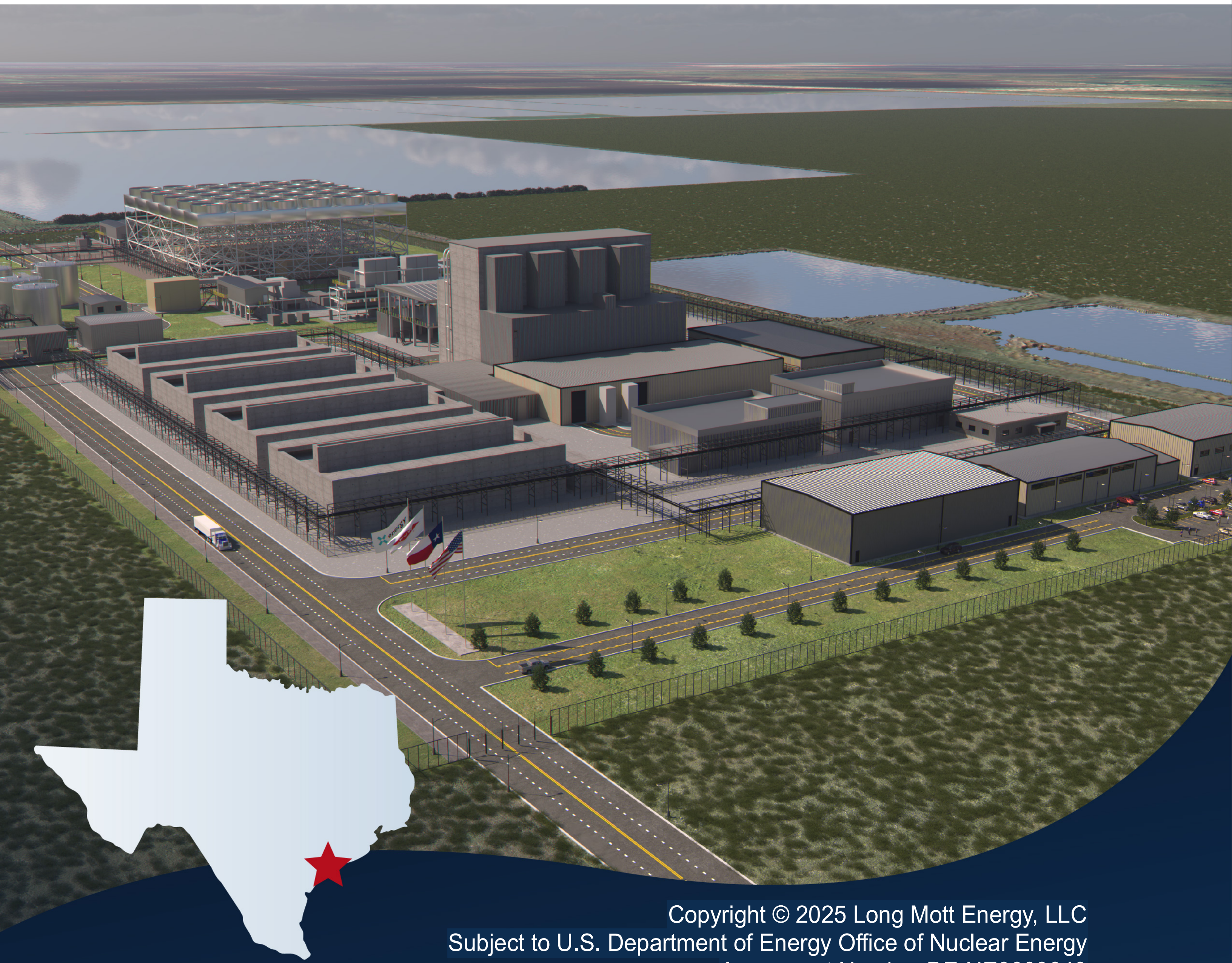
Long Mott Generating Station

Construction Permit Application
Part III
Environmental Report



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ABBREVIATIONS LIST

Abbreviation	Full Term
°C	degrees Celsius
°F	degrees Fahrenheit
AADT	Average Annual Daily Traffic
AC	alternating current
ac	acre(s)
ACC	air-cooled condenser(s)
ac-ft	acre -feet
ac-ft/yr	acre-feet per year
ACRES	Assessment, Cleanup and Redevelopment Exchange System
ACS	American Community Survey
AEA	Atomic Energy Act
AEP	American Electric Power
AGL	above ground level
ALARA	As Low As (is) Reasonably Achievable
ANR	advanced nuclear reactor
ANSI/TIA	American National Standards Institute/Telecommunications Industry Association
AOO	Anticipated Operational Occurrence
APE	Area of Potential Effect
ARDP	Advanced Reactor Demonstration Program
ASCE/SEI	American Society of Civil Engineers/Structural Engineering Institute
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc.
ASOS	automated surface (weather) observing station
AUB	ACC Utility Building
BACT	Best Available Control Technology
BDBE	Beyond Design Basis Event
BDT	blowdown tank

ABBREVIATIONS LIST

Abbreviation	Full Term
BEA	U.S. Department of Commerce Bureau Economic Analysis
bgs	below ground surface
BKG	background
BLS	U.S. Bureau of Labor Statistics
BMP	best management practice(s)
Btu	British thermal unit
CAA	Clean Air Act
CBC	Christmas Bird Count
CBG	Census Block Group
CCCS	closed-cycle cooling water systems
CCGCD	Calhoun County Groundwater Conservation District
CDC	U.S. Centers for Disease Control and Prevention
CDFS	Condensate and Feedwater System
CDS	Condenser System
CFR	Code of Federal Regulations
cfs	cubic feet per second
CGP	Construction General Permit
CI	Conventional Island
CICW	Conventional Island Cooling Water
cm	centimeter(s)
CMIP5	Coupled Model Intercomparison Project Phase 5
CMP	Coastal Management Program
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
COL	Combined License
COOP	cooperative weather observing station
CP	construction permit

ABBREVIATIONS LIST

Abbreviation	Full Term
CPA	Construction Permit Application
CPF	Canister Processing Facility
CWA	Clean Water Act
D&D	decontamination and dismantlement
D/Q	ground deposition factors
DAW	Dry Active Waste
dB	decibel(s)
dBA	A-weighted decibels
DBA	Design Basis Accidents
DBE	Design Basis Event
DBNPA	2,2-dibromo-3-nitrilopropionamide
DBT	dry bulb temperature
DFC	desired future condition
DMNT	Demineralized Water Treatment System
DO	dissolved oxygen
DOC	U.S. Department of Commerce
DOE	U.S. Department of Energy
Dow	Dow Chemical Corporation
EA	Environmental Assessment
EAB	Exclusion Area Boundary
ECHO	Enforcement and Compliance History Online
EFH	Essential Fish Habitat
EF-Scale	Enhanced Fujita Scale
EIS	Environmental Impact Statement
EJ	Environmental justice
EMF	electromagnetic field
ENSO	El Niño-Southern Oscillation
EPA	U.S. Environmental Protection Agency

ABBREVIATIONS LIST

Abbreviation	Full Term
ER	Environmental Report
ERCOT	Electric Reliability Council of Texas
ESA	Endangered Species Act
ESP	Early Site Permit
ESRP	Environmental Standard Review Plan
EWT	Extreme Weather in Texas
FEMA	Federal Emergency Management Agency
FHAB	Fuel Handling Auxiliary Building
FHS	Fuel Handling System
FIRM	Flood Insurance Rate Map
FM	Farm-to-Market
FPS	Fire Protection System
FRS	Facility Registry Service
F-Scale	Fujita Scale
FSV	Fort Saint Vrain
ft	foot/feet
ft/ft	feet per foot
ft/sec	feet per second
ft/yr	feet per year
ft^2	square feet
FTE	full-time equivalent
GAI	Geographic Area of Interest
GAM	Groundwater Availability Model
GBRA	Guadalupe-Blanco River Authority
GCD	groundwater conservation district
GCRPC	Golden Cresent Regional Planning Commission
GEIS	Generic Environmental Impact Statement
GHG	greenhouse gas

ABBREVIATIONS LIST

Abbreviation	Full Term
GIWW	Gulf Intracoastal Waterway
GMA	Groundwater Management Area
gpd	gallons per day
gpm	gallons per minute
GSA	Guadalupe-San Antonio River Basin
GWd	gigawatt days
GWd/MTU	gigawatt-days per metric ton of uranium
GWR	Groundwater Rule
ha	hectare(s)
HALEU	High-Assay Low-Enriched Uranium
HC	Helium Circulator
HCM	Highway Capacity Manual
HCS	Highway Capacity Software
HEFR	Hydrology-based Environmental Flow Regime
HLW	high-level radioactive waste
HPB	Helium Pressure Boundary
HPS	Helium Purification System
hr	hour(s)
HRS	Helium Recovery System
HSCW	Helium Services Cooling Water
HSF	Helium Service Facility
HSS	Helium Service System
HTGR	High-temperature gas-cooled reactor
HVAC	heating, ventilation, and air conditioning
Hz	hertz
IGCC	Integrated gasification combined cycle
i_h	horizontal hydraulic gradient
in	inch(es)

ABBREVIATIONS LIST

Abbreviation	Full Term
in. Hg	inches of Mercury
IPaC	Information for Planning and Conservation
IR	TCEQ Integrated Report
ISD	Independent School District
ISG-026	Combined License and Early Site Permit, Environmental Issues Associated with New Reactors Interim Staff Guidance #026
IUAT	inter-unit access tunnel
i_v	vertical hydraulic gradient
JFD	joint frequency distribution
KCS	Kansas City Southern
kg	kilogram(s)
kg/m^2	kilogram(s) per square meter
km	kilometer(s)
km/hr	kilometers per hour
km^2	square kilometer(s)
kp/h	kilo pounds per hour
kPa	kilopascal
KPKV	Calhoun County-Port Lavaca Airport
KPSX	Palacios-R.B. Trull Municipal Airport
KPSX	Palacios-R. B. Trull Municipal Airport
KRKP	Aransas County Airport Rockport
kts	knots
kV	kilovolt(s)
kV/m	kilovolt per meter
KVCT	Victoria Regional Airport
kW	kilowatt
L/min	liters per minute
LBE	licensing basis event

ABBREVIATIONS LIST

Abbreviation	Full Term
LCD	local climatological data
LD-DBA	Large HPB Depressurization DBA
L_{dn}	day-night average community noise level
L_{eq}	equivalent sound level
LiDAR	light deteection and ranging mapping
LLW	low-level radioactive waste
LME	Long Mott Energy, LLC
LMGS	Long Mott Generating Station
LOS	level of service
LPGS	Liquid Pathway Generic Study
LPZ	Low Population Zone
LRWH	Liquid Radwaste Handling Subsystem
LRWPA	Lavaca Regional Water Planning Area
LULUCF	Land Use, Land Use Change, and Forestry
LWR	light water reactor
m	meter(s)
m/s	meter(s) per second
m^2	square meter(s)
m^3	cubic meter(s)
m^3/day	cubic meter(s) per day
m^3/hr	cubic meter(s) per hour
m^3/min	cubic meter(s) per minute
m^3/s	cubic meter(s) per second
m^3/yr	cubic meters(s) per year
MACCS	MELCOR Accident Consequence Code System
MAG	modeled availale groundwater
mb	millibar

ABBREVIATIONS LIST

Abbreviation	Full Term
MBtu/hr	million British thermal units per hour
MCL	Maximum Concentration Levels
MDCT	mechanical draft cooling tower
MEI	Maximally Exposed Individual
mg/L	milligram per liter
MGD	million gallons per day
MHHW	mean higher-high water
mi	mile(s)
mi^2	square mile(s)
mL	milliliter(s)
MLLW	mean lower-low water
mm	millimeter
MMBtu	million British thermal units
MMT	million metric tons
mph	mile(s) per hour
Mrad	millirad
mrem	millirem
MRLC	Multi-Resolution Land Characteristics
MSGP	Multi Sector General Permit
mSv	milliSievert(s)
MT	metric ton(s)
MTU	metric ton uranium
MW	megawatt(s)
MWd	megawatt day(s)
MWe	megawatt(s) electric
MWt	megawatt(s) thermal
NAAQS	National Ambient Air Quality Standard
NaClO	Sodium Hypochlorite

ABBREVIATIONS LIST

Abbreviation	Full Term
$NaHSO_3$	Sodium Bisulfite
NAICS	North American Industry Classification System
NaOH	Caustic Soda
NAS	National Academy of Sciences
NAVD 88	North American Vertical Datum of 1988
NCA	National Climate Assessment
NCEI	National Centers for Environmental Information
NCZMP	National Coastal Zone Management Program
NEI	Nuclear Energy Institute
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Corp.
NESC	National Electrical Safety Code
NHPA	National Historic Preservation Act
NI	Nuclear Island
NI/CI	Nuclear Island/Conventional Island
NIAS	Nuclear Island Auxiliary Structure
NICW	Nuclear Island Cooling Water System
NILR	Nuclear Island Liquid Radwaste Drainage System
NIPW	Nuclear Island Process Water System
NLCD	National Land Cover Database
NLF	SDO North Landfill
NLFEC	SDO North Landfill Expansion Cell
NM	Noise Monitoring (location)
NM-#	noise monitoring location
NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NO_x	nitrogen oxides

ABBREVIATIONS LIST

Abbreviation	Full Term
NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NTU	Nessler Turbidity Units
NUREG	U.S. Nuclear Regulatory Commission (technical report designation)
NWI	National Wetland Inventory
NWS	National Weather Service
O_3	ozone
ODCM	Offsite Dose Calculation Manual
OHWM	ordinary high water mark
OL	operating license
OLA	operating license application
ORP	oxidation reduction potential
OSHA	Occupational Safety and Health Administration
OTCS	once through cooling system
PAB	Protected Area Boundary
Pb	lead
PBR	Permit By Rule
PBU1	Peach Bottom Unit 1
pCi/L	picacuries per liter
PCL	protective concentration limits
PDO	Pacific Decadal Oscillation
PEM	palustrine emergent
PGMA	Priority Groundwater Management Areas
PILT	payment in lieu of taxes
PM	particulate matter

ABBREVIATIONS LIST

Abbreviation	Full Term
PM_{10}	particulate matter with aerodynamic diameter less than or equal to 10 microns
$PM_{2.5}$	particulate matter with aerodynamic diameter less than or equal to 2.5 microns
PMIS	Pavement Management Information System
POC	point-of-compliance
PPE	plant parameter envelope
ppm	parts per million
PRA	probabilistic risk assessment
PSAR	Preliminary Safety Analysis Report
PSD	Prevention of Significant Deterioration
PSDAR	post-shutdown decommissioning activities report
PSS	palustrine scrub-shrub
psu	practical salinity unit(s)
PUCT	Public Utility Commission of Texas
QA	quality assurance
QAPD	Quality Assurance Program Description
QC	quality control
RAWT	Raw Water Treatment
RB	Reactor Building
RBCW	Reactor Building Cooling Water System
RCCS	Reactor Cavity Cooling System
RCRA	Resource Conservation and Recovery Act
RCSS	Reactivity Control and Shutdown System
rem	roentgen equivalent man
REMP	Radiological Environmental Monitoring Program
RFFA	Reasonably Foreseeable Future Actions
RG	NRC Regulatory Guide
RIMS II	Regional Input-Output Modeling Systems

ABBREVIATIONS LIST

Abbreviation	Full Term
RO	Reverse Osmosis
ROI	Region of Influence
ROST	Remotely Operated Special Tooling
ROW	right-of-way
RPCT	Rare Plant Communities of Texas
RRC	Railroad Commission of Texas
RV	Recreational Vehicle
RWB	Radwaste Building
RWM	Radioactive Waste Management System
RWT	Radwaste Treatment
s	second(s)
SAMA	severe accident mitigation alternative(s)
SAMDA	severe accident mitigation design alternative(s)
scf	standard cubic foot
SCTRWPG	South Central Texas Regional Water Planning Group
SDO	Seadrift Operations
SDPVS	School District Property Value Study
SDRT2	Seadrift, Texas meteorological station
SEMS	Superfund Enterprise Management System
SER	Service Water System
SFC	spent fuel canister
SFISF	Spent Fuel Intermediate Storage Facility
SFSS	spent fuel storage system
SG	Steam Generator
SGP	Southern Great Plains
SGS	Steam Generator System
SH	State Highway
SNF	spent nuclear fuel

ABBREVIATIONS LIST

Abbreviation	Full Term
SO_2	sulfur dioxide
SOW	Scope of Work
SO_X	sulfur oxides
SPCC	Spill Prevention, Control, and Countermeasure
sq. km	square kilometer(s)
sq. mi.	square mile(s)
SQG	small quantity generator
SRWH	Solid Radwaste Handling Subsystem
SSC	structures, systems, and components
SSS	Startup and Shutdown System
STP	South Texas Project Electric Generating Station
SUPP	Site Utilization Plot Plan
Sv	Sievert(s)
SWPPP	Stormwater Pollution Prevention Plan
SWU	separative work unit
TAC	Texas Administrative Code
TCDS	Traffic Count Database System
TCEQ	Texas Commission on Environmental Quality
TD-3505	a meteorological data archiving format
TDEM	Texas Division of Emergency Management
TDS	total dissolved solids
THC	Texas Historical Commission
THFN	Texas Highway Freight Network
TLD	Thermoluminescent Dosimeter
TMDL	total maximum daily load
TN	Tennessee
TPDES	Texas Pollutant Discharge Elimination System
TPWD	Texas Parks and Wildlife Department

ABBREVIATIONS LIST

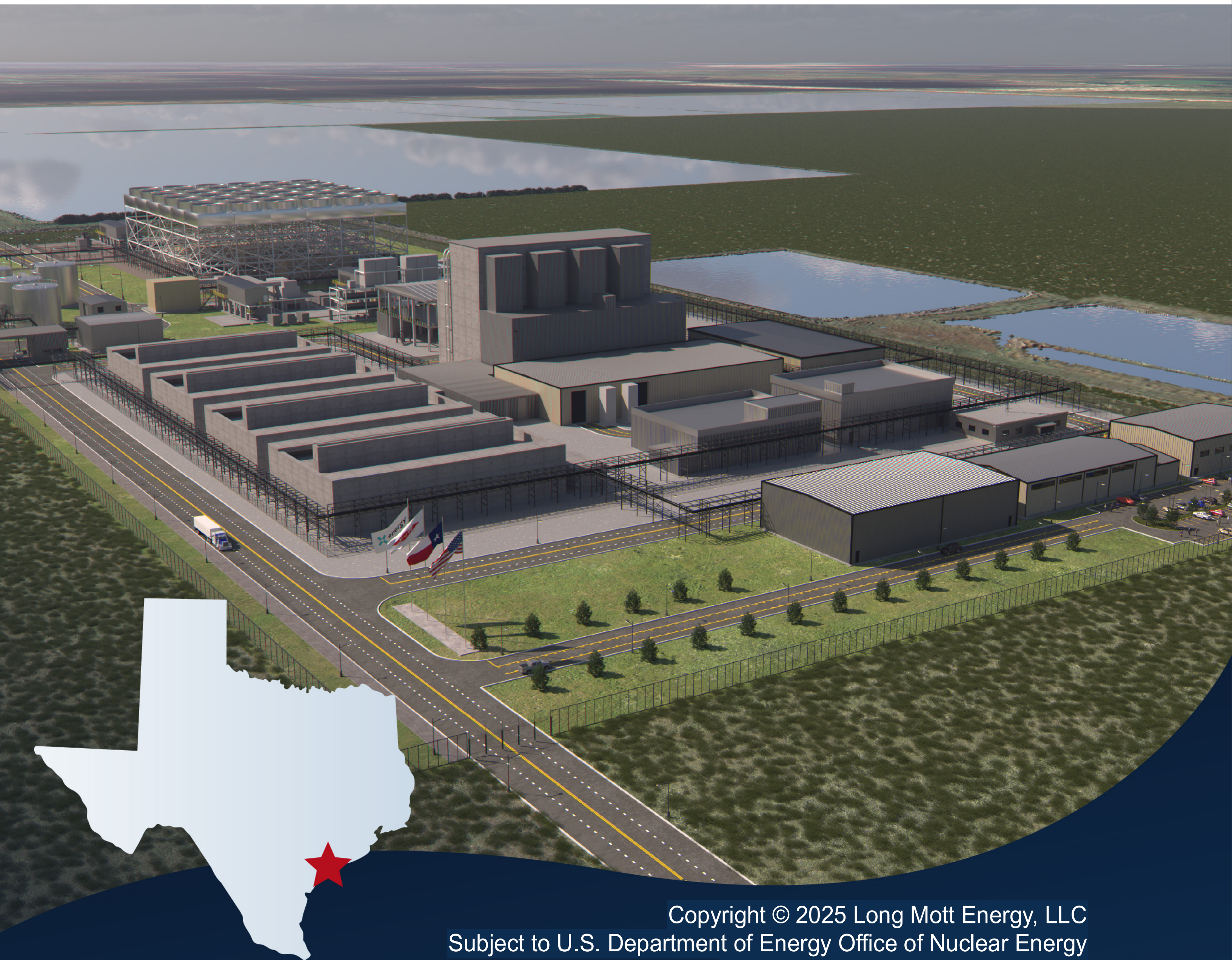
Abbreviation	Full Term
TRIS	Toxics Release Inventory System
TRISO	TRi-structural ISOtropic
TRU	transuranic
TT-DBA	Turbine Trip DBA
TWC	Texas Water Code
TWDB	Texas Water Development Board
TX	Texas
TxDOT	Texas Department of Transportation
U.S.	United States
U-235	uranium-235
U_3O_8	triuranium octaoxide
UCC	Union Carbide Corporation
UCO	uranium oxy-carbide
UF_6	uranium hexaflouride
UFC	Uranium Fuel Cycle
UO_2	uranium dioxide
UP	Union Pacific
USACE	U.S. Army Corps of Engineers
US-APWR	U.S. Advanced Pressurized Water Reactor
USC	United States Code
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
V/m	volts per meter
VP-55	Versa-Pac 55
WaaS	Water as a Service
WAM	Water Availability Model
WBT	wet bulb temperature

ABBREVIATIONS LIST

Abbreviation	Full Term
WCS	Waste Control Specialists
WMA	Wildlife Management Area
WOTUS	Waters of the United States
WQC	Water Quality Certification
WSP	WSP USA, Inc.
WTS	water treatment system
yd^3	cubic yard
yr	year(s)
ΔT	vertical temperature difference
μm	micrometer(s)
μS/cm	microSiemens per centimeter
μT	microtesla
X/Q	atmospheric dispersion factor

Long Mott Generating Station

Environmental Report
Chapter 1 - Introduction



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Chapter 1 - Introduction

In accordance with the provisions of Title 10 of the United States (U.S.) Code of Federal Regulations Part 50 (10 CFR 50) Domestic Licensing of Production and Utilization Facilities, Long Mott Energy, LLC (LME) is providing this Environmental Report (ER) in support of a U.S. Nuclear Regulatory Commission (NRC) Construction Permit (CP) for a nuclear power station as part of the Long Mott Generating Station (LMGS). Per 10 CFR 51.45, this document is intended to provide all information necessary to support the development of an Environmental Impact Statement (EIS) or an Environmental Assessment (EA) by the NRC. The NRC utilizes this data to systematically analyze the environmental effects of construction, operation, and decommissioning of the proposed nuclear power station, fulfilling the requirements of the National Environmental Policy Act (NEPA).

The LMGS site is adjacent to an industrial facility, known as Seadrift Operations (SDO), which is owned and operated by the Union Carbide Corporation, a subsidiary of The Dow Chemical Company, located in Seadrift, Texas. The operation of SDO requires a combination of electrical power and high-temperature steam with high reliability and capacity factors. SDO currently relies on an adjacent natural-gas fired cogeneration plant with gas turbines and heat recovery steam generators for that purpose. However, the existing cogeneration plant is reaching the end of its operating life.

1.1 Proposed Action

The proposed federal action is the issuance of a CP to LME authorizing construction of four Xe-100 reactor modules.

1.1.1 Purpose and Need

The purpose of and need for the proposed action is to demonstrate the Xe-100 advanced reactor in support of the U.S. Department of Energy's (DOE) Advanced Reactor Demonstration Program (ARDP) and to replace the existing natural gas-fired cogeneration plant at the SDO site with a non-carbon emitting generating plant (consistent with Dow's corporate decarbonization goals) that meets Texas regulatory requirements and is capable of producing approximately 320 megawatt electric (MWe) of power or 800 megawatt thermal (MWt) of steam with high reliability and a high-capacity factor with intra-hour flexibility.

Tables

None

Figures

None

1.2 Proposed Project

This section provides a brief description of the proposed project, the site location, and identifies the applicant and owners.

1.2.1 The Applicant and Owners

Long Mott Energy, LLC, is the applicant and owner.

1.2.2 Site Location

LMGS is located immediately north-northeast of the existing SDO site location situated in Calhoun County, Texas. This site is approximately 8 mi (13 km) north-northwest of Seadrift, Texas, approximately 23 mi (37 km) southeast of Victoria, Texas, and approximately 11 mi (17 km) west-southwest of Port Lavaca, Texas.

1.2.3 Reactor Information

LMGS consists of four Xe-100 high temperature gas cooled reactor modules, two turbine-generator sets, air cooled condensers (ACCs), and auxiliaries to support SDO. Each Xe-100 reactor module is capable of generating 80 MWe of electrical power or approximately 200 MWt of steam. Steam and electricity from the project support the entirety of SDO’s energy needs.

Additional information is provided in Section 3.2, Reactor Power Conversion System.

1.2.4 Cooling System Information

The main heat transfer systems for the Xe-100 reactor modules are the ACCs, Startup and Shutdown System (SSS), and the Reactor Cavity Cooling System (RCCS).

The X-energy design uses helium gas to transfer heat from the reactor module to the steam generator. The steam created in the steam generator rotates the turbine to produce electricity. The exhaust steam is then cooled by the ACCs, which condenses the steam into condensate water. This water is recycled to the steam generator to continue producing steam. This dry cooling process provides a substantial reduction in water usage when compared to a wet cooling option.

The SSS provides heat removal for the plant during startup and shutdown when the ACCs are not available.

The RCCS structures, systems, and components (SSCs) in the reactor building provide the safety-related passive means for heat removal for the Reactor Pressure Vessel and reactor building walls during a Design Basis Event / Design Basis Accident. The RCCS removes sufficient heat to ensure safe shutdown of the reactor modules.

During normal operation, the RCCS is designed to circulate water to remove up to 1 MWt of heat per reactor module.

Water is used by the plant to support system makeup for water losses in both the demineralized water system and service water system. Water is also used by the plant for makeup to the Condensate and Feedwater System to support process steam losses to the SDO facility. The water necessary to run the facility is withdrawn from Basin #5, an existing SDO basin. Basin #5 provides makeup for LMGS. Makeup to Basin #5 is taken from an intake structure in the Guadalupe-Blanco River Authority Calhoun Canal. Non-radioactive liquid effluent is discharged to the SDO liquid waste system, which is eventually discharged to the Victoria Barge Canal through an existing permitted outfall.

Additional information is provided in Section 3.4, Cooling System.

1.2.5 Transmission System Information

New transmission lines approximately 1 mi (1.6 km) in length are required from LMGS switchyard to the SDO substation.

Additional information is provided in Section 3.7, Power Transmission Systems.

Tables

None

Figures

None

1.3 Planned Activities and Schedules

1.3.1 Construction and Operations Schedule

A construction and operations schedule is required to support the environmental impacts calculations and evaluations. Table 1.3-1 presents the schedule for preconstruction and construction activities (collectively referred to as building activities) and operations. The schedule will be revised in the Revised ER for the Operating License Application to reflect the latest project management basis at that time.

Tables

Table 1.3-1: Building and Operation Schedule

Activity	End Date
Subsurface Investigations Complete	November 2024
Construction Permit Application Submittal	First Quarter 2025
DOE NEPA Review for Preconstruction Complete	June 2026
Detailed Design Complete	January 2030
Construction Permit Issued	Third Quarter 2027
Operating License Application Submitted	Fourth Quarter 2027
Preconstruction Start	January 2028
Construction Start	October 2028
Operating License Issued	May 2030
Reactor Modules 1–4 Staggered Commencement of Commercial Operation	April–December 2033
Abbreviations: DOE = U.S. Department of Energy; NEPA = National Environmental Policy Act	

Figures

None

1.4 Status of Reviews, Approvals, and Consultations

A comprehensive list of all regulatory authorizations required for the project is presented in Table 1.4-1. Each authorization provided addresses the following:

- Jurisdictional agency
- Statute, law, or regulation that dictates the requirement
- Authorization type
- Current status
- Authorization approval identification, as applicable
- Date of issuance / expiration of authorization, as applicable
- Activity that is approved upon issuance of the authorization

Correspondence with jurisdictional agencies is attached hereto in Appendix 1A.

Table 1.4-1: Regulatory Approval and Authorizations (Sheet 1 of 13)

Agency	Statute / Law	Authorization Type	Authorization Status	Approval ID #	Issue / Exp. Date	Authorized Activity
Approvals and Authorizations Required for Preconstruction and Construction[(a)]						
Calhoun County Floodplain Administration	Flood Plain Management Plan C Zone Requirements	Land Disturbing Activity and Construction Permit	Notification letter issued December 20, 2023	-	-	Land disturbing activities within the boundaries of Calhoun County including new construction and renovation of buildings
Calhoun County Groundwater Conservation District (CCGCD)	Rules of the CCGCD, Sections 3 and 4	Groundwater Well Permit	Notification letter issued December 20, 2023	-	-	New groundwater well installation and operation
	Rules of the CCGCD, Section 2	Permit for capping and plugging of groundwater wells	Notification letter issued to CCGCD December 20, 2023	-	-	Capping and plugging of monitoring wells at completion of subsurface investigation
Coastal Coordination Advisory Committee (CCAC) of the Texas General Land Office (GLO)	Coastal Zone Management Act Texas Coastal Management Plan 15 CFR Part 930 Subpart D Title 31 of the Texas Administrative Code Part I Chapters 26, 27, 28, and 30	Consistency determination	Notification letter issued December 20, 2023 Certification Package submitted March 2025 Determination pending	-	-	Certifies LMGS is consistent with the enforceable policies in the CMP (31 TAC 26)
National Oceanic and Atmospheric Administration (NOAA) Fisheries	Endangered Species Act of 1973 Title 50 Code of Federal Regulations (CFR) Part 18 Magnuson-Stevens Fishery Conservation and Management Act	Consultation regarding potential to adversely impact protected marine and anadromous species	Notification letter issued December 20, 2023	-	-	Concurrence with no adverse impact or consultation on appropriate mitigation measures

Table 1.4-1: Regulatory Approval and Authorizations (Continued) (Sheet 2 of 13)

Agency	Statute / Law	Authorization Type	Authorization Status	Approval ID #	Issue / Exp. Date	Authorized Activity
Texas Commission on Environmental Quality (TCEQ)	Clean Air Act General Air Quality Rules 30 TAC Part 1, Chapters 101, 111, and 116	Air quality construction permit	Notification letter issued December 20, 2023	-	-	Construction air emissions sources: diesel combustion generator, diesel generators, vents, and other air sources regulated by TCEQ
	Clean Air Act General Air Quality Rules 30 TAC Part 1, Chapters 101, 111, and 116	Air quality construction permit	Notification letter issued December 20, 2023	-	-	Construction air emission sources: Concrete batch plant, sand blast facility and surfacing coating facility
	30 TAC Part 1, Chapter 335	Notice of Registration for onsite or offsite disposal of industrial solid wastes	Notification letter issued December 20, 2023	-	-	Onsite and/or offsite disposal of Class III industrial solid waste consisting of earth and earth-like products, concrete, rock, bricks, and land clearing debris (as required)

Table 1.4-1: Regulatory Approval and Authorizations (Continued)
(Sheet 3 of 13)

Agency	Statute / Law	Authorization Type	Authorization Status	Approval ID #	Issue / Exp. Date	Authorized Activity
Texas Commission on Environmental Quality (TCEQ)	30 TAC Part 1, Chapter 350	Texas Risk Reduction Program	Notification letter issued December 20, 2023	-	-	Relocation of hazardous waste accumulation area and closure of Class III onsite landfill if necessary
	30 TAC Part 1 Chapter 290	Approval of modification of public water system	Notification letter issued December 20, 2023	-	-	Modify treatment, storage, distribution of potable water system as needed for expansion. Approval of plans and specifications or TCEQ determination that approval is not required must occur before construction commences on any new or expanded component of water system, including water well, storage, treatment or distribution lines
	30 TAC Part 1 Chapter 299	Dam Safety Program	Not yet submitted	-	-	Reconstruction, modification, enlargement, rehabilitation, alteration, or repair of an existing dam. All engineering plans and specifications, inspections, reports, and records must be prepared by, or under the direct supervision of, a professional engineer licensed in the State of Texas.

Table 1.4-1: Regulatory Approval and Authorizations (Continued) (Sheet 4 of 13)

Agency	Statute / Law	Authorization Type	Authorization Status	Approval ID #	Issue / Exp. Date	Authorized Activity
Texas Commission on Environmental Quality (TCEQ)	30 TAC Part 1 Chapters 295, 297	Water Rights	Notification letter issued December 20, 2023	-	-	Access and use of surface waters
	Clean Water Act 30 TAC Part 1, Chapter 321 Texas Water Code (TWC) Chapter 26	Notice of Registration	Notification letter issued December 20, 2023	-	-	Relocation or alteration of existing cooling ponds
	Clean Water Act Title 33 of the United States Code (USC) Section 1251 et seq. 30 TAC Part 1 Chapters 307 and 309	Section 401 certification	Notification letter issued December 20, 2023	-	-	Certify that issuance of the NRC license will not result in a violation of state water quality standards. Additional TCEQ requirements will be incorporated into individual Section 404 permit

Table 1.4-1: Regulatory Approval and Authorizations (Continued) (Sheet 5 of 13)

Agency	Statute / Law	Authorization Type	Authorization Status	Approval ID #	Issue / Exp. Date	Authorized Activity
Texas Commission on Environmental Quality (TCEQ)	Clean Water Act, Section 402 33 USC Section 1342 TWC Chapter 26	Texas Pollutant Discharge Elimination System (TPDES) general permit	Notification letter issued December 20, 2023	-	-	Discharge of uncontaminated groundwater encountered during construction will be included in TPDES General Permit for construction activities
	Clean Water Act TWC Chapter 26 30 TAC Part 1 Chapters 205, 279, 307, 309	Establishment/renewal/ amendment of existing TPDES	Notification letter issued December 20, 2023	-	-	Regulates limits of pollutants in liquid discharge to surface water
	Clean Water Act TWC Chapter 26	General permit for stormwater discharges associated with construction activity	Notification letter issued December 20, 2023	-	-	Discharge stormwater from site during construction
	30 TAC Part 1 Chapter 290	Revision or new permit to operate a public water system – Notice of Termination	Notification letter issued December 20, 2023	-	-	Operate a public noncommunity water system (if required for Site Redress)
	Oil Pollution Act 33 USC Section 2701 40 CFR Part 112	Spill Prevention, Control, and Countermeasure Plan Approval	Notification letter issued December 20, 2023	-	-	Allows operation of facility with aboveground storage tanks at total aggregate capacity of oil/ fuel >1320 gallons or with underground storage tanks at >42,000 gallons
Texas Department of Licensing and Regulations	16 TAC Part 4 Chapter 76	Permit for capping and plugging of groundwater wells	Well-plugging form to be submitted within 30 days after well plugged	-	-	Capping and plugging of monitoring wells at completion of subsurface investigation

Table 1.4-1: Regulatory Approval and Authorizations (Continued) (Sheet 6 of 13)

Agency	Statute / Law	Authorization Type	Authorization Status	Approval ID #	Issue / Exp. Date	Authorized Activity
Texas Department of Transportation (TxDOT)	43 TAC Part 10, Chapter 218	Common carrier permit Oversize/Overweight (OS/OW) permit	Notification letter issued December 20, 2023	-	-	Transportation of Materials within Texas Overweight Limits
Texas Historical Commission	National Historic Preservation Act Section 106 16 USC Section 470f 36 CFR Part 800 13 TAC 2	Consultation regarding potential to adversely affect historic resources	Notification letter issued December 20, 2023. Response received February 16, 2024, (Appendix 1A, Part VI Supplemental Information)	-	-	Confirm site construction or operation would not affect protected historic resources
Texas Parks and Wildlife Department (TPWD)	31 TAC Part 2, Chapter 69 31 TAC Part 2, Chapter 65	Consultation regarding potential to adversely impact state listed protected species	Notification letter issued December 20, 2023. Response received February 16, 2024, (Appendix 1A)	-	-	Adverse impacts on state listed protected species and/or their habitat
U.S. Army Corps of Engineers (USACE)	Rivers and Harbors Act 33 USC Section 401 33 CFR Part 322	Section 10 Permit	Notification letter issued December 20, 2023	-	-	Any required maintenance dredging
U.S. Department of Agriculture (USDA)	Farmland Protection Policy Act 7 USC Section 4201 7 CFR Part 658	AD-1006 submittal for Natural Resources Conservation Service (NRCS) Prime Farmland Impact determination	AD-1006 submitted August 15, 2024 Response received August 20, 2024, (Appendix 1A)	-	-	NRCS farmland conversion impact rating NRCS does not approve project The funding agency uses the impact rating to approve project

Table 1.4-1: Regulatory Approval and Authorizations (Continued) (Sheet 7 of 13)

Agency	Statute / Law	Authorization Type	Authorization Status	Approval ID #	Issue / Exp. Date	Authorized Activity
U.S. Department of Energy (DOE)	10 CFR Part 1021	National Environmental Policy Act (NEPA) Determination	Categorical Exclusion issued September 5, 2023 to conduct ground disturbing site characterization and environmental monitoring activities	-	-	Environmental effects of preconstruction
	Nuclear Waste Policy Act 42 USC Section 108 10 CFR Part 961	Spent fuel contract or good faith negotiations	Good faith letter issued by DOE November 6, 2024 (Appendix 1A)	-	-	DOE's Standard Contract for disposal of spent nuclear fuel contained in 10 CFR Part 961
U.S. Department of Transportation (USDOT)	Hazardous Material Transportation Act 49 USC 5101	Certificate of Registration	Application not yet submitted	-	-	Transportation of Hazardous Materials Requirements
U.S. Federal Aviation Administration (FAA)	Safe, Efficient Use, and Preservation of the Navigable Airspace 14 CFR Part 77.13	Notification of Proposed Construction or Alteration	Not yet completed	-	-	Clearance for structures at or greater than 200 feet in height
U.S. Fish & Wildlife Service (USFWS)	Migratory Bird Treaty Act 50 CFR Part 21	Compliance	Notification letter issued December 20, 2023	-	-	Agency consultation is needed for concurrence with no adverse impact or proposed mitigation measures on protected species and/or their nests
	Endangered Species Act of 1973 50 CFR Part 17	Consultation regarding potential to adversely impact protected (non-marine) species	Notification letter issued December 20, 2023	-	-	Concurrence with no adverse impact or consultation on appropriate mitigation measures

Table 1.4-1: Regulatory Approval and Authorizations (Continued) (Sheet 8 of 13)

Agency	Statute / Law	Authorization Type	Authorization Status	Approval ID #	Issue / Exp. Date	Authorized Activity
U.S. Nuclear Regulatory Commission (NRC)	Atomic Energy Act 42 USC Section 2201, et seq. 10 CFR Part 50	Construction Permit	Addressed in this Construction Permit Application	-	-	Safety-related and important to safety construction for a nuclear power facility
	10 CFR Part 51	NEPA Determination	Addressed in this ER	-	-	Environmental effects of construction and operation
USACE NOAA	Section 404 of Clean Water Act 33 CFR Part 323 Coastal Zone Management Act	Section 404 Permit	Notification letter issued December 20, 2023	-	-	Disturbance or crossing wetland areas or navigable waters
Approvals and Authorizations Required for Plant Operation[(b)]						
State of Tennessee Department of Environment and Conservation Division of Radiological Health	Tennessee Department of Environment and Conservation Rule 1200-2-10.32	Revision of existing Tennessee Radioactive Waste License-for-Delivery	Application not yet submitted	-	-	Transportation of radioactive waste into the state of Tennessee (if required; applicable to MLLW)
State of Utah Department of Environmental Quality Division of Radiation Control	R313-26 of the Utah Radiation Control Rules	Revision of existing General Site Access Permit	Application not yet submitted	-	-	Transportation of radioactive materials into the State of Utah (if required)

Table 1.4-1: Regulatory Approval and Authorizations (Continued)
(Sheet 9 of 13)

Agency	Statute / Law	Authorization Type	Authorization Status	Approval ID #	Issue / Exp. Date	Authorized Activity
Texas Commission on Environmental Quality (TCEQ)	Air New Source Review Permit	Operation of air emission sources	Notification letter issued December 20, 2023	-	-	Facility emissions are expected to be more than *de minimis* but processes are expected to be covered under 30 TAC Part 1 Chapter 106.
	30 TAC Part 1 Chapter 335	Industrial/Hazardous Waste Registration	Notification letter issued December 20, 2023; TCEQ-00002, not yet submitted	-	-	Industrial/Hazardous waste generation, storage, and disposal activities

Table 1.4-1: Regulatory Approval and Authorizations (Continued) (Sheet 10 of 13)

Agency	Statute / Law	Authorization Type	Authorization Status	Approval ID #	Issue / Exp. Date	Authorized Activity
Texas Commission on Environmental Quality (TCEQ)	30 TAC Part 1 Chapter 328	Waste Minimization and Recycling	Notification letter issued December 20, 2023	-	-	Program for waste reduction
	Clean Water Act 33 USC Section 1251 et seq. 30 TAC Part 1 Chapters 307 and 309	Section 401 certification	Notification letter issued December 20, 2023	-	-	Certify that issuance of the NRC license will not result in a violation of state water quality standards
	Clean Water Act 30 TAC Part 1 Chapters 307, 309, 317	Amendment to existing TPDES permit	Notification letter issued December 20, 2023	-	-	Regulates limits of pollutants in liquid discharge to surface water
	30 TAC Part 1 Chapter 327	Spill Prevention and Control	Notification letter issued December 20, 2023	-	-	Procedures for reporting spills of hazardous materials on site
	Clean Water Act 30 TAC Part 1 Chapters 307, 309, 317	Multi-sector stormwater permit – Revision of Storm Water Pollution Prevention Plan	Notification letter issued December 20, 2023	-	-	Areas meeting the definition of industrial activity to be added to the current program (if required)

Table 1.4-1: Regulatory Approval and Authorizations (Continued) (Sheet 11 of 13)

Agency	Statute / Law	Authorization Type	Authorization Status	Approval ID #	Issue / Exp. Date	Authorized Activity
Texas Department of State Health Services Radiation Safety Licensing Branch (RSLB)	Texas Health and Safety Code 401.052 "Rules for Transportation and Routing" 25 TAC Part 289 Chapter 257 "Packaging and Transportation of Radioactive Material"	Approved emergency plan, quality assurance program for packaging, and business information form with cover letter.	Not yet prepared	-	-	Transportation of radioactive materials. A shipper and transporter must submit their emergency plan, quality assurance program for packaging, and business information form with a cover letter signed by a person authorized to sign on the shipper's behalf
Texas Low Level Radioactive Waste Disposal Compact Commission (TLLRWDCC)	31 TAC Part 21 Chapter 675 Subchapter B	Export Permit	Application not yet submitted	-	-	Allows low level waste (LLW) or mixed low level waste (MLLW) shipment to a non-TLLRWDCC facility if treatment, storage, or disposal at Waste Control Specialists is unavailable
	31 TAC Part 22	Report regarding export and return of LLW	Not yet prepared	-	-	Required when LLW or MLLW is transported outside Texas for treatment, then returned for disposal within Texas
U.S. Department of Energy (DOE)	Nuclear Waste Policy Act 42 USC Section 108 10 CFR Part 961	Spent fuel contract	Active good faith negotiations (Appendix 1A)	-	-	DOE's Standard Contract for disposal of spent nuclear fuel contained in 10 CFR Part 961
U.S. Environmental Protection Agency (EPA)	Resource Conservation and Recovery Act, Section 3010 Notification of Regulated Waste Activity 40 CFR Part 261	Hazardous Waste Generator ID#	Application not yet submitted	-	-	Formal Notification of Intent to Generate & Manage Hazardous, Dangerous, Radioactive, Inert Wastes

Table 1.4-1: Regulatory Approval and Authorizations (Continued) (Sheet 12 of 13)

Agency	Statute / Law	Authorization Type	Authorization Status	Approval ID #	Issue / Exp. Date	Authorized Activity
U.S. Environmental Protection Agency (EPA)	Emergency Planning and Community Right-to-Know Act 42 USC Section 116 40 CFR Part 355	Hazardous Waste Inventory and Contingency Plan	Not yet prepared	-	-	Preparation of an inventory of hazardous wastes on-site and contingency
	Toxic Release Inventory Program 40 CFR Part 372 Pollution Prevention Act of 1990 42 USC Section 133	Toxic Chemical Inventory and Community Right-to-Know Plan	Not yet prepared	-	-	Preparation of an inventory of toxic chemicals on-site that exceed threshold limits
	40 CFR Part 370	Hazardous Chemical Inventory and Community Right-to-Know Plan	Not yet prepared	-	-	Preparation of an inventory of hazardous chemicals on-site
U.S. Nuclear Regulatory Commission (NRC)	Atomic Energy Act 42 USC Section 2201, et seq. 10 CFR Part 51	Supplemental Environmental Impact Statement or Environmental Assessment for Operating License	Not yet prepared	-	-	Revised environmental report to meet NEPA requirements to obtain Operating License
	10 CFR Part 50	Operating License	Not yet prepared	-	-	Application for the Operating License
	10 CFR Part 30	Byproduct License	Application not yet submitted	-	-	Approval to possess byproduct material
	10 CFR Part 40	Source Material License	Application not yet submitted	-	-	Approval to possess source material

Table 1.4-1: Regulatory Approval and Authorizations (Continued)
(Sheet 13 of 13)

Agency	Statute / Law	Authorization Type	Authorization Status	Approval ID #	Issue / Exp. Date	Authorized Activity
U.S. Nuclear Regulatory Commission (NRC)	10 CFR Part 70	Special Nuclear Materials License	Application not yet submitted	-	-	Approval to possess special nuclear material
	10 CFR Part 71	Packaging and Transportation of Radioactive Material	Not yet prepared	-	-	Packaging, preparation for shipment, and transportation of licensed material
Waste Control Specialists (WCS)	Application for License to Authorize Near Surface Land Disposal of Low-Level Radioactive Waste, Appendix 5.2-1, Waste Acceptance Plan	Generator Certification (annual recertification)	Application not yet submitted	-	-	Submit a generator certification packet as described in WCS Waste Acceptance Plan, including waste profiles
Other Agencies Consulted						
Railroad Commission of Texas	-	None identified	Notification letter issued December 20, 2023	-	-	-
Texas Public Utilities Commission	-	None identified	Notification letter issued December 20, 2023	-	-	-
Texas Water Rights Development Board	-	None identified	Notification letter issued December 20, 2023	-	-	-

Notes:

a) For these approvals and authorizations, the authorization status column indicates where initial contact via letter with the relevant agency has taken place. Additional interactions, including submission of application materials, where necessary, and issuance of approvals or authorizations will take place in advance of the activities requiring authorization. Relevant dates for these authorized preconstruction and construction activities are provided in Table 1.3-1.

b) For these approvals and authorizations, the authorization status column indicates where initial contact via letter with the relevant agency has taken place. Additional interactions, including submission of application materials, where necessary, and issuance of approvals or authorizations will take place in advance of the activities requiring authorization. The planned dates for operating license acquisition and commencement of commercial operation are provided in Table 1.3-1.

Figures

None

TEXAS PARKS & WILDLIFE

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February 16, 2024

Mr. Sam Gammage
DOW
1111 Guadalupe St
Austin, TX 78701-2115

RE: Proposed Long Mott Small Modular Reactor Generating Plant; Seadrift, Calhoun County, Texas

Dear Mr. Gammage:

Texas Parks and Wildlife Department (TPWD) has received and reviewed the submitted documentation regarding the above-referenced proposed power generation facility.

Project Description

X-energy, LLC (X-energy), is conducting environmental evaluations to support a licensing application to the U.S. Nuclear Regulatory Commission (NRC) for construction and operation of a proposed Xe-100 small modular reactor (SMR) for Project Long Mott at Dow's UCC1 Seadrift Operations site (Seadrift or site). DOW and X-energy are subawardees under the U.S. Department of Energy's (DOE) Advanced Reactor Demonstration Program (ARDP) Cooperative Agreement and seek to demonstrate the first grid-scale advanced nuclear reactor for an industrial site in North America at the Project Long Mott site near Seadrift, Calhoun County, Texas. Dow will work with X-energy to install a high-temperature gas-cooled reactor (HTGR) at the Seadrift site.

The footprint of the plant requires approximately 40 acres. The total land area used at the site, however, is expected to be larger due to the required ancillary facilities that will include transmission lines, steam delivery pipelines, site-specific stormwater drainage and management ponds, access roads, and areas used temporarily during construction. The power generating station would be constructed on disturbed land that is currently used for agriculture. Other disturbed agricultural lands within the site have been designated as potential borrow areas.

Among the regulatory processes to which the project is subject, the National Environmental Policy Act (NEPA) requires the preparation of an Environmental Impact Statement (EIS). TPWD offers the following comments and recommendations concerning this project and looks forward to continued engagement and comment opportunities. Please be aware that a written response to a TPWD recommendation or informational comment received by a state governmental agency may be required by state law. For further guidance, see the Texas Parks and Wildlife Code (PWC), section 12.0011. For tracking purposes, please refer to TPWD project number 51845 in any return correspondence regarding this project.

4200 SMITH SCHOOL ROAD
AUSTIN, TEXAS 78744-3291
512.389.4800
www.tpwd.texas.gov

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General Comments

The proposed project site is within a subtropical, often semi-arid, region of Texas, with an average annual rainfall of about 40 inches and with limited sources of freshwater, an important resource for native wildlife. TPWD staff have concerns about water consumption that may be needed for the facility's operations, potential sources of water, and acquisition of water rights potentially required to sustain species of greatest conservation need (SGCN), including protected species such as native freshwater mussels and the whooping crane (*Grus americana*).

Additionally, the proposed project site is less than 25 miles from the Gulf of Mexico and is prone to tropical storms and hurricanes. NEPA analyses should include potential impacts caused by flooding and hurricane-force winds that could cause infrastructure damage to the Seadrift site. Such analyses should incorporate the potential effects of climate change on frequency and severity of tropical storms, increased frequency and duration of drought, and continuing sea level rise.

Construction Recommendations

General Construction Recommendations

Recommendation: TPWD recommends the judicious use and placement of sediment control fence to exclude wildlife from the construction area. For extensive linear projects, the exclusion fence can be installed around only active work sites. In many cases, sediment control fence placement for the purposes of controlling erosion and protecting water quality can be modified minimally to also provide the benefit of excluding wildlife access to construction areas. The exclusion fence should be buried at least six inches and be at least 24 inches high. The exclusion fence should be maintained for the life of the project and only removed after the construction is completed and the disturbed site has been revegetated. Construction personnel should be encouraged to examine the inside of the exclusion area daily to determine if any wildlife species have been trapped inside the area of impact and provide safe egress opportunities prior to initiation of construction activities.

Recommendation: Where trenching or other excavation is involved in construction TPWD recommends that contractors keep trenching/excavation and backfilling crews close together to minimize the amount of trenches/excavation areas left open at any given time during construction. TPWD recommends that any open trenches or excavation areas be covered overnight and/or inspected every morning to ensure no wildlife species have been trapped. Trenches left open for more than two daylight hours should be inspected for the presence of trapped wildlife prior to backfilling. If trenches/excavation areas cannot be backfilled the day of initial excavation, then escape ramps should be installed at least every 90 meters (approximately 295 feet). Escape ramps can be short lateral trenches or wooden planks sloping to the surface at an angle less than 45 degrees (1:1).

Recommendation: For soil stabilization and/or revegetation of disturbed areas within the proposed project area, TPWD recommends erosion and seed/mulch stabilization

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materials that avoid entanglement hazards to snakes and other wildlife species. Because the mesh found in many erosion control blankets or mats pose an entanglement hazard to wildlife, TPWD recommends the use of no-till drilling, hydromulching and/or hydroseeding rather than erosion control blankets or mats due to a reduced risk to wildlife. If erosion control blankets or mats will be used, the product should contain no netting or contain loosely woven, natural fiber netting in which the mesh design allows the threads to move, therefore allowing expansion of the mesh openings. Plastic mesh matting and hydromulch containing microplastics should be avoided.

Recommendation: During construction, operation, and maintenance of the proposed facility, TPWD recommends observing slow (25 miles per hour, or less) speed limits within the project site. Reduced speed limits would allow personnel to see wildlife in the vehicle path and avoid harming them.

Lighting

Light pollution can have negative impacts on wildlife, particularly sky glow and the unnecessary lighting of unpaved areas. Sky glow because of light pollution can have negative impacts on wildlife and ecosystems by disrupting natural diurnal and nocturnal behaviors such as migration, reproduction, nourishment, rest, and cover from predators. Artificial nighttime lighting can attract and disorient night-migrating birds as well as insects. Birds or insects circling the lights' glare can cause exhaustion mortality, or insects may be heavily preyed upon. A single artificial light source can disrupt normal flight activity, long distance migrations, or even attract insects that don't normally move from their habitat. Nighttime lighting can also disrupt the breeding of amphibians.

The International Dark Sky Places (IDSP) Program was founded in 2001 to encourage communities, parks, and protected areas around the world to preserve and protect dark sites through responsible lighting polices and public education. As of January 2022, there are over 195 certified IDSP in the world with 16 certified IDSPs in Texas. The International Dark-sky Association utilizes a rigorous designation process to designate IDSPs. The IDSP Program offers five types of designations: IDS Communities, IDS Parks, IDS Reserves, IDS Sanctuaries, and Urban Night Sky Places. Sky glow from light pollution can have negative impacts on wildlife and ecosystems by disrupting natural day and night cycles inherent in managing behaviors such as migration, reproduction, nourishment, sleep, and protection from predators.

Wildlife impacts from light pollution and potential impacts to IDSP are of concern to TPWD. The severity and impacts of light pollution increase with the overall cumulative presence of artificial lighting across the landscape. Implementation of the following lighting minimization practices can be meaningful, even when these practices are employed within an already-developed area.

Recommendation: As bird protection measures for migrant and resident birds as well as other wildlife, TPWD recommends utilizing the minimum amount of permanent night-time lighting needed for safety and security and encourages the use of dark sky friendly lighting. TPWD recommends minimizing the project's contribution toward

Sam Gammage
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> skyglow by focusing light downward, with full cutoff luminaries to avoid light emitting above the horizontal, and to use dark-sky friendly lighting that is on only when needed, down-shielded, as bright as needed, and minimizes blue light emissions. Appropriate lighting technologies, beneficial management practices, and other dark sky resources can be found at the International Dark-Sky Association and McDonald Observatory websites.

Federal Law: Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) prohibits actions that reduce migratory birds, their eggs, or their nests, by killing or capturing, to human control, except when specifically authorized by the Department of the Interior. This protection applies to most native bird species, including ground nesting species. The U.S. Fish and Wildlife Service (USFWS) Migratory Bird Office can be contacted at (505) 248-7882 for more information on potential impacts to migratory birds.

> **Recommendation:** TPWD recommends any clearing be scheduled outside of the general bird nesting season of March 15th to September 15th; however, if clearing must occur during nesting season, TPWD recommends surveying the area proposed for disturbance to ensure that no nests with eggs or young will be disturbed by construction. Nest surveys should be conducted not more than five days prior to clearing activities to maximize detection of active nests. TPWD generally recommends a 100-foot radius buffer of vegetation remain around active nests until the eggs have hatched and the young have fledged; however, the size of the buffer zone depends on various factors and can be coordinated with the local or regional USFWS office.
>
> Raptor nesting occurs late winter through early spring; TPWD recommends construction activities be excluded from a minimum zone of approximately 328 feet (100 meters) surrounding any raptor nest during the period of February 1 through July 15. The USFWS can be contacted at the number listed above for further information.

Several areas within the near vicinity of the proposed facility are well-documented sites of high usage for birds, with a wide array of native bird species being documented. These include Green Lake and the Guadalupe Delta Wildlife Management Area. Although the specific tract proposed for development does not appear to itself provide habitat of any exceptional quality, avian use throughout the vicinity is high and should be thoroughly considered during development, operation, and maintenance of the facility.

Of particular concern are any open water features associated with the overall industrial complex. Shallow ponds, even if surrounded by other facets of industrial development, resemble natural wetlands and lakes to migrating birds, such as waterfowl. Birds are not able to discern these "ponds" are not suitable resting or foraging habitat until landing; any toxins and oils held in the ponds then coat the birds' feathers, disrupting both thermoregulation and and flight. Birds sometimes drown within these industrial "ponds." Similarly, songbirds are attracted to insects trapped in oil on the water's surface; when attempting to feed on the insects, the songbird will in turn become stranded. Struggling or dead birds may then attract predatory species like hawks and owls. The USFWS estimates

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that 500,000 to 1 million birds are killed annually in features such as oil pits and evaporation ponds.

> **Recommendation:** TPWD recommends an enclosed system for handling all wastes, making those potentially hazardous materials unavailable to birds and other wildlife. If a completely enclosed system is not possible, a net intended for the purpose of wildlife exclusion should be installed over every "pond" associated with the facility. Nets break up the appearance of the "pond", making it less likely that flying birds will interpret it as useable habitat. Additionally, the net will provide a physical barrier to any birds that do attempt to land within the water.

The potential exists for birds to collide with power lines and associated guy wires and static lines. The presence of many water features within the project area and near vicinity, such as Green Lake, present a heightened risk of bird-structure collisions due to concentrations of birds utilizing those water resource habitats. Bird fatalities can also occur due to electrocution if perching birds simultaneously contact energized and grounded structures.

> **Recommendation:** TPWD recommends bird collision and electrocution risks be considered during project design and recommends incorporating design features that will minimize those risks. For additional information, please see the guidelines published by USFWS and the Avian Power Lines Interaction Committee (APLIC) in the updated guidance document *Reducing Avian Collisions with Power Lines: State of the Art in 2012*. This manual, released on December 20, 2012, identifies beneficial practices and provides specific guidance to help electric utilities and cooperatives reduce bird collisions with power lines. A companion document, *Suggested Practices for Avian Protection on Power Lines*, was published by APLIC and the USFWS in 2006.

Federal Law: Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (BGEPA) prohibits anyone, without a permit issued by the Secretary of the Interior, from taking bald eagles (*Haliaeetus leucocephalus*) or golden eagles (*Aquila chrysaetos*), including their parts, nests, or eggs. The BGEPA provides criminal penalties for persons who "*take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle ... [or any golden eagle], alive or dead, or any part, nest, or egg thereof.*" The BGEPA defines "take" as to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb.

Based upon surrounding habitats and the high use by prey species of the bald eagle, such as waterfowl, it is likely that bald eagles will be in the area of the proposed facility.

> **Recommendation:** Please review the *Federal Law: Migratory Bird Treaty Act* section above for recommendations, particularly regarding facility "ponds" and electrical infrastructure, as these recommendations are also applicable for BGEPA compliance.

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Recommendation: When potential impacts to the bald eagle are anticipated, TPWD recommends consultation with the USFWS – Corpus Christi Ecological Services Field Office regarding compliance with the BGEPA.

Federal Law: Endangered Species Act

Federally listed animal species and their habitat are protected from take on any property by the Endangered Species Act (ESA). Take of a federally listed species can be allowed if it is incidental to an otherwise lawful activity and must be permitted in accordance with Section 7 or 10 of the ESA. Any take of a federally listed species or its habitat without the required take permit (or allowance) from the USFWS is a violation of the ESA.

Recommendation: The USFWS should be contacted for species occurrence data, guidance, permitting, survey protocols, and mitigation for federally listed species.

Recommendation: If federally listed species are encountered during construction, work should stop immediately. The USFWS – Corpus Christi Ecological Services Office should be contacted regarding compliance with the ESA.

State Law: Parks and Wildlife Code – Chapter 64, Birds

PWC section 64.002, regarding protection of nongame birds, provides that no person may catch, kill, injure, pursue, or possess a bird that is not a game bird. PWC section 64.003, regarding destroying nests or eggs, provides that no person may destroy or take the nests, eggs, or young and any wild game bird, wild bird, or wild fowl.

Recommendation: Please review the *Federal Law: Migratory Bird Treaty Act* section above for recommendations as they are also applicable for chapter 64 of the PWC compliance.

State Law: Aquatic Resources

PWC section 1.011 grants TPWD authority to regulate and conserve aquatic animal life of public waters. Title 31, chapter 57, subchapter B, section 57.157 of the Texas Administrative Code (TAC) regulates take of mussels and clams, and section 12.301 of the PWC identifies liability for wildlife taken in violation of PWC or a regulation adopted under PWC.

Intermittent streams and smaller perennial streams provide important habitat for fish by providing spawning and nursery habitat as well as providing invertebrate, detritus, and other organic matter to downstream food webs. Fish also serve as hosts for mussel larvae and are essential in completing the mussel life cycle. Because the waters of the project area do provide habitat as evidenced by survey results cited in project documents, avoiding impacts to stream habitat, fish, mussels, and other aquatic life during construction is encouraged.

Recommendation: To avoid or minimize potential adverse impacts to aquatic species, TPWD recommends implementing lower-impact methodologies and beneficial authority of PWC sections 12.0011(b)(1) and 12.301.

State Law: Parks and Wildlife Code, Section 68.015

PWC regulates state listed threatened and endangered animal species. The capture, trap, take, or killing of state-listed threatened and endangered animal species is unlawful unless expressly authorized under a permit issued by USFWS or TPWD. A copy of TPWD Protection of State Listed Species Guidelines, which includes a list of penalties for take of species, can be found online at the TPWD website. For purposes of relocation, surveys, monitoring, and research, State-listed species may only be handled by persons with the appropriate authorization obtained through the TPWD Wildlife Permits Program. For more information on this authorization, please contact the Wildlife Permits Office at (512) 389-4647.

TPWD provides online access to state-listed species information through the TPWD Rare, Threatened, and Endangered Species of Texas by County (RTEST) application. This application provides county-level information regarding occurrence of protected species (federal- or state-listed threatened or endangered) and may be utilized to inform development project planning. Additionally, records of occurrence for these protected species are tracked within the Texas Natural Diversity Database (TXNDD) and are publicly available by request.

> **Recommendation:** Please review publicly available resources concerning state listed species which may occur in Calhoun County as these species could be negatively impacted by the project. An accounting of state listed species, potential impacts on those species, and BMP or other impact minimization efforts targeting protected species and their habitats should be presented in the EIS.

Species of Concern/Special Features

In addition to state and federally protected species, TPWD tracks special features, natural communities, and rare species that are not listed as threatened or endangered but are also considered species of greatest conservation need (SGCN). TPWD actively promotes their conservation and considers it important to evaluate and, if necessary, minimize impacts to rare species and their habitat to reduce the likelihood of endangerment and preclude the need to list. These species and communities are tracked in the TXNDD.

> **Recommendation:** Please review the TPWD county list of rare and protected species for Calhoun County because SGCN could be present within the project area depending upon habitat availability. Please note that the TPWD county list is regularly updated. The USFWS should be contacted for species occurrence data, guidance, permitting, survey protocols, and mitigation for federally listed species.
>
> Determining the actual presence of a species in an area depends on many variables including daily and seasonal activity cycles, environmental activity cues, preferred habitat, transiency, and population density (both wildlife and human). The absence of a species can be demonstrated only with great difficulty and then only with repeated negative observations, accounting for all the variable factors contributing to the lack

Sam Gammage
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of detectable presence. If encountered during construction, measures should be taken to avoid impacting all wildlife, regardless of listing status.

Recommendation: An accounting of SGCN, potential impacts on those species, and BMP or other impact minimization efforts targeting SCGN and their habitats should be presented in the EIS.

Recommendation: Implementation of the *General Construction Recommendations*, discussed above, would serve to minimize risk to many SGCN and other species of wildlife. If during construction, the project area is found to contain rare species, natural plant communities, or special features, TPWD recommends that precautions be taken to avoid impacts to them.

Data Reporting and the Texas Natural Diversity Database

TPWD maintains records of occurrence for protected and rare species, or SGCN, within the TXNDD and these data are publicly available by request. The TXNDD is intended to assist users in avoiding harm to rare species or significant ecological features. The TXNDD is updated continuously, and relies partially on information submitted by private parties, such as developers or their consultants. Given the small proportion of public versus private land in Texas, the TXNDD does not include a comprehensive inventory of rare resources in the state.

Recommendation: To aid in the scientific knowledge of a species' status and current range, TPWD encourages reporting encounters of protected and rare species to the TXNDD according to the data submittal instructions found at the TPWD Texas Natural Diversity Database: Submit Data webpage.

Thank you for considering project impacts to Texas' fish and wildlife resources. If you have any questions, please contact me at Rachel.Lange@tpwd.texas.gov or (979) 732-4213.

Sincerely,

Rachel Lange

Rachel Lange
Environmental Review Biologist
Wildlife Division

RAL/51845

Cc: Mr. Ryan Alexander, NRC; Ryan.Alexander@nrc.gov

From: noreply@thc.state.tx.us <noreply@thc.state.tx.us>
Sent: Friday, February 16, 2024 7:48 PM
To: Hunter, John <john.a.hunter@wsp.com>; reviews@thc.state.tx.us <reviews@thc.state.tx.us>
Subject: XE-100 Dow Seadrift/ Project Long Mott

Re: Project Review under Section 106 of the National Historic Preservation Act
THC Tracking #202405469
Date: 02/16/2024
XE-100 Dow Seadrift/ Project Long Mott
7501 TX-185

Description: Submitting revised reports as requested. Added STP data in appendices.

Dear John A. Hunter:
Thank you for your submittal regarding the above-referenced project. This response represents the comments of the State Historic Preservation Officer, the Executive Director of the Texas Historical Commission (THC), pursuant to review under Section 106 of the National Historic Preservation Act.

The review staff, led by Jeff Durst, Caitlin Brashear and Tracy Lovingood, has completed its review and has made the following determinations based on the information submitted for review:

Above-Ground Resources

- No historic properties are present or affected by the project as proposed. However, if historic properties are discovered or unanticipated effects on historic properties are found, work should cease in the immediate area; work can continue where no historic properties are present. Please contact the THC's History Programs Division at 512-463-5853 to consult on further actions that may be necessary to protect historic properties.

Archeology Comments

- No historic properties affected. However, if cultural materials are encountered during construction or disturbance activities, work should cease in the immediate area; work can continue where no cultural materials are present. Please contact the THC's Archeology Division at 512-463-6096 to consult on further actions that may be necessary to protect the cultural remains.
- THC/SHPO concurs with information provided.
- This draft report is acceptable. To facilitate review and make project information and final reports available through the Texas Archeological Sites Atlas, we appreciate submission of tagged pdf copies of the final report including one restricted version with all site location information (if applicable), and one public version with all site

location information redacted; an online abstract form submitted via the abstract tab on eTRAC; and survey area shapefiles submitted via the shapefile tab on eTRAC. For questions on how to submit these please visit our video training series at: https://www.youtube.com/playlist?list=PLONbbv2pt4cog5t6mCqZVaEAx3d0MkgQC Please note that these steps are required for projects conducted under a Texas Antiquities Permit.

We look forward to further consultation with your office and hope to maintain a partnership that will foster effective historic preservation. Thank you for your cooperation in this review process, and for your efforts to preserve the irreplaceable heritage of Texas. If the project changes, or if new historic properties are found, please contact the review staff. If you have any questions concerning our review or if we can be of further assistance, please email the following reviewers: Jeff.Durst@thc.texas.gov, caitlin.brashear@thc.texas.gov, tracy.lovingood@thc.texas.gov.

This response has been sent through the electronic THC review and compliance system (eTRAC). Submitting your project via eTRAC eliminates mailing delays and allows you to check the status of the review, receive an electronic response, and generate reports on your submissions. For more information, visit http://thc.texas.gov/etrac-system.

Sincerely,

for Edward G. Lengel, Ph.D
State Historic Preservation Officer

Please do not respond to this email.

From: noreply@thc.state.tx.us
To: Stephanie Yazzie; reviews@thc.state.tx.us
Subject: Xe-100 DOW Seadrift DOE Subsurface Investigation
Date: Wednesday, August 30, 2023 11:30:24 AM

Notice: This email originated from outside of the organization. *Do not click links or open attachments unless you recognize the sender and know the content is safe.*

Re: Project Review under Section 106 of the National Historic Preservation Act
THC Tracking #202312012
Date: 08/30/2023
Xe-100 DOW Seadrift DOE Subsurface Investigation
Dow Chemical Seadrift

Description: Results of the archeological survey and request for concurrence on no historic properties identified.

Dear Stephanie Yazzie:
Thank you for your submittal regarding the above-referenced project. This response represents the comments of the State Historic Preservation Officer, the Executive Director of the Texas Historical Commission (THC), pursuant to review under Section 106 of the National Historic Preservation Act.

The review staff, led by Jeff Durst and Caitlin Brashear, has completed its review and has made the following determinations based on the information submitted for review:

Above-Ground Resources

- No historic properties are present or affected by the project as proposed. However, if historic properties are discovered or unanticipated effects on historic properties are found, work should cease in the immediate area; work can continue where no historic properties are present. Please contact the THC's History Programs Division at 512-463-5853 to consult on further actions that may be necessary to protect historic properties.

Archeology Comments

- No historic properties affected. However, if cultural materials are encountered during construction or disturbance activities, work should cease in the immediate area; work can continue where no cultural materials are present. Please contact the THC's Archeology Division at 512-463-6096 to consult on further actions that may be necessary to protect the cultural remains.
- THC/SHPO concurs with information provided.
- This draft report is acceptable. To facilitate review and make project information and final reports available through the Texas Archeological Sites Atlas, we appreciate

submission of tagged pdf copies of the final report including one restricted version with all site location information (if applicable), and one public version with all site location information redacted; an online abstract form submitted via the abstract tab on eTRAC; and survey area shapefiles submitted via the shapefile tab on eTRAC. For questions on how to submit these please visit our video training series at: https://www.youtube.com/playlist?list=PLONbbv2pt4cog5t6mCqZVaEAx3d0MkgQC Please note that these steps are required for projects conducted under a Texas Antiquities Permit.

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This response has been sent through the electronic THC review and compliance system (eTRAC). Submitting your project via eTRAC eliminates mailing delays and allows you to check the status of the review, receive an electronic response, and generate reports on your submissions. For more information, visit http://thc.texas.gov/etrac-system.

Sincerely,

for Mark Wolfe, State Historic Preservation Officer
Executive Director, Texas Historical Commission

Please do not respond to this email.

December 20, 2023

Calhoun County Floodplain Administration
Ladonna Thigpen, Floodplain Administrator
211 S. Ann Street Suite 3.1
Port Lavaca, TX 77979

RE: Request for Information on Potential Site for a Proposed Small Modular Reactor Generating Plant

Dear Ms. Thigpen:

X-energy, LLC (X-energy), is conducting environmental evaluations to support a licensing application to the U.S. Nuclear Regulatory Commission (NRC) for construction and operation of a proposed Xe-100 small modular reactor (SMR) for Project Long Mott at Dow's UCC[1] Seadrift Operations site (Seadrift or site). As a subawardee under the U.S. Department of Energy's (DOE) Advanced Reactor Demonstration Program (ARDP) Cooperative Agreement, Dow, the world's leading materials science company, and X-Energy, a leading developer of advanced nuclear reactors and fuel technology for clean energy generation, will demonstrate the first grid-scale advanced nuclear reactor for an industrial site in North America at the Project Long Mott site. Dow intends to work with X-energy to install their Xe-100 high-temperature gas-cooled reactor (HTGR) to provide the site with safe, reliable, low-carbon power and steam.

The Xe-100 reactor is a high temperature gas-cooled reactor. Each unit produces up to 200 megawatts thermal (MWth), and in an electricity-only generating mode produces up to 80-megawatts electric (Mwe) that is scalable up to 320 MWe and 800 MWth for a four-unit advanced nuclear power plant. The Xe-100 reactor uses TRi-structural ISOtropic particle fuel (TRISO-X) manufactured by X-energy's subsidiary TRISO-X, LLC. TRISO-coated fuels are unique in their multi-layer encapsulation of uranium, providing increased safety, proliferation resistance, and functional containment. The proposed Project Long Mott is located on an approximately 1,548-acre site in Calhoun County, Texas adjacent to the existing site.

A license under Title 10 of the Code of Federal Regulations (CFR), Part 50, from the NRC will be required for construction and operation of the proposed Project Long Mott. X-energy will prepare an Environmental Report (ER) to be issued to the NRC. The ER will be prepared pursuant to NUREG[2] 1555 "Standard Review Plans for Environmental Reviews for Nuclear Power Plants" (NRC 2007)[3] and

[1] Union Carbide Corporation (UCC) is a wholly owned subsidiary of the Dow Chemical Company.
[2] In general, a NUREG publication is prepared by NRC and documents regulatory decisions, results of research, results of incident investigations, and other technical and administrative information. NUREG 1555 provides guidance to the NRC staff in implementing provisions of 10 CFR 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," related to nuclear power plants.
[3] U.S. Nuclear Regulatory Commission (NRC). 2007. NUREG 1555. Environmental Standard Review Plan. Standard Review Plans for Environmental Reviews for Nuclear Power Plants. Revision 1. Office of New Reactors, Washington, DC 20555-0001. July.

Regulatory Guide 4.2, "Preparation of Environmental Reports for Nuclear Power Stations," Revision 3 (RG 4.2; NRC 2018)[4]. The NRC decision to issue a license for the proposed facility is a federal action subject to the National Environmental Policy Act (NEPA), which will require that an Environmental Impact Statement (EIS) be prepared by the NRC pursuant to 10 CFR Part 51 to evaluate X-energy's license application.

The Project Site has the available space needed for all activities associated with the proposed SMR facility. The 4-unit Xe-100 SMR plant would supply steam and electric power to the site and allow Dow to retire existing fossil-fuel power generation infrastructure at the Seadrift site. The footprint of the standard 4-unit Xe-100 plant requires approximately 40 acres. The total land area used at the site, however, is expected to be larger due to the required ancillary facilities, such as transmission lines, steam delivery pipelines, site-specific stormwater drainage and management ponds, access roads, and areas used temporarily during construction. The power generating station would be constructed on disturbed land that is currently used for agriculture. Other disturbed agricultural lands within the site have been designated as potential borrow areas.

As part of the planning and evaluation process, and to meet requirements in RG 4.2 Rev 3 and NUREG 1555, we are evaluating the effects of construction and operation on a full range of interdisciplinary resources, including conducting relevant field studies as required. Accordingly, we are requesting information and input from the Calhoun County Floodplain Administration to identify notable environmental permits and authorizations that should be considered in the environmental review of the proposed facility.

In conjunction with the guidance of NUREG 1555, a full range of environmental resources will be considered in the preparation of the ER and the overall licensing process. To assist your consideration of this request, please find attached a figure depicting the project site and vicinity. We respectfully request your review for our consideration in the development of licensing application materials.

We look forward to working with the Calhoun County Floodplain Administration in obtaining the necessary permits to support authorization of this important project.

If you have any questions or comments about the proposed Project Long Mott or the materials provided, please contact me at sgammage@dow.com or (512) 534-5193.

Respectfully,

	DocuSigned by: Milton Gorden 0E3402AB6A8446B...
Dow	Milton Gorden
Director, State Government Affairs	X Energy, LLC
	Siting and Environmental Manager
	mgorden@x-energy.com
Enclosure	M: (240) 803-8580

[4] NRC. 2018.

December 20, 2023

Calhoun County Groundwater Conservation District
131-A N. Virginia Street
Port Lavaca, TX 77979

RE: Request for Information on Potential Site for a Proposed Small Modular Reactor Generating Plant

Dear Sir or Madam:

X-energy, LLC (X-energy), is conducting environmental evaluations to support a licensing application to the U.S. Nuclear Regulatory Commission (NRC) for construction and operation of a proposed Xe-100 small modular reactor (SMR) for Project Long Mott at Dow's UCC[1] Seadrift Operations site (Seadrift or site). As a subawardee under the U.S. Department of Energy's (DOE) Advanced Reactor Demonstration Program (ARDP) Cooperative Agreement, Dow, the world's leading materials science company, and X-Energy, a leading developer of advanced nuclear reactors and fuel technology for clean energy generation, will demonstrate the first grid-scale advanced nuclear reactor for an industrial site in North America at the Project Long Mott site. Dow intends to work with X-energy to install their Xe-100 high-temperature gas-cooled reactor (HTGR) to provide the site with safe, reliable, low-carbon power and steam.

The Xe-100 reactor is a high temperature gas-cooled reactor. Each unit produces up to 200 megawatts thermal (MWth), and in an electricity-only generating mode produces up to 80-megawatts electric (Mwe) that is scalable up to 320 MWe and 800 MWth for a four-unit advanced nuclear power plant. The Xe-100 reactor uses TRi-structural ISOtropic particle fuel (TRISO-X) manufactured by X-energy's subsidiary TRISO-X, LLC. TRISO-coated fuels are unique in their multi-layer encapsulation of uranium, providing increased safety, proliferation resistance, and functional containment. The proposed Project Long Mott is located on an approximately 1,548-acre site in Calhoun County, Texas adjacent to the existing site.

A license under Title 10 of the Code of Federal Regulations (CFR), Part 50, from the NRC will be required for construction and operation of the proposed Project Long Mott. X-energy will prepare an Environmental Report (ER) to be issued to the NRC. The ER will be prepared pursuant to NUREG[2] 1555 "Standard Review Plans for Environmental Reviews for Nuclear Power Plants" (NRC 2007)[3] and

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The Project Site has the available space needed for all activities associated with the proposed SMR facility. The 4-unit Xe-100 SMR plant would supply steam and electric power to the site and allow Dow to retire existing fossil-fuel power generation infrastructure at the Seadrift site. The footprint of the standard 4-unit Xe-100 plant requires approximately 40 acres. The total land area used at the site, however, is expected to be larger due to the required ancillary facilities, such as transmission lines, steam delivery pipelines, site-specific stormwater drainage and management ponds, access roads, and areas used temporarily during construction. The power generating station would be constructed on disturbed land that is currently used for agriculture. Other disturbed agricultural lands within the site have been designated as potential borrow areas.

As part of the planning and evaluation process, and to meet requirements in RG 4.2 Rev 3 and NUREG 1555, we are evaluating the effects of construction and operation on a full range of interdisciplinary resources, including conducting relevant field studies as required. Accordingly, we are requesting information and input from the Calhoun County Groundwater Conservation District to identify notable environmental permits and authorizations that should be considered in the environmental review of the proposed facility.

In conjunction with the guidance of NUREG 1555, a full range of environmental resources will be considered in the preparation of the ER and the overall licensing process. To assist your consideration of this request, please find attached a figure depicting the project site and vicinity. We respectfully request your review for our consideration in the development of licensing application materials.

We look forward to working with the Calhoun County Groundwater Conservation District in obtaining the necessary permits to support authorization of this important project.

If you have any questions or comments about the proposed Project Long Mott or the materials provided, please contact me or Sam Gammage at sgammage@dow.com or (512) 534-5193.

Respectfully,

Jason Ammerman
Jason Ammerman
Dow
Seadrift Operations Leader

DocuSigned by:
Milton Gorden
0E3402AB6A8446B...
Milton Gorden
X Energy, LLC
Siting and Environmental Manager
mgorden@x-energy.com
M: (240) 803-8580

Enclosure

[4] NRC. 2018.

December 20, 2023

National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southeast Regional Office
263 13th Ave, South
St. Petersburg, FL 33701

RE: Request for Information on Potential Site for a Proposed Small Modular Reactor Generating Plant

Dear Sir or Madam:

X-energy, LLC (X-energy), is conducting environmental evaluations to support a licensing application to the U.S. Nuclear Regulatory Commission (NRC) for construction and operation of a proposed Xe-100 small modular reactor (SMR) for Project Long Mott at Dow's UCC[1] Seadrift Operations site (Seadrift or site). As a subawardee under the U.S. Department of Energy's (DOE) Advanced Reactor Demonstration Program (ARDP) Cooperative Agreement, Dow, the world's leading materials science company, and X-Energy, a leading developer of advanced nuclear reactors and fuel technology for clean energy generation, will demonstrate the first grid-scale advanced nuclear reactor for an industrial site in North America at the Project Long Mott site. Dow intends to work with X-energy to install their Xe-100 high-temperature gas-cooled reactor (HTGR) to provide the site with safe, reliable, low-carbon power and steam.

The Xe-100 reactor is a high temperature gas-cooled reactor. Each unit produces up to 200 megawatts thermal (MWth), and in an electricity-only generating mode produces up to 80-megawatts electric (Mwe) that is scalable up to 320 MWe and 800 MWth for a four-unit advanced nuclear power plant. The Xe-100 reactor uses TRi-structural ISOtropic particle fuel (TRISO-X) manufactured by X-energy's subsidiary TRISO-X, LLC. TRISO-coated fuels are unique in their multi-layer encapsulation of uranium, providing increased safety, proliferation resistance, and functional containment. The proposed Project Long Mott is located on an approximately 1,548-acre site in Calhoun County, Texas adjacent to the existing site.

A license under Title 10 of the Code of Federal Regulations (CFR), Part 50, from the NRC will be required for construction and operation of the proposed Project Long Mott. X-energy will prepare an Environmental Report (ER) to be issued to the NRC. The ER will be prepared pursuant to NUREG[2] 1555 "Standard Review Plans for Environmental Reviews for Nuclear Power Plants" (NRC 2007)[3] and Regulatory Guide 4.2, "Preparation of Environmental Reports for Nuclear Power Stations," Revision 3 (RG 4.2; NRC 2018)[4]. The

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[4] NRC. 2018.

NRC decision to issue a license for the proposed facility is a federal action subject to the National Environmental Policy Act (NEPA), which will require that an Environmental Impact Statement (EIS) be prepared by the NRC pursuant to 10 CFR Part 51 to evaluate X-energy's license application.

The Project Site has the available space needed for all activities associated with the proposed SMR facility. The 4-unit Xe-100 SMR plant would supply steam and electric power to the site and allow Dow to retire existing fossil-fuel power generation infrastructure at the Seadrift site. The footprint of the standard 4-unit Xe-100 plant requires approximately 40 acres. The total land area used at the site, however, is expected to be larger due to the required ancillary facilities, such as transmission lines, steam delivery pipelines, site-specific stormwater drainage and management ponds, access roads, and areas used temporarily during construction. The power generating station would be constructed on disturbed land that is currently used for agriculture. Other disturbed agricultural lands within the site have been designated as potential borrow areas.

As part of the planning and evaluation process, and to meet requirements in RG 4.2 Rev 3 and NUREG 1555, we are evaluating the effects of construction and operation on a full range of interdisciplinary resources, including conducting relevant field studies as required. Accordingly, we are requesting information and input from National Oceanic and Atmospheric Administration (NOAA) Fisheries to identify notable environmental permits and authorizations that should be considered in the environmental review of the proposed facility.

In conjunction with the guidance of NUREG 1555, a full range of environmental resources will be considered in the preparation of the ER and the overall licensing process. To assist your consideration of this request, please find attached a figure depicting the project site and vicinity. We respectfully request your review for our consideration in the development of licensing application materials.

We look forward to working with NOAA Fisheries in obtaining the necessary permits to support authorization of this important project.

If you have any questions or comments about the proposed Project Long Mott or the materials provided, please contact Sam Gammage at sgammage@dow.com or (512) 534-5193.

Respectfully,

Heather Lyons

Heather Lyons
Dow
Seadrift Site Leader

DocuSigned by:
Milton Gorden
0E3402AB6A8446B...

Milton Gorden
X Energy, LLC
Siting and Environmental Manager
mgorden@x-energy.com
M: (240) 803-8580

Enclosure

December 20, 2023

Railroad Commission of Texas
P.O. Box 12967
Austin, Texas 78711-2967

RE: Request for Information on Potential Site for a Proposed Small Modular Reactor Generating Plant

Dear Sir or Madam:

X-energy, LLC (X-energy), is conducting environmental evaluations to support a licensing application to the U.S. Nuclear Regulatory Commission (NRC) for construction and operation of a proposed Xe-100 small modular reactor (SMR) for Project Long Mott at Dow's UCC[1] Seadrift Operations site (Seadrift or site). As a subawardee under the U.S. Department of Energy's (DOE) Advanced Reactor Demonstration Program (ARDP) Cooperative Agreement, Dow, the world's leading materials science company, and X-Energy, a leading developer of advanced nuclear reactors and fuel technology for clean energy generation, will demonstrate the first grid-scale advanced nuclear reactor for an industrial site in North America at the Project Long Mott site. Dow intends to work with X-energy to install their Xe-100 high-temperature gas-cooled reactor (HTGR) to provide the site with safe, reliable, low-carbon power and steam.

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A license under Title 10 of the Code of Federal Regulations (CFR), Part 50, from the NRC will be required for construction and operation of the proposed Project Long Mott. X-energy will prepare an Environmental Report (ER) to be issued to the NRC. The ER will be prepared pursuant to NUREG[2] 1555 "Standard Review Plans for Environmental Reviews for Nuclear Power Plants" (NRC 2007)[3] and

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As part of the planning and evaluation process, and to meet requirements in RG 4.2 Rev 3 and NUREG 1555, we are evaluating the effects of construction and operation on a full range of interdisciplinary resources, including conducting relevant field studies as required. Accordingly, we are requesting information and input from the Railroad Commission of Texas to identify notable environmental permits and authorizations that should be considered in the environmental review of the proposed facility.

In conjunction with the guidance of NUREG 1555, a full range of environmental resources will be considered in the preparation of the ER and the overall licensing process. To assist your consideration of this request, please find attached a figure depicting the project site and vicinity. We respectfully request your review for our consideration in the development of licensing application materials.

We look forward to working with the Railroad Commission of Texas in obtaining the necessary permits to support authorization of this important project.

If you have any questions or comments about the proposed Project Long Mott or the materials provided, please contact me at shampton1@dow.com 832-262-1738.

Respectfully,

Sherman Hampton
Dow
Regulatory Affairs Director

DocuSigned by:
Milton Gorden
0E3402AB0A8440B...
Milton Gorden
X Energy, LLC
Siting and Environmental Manager
mgorden@x-energy.com
M: (240) 803-8580

Enclosure

[4] NRC. 2018.

December 20, 2023

Texas Commission on Environmental Quality
MC 145, P.O. Box 13087
Austin, Texas 78711-3087

RE: Request for Information on Potential Site for a Proposed Small Modular Reactor Generating Plant

Dear Sir or Madam:

X-energy, LLC (X-energy), is conducting environmental evaluations to support a licensing application to the U.S. Nuclear Regulatory Commission (NRC) for construction and operation of a proposed Xe-100 small modular reactor (SMR) for Project Long Mott at Dow's UCC[1] Seadrift Operations site (Seadrift or site). As a subawardee under the U.S. Department of Energy's (DOE) Advanced Reactor Demonstration Program (ARDP) Cooperative Agreement, Dow, the world's leading materials science company, and X-Energy, a leading developer of advanced nuclear reactors and fuel technology for clean energy generation, will demonstrate the first grid-scale advanced nuclear reactor for an industrial site in North America at the Project Long Mott site. Dow intends to work with X-energy to install their Xe-100 high-temperature gas-cooled reactor (HTGR) to provide the site with safe, reliable, low-carbon power and steam.

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As part of the planning and evaluation process, and to meet requirements in RG 4.2 Rev 3 and NUREG 1555, we are evaluating the effects of construction and operation on a full range of interdisciplinary resources, including conducting relevant field studies as required. Accordingly, we are requesting information and input from the Texas Commission on Environmental Quality to identify notable environmental permits and authorizations that should be considered in the environmental review of the proposed facility.

In conjunction with the guidance of NUREG 1555, a full range of environmental resources will be considered in the preparation of the ER and the overall licensing process. To assist your consideration of this request, please find attached a figure depicting the project site and vicinity. We respectfully request your review for our consideration in the development of licensing application materials.

We look forward to working with the Texas Commission on Environmental Quality in obtaining the necessary permits to support authorization of this important project.

If you have any questions or comments about the proposed Project Long Mott or the materials provided, please contact me at shampton1@dow.com 832-262-1738.

Respectfully,

Sherman Hampton
Dow
Regulatory Affairs Director

DocuSigned by:
Milton Gorden
0E3402AB6A6446B...
Milton Gorden
X Energy, LLC
Siting and Environmental Manager
mgorden@x-energy.com
M: (240) 803-8580

Enclosure

[4] NRC. 2018.

December 20, 2023

Texas Department of Transportation
125 E. 11th St.
Austin, TX 78701

RE: Request for Information on Potential Site for a Proposed Small Modular Reactor Generating Plant

Dear Sir or Madam:

X-energy, LLC (X-energy), is conducting environmental evaluations to support a licensing application to the U.S. Nuclear Regulatory Commission (NRC) for construction and operation of a proposed Xe-100 small modular reactor (SMR) for Project Long Mott at Dow's UCC[1] Seadrift Operations site (Seadrift or site). As a subawardee under the U.S. Department of Energy's (DOE) Advanced Reactor Demonstration Program (ARDP) Cooperative Agreement, Dow, the world's leading materials science company, and X-Energy, a leading developer of advanced nuclear reactors and fuel technology for clean energy generation, will demonstrate the first grid-scale advanced nuclear reactor for an industrial site in North America at the Project Long Mott site. Dow intends to work with X-energy to install their Xe-100 high-temperature gas-cooled reactor (HTGR) to provide the site with safe, reliable, low-carbon power and steam.

The Xe-100 reactor is a high temperature gas-cooled reactor. Each unit produces up to 200 megawatts thermal (MWth), and in an electricity-only generating mode produces up to 80-megawatts electric (Mwe) that is scalable up to 320 MWe and 800 MWth for a four-unit advanced nuclear power plant. The Xe-100 reactor uses TRi-structural ISOtropic particle fuel (TRISO-X) manufactured by X-energy's subsidiary TRISO-X, LLC. TRISO-coated fuels are unique in their multi-layer encapsulation of uranium, providing increased safety, proliferation resistance, and functional containment. The proposed Project Long Mott is located on an approximately 1,548-acre site in Calhoun County, Texas adjacent to the existing site.

A license under Title 10 of the Code of Federal Regulations (CFR), Part 50, from the NRC will be required for construction and operation of the proposed Project Long Mott. X-energy will prepare an Environmental Report (ER) to be issued to the NRC. The ER will be prepared pursuant to NUREG[2] 1555 "Standard Review Plans for Environmental Reviews for Nuclear Power Plants" (NRC 2007)[3] and

[1] Union Carbide Corporation (UCC) is a wholly owned subsidiary of the Dow Chemical Company.
[2] In general, a NUREG publication is prepared by NRC and documents regulatory decisions, results of research, results of incident investigations, and other technical and administrative information. NUREG 1555 provides guidance to the NRC staff in implementing provisions of 10 CFR 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," related to nuclear power plants.
[3] U.S. Nuclear Regulatory Commission (NRC). 2007. NUREG 1555. Environmental Standard Review Plan. Standard Review Plans for Environmental Reviews for Nuclear Power Plants. Revision 1. Office of New Reactors, Washington, DC 20555-0001. July.

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Regulatory Guide 4.2, "Preparation of Environmental Reports for Nuclear Power Stations," Revision 3 (RG 4.2; NRC 2018)[4]. The NRC decision to issue a license for the proposed facility is a federal action subject to the National Environmental Policy Act (NEPA), which will require that an Environmental Impact Statement (EIS) be prepared by the NRC pursuant to 10 CFR Part 51 to evaluate X-energy's license application.

The Project Site has the available space needed for all activities associated with the proposed SMR facility. The 4-unit Xe-100 SMR plant would supply steam and electric power to the site and allow Dow to retire existing fossil-fuel power generation infrastructure at the Seadrift site. The footprint of the standard 4-unit Xe-100 plant requires approximately 40 acres. The total land area used at the site, however, is expected to be larger due to the required ancillary facilities, such as transmission lines, steam delivery pipelines, site-specific stormwater drainage and management ponds, access roads, and areas used temporarily during construction. The power generating station would be constructed on disturbed land that is currently used for agriculture. Other disturbed agricultural lands within the site have been designated as potential borrow areas.

As part of the planning and evaluation process, and to meet requirements in RG 4.2 Rev 3 and NUREG 1555, we are evaluating the effects of construction and operation on a full range of interdisciplinary resources, including conducting relevant field studies as required. Accordingly, we are requesting information and input from the Texas Department of Transportation to identify notable environmental permits and authorizations that should be considered in the environmental review of the proposed facility.

In conjunction with the guidance of NUREG 1555, a full range of environmental resources will be considered in the preparation of the ER and the overall licensing process. To assist your consideration of this request, please find attached a figure depicting the project site and vicinity. We respectfully request your review for our consideration in the development of licensing application materials.

We look forward to working with the Texas Department of Transportation in obtaining the necessary permits to support authorization of this important project.

If you have any questions or comments about the proposed Project Long Mott or the materials provided, please contact me at sgammage@dow.com or (512) 534-5193.

Respectfully,

Sam Gammage
Dow
Director, State Government Affairs

DocuSigned by:
Milton Gorden
0E3402AB6A8446B...
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X Energy, LLC
Siting and Environmental Manager
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M: (240) 803-8580

Enclosure

[4] NRC. 2018.

December 20, 2023

Texas General Land Office
1700 North Congress Avenue
Austin, Texas 78701-1495

RE: Request for Information on Potential Site for a Proposed Small Modular Reactor Generating Plant

Dear Sir or Madam:

X-energy, LLC (X-energy), is conducting environmental evaluations to support a licensing application to the U.S. Nuclear Regulatory Commission (NRC) for construction and operation of a proposed Xe-100 small modular reactor (SMR) for Project Long Mott at Dow's UCC[1] Seadrift Operations site (Seadrift or site). As a subawardee under the U.S. Department of Energy's (DOE) Advanced Reactor Demonstration Program (ARDP) Cooperative Agreement, Dow, the world's leading materials science company, and X-Energy, a leading developer of advanced nuclear reactors and fuel technology for clean energy generation, will demonstrate the first grid-scale advanced nuclear reactor for an industrial site in North America at the Project Long Mott site. Dow intends to work with X-energy to install their Xe-100 high-temperature gas-cooled reactor (HTGR) to provide the site with safe, reliable, low-carbon power and steam.

The Xe-100 reactor is a high temperature gas-cooled reactor. Each unit produces up to 200 megawatts thermal (MWth), and in an electricity-only generating mode produces up to 80-megawatts electric (Mwe) that is scalable up to 320 MWe and 800 MWth for a four-unit advanced nuclear power plant. The Xe-100 reactor uses TRi-structural ISOtropic particle fuel (TRISO-X) manufactured by X-energy's subsidiary TRISO-X, LLC. TRISO-coated fuels are unique in their multi-layer encapsulation of uranium, providing increased safety, proliferation resistance, and functional containment. The proposed Project Long Mott is located on an approximately 1,548-acre site in Calhoun County, Texas adjacent to the existing site.

A license under Title 10 of the Code of Federal Regulations (CFR), Part 50, from the NRC will be required for construction and operation of the proposed Project Long Mott. X-energy will prepare an Environmental Report (ER) to be issued to the NRC. The ER will be prepared pursuant to NUREG[2] 1555 "Standard Review Plans for Environmental Reviews for Nuclear Power Plants" (NRC 2007)[3] and

[1] Union Carbide Corporation (UCC) is a wholly owned subsidiary of the Dow Chemical Company.
[2] In general, a NUREG publication is prepared by NRC and documents regulatory decisions, results of research, results of incident investigations, and other technical and administrative information. NUREG 1555 provides guidance to the NRC staff in implementing provisions of 10 CFR 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," related to nuclear power plants.
[3] U.S. Nuclear Regulatory Commission (NRC). 2007. NUREG 1555. Environmental Standard Review Plan. Standard Review Plans for Environmental Reviews for Nuclear Power Plants. Revision 1. Office of New Reactors, Washington, DC 20555-0001. July.

Regulatory Guide 4.2, "Preparation of Environmental Reports for Nuclear Power Stations," Revision 3 (RG 4.2; NRC 2018)[4]. The NRC decision to issue a license for the proposed facility is a federal action subject to the National Environmental Policy Act (NEPA), which will require that an Environmental Impact Statement (EIS) be prepared by the NRC pursuant to 10 CFR Part 51 to evaluate X-energy's license application.

The Project Site has the available space needed for all activities associated with the proposed SMR facility. The 4-unit Xe-100 SMR plant would supply steam and electric power to the site and allow Dow to retire existing fossil-fuel power generation infrastructure at the Seadrift site. The footprint of the standard 4-unit Xe-100 plant requires approximately 40 acres. The total land area used at the site, however, is expected to be larger due to the required ancillary facilities, such as transmission lines, steam delivery pipelines, site-specific stormwater drainage and management ponds, access roads, and areas used temporarily during construction. The power generating station would be constructed on disturbed land that is currently used for agriculture. Other disturbed agricultural lands within the site have been designated as potential borrow areas.

As part of the planning and evaluation process, and to meet requirements in RG 4.2 Rev 3 and NUREG 1555, we are evaluating the effects of construction and operation on a full range of interdisciplinary resources, including conducting relevant field studies as required. Accordingly, we are requesting information and input from the Texas General Land Office to identify notable environmental permits and authorizations that should be considered in the environmental review of the proposed facility.

In conjunction with the guidance of NUREG 1555, a full range of environmental resources will be considered in the preparation of the ER and the overall licensing process. To assist your consideration of this request, please find attached a figure depicting the project site and vicinity. We respectfully request your review for our consideration in the development of licensing application materials.

We look forward to working with the Texas General Land Office in obtaining the necessary permits to support authorization of this important project.

If you have any questions or comments about the proposed Project Long Mott or the materials provided, please contact me at sgammage@dow.com or (512) 534-5193.

Respectfully,

Sam Gammage
Dow
Director, State Government Affairs

DocuSigned by:
Milton Gorden
0E3402AB6A8446B...

Milton Gorden
X Energy, LLC
Siting and Environmental Manager
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M: (240) 803-8580

Enclosure

[4] NRC. 2018.

December 20, 2023

Texas Historical Commission
P.O. Box 12276
Austin, TX 78701

RE: Request for Information on Potential Site for a Proposed Small Modular Reactor Generating Plant

Dear Sir or Madam:

X-energy, LLC (X-energy), is conducting environmental evaluations to support a licensing application to the U.S. Nuclear Regulatory Commission (NRC) for construction and operation of a proposed Xe-100 small modular reactor (SMR) for Project Long Mott at Dow's UCC[1] Seadrift Operations site (Seadrift or site). As a subawardee under the U.S. Department of Energy's (DOE) Advanced Reactor Demonstration Program (ARDP) Cooperative Agreement, Dow, the world's leading materials science company, and X-Energy, a leading developer of advanced nuclear reactors and fuel technology for clean energy generation, will demonstrate the first grid-scale advanced nuclear reactor for an industrial site in North America at the Project Long Mott site. Dow intends to work with X-energy to install their Xe-100 high-temperature gas-cooled reactor (HTGR) to provide the site with safe, reliable, low-carbon power and steam.

The Xe-100 reactor is a high temperature gas-cooled reactor. Each unit produces up to 200 megawatts thermal (MWth), and in an electricity-only generating mode produces up to 80-megawatts electric (Mwe) that is scalable up to 320 MWe and 800 MWth for a four-unit advanced nuclear power plant. The Xe-100 reactor uses TRi-structural ISOtropic particle fuel (TRISO-X) manufactured by X-energy's subsidiary TRISO-X, LLC. TRISO-coated fuels are unique in their multi-layer encapsulation of uranium, providing increased safety, proliferation resistance, and functional containment. The proposed Project Long Mott is located on an approximately 1,548-acre site in Calhoun County, Texas adjacent to the existing site.

A license under Title 10 of the Code of Federal Regulations (CFR), Part 50, from the NRC will be required for construction and operation of the proposed Project Long Mott. X-energy will prepare an Environmental Report (ER) to be issued to the NRC. The ER will be prepared pursuant to NUREG[2] 1555 "Standard Review Plans for Environmental Reviews for Nuclear Power Plants" (NRC 2007)[3] and

[1] Union Carbide Corporation (UCC) is a wholly owned subsidiary of the Dow Chemical Company.
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[3] U.S. Nuclear Regulatory Commission (NRC). 2007. NUREG 1555. Environmental Standard Review Plan. Standard Review Plans for Environmental Reviews for Nuclear Power Plants. Revision 1. Office of New Reactors, Washington, DC 20555-0001. July.

Regulatory Guide 4.2, "Preparation of Environmental Reports for Nuclear Power Stations," Revision 3 (RG 4.2; NRC 2018)[4]. The NRC decision to issue a license for the proposed facility is a federal action subject to the National Environmental Policy Act (NEPA), which will require that an Environmental Impact Statement (EIS) be prepared by the NRC pursuant to 10 CFR Part 51 to evaluate X-energy's license application.

The Project Site has the available space needed for all activities associated with the proposed SMR facility. The 4-unit Xe-100 SMR plant would supply steam and electric power to the site and allow Dow to retire existing fossil-fuel power generation infrastructure at the Seadrift site. The footprint of the standard 4-unit Xe-100 plant requires approximately 40 acres. The total land area used at the site, however, is expected to be larger due to the required ancillary facilities, such as transmission lines, steam delivery pipelines, site-specific stormwater drainage and management ponds, access roads, and areas used temporarily during construction. The power generating station would be constructed on disturbed land that is currently used for agriculture. Other disturbed agricultural lands within the site have been designated as potential borrow areas.

As part of the planning and evaluation process, and to meet requirements in RG 4.2 Rev 3 and NUREG 1555, we are evaluating the effects of construction and operation on a full range of interdisciplinary resources, including conducting relevant field studies as required. Accordingly, we are requesting information and input from the Texas Historical Commission to identify notable environmental permits and authorizations that should be considered in the environmental review of the proposed facility.

In conjunction with the guidance of NUREG 1555, a full range of environmental resources will be considered in the preparation of the ER and the overall licensing process. To assist your consideration of this request, please find attached a figure depicting the project site and vicinity. We respectfully request your review for our consideration in the development of licensing application materials.

We look forward to working with the Texas Historical Commission in obtaining the necessary permits to support authorization of this important project.

If you have any questions or comments about the proposed Project Long Mott or the materials provided, please contact me at sgammage@dow.com or (512) 534-5193.

Respectfully,

DocuSigned by:
Milton Gorden
0E3402AB0A8446B...

Sam Gammage
Dow
Director, State Government Affairs

Milton Gorden
X Energy, LLC
Siting and Environmental Manager
mgorden@x-energy.com
M: (240) 803-8580

Enclosure

[4] NRC. 2018.

December 20, 2023

Texas Parks and Wildlife Department
Environmental Review Coordinator
4200 Smith School Road
Austin, TX 78744-3291

RE: Request for Information on Potential Site for a Proposed Small Modular Reactor Generating Plant

Dear Sir or Madam:

X-energy, LLC (X-energy), is conducting environmental evaluations to support a licensing application to the U.S. Nuclear Regulatory Commission (NRC) for construction and operation of a proposed Xe-100 small modular reactor (SMR) for Project Long Mott at Dow's UCC[1] Seadrift Operations site (Seadrift or site). As a subawardee under the U.S. Department of Energy's (DOE) Advanced Reactor Demonstration Program (ARDP) Cooperative Agreement, Dow, the world's leading materials science company, and X-Energy, a leading developer of advanced nuclear reactors and fuel technology for clean energy generation, will demonstrate the first grid-scale advanced nuclear reactor for an industrial site in North America at the Project Long Mott site. Dow intends to work with X-energy to install their Xe-100 high-temperature gas-cooled reactor (HTGR) to provide the site with safe, reliable, low-carbon power and steam.

The Xe-100 reactor is a high temperature gas-cooled reactor. Each unit produces up to 200 megawatts thermal (MWth), and in an electricity-only generating mode produces up to 80-megawatts electric (Mwe) that is scalable up to 320 MWe and 800 MWth for a four-unit advanced nuclear power plant. The Xe-100 reactor uses TRi-structural ISOtropic particle fuel (TRISO-X) manufactured by X-energy's subsidiary TRISO-X, LLC. TRISO-coated fuels are unique in their multi-layer encapsulation of uranium, providing increased safety, proliferation resistance, and functional containment. The proposed Project Long Mott is located on an approximately 1,548-acre site in Calhoun County, Texas adjacent to the existing site.

A license under Title 10 of the Code of Federal Regulations (CFR), Part 50, from the NRC will be required for construction and operation of the proposed Project Long Mott. X-energy will prepare an Environmental Report (ER) to be issued to the NRC. The ER will be prepared pursuant to NUREG[2] 1555 "Standard Review Plans for Environmental Reviews for Nuclear Power Plants" (NRC 2007)[3] and Regulatory Guide 4.2,

[1] Union Carbide Corporation (UCC) is a wholly owned subsidiary of the Dow Chemical Company.

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[3] U.S. Nuclear Regulatory Commission (NRC). 2007. NUREG 1555. Environmental Standard Review Plan. Standard Review Plans for Environmental Reviews for Nuclear Power Plants. Revision 1. Office of New Reactors, Washington, DC 20555-0001. July.

"Preparation of Environmental Reports for Nuclear Power Stations," Revision 3 (RG 4.2; NRC 2018)[4]. The NRC decision to issue a license for the proposed facility is a federal action subject to the National Environmental Policy Act (NEPA), which will require that an Environmental Impact Statement (EIS) be prepared by the NRC pursuant to 10 CFR Part 51 to evaluate X-energy's license application.

The Project Site has the available space needed for all activities associated with the proposed SMR facility. The 4-unit Xe-100 SMR plant would supply steam and electric power to the site and allow Dow to retire existing fossil-fuel power generation infrastructure at the Seadrift site. The footprint of the standard 4-unit Xe-100 plant requires approximately 40 acres. The total land area used at the site, however, is expected to be larger due to the required ancillary facilities, such as transmission lines, steam delivery pipelines, site-specific stormwater drainage and management ponds, access roads, and areas used temporarily during construction. The power generating station would be constructed on disturbed land that is currently used for agriculture. Other disturbed agricultural lands within the site have been designated as potential borrow areas.

As part of the planning and evaluation process, and to meet requirements in RG 4.2 Rev 3 and NUREG 1555, we are evaluating the effects of construction and operation on a full range of interdisciplinary resources, including conducting relevant field studies as required. Accordingly, we are requesting information and input from the Texas Parks and Wildlife Department to identify notable environmental permits and authorizations that should be considered in the environmental review of the proposed facility.

In conjunction with the guidance of NUREG 1555, a full range of environmental resources will be considered in the preparation of the ER and the overall licensing process. To assist your consideration of this request, please find attached a figure depicting the project site and vicinity. We respectfully request your review for our consideration in the development of licensing application materials.

We look forward to working with the Texas Parks and Wildlife Department in obtaining the necessary permits to support authorization of this important project.

If you have any questions or comments about the proposed Project Long Mott or the materials provided, please contact me at sgammage@dow.com or (512) 534-5193.

Respectfully,

DocuSigned by:
Milton Gorden
0E3402AB6A8446B...

Sam Gammage
Dow
Director, State Government Affairs

Milton Gorden
X Energy, LLC
Siting and Environmental Manager
mgorden@x-energy.com
M: (240) 803-8580

Enclosure

[4] NRC. 2018.

December 20, 2023

Texas Public Utility Commission
1701 N. Congress Avenue
PO Box 13326
Austin, TX 78711-3326

RE: Request for Information on Potential Site for a Proposed Small Modular Reactor Generating Plant

Dear Sir or Madam:

X-energy, LLC (X-energy), is conducting environmental evaluations to support a licensing application to the U.S. Nuclear Regulatory Commission (NRC) for construction and operation of a proposed Xe-100 small modular reactor (SMR) for Project Long Mott at Dow's UCC[1] Seadrift Operations site (Seadrift or site). As a subawardee under the U.S. Department of Energy's (DOE) Advanced Reactor Demonstration Program (ARDP) Cooperative Agreement, Dow, the world's leading materials science company, and X-Energy, a leading developer of advanced nuclear reactors and fuel technology for clean energy generation, will demonstrate the first grid-scale advanced nuclear reactor for an industrial site in North America at the Project Long Mott site. Dow intends to work with X-energy to install their Xe-100 high-temperature gas-cooled reactor (HTGR) to provide the site with safe, reliable, low-carbon power and steam.

The Xe-100 reactor is a high temperature gas-cooled reactor. Each unit produces up to 200 megawatts thermal (MWth), and in an electricity-only generating mode produces up to 80-megawatts electric (Mwe) that is scalable up to 320 MWe and 800 MWth for a four-unit advanced nuclear power plant. The Xe-100 reactor uses TRi-structural ISOtropic particle fuel (TRISO-X) manufactured by X-energy's subsidiary TRISO-X, LLC. TRISO-coated fuels are unique in their multi-layer encapsulation of uranium, providing increased safety, proliferation resistance, and functional containment. The proposed Project Long Mott is located on an approximately 1,548-acre site in Calhoun County, Texas adjacent to the existing site.

A license under Title 10 of the Code of Federal Regulations (CFR), Part 50, from the NRC will be required for construction and operation of the proposed Project Long Mott. X-energy will prepare an Environmental Report (ER) to be issued to the NRC. The ER will be prepared pursuant to NUREG[2] 1555 "Standard Review Plans for Environmental Reviews for Nuclear Power Plants" (NRC 2007)[3] and Regulatory Guide 4.2,

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"Preparation of Environmental Reports for Nuclear Power Stations," Revision 3 (RG 4.2; NRC 2018)[4]. The NRC decision to issue a license for the proposed facility is a federal action subject to the National Environmental Policy Act (NEPA), which will require that an Environmental Impact Statement (EIS) be prepared by the NRC pursuant to 10 CFR Part 51 to evaluate X-energy's license application.

The Project Site has the available space needed for all activities associated with the proposed SMR facility. The 4-unit Xe-100 SMR plant would supply steam and electric power to the site and allow Dow to retire existing fossil-fuel power generation infrastructure at the Seadrift site. The footprint of the standard 4-unit Xe-100 plant requires approximately 40 acres. The total land area used at the site, however, is expected to be larger due to the required ancillary facilities, such as transmission lines, steam delivery pipelines, site-specific stormwater drainage and management ponds, access roads, and areas used temporarily during construction. The power generating station would be constructed on disturbed land that is currently used for agriculture. Other disturbed agricultural lands within the site have been designated as potential borrow areas.

As part of the planning and evaluation process, and to meet requirements in RG 4.2 Rev 3 and NUREG 1555, we are evaluating the effects of construction and operation on a full range of interdisciplinary resources, including conducting relevant field studies as required. Accordingly, we are requesting information and input from the Texas Public Utility Commission to identify notable environmental permits and authorizations that should be considered in the environmental review of the proposed facility.

In conjunction with the guidance of NUREG 1555, a full range of environmental resources will be considered in the preparation of the ER and the overall licensing process. To assist your consideration of this request, please find attached a figure depicting the project site and vicinity. We respectfully request your review for our consideration in the development of licensing application materials.

We look forward to working with the Texas Public Utility Commission in obtaining the necessary permits to support authorization of this important project.

If you have any questions or comments about the proposed Project Long Mott or the materials provided, please contact Sam Gammage at sgammage@dow.com or (512) 534-5193.

Respectfully,

KYoung

Kreshka Young
Dow
Commercial Energy Director

Enclosure

DocuSigned by:
Milton Gorden
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Milton Gorden
X Energy, LLC
Siting and Environmental Manager
mgorden@x-energy.com
M: (240) 803-8580

[4] NRC. 2018.

December 20, 2023

Texas Water Development Board
1700 North Congress Avenue
Austin, TX 78701

RE: Request for Information on Potential Site for a Proposed Small Modular Reactor Generating Plant

Dear Sir or Madam:

X-energy, LLC (X-energy), is conducting environmental evaluations to support a licensing application to the U.S. Nuclear Regulatory Commission (NRC) for construction and operation of a proposed Xe-100 small modular reactor (SMR) for Project Long Mott at Dow's UCC[1] Seadrift Operations site (Seadrift or site). As a subawardee under the U.S. Department of Energy's (DOE) Advanced Reactor Demonstration Program (ARDP) Cooperative Agreement, Dow, the world's leading materials science company, and X-Energy, a leading developer of advanced nuclear reactors and fuel technology for clean energy generation, will demonstrate the first grid-scale advanced nuclear reactor for an industrial site in North America at the Project Long Mott site. Dow intends to work with X-energy to install their Xe-100 high-temperature gas-cooled reactor (HTGR) to provide the site with safe, reliable, low-carbon power and steam.

The Xe-100 reactor is a high temperature gas-cooled reactor. Each unit produces up to 200 megawatts thermal (MWth), and in an electricity-only generating mode produces up to 80-megawatts electric (Mwe) that is scalable up to 320 MWe and 800 MWth for a four-unit advanced nuclear power plant. The Xe-100 reactor uses TRi-structural ISOtropic particle fuel (TRISO-X) manufactured by X-energy's subsidiary TRISO-X, LLC. TRISO-coated fuels are unique in their multi-layer encapsulation of uranium, providing increased safety, proliferation resistance, and functional containment. The proposed Project Long Mott is located on an approximately 1,548-acre site in Calhoun County, Texas adjacent to the existing site.

A license under Title 10 of the Code of Federal Regulations (CFR), Part 50, from the NRC will be required for construction and operation of the proposed Project Long Mott. X-energy will prepare an Environmental Report (ER) to be issued to the NRC. The ER will be prepared pursuant to NUREG[2] 1555 "Standard Review Plans for Environmental Reviews for Nuclear Power Plants" (NRC 2007)[3] and

[1] Union Carbide Corporation (UCC) is a wholly owned subsidiary of the Dow Chemical Company.
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Regulatory Guide 4.2, "Preparation of Environmental Reports for Nuclear Power Stations," Revision 3 (RG 4.2; NRC 2018)[4]. The NRC decision to issue a license for the proposed facility is a federal action subject to the National Environmental Policy Act (NEPA), which will require that an Environmental Impact Statement (EIS) be prepared by the NRC pursuant to 10 CFR Part 51 to evaluate X-energy's license application.

The Project Site has the available space needed for all activities associated with the proposed SMR facility. The 4-unit Xe-100 SMR plant would supply steam and electric power to the site and allow Dow to retire existing fossil-fuel power generation infrastructure at the Seadrift site. The footprint of the standard 4-unit Xe-100 plant requires approximately 40 acres. The total land area used at the site, however, is expected to be larger due to the required ancillary facilities, such as transmission lines, steam delivery pipelines, site-specific stormwater drainage and management ponds, access roads, and areas used temporarily during construction. The power generating station would be constructed on disturbed land that is currently used for agriculture. Other disturbed agricultural lands within the site have been designated as potential borrow areas.

As part of the planning and evaluation process, and to meet requirements in RG 4.2 Rev 3 and NUREG 1555, we are evaluating the effects of construction and operation on a full range of interdisciplinary resources, including conducting relevant field studies as required. Accordingly, we are requesting information and input from the Texas Water Development Board to identify notable environmental permits and authorizations that should be considered in the environmental review of the proposed facility.

In conjunction with the guidance of NUREG 1555, a full range of environmental resources will be considered in the preparation of the ER and the overall licensing process. To assist your consideration of this request, please find attached a figure depicting the project site and vicinity. We respectfully request your review for our consideration in the development of licensing application materials.

We look forward to working with the Texas Water Development Board in obtaining the necessary permits to support authorization of this important project.

If you have any questions or comments about the proposed Project Long Mott or the materials provided, please contact Sam Gammage at sgammage@dow.com or (512) 534-5193.

Respectfully,

Timothy D. Finley

Tim Finley
Dow
Global Technology Principle for
Water, Wastewater & Cooling

DocuSigned by:
Milton Gorden
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Milton Gorden
X Energy, LLC
Siting and Environmental Manager
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M: (240) 803-8580

Enclosure

[4] NRC. 2018.

December 20, 2023

U.S. Army Corps of Engineers-Galveston District
C/O Jayson Hudson
Corpus Christi Field Office
2000 Fort Point Road
Galveston, Texas 77550

RE: Request for Information on Potential Site for a Proposed Small Modular Reactor Generating Plant

Dear Sir or Madam:

X-energy, LLC (X-energy), is conducting environmental evaluations to support a licensing application to the U.S. Nuclear Regulatory Commission (NRC) for construction and operation of a proposed Xe-100 small modular reactor (SMR) for Project Long Mott at Dow's UCC[1] Seadrift Operations site (Seadrift or site). As a subawardee under the U.S. Department of Energy's (DOE) Advanced Reactor Demonstration Program (ARDP) Cooperative Agreement, Dow, the world's leading materials science company, and X-Energy, a leading developer of advanced nuclear reactors and fuel technology for clean energy generation, will demonstrate the first grid-scale advanced nuclear reactor for an industrial site in North America at the Project Long Mott site. Dow intends to work with X-energy to install their Xe-100 high-temperature gas-cooled reactor (HTGR) to provide the site with safe, reliable, low-carbon power and steam.

The Xe-100 reactor is a high temperature gas-cooled reactor. Each unit produces up to 200 megawatts thermal (MWth), and in an electricity-only generating mode produces up to 80-megawatts electric (Mwe) that is scalable up to 320 MWe and 800 MWth for a four-unit advanced nuclear power plant. The Xe-100 reactor uses TRi-structural ISOtropic particle fuel (TRISO-X) manufactured by X-energy's subsidiary TRISO-X, LLC. TRISO-coated fuels are unique in their multi-layer encapsulation of uranium, providing increased safety, proliferation resistance, and functional containment. The proposed Project Long Mott is located on an approximately 1,548-acre site in Calhoun County, Texas adjacent to the existing site.

A license under Title 10 of the Code of Federal Regulations (CFR), Part 50, from the NRC will be required for construction and operation of the proposed Project Long Mott. X-energy will prepare an Environmental Report (ER) to be issued to the NRC. The ER will be prepared pursuant to NUREG[2] 1555 "Standard Review Plans for Environmental Reviews for Nuclear Power Plants" (NRC 2007)[3] and Regulatory Guide 4.2,

[1] Union Carbide Corporation (UCC) is a wholly owned subsidiary of the Dow Chemical Company.
[2] In general, a NUREG publication is prepared by NRC and documents regulatory decisions, results of research, results of incident investigations, and other technical and administrative information. NUREG 1555 provides guidance to the NRC staff in implementing provisions of 10 CFR 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," related to nuclear power plants.
[3] U.S. Nuclear Regulatory Commission (NRC). 2007. NUREG 1555. Environmental Standard Review Plan. Standard Review Plans for Environmental Reviews for Nuclear Power Plants. Revision 1. Office of New Reactors, Washington, DC 20555-0001. July.

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"Preparation of Environmental Reports for Nuclear Power Stations," Revision 3 (RG 4.2; NRC 2018)[4]. The NRC decision to issue a license for the proposed facility is a federal action subject to the National Environmental Policy Act (NEPA), which will require that an Environmental Impact Statement (EIS) be prepared by the NRC pursuant to 10 CFR Part 51 to evaluate X-energy's license application.

The Project Site has the available space needed for all activities associated with the proposed SMR facility. The 4-unit Xe-100 SMR plant would supply steam and electric power to the site and allow Dow to retire existing fossil-fuel power generation infrastructure at the Seadrift site. The footprint of the standard 4-unit Xe-100 plant requires approximately 40 acres. The total land area used at the site, however, is expected to be larger due to the required ancillary facilities, such as transmission lines, steam delivery pipelines, site-specific stormwater drainage and management ponds, access roads, and areas used temporarily during construction. The power generating station would be constructed on disturbed land that is currently used for agriculture. Other disturbed agricultural lands within the site have been designated as potential borrow areas.

As part of the planning and evaluation process, and to meet requirements in RG 4.2 Rev 3 and NUREG 1555, we are evaluating the effects of construction and operation on a full range of interdisciplinary resources, including conducting relevant field studies as required. Accordingly, we are requesting information and input from the U.S. Army Corps of Engineers to identify notable environmental permits and authorizations that should be considered in the environmental review of the proposed facility.

In conjunction with the guidance of NUREG 1555, a full range of environmental resources will be considered in the preparation of the ER and the overall licensing process. To assist your consideration of this request, please find attached a figure depicting the project site and vicinity. We respectfully request your review for our consideration in the development of licensing application materials.

We look forward to working with the U.S. Army Corps of Engineers in obtaining the necessary permits to support authorization of this important project.

If you have any questions or comments about the proposed Project Long Mott or the materials provided, please contact me at tdfinley@dow.com or (979) 238-5884.

Respectfully,

Timothy D. Finley

Tim Finley
Dow
Global Technology Principle for
Water, Wastewater & Cooling

Enclosure

DocuSigned by:
Milton Gorden
0E3402AB6A8446B...

Milton Gorden
X Energy, LLC
Siting and Environmental Manager
mgorden@x-energy.com
M: (240) 803-8580

[4] NRC. 2018.

December 20, 2023

United States Fish and Wildlife Service
4444 Corona Drive, Suite 215
Corpus Christi, TX 78411

RE: Request for Information on Potential Site for a Proposed Small Modular Reactor Generating Plant

Dear Sir or Madam:

X-energy, LLC (X-energy), is conducting environmental evaluations to support a licensing application to the U.S. Nuclear Regulatory Commission (NRC) for construction and operation of a proposed Xe-100 small modular reactor (SMR) for Project Long Mott at Dow's UCC[1] Seadrift Operations site (Seadrift or site). As a subawardee under the U.S. Department of Energy's (DOE) Advanced Reactor Demonstration Program (ARDP) Cooperative Agreement, Dow, the world's leading materials science company, and X-Energy, a leading developer of advanced nuclear reactors and fuel technology for clean energy generation, will demonstrate the first grid-scale advanced nuclear reactor for an industrial site in North America at the Project Long Mott site. Dow intends to work with X-energy to install their Xe-100 high-temperature gas-cooled reactor (HTGR) to provide the site with safe, reliable, low-carbon power and steam.

The Xe-100 reactor is a high temperature gas-cooled reactor. Each unit produces up to 200 megawatts thermal (MWth), and in an electricity-only generating mode produces up to 80-megawatts electric (Mwe) that is scalable up to 320 MWe and 800 MWth for a four-unit advanced nuclear power plant. The Xe-100 reactor uses TRi-structural ISOtropic particle fuel (TRISO-X) manufactured by X-energy's subsidiary TRISO-X, LLC. TRISO-coated fuels are unique in their multi-layer encapsulation of uranium, providing increased safety, proliferation resistance, and functional containment. The proposed Project Long Mott is located on an approximately 1,548-acre site in Calhoun County, Texas adjacent to the existing site.

A license under Title 10 of the Code of Federal Regulations (CFR), Part 50, from the NRC will be required for construction and operation of the proposed Project Long Mott. X-energy will prepare an Environmental Report (ER) to be issued to the NRC. The ER will be prepared pursuant to NUREG[2] 1555 "Standard Review Plans for Environmental Reviews for Nuclear Power Plants" (NRC 2007)[3] and

[1] Union Carbide Corporation (UCC) is a wholly owned subsidiary of the Dow Chemical Company.
[2] In general, a NUREG publication is prepared by NRC and documents regulatory decisions, results of research, results of incident investigations, and other technical and administrative information. NUREG 1555 provides guidance to the NRC staff in implementing provisions of 10 CFR 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," related to nuclear power plants.
[3] U.S. Nuclear Regulatory Commission (NRC). 2007. NUREG 1555. Environmental Standard Review Plan. Standard Review Plans for Environmental Reviews for Nuclear Power Plants. Revision 1. Office of New Reactors, Washington, DC 20555-0001. July.

Regulatory Guide 4.2, "Preparation of Environmental Reports for Nuclear Power Stations," Revision 3 (RG 4.2; NRC 2018)[4]. The NRC decision to issue a license for the proposed facility is a federal action subject to the National Environmental Policy Act (NEPA), which will require that an Environmental Impact Statement (EIS) be prepared by the NRC pursuant to 10 CFR Part 51 to evaluate X-energy's license application.

The Project Site has the available space needed for all activities associated with the proposed SMR facility. The 4-unit Xe-100 SMR plant would supply steam and electric power to the site and allow Dow to retire existing fossil-fuel power generation infrastructure at the Seadrift site. The footprint of the standard 4-unit Xe-100 plant requires approximately 40 acres. The total land area used at the site, however, is expected to be larger due to the required ancillary facilities, such as transmission lines, steam delivery pipelines, site-specific stormwater drainage and management ponds, access roads, and areas used temporarily during construction. The power generating station would be constructed on disturbed land that is currently used for agriculture. Other disturbed agricultural lands within the site have been designated as potential borrow areas.

As part of the planning and evaluation process, and to meet requirements in RG 4.2 Rev 3 and NUREG 1555, we are evaluating the effects of construction and operation on a full range of interdisciplinary resources, including conducting relevant field studies as required. Accordingly, we are requesting information and input from the U.S. Fish and Wildlife Service to identify notable environmental permits and authorizations that should be considered in the environmental review of the proposed facility.

In conjunction with the guidance of NUREG 1555, a full range of environmental resources will be considered in the preparation of the ER and the overall licensing process. To assist your consideration of this request, please find attached a figure depicting the project site and vicinity. We respectfully request your review for our consideration in the development of licensing application materials.

We look forward to working with the U.S. Fish and Wildlife Service in obtaining the necessary permits to support authorization of this important project.

If you have any questions or comments about the proposed Project Long Mott or the materials provided, please contact Sam Gammage at sgammage@dow.com or (512) 534-5193.

Respectfully,

Heather Lyons

DocuSigned by:
Milton Gorden
0E3492AB6A8446B...

Heather Lyons
Dow
Seadrift Site Leader

Enclosure

Milton Gorden
X Energy, LLC
Siting and Environmental Manager
mgorden@x-energy.com
M: (240) 803-8580

[4] NRC. 2018.

National Environmental Policy Act (NEPA) Determination

Categorical Exclusion

Recipient:	X-Energy, LLC
State:	Texas
Project Title:	Site Characterization Activities Supporting XE-100 Deployment
Funding Opportunity Announcement Number:	DE-FOA-0002271 (Amendment 0002)
Award Number:	DE-NE0009040
OCED NEPA Control Number:	OCED-09040-013-CX

Based on my review of the information concerning the proposed action, as NEPA Compliance Officer (authorized under DOE Policy 451.1), I have made the following determination:

CATEGORICAL EXCLUSION APPENDIX, NUMBER, AND DESCRIPTION: B3.1 Site Characterization and Environmental Monitoring: Site characterization and environmental monitoring (including, but not limited to, siting, construction, modification, operation, and dismantlement and removal or otherwise proper closure (such as of a well) of characterization and monitoring devices, and siting, construction, and associated operation of a small-scale laboratory building or renovation of a room in an existing building for sample analysis). Such activities would be designed in conformance with applicable requirements and use best management practices to limit the potential effects of any resultant ground disturbance. Covered activities include, but are not limited to, site characterization and environmental monitoring under CERCLA and RCRA. (This class of actions excludes activities in aquatic environments. See B3.16 of this appendix for such activities.) Specific activities include but are not limited to: (a) Geological, geophysical (such as gravity, magnetic, electrical, seismic, radar, and temperature gradient), geochemical, and engineering surveys and mapping, and the establishment of survey marks. Seismic techniques would not include large-scale reflection or refraction testing; (b) Installation and operation of field instruments (such as stream-gauging stations or flow-measuring devices, telemetry systems, geochemical monitoring tools, and geophysical exploration tools); (c) Drilling of wells for sampling or monitoring of groundwater or the vadose (unsaturated) zone, well logging, and installation of water-level recording devices in wells; (d) Aquifer and underground reservoir response testing; (e) Installation and operation of ambient air monitoring equipment; (f) Sampling and characterization of water, soil, rock, or contaminants (such as drilling using truck- or mobile-scale equipment, and modification, use, and plugging of boreholes); (g) Sampling and characterization of water effluents, air emissions, or solid waste streams; (h) Installation and operation of meteorological towers and associated activities (such as assessment of potential wind energy resources); (i) Sampling of flora or fauna; and (j) Archeological, historic, and cultural resource identification in compliance with 36 CFR part 800 and 43 CFR part 7.

Rationale for Determination:

In February 2021, the U.S. Department of Energy's (DOE) Advanced Reactor Demonstration Program entered into a cooperative agreement with X-energy for the development and demonstration of an advanced nuclear reactor. Prior to entering into the cooperative agreement with X-energy, DOE completed a NEPA review and issued a categorical exclusion for design, planning, and administrative activities. The scope of the cooperative agreement includes, among other elements, the development and operation of a training facility. DOE completed a NEPA review and issued a categorical exclusion for the following activities: development and operation of a training facility in February 2023; non-ground disturbing site characterization and environmental monitoring in April 2023; and installation of support trailers in August 2023. DOE has provided initial funding to X-energy in support of those activities. Authorization of federal funding for other project activities is contingent upon additional NEPA review.

At this time, DOE's Office of Clean Energy Demonstrations (OCED) is proposing to provide funding to X-energy (XE), under the existing cooperative agreement, to conduct siting activities for the Xe-100 advanced nuclear reactor in the Gulf Coast of Texas. The activities listed below are a portion of the complete scope of work to be completed for the site characterization and environmental monitoring activities which were divided into ground disturbing and non-ground disturbing activities. A CX was completed for the non-ground disturbing activities in April 2023. XE is proposing to perform the following ground disturbing site characterization and environmental monitoring activities.

- Sampling and characterization of water, soil, rock, or contaminants (such as drilling using truck- or mobile-scale equipment, and modification, use, and plugging of boreholes).
- Installation and operation of field instruments (such as stream-gauging stations or flow-measuring devices).
- Drilling of wells for sampling and monitoring of groundwater or the vadose (unsaturated) zone, well logging, and installation of water-level recording devices in wells.
- Installation and operation of ambient air monitoring equipment to a) validate air quality assumptions, b) establish a baseline for monitoring environmental and worker impacts and development of the Radiological Environmental Monitoring Program (REMP), and c) to augment the use of existing monitoring data.
- Installation, operation and monitoring of a <200' meteorological tower to meet NRC RG 1.23 "Meteorological Monitoring Programs for Nuclear Power Plants" and to support radiological release and accident analysis assessments and air quality permitting and development of the REMP.

DOE has considered potential impacts on resources, including those of an ecological, historical, and cultural nature. Preliminary research indicated that there was potential for historic and/or cultural resources to be present at the proposed site. A Class III cultural resources survey was completed the week of July 10th, 2023. Based on the findings of that survey, DOE completed consultation with the Texas State Historic Preservation Office (TX SHPO) and Tribes with ancestral ties to the project area including the Apache Tribe of Oklahoma, Cheyenne & Arapaho Tribes, Comanche Nation, Kiowa Indian Tribe of Oklahoma, Mescalero Apache Tribe, Shawnee Tribe, Tonkawa Tribe of Oklahoma, and the Tunica Biloxi Tribe of Louisiana. DOE received concurrence from TX SHPO on our finding of no historic properties or cultural resources present in the project area and received one comment from the Shawnee Tribe that the project is located outside of the Tribe's area of interest. Therefore, DOE does not anticipate adverse impacts to any sensitive resources as a result of the proposed ground disturbing activities.

☒The proposed action (or the part of the proposal defined in the Rationale above) fits within a class of actions that is listed in Appendix A or B to 10 CFR Part 1021, Subpart D. To fit within the classes of actions listed in 10 CFR Part 1021, Subpart D, Appendix B, a proposal must be one that would not:

(1) threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, or similar requirements of DOE or Executive Orders;

(2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities (including incinerators), but the proposal may include categorically excluded waste storage, disposal, recovery, or treatment actions or facilities;

(3) disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that preexist in the environment such that there would be uncontrolled or unpermitted releases;

(4) have the potential to cause significant impacts on environmentally sensitive resources, including, but not limited to, those listed in paragraph B (4) of 10 CFR Part 1021, Subpart D, Appendix B;

(5) involve genetically engineered organisms, synthetic biology, governmentally designated noxious weeds, or invasive species, unless the proposed activity would be contained or confined in a manner designed and operated to prevent unauthorized release into the environment and conducted in accordance with applicable requirements, such as those listed in paragraph B (5) of 10 CFR Part 1021, Subpart D, Appendix B.

☒There are no extraordinary circumstances related to the proposed action that may affect the significance of the environmental effects of the proposal. The proposed action has not been segmented to meet the definition of a categorical exclusion.

☒This proposal is not connected to other actions with potentially significant impacts (40 CFR 1501.9(e)(1)), is not related to other actions with individually insignificant but cumulatively significant impacts (40 CFR 1508.1(g)(3)) and is not precluded by 40 CFR 1506.1 or 10 CFR 1021.211 concerning limitations on actions during preparation of an environmental impact statement.

☐DOE has determined that work to be carried out outside of the United States, its territories and possessions is exempt from further review pursuant to Section 5.1.1 of the DOE Final Guidelines for Implementation of Executive Order 12114; "Environmental Effects Abroad of Major Federal Actions."

☐The proposed action is categorically excluded from further NEPA review.

☒ A portion of the proposed action is categorically excluded from further NEPA review.

Notes: This categorical exclusion applies to those activities associated with the ground disturbing activities for site characterization and environmental monitoring. Any changes to the project activities or location are subject to additional NEPA review by DOE and are not authorized for federal funding unless and until the Contracting Officer provides written authorization on those additions or modifications.

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

OCED NEPA Compliance Officer Signature: Kristin Kerwin Digitally signed by Kristin Kerwin Date: 2023.09.05 13:28:15 -06'00'

Date:

From: Tamsky, David
To: Boulware, Karen
Subject: FW: FPPA - Proposed Long Mott Energy, LLC SMR Power Generation Facility Project in Calhoun, Texas
Date: Wednesday, August 21, 2024 2:21:02 PM
Attachments: Long Mott SMR Power Generators Project_FPPA_Letter.pdf
Long Mott SMR Project_TX057_AD-1006.pdf

From: Holle, Chris - FPAC-NRCS, TX <chris.holle@usda.gov>
Sent: Tuesday, August 20, 2024 11:30 AM
To: Tamsky, David <David.Tamsky@wsp.com>
Cc: Stahnke, Alan - FPAC-NRCS, TX <alan.stahnke@usda.gov>; Anderson, Ashley - FPAC-NRCS, TX <ashley.anderson@usda.gov>
Subject: FPPA - Proposed Long Mott Energy, LLC SMR Power Generation Facility Project in Calhoun, Texas

David,

Attached you will find the AD-1006 and letter for the Proposed Long Mott Energy, LLC SMR Power Generation Facility Project. This project scored over 160, which is the exemption threshold. Since the score was over 160 but under 220, you have 2 options.

1. Submit 2 alternative site locations and choose the one with the lowest rating, **OR**

2. If there are **overriding** reasons for the site location for the project, such as; proximity to already established infrastructure, feasibility for project success, project benefits for customers due to increased usage in the area, etc., include that reasoning in a letter to U.S. Nuclear Regulatory Commission (NRC) and submit it with the 2 attachments I sent today.

If you have any questions, please let me know.

Chris Holle
USDA-NRCS
101 S. Main
Temple, Texas
(254) 742-9951

This electronic message contains information generated by the USDA solely for the intended recipients. Any unauthorized interception of this message or the use or disclosure of the information it contains may violate the law and subject the violator to civil or criminal penalties. If you believe you have received this message in error, please notify the sender and delete the email immediately.

Natural Resources Conservation Service
U.S. DEPARTMENT OF AGRICULTURE

Texas State Office
101 S. Main Street
Temple, TX, 76501

August 20, 2024

WSP

Attention: David Tamsky, Assistant Environmental Planner, Earth and Environment

Subject: Proposed Long Mott Energy, LLC SMR Power Generation Facility Project in Calhoun County, Texas

We have reviewed the information provided in your correspondence dated August 15, 2024 concerning the proposed Long Mott Energy, LLC SMR Power Generation Facility Project in Calhoun County, Texas. This review is part of the National Environmental Policy Act (NEPA) evaluation for the United States Nuclear Regulatory Commission (NRC). We have evaluated the proposed site as required by the Farmland Protection Policy Act (FPPA).

The proposed site for the power generation facility contains areas of Prime Farmland and we have completed the Farmland Conversion Impact Rating form (AD-1006) for the proposed site. The combined rating of the site is **190**. If the total of points is between 160 and 220, at least two other alternatives need to be evaluated and the one with the lowest number of points selected unless there are other overriding considerations. In these cases, documentation should clearly show why the alternative with the higher total of points was selected and explain any other overriding considerations.

If you have further questions, please contact me at (254) 742-9951 or by email at chris.holle@usda.gov.

Sincerely,

Chris Holle

Chris Holle
USDA/NRCS

Attachment: Long Mott SMR Project_TX057_AD-1006

Natural Resources Conservation Service
USDA is an equal opportunity provider, employer, and lender.

Year of the Dragon

In Chinese Folklore, the Chinese dragon is a symbol of wisdom , power, wealth, and good luck.

Therefore, dragon dances are performed during festive occasions as amends to chase away bad times and usher in prosperous times.

We thank the 8th grade class of Our Lady of the Gulf Catholic School for performing the Dragon Dance tonight. We also want to thank the Comfort Community Church for their performance of their traditional song and folk dances.

May everyone have a New Year filled with joy and goodness!

You are invited to join the students of Our Lady of the Gulf Catholic School for their full performance to celebrate the Lunar New Year: Year of the Dragon on Tuesday, February 13 at 2:30pm in the school gym. The Comfort Community Church also invites you to their Lunar New Year Celebration on Sunday, February 11, 2024 from 2-4 p.m.

Welcome to the Texas Municipal League Region 11 Quarterly Meeting

Happy Lunar New Year 2024

Hosted by the City of Port Lavaca
February 2, 2024

2023-2024 TML Region 11 Officers

President Robin Alaniz, Alderperson, Goliad

1st Vice President Jesse Falcon, Mayor Pro Tem, Odem

2nd Vice President Leonard Anzaldua, Councilmember, Refugio

Secretary Vacant

TML Director Cathy Skurow, Mayor, Portland

City of Port Lavaca City Council

Mayor, Jack Whitlow

Councilmember District 1, Daniel Aguirre

Councilmember District 2, Tim Dent

Councilmember District 3, W. Allen Tippit, Jr.

Councilmember District 4, Rosie Padron

Councilmember District 5, Jim Ward

Councilmember District 6, Ken Barr

City of Port Lavaca Administration

Interim City Manager, JoAnna P. "Jody" Weaver

City Secretary, Mandy Grant

Fire Chief, Joe Reyes

Police Chief, Colin Rangnow

Public Works Director, Wayne Shaffer

Director of Development Services, Derrick Smith

Acting Finance Director, Brittney Hogan

TML REGION 11 MEETING

5:30 p.m. to 6:30 p.m.	Social Hour
6:30 p.m.	Dinner/Entertainment/ Business Meeting/Presentations

Notice is hereby given of a meeting of the Texas Municipal League Region 11 of Texas to be held on Friday, February 02, 2024 beginning at 6:30 p.m. at the Bauer Community Center, 2300 Hwy 35 North, Port Lavaca, Texas for the purpose of considering the following agenda items. All agenda items are subject to action.

BUSINESS MEETING AGENDA

1. Welcome	Mayor Jack Whitlow, City of Port Lavaca
2. Pledge of Allegiances:	
	United States Flag
	Texas Flag
3. Invocation:	Reverend Tommy Chen, Pastor (Our Lady of the Gulf Church)
4. Dinner:	Prepared by Inteplast Lolita Café
Entertainment:	Our Lady of the Gulf Church; and Comfort Community Church
5. Call to Order:	Robin Alaniz, TML Region 11 President Councilmember, City of Goliad
6. Roll Call:	Becky Miska, TML Region 11 Secretary City Secretary, City of Goliad
7. Approval of the Minutes:	
	September 29, 2023
8. Presentation:	DOW Chemical Company; andX-energy SMR Nuclear Plant Project
9. Reports:	
	TML Region 11 Report – TML Director Cathy Skurow, Mayor, City of Portland
10. New Business:	
	Meeting Date and Host for next quarterly meeting
11. Closing Remarks by Presiding Officer	
12. Adjournment	

Calhoun County Groundwater Conservation District

131-A N. Virginia St., Port Lavaca, Texas 77979
P.O. Box 1395, Port Lavaca, Texas 77979
Phone (361) 482-0357 | Fax (361) 482-0303 | www.calhouncountygcd.org

THE STATE OF TEXAS
CALHOUN COUNTY
The Board of Directors of the Calhoun County Groundwater Conservation District convened a meeting at the Coastal Center, 131-A N. Virginia St, Port Lavaca TX 77979, Calhoun County, on July 24, 2023, at 5:30 PM.

Meeting Attendance:

Precinct 1:	Mr. Steven Dierschke, Director	Present
Precinct 2:	Mr. Wesley Brett, Vice-President	Absent
Precinct 3:	Mr. Galen Johnson, Secretary	Present
Precinct 4:	Mr. Michael Hahn, Treasurer	Absent
At Large:	Mr. Harold May, President	Present
General Manager:	Mr. Timothy Andruss	Present
Legal Counsel:	Mr. James Allison	Present

Agenda Items -

Agenda Item 1: Call the meeting to order and welcome guests.

Meeting Discussion: Mr. May called the meeting to order at 5:30 PM.

Board Action: None.

Agenda Item 2: Receive public comments.

Meeting Discussion: None.

Board Action: None.

Agenda Item 3: Consideration of and possible action on matters related to groundwater management including the efforts and activities of the District regarding permitting, complaints, investigations, violations, and enforcement cases associated with permitting.

3.0 – Report regarding Groundwater Management

Meeting Discussion: Mr. Andruss explained as of July 23, staff had received 24 well registration applications, 1 production permit renewal request, initiated 37 permitting request cases, 4 permitting request cases pending, and processed 34 groundwater production reports.

Calhoun County Groundwater Conservation District
131-A N. Virginia St., Port Lavaca, Texas 77979
P.O. Box 1395, Port Lavaca, Texas 77979
Phone (361) 482-0357 | Fax (361) 482-0303 | www.calhouncountygcd.org

The staff also had 1 open investigation related to groundwater management associated with 4 different entities, and had 3 open enforcement cases related to groundwater management.

Board Action: None.

3.1 – Presentation regarding the Proposed Nuclear Reactors at the Dow Seadrift Plant.

Meeting Discussion: Mr. Andruss explained after learning of the proposed nuclear reactors at the DOW Seadrift Plant, staff contacted Mr. Daniel Womack and Mr. Sam Gammage of DOW Governmental Affairs for the purposes of arranging for a presentation on the proposed project and the impact, if any, on local water resources. On July 10, 2023, Mr. Womack confirmed that he had made the necessary arrangements for a presentation to be made at this meeting.

The following representatives were present, and gave their presentation:

- Sam Gammage – Dow
- Mark Feltner - Dow
- Marcy Sanderson – X-Energy
- Garrett McLead – Dow
- Milton Gorden – X-Energy
- Joe Smith - Dow

Board Action: None.

3.2 – Groundwater Production Reporting for CY2022

Meeting Discussion: Mr. Andruss explained as of July 23, 2023, staff have process 34 groundwater production reports for 62 wells for calendar year 2022 reporting 7,649 acre-feet of groundwater production.

Board Action: None.

3.3 – Production Permit Renewals for FY2023

Meeting Discussion: Mr. Andruss explained based on a query of the district's database, 1 production permit has been identified as candidates for renewal in FY2023: OPW-20190513-01.

Staff attempted to assist the permittee with the submittal of permit renewal requests before the expiration of the associated permits.

Calhoun County Groundwater Conservation District

131-A N. Virginia St., Port Lavaca, Texas 77979
P.O. Box 1395, Port Lavaca, Texas 77979
Phone (361) 482-0357 | Fax (361) 482-0303 | www.calhouncountygcd.org

As of July 21, 2023, staff had received administratively complete application seeking the renewal of production permit scheduled to expire in July 2023:

1. Permitting Request Cases - PRC-20230721-01 - ARP-20230510-01 - Trinity Shores Dr. LLC. - Pending.

The submitted production permit renewal application is administratively complete and satisfy the requirements related to production permit renewal established by RULE 4.4: GENERAL PROCEDURES RELATED TO RENEWAL AND AMENDMENT OF PERMITS of the rules of the district.

Board Action: Mr. Dierschke moved to authorize the general manager to issue production permit renewals for the permits associated with the following renewal requests in accordance with the Rules of the District:

1. Permitting Request Cases - PRC-20230721-01 - ARP-20230510-01 - Trinity Shores Dr. LLC. - Pending.

Mr. Johnson seconded the motion. The motion passed unanimously.

3.4 – Permit Hearing – PRC-20230315-03 – Farmers Transport

Meeting Discussion: Mr. Andruss explained Mr. Jesse Wood for Farmers Transport seeks, under permitting request case PRC-20230315-03, a historic-use production permit protecting the historic production of groundwater from grandfathered well GW-00082 for commercial uses at rates not to exceed 200 gallons per minute or 29.88 acre-feet per year. The subject well is located on a 6.29-acre tract of land near the intersection of County Rd. 306 and Sunidolfin Dr. in Calhoun County, Texas.

The applications and supplemental information associated with this permitting request case are considered administratively complete and contain sufficient information evaluate the request relative to the rules of the district. The applicant has not submitted a request for a district waiver in connection with the permitting request.

The application includes an affidavit, executed by Mr. Jesse Wood, regarding the evidence of historic use submitted in the application that states "The evidence of historic use submitted to support the validation of the historic use of the well located at: Latitude: 28.6559088 N, Longitude: -96.4211717 W is to the best of my knowledge and belief true and correct and that all available information concerning groundwater production of the subject well during the historic use validation year has been provided to the district with this application." The application includes supplemental documentation containing the TWDB Water Use Survey (Survey Number: 0829478) for the subject well for calendar year

Calhoun County Groundwater Conservation District

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2011. The survey indicates the subject well produced 9,765,400 gallons in year 2011 (29.96 acre-feet).

Based on the review of the information provided within the associated application and supplemental information provided by the applicant, management has determined that the request is consistent with the policies and rules of the district.

On May 19, 2023, staff completed the public notice requirements for the hearing.

As of July 23, 2023, the district had not received any notices of intent to contest the permitting request.

Board Action: Mr. Johnson moved to 1) cancel the permit hearing and proceed with the permitting case as an uncontested matter; and 2) issue a production permit for historic use of a well to Farmers Transport for the subject well under permitting request case PRC-20230315-03 with the following parameters and conditions and the requirements established in the rules of the district now in effect:

Permit Identification Number: HUPPW-20230723-01
Associated Application Number: AVHUW-20230208-01
Subject Non-Grandfathered Wells: GW-00082
Authorized Groundwater Production Amount: 29.88 acre-feet per year
Authorized Groundwater Production Purpose: Commercial Uses
Well Owner: Farmers Transport
Owner of Groundwater Resources: Farmers Transport
Authorized Operator: Farmers Transport
Reporting Requirements: per RULE 4.2: REPORTING REQUIREMENT RELATED TO NON-EXEMPT-USE WELLS

1. The authorized operator of a permit shall report to the district any monitoring data required under the permit within thirty days (30 days) of the close of the relevant reporting period unless specified otherwise within the rules of the district or the permit.
2. The well owner of a non-exempt-use well shall report the volume of groundwater produced from the non-exempt-use well to the district on an annual basis.
3. The well owner, authorized agent, or the authorized operator of a production permit shall measure the volume of produced groundwater from each of the subject wells using a device or method that is accurate within ten percent (10%) of the actual volume produced.
4. The well owner of a non-exempt-use well shall report the volume of groundwater produced from the non-exempt-use well that is accurate within ten percent (10%) of the actual volume of groundwater produced by the non-exempt use during the calendar year.

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5. The well owner of a non-exempt-use well shall report the volume of groundwater produced from the non-exempt-use well for the previous calendar year (January 1 to December 31) during January of the current calendar year.

6. The well owner of a non-exempt-use well shall report the volume of groundwater produced from the non-exempt-use well using a form provided by the district.

7. The well owner of a non-exempt-use well shall include the following information when reporting the volume of groundwater produced from a non-exempt-use well:

7.1. the well registration number assigned by the district;

7.2. the production permit identification number;

7.3. the reporting period;

7.4. the volume of groundwater produced during the reporting period in acre-foot;

7.5. the method used to determine the volumes of groundwater produced during the reporting period;

7.6. a statement certifying, under penalty of law, that the information reported on and attached to the report was prepared under the direction or supervision of the well owner and is, to the best of the knowledge and belief of the well owner, true, accurate and complete;

7.7. the printed name of the person submitting the report; and

7.8. the dated signature of the person submitting the report.

Mr. Dierschke seconded the motion. The motion passed unanimously.

3.5 – Permit Hearing – PRC-20230512-01 – Port Alto HOA District 1

Meeting Discussion: Mr. Andruss explained Mr. Harold Green for Port Alto HOA District 1 seeks, under permitting request case PRC-20230512-01, a historic-use production permit protecting the historic production of groundwater from a grandfathered well field comprised of grandfathered well GW-00080 and grandfathered well GW-00081 for Public Water Supply uses at rates not to exceed 68 gallons per minute or 13.350 acre-feet per year. The subject well field is located on a 0.18-acre tract of land near the intersection of Spur 159 and County Rd. 307 Calhoun County, Texas.

The applications and supplemental information associated with this permitting request case are considered administratively complete and contain sufficient information evaluate the request relative to the rules of the district. The applicant has not submitted a request for a district waiver in connection with the permitting request.

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The application includes an affidavit, executed by Mr. Harold Green, regarding the evidence of historic use submitted in the application that states "The evidence of historic use submitted to support the validation of the historic use of the well field located at: Latitude: 28.662789 N, Longitude: -96.41178 W is to the best of my knowledge and belief true and correct and that all available information concerning groundwater production of the subject well during the historic use validation year has been provided to the district with this application." The application includes supplemental documentation containing the TWDB Water Use Survey (Survey Number: 0690176) for the subject well field for calendar year 2009. The survey indicates the subject well produced 4,350,400 gallons in year 2009 (13.35 acre-feet).

Based on the review of the information provided within the associated application and supplemental information provided by the applicant, management has determined that the request is consistent with the policies and rules of the district.

On May 19, 2023, staff completed the public notice requirements for the hearing.

As of July 23, 2023, the district had not received any notices of intent to contest the permitting request.

Board Action: Mr. Johnson moved to 1) cancel the permit hearing and proceed with the permitting case as an uncontested matter; and 2) issue a production permit for historic use of a well field to Port Alto HOA District 1 for the subject well field under permitting request case PRC-20230512-01 with the following parameters and conditions and the requirements established in the rules of the district now in effect:

Permit Identification Number: HUPPWF-20230723-02
Associated Application Number: AVHUWF-20230512-01
Subject Non-Grandfathered Wells: GW-00080, GW-00081
Authorized Groundwater Production Amount: 13.35 acre-feet per year
Authorized Groundwater Production Purpose: Public Water Supply Uses
Well Owner: Port Alto HOA District 1
Owner of Groundwater Resources: Port Alto HOA District 1
Authorized Operator: Port Alto HOA District 1
Reporting Requirements: per RULE 4.2: REPORTING REQUIREMENT RELATED TO NON-EXEMPT-USE WELLS

1. The authorized operator of a permit shall report to the district any monitoring data required under the permit within thirty days (30 days) of the close of the relevant reporting period unless specified otherwise within the rules of the district or the permit.

2. The well owner of a non-exempt-use well shall report the volume of groundwater produced from the non-exempt-use well to the district on an annual basis.

3. The well owner, authorized agent, or the authorized operator of a production permit shall measure the volume of produced groundwater from each of the subject wells using a device or method that is accurate within ten percent (10%) of the actual volume produced.

4. The well owner of a non-exempt-use well shall report the volume of groundwater produced from the non-exempt-use well that is accurate within ten percent (10%) of the actual volume of groundwater produced by the non-exempt use during the calendar year.

5. The well owner of a non-exempt-use well shall report the volume of groundwater produced from the non-exempt-use well for the previous calendar year (January 1 to December 31) during January of the current calendar year.

6. The well owner of a non-exempt-use well shall report the volume of groundwater produced from the non-exempt-use well using a form provided by the district.

7. The well owner of a non-exempt-use well shall include the following information when reporting the volume of groundwater produced from a non-exempt-use well:

7.1. the well registration number assigned by the district;

7.2. the production permit identification number;

7.3. the reporting period;

7.4. the volume of groundwater produced during the reporting period in acre-foot;

7.5. the method used to determine the volumes of groundwater produced during the reporting period;

7.6. a statement certifying, under penalty of law, that the information reported on and attached to the report was prepared under the direction or supervision of the well owner and is, to the best of the knowledge and belief of the well owner, true, accurate and complete;

7.7. the printed name of the person submitting the report; and

7.8. the dated signature of the person submitting the report.

Mr. Diershcke seconded the motion. The motion passed unanimously.

3.6 – Permit Hearing – PRC-20230626-01 – Port Alto WSC

Meeting Discussion: Mr. Andruss explained Mr. John Warren Schuhsler for Port Alto WSC seeks, under permitting request case PRC-20230626-01, a historic-use production permit protecting the historic production of groundwater from a grandfathered well field comprised of grandfathered well GW-00086 and grandfathered well GW-00087 for public water supply uses at rates not to exceed 50 gallons per minute or 10.10 acre-feet per year. The subject well field is located on a 27.55-acre tract of land near the intersection of Flamingo Street and County Road 307 in Calhoun County, Texas.

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The applications and supplemental information associated with this permitting request case are considered administratively complete and contain sufficient information evaluate the request relative to the rules of the district. The applicant has not submitted a request for a district waiver in connection with the permitting request.

The application includes an affidavit, executed by Mr. John Schuhsler, regarding the evidence of historic use submitted in the application that states "The evidence of historic use submitted to support the validation of the historic use of the well field with wells located at: Latitude: 28.662789 N, Longitude: -96.41178 W is to the best of my knowledge and belief true and correct and that all available information concerning groundwater production of the subject well during the historic use validation year has been provided to the district with this application." The application includes supplemental documentation containing the TWDB Water Use Survey (Survey Number: 0690177) for the subject well field for calendar year 2011. The survey indicates the subject well produced 3,291,400 gallons in year 2011 (10.10 acre-feet).

Based on the review of the information provided within the associated application and supplemental information provided by the applicant, management has determined that the request is consistent with the policies and rules of the district.

On June 30, 2023, staff completed the public notice requirements for the hearing.

As of July 23, 2023, the district had not received any notices of intent to contest the permitting request.

Board Action: Mr. Dierschke moved to 1) cancel the permit hearing and proceed with the permitting case as an uncontested matter; and 2) issue a production permit for historic use of a well field to Port Alto WSC for the subject well field under permitting request case PRC-20230626-01 with the following parameters and conditions and the requirements established in the rules of the district now in effect:

Permit Identification Number: HUPPWF-20230723-03
Associated Application Number: AVHUWF-20230621-01
Subject Non-Grandfathered Wells: GW-00086, GW-00087
Authorized Groundwater Production Amount: 10.10 acre-feet per year
Authorized Groundwater Production Purpose: Public Water Supply Uses
Well Owner: Port Alto WSC
Owner of Groundwater Resources: Port Alto WSC
Authorized Operator: Port Alto WSC
Reporting Requirements: per RULE 4.2: REPORTING REQUIREMENT RELATED TO NON-EXEMPT-USE WELLS

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1. The authorized operator of a permit shall report to the district any monitoring data required under the permit within thirty days (30 days) of the close of the relevant reporting period unless specified otherwise within the rules of the district or the permit.
2. The well owner of a non-exempt-use well shall report the volume of groundwater produced from the non-exempt-use well to the district on an annual basis.
3. The well owner, authorized agent, or the authorized operator of a production permit shall measure the volume of produced groundwater from each of the subject wells using a device or method that is accurate within ten percent (10%) of the actual volume produced.
4. The well owner of a non-exempt-use well shall report the volume of groundwater produced from the non-exempt-use well that is accurate within ten percent (10%) of the actual volume of groundwater produced by the non-exempt use during the calendar year.
5. The well owner of a non-exempt-use well shall report the volume of groundwater produced from the non-exempt-use well for the previous calendar year (January 1 to December 31) during January of the current calendar year.
6. The well owner of a non-exempt-use well shall report the volume of groundwater produced from the non-exempt-use well using a form provided by the district.
7. The well owner of a non-exempt-use well shall include the following information when reporting the volume of groundwater produced from a non-exempt-use well:
    7.1. the well registration number assigned by the district;
    7.2. the production permit identification number;
    7.3. the reporting period;
    7.4. the volume of groundwater produced during the reporting period in acre-foot;
    7.5. the method used to determine the volumes of groundwater produced during the reporting period;
    7.6. a statement certifying, under penalty of law, that the information reported on and attached to the report was prepared under the direction or supervision of the well owner and is, to the best of the knowledge and belief of the well owner, true, accurate and complete;
    7.7. the printed name of the person submitting the report; and
    7.8. the dated signature of the person submitting the report.

Mr. Johnson seconded the motion. The motion passed unanimously.

3.7 – Enforcement Hearing re ECV-20230425-03 – Juan Cruz Cervantes – Failure to Report Groundwater Production CY2022

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Meeting Discussion: Mr. Andruss explained on April 24, 2023, the Board passed a motion to:
1. find that Juan Cruz Cervantes violated RULE 4.2: REPORTING REQUIREMENT RELATED TO NON-EXEMPTUSE WELLS of the Rules of the District related to well NW-00087 unless evidence to the contrary or evidence of relevant extenuating circumstances is submitted to the District;
2. authorize the General Manager to initiate an enforcement case regarding the violation;
3. set a $100.00 penalty for the violation per RULE 11.10: PENALTIES of the Rules of the District; and
4. offer to settle the violation if Juan Cruz Cervantes consents to the following conditions:
    1. acknowledges the violation by June 30, 2023;
    2. pays a settlement fee of $0.00 by June 30, 2023; and
    3. submits a administratively complete groundwater production report for calendar year 2022 by June 30, 2023.

In response to the action taken by the Board, staff recorded violation ECV-20230425-03

On May 2, 2023, staff attempted to provide notice of violation ECV-20230425-03 to Juan Cruz Cervantes by certified mail (CMRRR 7021 0350 0000 2790 7553).

On June 1, 2023, staff attempted to provide notice of violation ECV-20230425-03 to Juan Cruz Cervantes by certified mail (CMRRR 7021 0350 0000 2790 9083).

On July 6, 2023, the staff attempted to provide notice of this enforcement hearing and intent to seek authorization to pursue enforcement of the rules by filing a civil suit against Juan Cruz Cervantes at the next regularly scheduled meeting of the board of directors to Juan Cruz Cervantes by certified mail (CMRRR 7021 0350 0000 2790 9267).

On July 14, 2023, Mr. Allison, Legal Counsel for the District, provided a draft enforcement order regarding this matter. If adopted, the order would record the finds of the board including:
1. impose penalties established by the Board,
2. cancel any permits associated with the subject well,
3. prohibit production from the subject well until a production permit were reinstated,
4. order staff to seal the subject well to prevent further production, and
5. instruct Legal Counsel to file suit if necessary to enforce the order.

On July 13, 2023, the staff of the District attempted to deliver notice of need to file suit letter to Mr. Cervantes.

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Mr. Cervantes did not appear at the meeting.

Board Action: The enforcement hearing was opened and recessed at 6:27 PM by motion of Mr. Johnson. Mr. Dierschke seconded the motion. The motion passed unanimously.

Mr. Johnson moved to instruct the General Manager to attempt to notify Juan Cruz Cervantes that if the required groundwater production report for calendar year 2022 is not submitted September 30, 2023, by the District, the Board of Directors will consider entering a finding that:
1. Juan Cruz Cervantes has committed a violation of District Rule 4.2 REPORTING REQUIREMENT RELATED TO NON-EXEMPT USE WELLS by failing to report groundwater production for calendar year 2022 for non-exempt well NW-00087 and that such violation is continuing. Each day of continued failure to report the groundwater production for calendar year 2022 constitutes a separate violation.
2. The penalty for this violation is assessed at $2,000.00. Additional penalties are assessed at $50.00 per day for each day following adoption of this order until the groundwater production for 2022 is properly reported.
3. Further, any associated permit for well No. NW-00087 is hereby cancelled and further production is prohibited from the well until said permit is reinstated by the district. District staff is ordered to place a seal upon the well to prevent further production.
4. Legal Counsel is hereby instructed to file suit if necessary to enforce this order.

Mr. Dierschke seconded the motion. The motion passed unanimously.

3.8 – Enforcement Hearing re ECV-20230425-04 – CBPB Partners, LLC. – Failure to Report Groundwater Production CY2022

Meeting Discussion: Mr. Andruss explained on April 24, 2023, the Board passed a motion to:
1. find that CBPB Partners, LLC violated RULE 4.2: REPORTING REQUIREMENT RELATED TO NON-EXEMPTUSE WELLS of the Rules of the District related to well NW-00133 unless evidence to the contrary or evidence of relevant extenuating circumstances is submitted to the District;
2. authorize the General Manager to initiate an enforcement case regarding the violation;
3. set a $100.00 penalty for the violation per RULE 11.10: PENALTIES of the Rules of the District; and
4. offer to settle the violation if CBPB Partners, LLC consents to the following conditions:

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1. acknowledges the violation by June 30, 2023;
2. pays a settlement fee of $0.00 by June 30, 2023; and
3. submits a administratively complete groundwater production report for calendar year 2022 by June 30, 2023.

In response to the action taken by the Board, staff recorded violation ECV-20230425-04.

On May 2, 2023, staff attempted to provide notice of violation ECV-20230425-04 to CBPB Partners, LLC by certified mail (CMRRR 7021 0350 0000 2790 7560).

On June 1, 2023, staff attempted to provide notice of violation ECV-20230425-04 to CBPB Partners, LLC by certified mail (CMRRR 7021 0350 0000 2790 9090).

On July 6, 2023, the staff attempted to provide notice of this enforcement hearing and intent to seek authorization to pursue enforcement of the rules by filing a civil suit against CBPB Partners, LLC at the next regularly scheduled meeting of the board of directors to CBPB Partners, LLC. by certified mail (CMRRR 7021 0350 0000 2790 9281).

Board Action: The enforcement hearing was opened and recessed at 6:28 PM by motion of Mr. Dierschke. Mr. Johnson seconded the motion. The motion passed unanimously.

Mr. Dierschke moved to instruct the General Manager to attempt to notify CBPB Partners, LLC that if the required groundwater production report for calendar year 2022 is not September 30, 2023 by the District, the Board of Directors will consider entering a finding that:
1. CBPB Partners, LLC has committed a violation of District Rule 4.2 REPORTING REQUIREMENT RELATED TO NON-EXEMPT USE WELLS by failing to report groundwater production for calendar year 2022 for non-exempt well NW-00133 and that such violation is continuing. Each day of continued failure to report the groundwater production for calendar year 2022 constitutes a separate violation.
2. The penalty for this violation is assessed at $2,000.00. Additional penalties are assessed at $50.00 per day for each day following adoption of this order until the groundwater production for 2022 is properly reported.
3. Further, any associated permit for well No. NW-00133 is hereby cancelled and further production is prohibited from the well until said permit is reinstated by the district. District staff is ordered to place a seal upon the well to prevent further production.
4. Legal Counsel is hereby instructed to file suit if necessary to enforce this order.

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Mr. Johnson seconded the motion. The motion passed unanimously.

3.9 – Investigation INV-20221012.1455 related to Failure to Obtain Production Permits

Meeting Discussion: Mr. Andruss explained on October 12, 2022, staff initiated an investigation to gather information regarding active utilities within Victoria County that obtain water from groundwater-based public water systems that do not have valid groundwater production permits issued by the District.

As of July 21, 2023, staff had an open investigation related to groundwater management associated with 5 entities that had not submitted administratively complete permitting applications. The entities are:
1. City of Seadrift
2. Sea Port Lakes Water Systems LLC.
3. Shoalwater Flats Association
4. Port Alto Investments
5. Machaceks Rocking M. RV Park and Campground

See:
1. INV-20221012.1455 - Failure to Satisfy Rules of the District - Failure to Obtain a Production Permit - Machaceks Rockin M RV Park and Campground - Active
2. INV-20221012.1455 - Failure to Satisfy Rules of the District - Failure to Obtain a Production Permit - Sea Port Lakes Water Systems LLC - Active
3. INV-20221012.1455 - Failure to Satisfy Rules of the District - Failure to Obtain a Production Permit - Shoalwater Flats Association - Active
4. INV-20221012.1455 - Failure to Satisfy Rules of the District - Failure to Obtain a Production Permit - Port Alto Investments - Active
5. INV-20221012.1455 - Failure to Satisfy Rules of the District - Failure to Obtain a Production Permit - City of Seadrift - Active

The relevant provisions of the rules of the district associated with the investigations are:
- RULE 3.1: GENERAL POLICIES RELATED TO REGISTRATION OF WELLS, WELL FIELDS, AND WELL SYSTEMS

3. The well owner or authorized agent of a grandfathered non-exempt-use well within the boundary of the district shall apply for the registration of the grandfathered non-exempt-use well prior to operating the subject well for non-exempt use.

- RULE 4.1: GENERAL POLICIES RELATED TO PERMITS

15. No person shall operate a well to produce groundwater to be used for any purpose other than those uses defined as exempt use prior to obtaining a production permit from the district unless the subject well satisfies the

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definition of an original exempt-use grandfathered well or an original exempt-use non-grandfathered well.
- RULE 11.2: GENERAL POLICIES RELATED VIOLATIONS

5. Any person that produces groundwater from a well for non-exempt uses in any amount without a valid production permit authorizing the groundwater production violates the rules of the district.

6. Any person that produces groundwater from a well for non-exempt uses for any purpose of use not authorized by production permits associated with well violates the rules of the district.

10. Any person that engages in an activity that requires a permit from the district under the rules of the district prior to receiving such permit violates the rules of the district.

In each instance, staff have attempted to contact representatives of the entities to notify the entity of the permitting requirements of the District and attempt to assist the entities with submitting production permit applications since January 2023.

Board Action: Mr. Johnson moved to instruct the General Manager to notify the 5 public supply entities operating a well for source water without a production permit granted by the district that if the necessary administratively complete production permit applications are not received by September 30, 2023, by the District, the Board of Directors will consider entering a finding that:
1. the entity violated RULE 4.1: GENERAL POLICIES RELATED TO PERMITS of the Rules of the District by producing groundwater from a well or wells owned by the entity unless evidence to the contrary or evidence of relevant extenuating circumstances is submitted to the District;
2. authorize the General Manager to register a violation against the entity;
3. the penalty for the violation will be assessed at $2,000.00;
4. the additional penalties for the violation will be assessed at $50.00 per day for each day following adoption of the order until the necessary administratively complete production permit applications are received by the District; and
5. Legal Counsel is thereby instructed to file suit if necessary to enforce the order.

Agenda Item 4: Consideration of and possible action on matters related to groundwater protection including complaints, investigations, violations, and enforcement cases related to groundwater contamination and waste.

4.0 – Report regarding Groundwater Protection

Meeting Discussion: Mr. Andruss explained on May 31, 2023, staff received notice that Formosa Plastics applied for permit applications related to 21 injection wells to be operated to dispose of industrial waste as required by state law. The

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applications will be reviewed by TCEQ and a preliminary decision will be issued by the Executive Director.

Board Action: None.

Agenda Item 5: Consideration of and possible action on matters related to groundwater monitoring.

5.0 – Report regarding Groundwater Monitoring

Meeting Discussion: Mr. Andruss explained as of July 23, 2023, the U.S. Drought Monitor (https://www.drought.gov/states/texas/county/calhoun) indicates that 100% of Calhoun County is experiencing abnormally dry conditions with 0% experiencing moderate drought conditions or worse.

As of July 23, 2023, drought condition information related to the district and the surrounding region of Texas collected from the Water Data for Texas website (https://www.waterdatafortexas.org/drought/) indicates that all portions of Calhoun County are experiencing drought conditions.

As of July 23, 2023, staff had collected the following water level measurements since October 1, 2022: WLM-20230310-01 - GW-00003, WLM-20230310-02 - NW-00024, WLM-20230310-03 - GW-00005, WLM-20230310-04 - GW-00001, and WLM-20230310-05 - GW-00009.

On July 23, 2023, staff developed a chart and diagrams depicting water level data collected by the District. See: MFC-20230724-5.1 - Groundwater Level Measurements for Calendar Year 2022.

As of July 23, 2023, staff had collected the following water quality measurements since October 1, 2022: WQFM-20221006-02 - NW-00151; and WQFM-20221006.0816 - NW-00064.

On July 23, 2023, staff developed a chart and diagrams depicting water quality data (i.e., conductivity measurements) by the District. See: MFC-20230724-5.2 - Groundwater Quality Measurements for Calendar Year 2022.

On June 19, 2023, staff attempted to contact candidate well owners (of 18 candidate wells) regarding participation in the baseline water quality project. As of July 23, 2023, the District had been contacted by a well owner inquiring about the monitoring effort. Upon inspecting the candidate well, the well was determined to nonoperational and unable to be sampled by the District. Staff will randomly select 20 new candidate wells and attempt to contact the owners for

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inclusion in the baseline water quality monitoring project and provide a update on the project during the October 2023 meeting.

On June 21, 2023, staff participated in a virtual meeting with representatives of WellIntel (Dawna Urlakis, Director of Business Development and Charles Dunning) in for the purposes of learning more about aquifer monitoring products (water level sensor and telemetry equipment) and services (analytics dashboard) offered by WellIntel.

April 10, 2023, staff contacted Dr. Steve Young of Intera requesting a project proposal for updating the water level analysis report from previous years.

On May 5, 2023, staff transmitted interest letters to the landowners of 28 Chicot water wells seeking to gain access to candidate monitoring wells as recommended within the Intera Report.

As of July 23, 2023, staff had received a response to the interest letters.

Board Action: None.

5.1 – Groundwater Level Measurements for Calendar Year 2022

Meeting Discussion: Mr. Andruss explained staff have collected water level measurements from 7 wells during year 2022.

Generally, the depth to water in monitored wells has decreased from year 2021 to year 2022 by 0.3 feet and decreased from year 2000 to year 2022 by 1.8 feet.

Board Action: None.

5.2 – Groundwater Quality Measurements for Calendar Year 2022

Meeting Discussion: Mr. Andruss explained staff have collected water quality measurements from 6 wells during year 2022.

Generally, the conductivity measurement (a measure of the mineralization of the water) in monitored wells has decreased in year 2022 compared to the historic values for those wells with measurements collected before year 2022.

Board Action: None.

5.3 – WellIntell Service for Continuous Aquifer Monitoring

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Meeting Discussion: Mr. Andruss explained on June 21, 2023, staff participated in a virtual meeting with representatives of Wellntel (Dawna Urlakis, Director of Business Development and Charles Dunning) in connection with project PRJ-20234100.03 - Continuous Water Level Monitoring for FY2023 (MG7:O1) - Active for the purposes of learning more about products (water level sensor and telemetry equipment) and services (analytics dashboard) offered by Wellntel. The Wellntel offerings could potentially improve the monitoring program of the district by 1) increasing the amount of data collected regarding water levels and water quality in terms of measurement frequency (continuous measurements versus synoptic/ad hoc measurements) with the use of the Wellntel Water Level Sensor, 2) increasing operational efficiency by reducing data processing labor and transportation costs associate with monitoring efforts (e.g., eliminate post-processing of sensor data, reducing travel cost to well sites, etc.), and 3) increasing access and use of monitoring data for assessing aquifer conditions and regulatory compliance with permitting. A two-year pilot project with 4 monitoring wells is estimated to cost $23,500 in Year 1 and $2,500 in Year 2 for an estimated total of $26,000. Integration of 3rd party instruments would result in additional costs.

Board Action: Mr. Johnson moved to authorize the general manager to budget for and execute a two-year pilot project in FY2024 with 4 monitoring wells within the district at a cost not to exceed $35.000.00. Mr. Johnson seconded the motion. The motion passed unanimously.

5.4 – Intera Proposal for Update of Water Level Assessment Report

Meeting Discussion: Mr. Andruss explained on July 14, 2023, Dr. Young of Intera submitted a proposal to Victoria County GCD to apply geostatistical techniques to interpret measured 2022 water level in Calhoun County GCD, Refugio GCD, Texana GCD and Victoria County GCD. The proposed work will expand the analysis of measured water levels performed by Young and others (2021) [Application of Geostatistical Techniques to Quantify Changes in Water Levels] and INTERA (2022) [memorandum :Application of Geostatistical Techniques to Interpret Measured 2021 Water Levels, dated June 29, 2022] to include measured water levels in 2022.

The cost for performing the completing the work is $15,000. The project will be fixed priced. The presentations and the memorandum will be completed by December 4, 2023. The memorandum will be similar in its content and figures to the INTERA (2022) memorandum that provided an analysis of the 2021 water level data.

The proposal will be presented to the boards of Refugio GCD, Victoria GCD, and Texana GCD with a recommendation to approve the proposal and share in the costs equally at a fixed cost of $3,750.00.

Board Action: Mr. Dierschke moved to approve the proposal and share in the costs equally at a fixed cost of $3,750.00. Mr. Johnson seconded the motion. The motion passed unanimously.

Agenda Item 6: Consideration of and possible action on matters related to groundwater conservation.

6.0 – Report regarding Groundwater Conservation

Meeting Discussion: Mr. Andruss explained on April 24, 2023, the board authorized the expenditure of up to $5,000.00 for sponsorship of field trips by 4th and 5th grade students from Calhoun County to the Wetland Education Center located in the INVISTA Victoria Plant Wetland for the purposes of promoting water conservation.

On May 8, 2023, staff notified Calhoun County ISD of the sponsorship opportunity.

On May 23, 2023, staff notified Our Lady Of The Gulf Catholic School of the funding opportunity.

As of July 22, 2023, staff had not received any applications requesting sponsorship.

Board Action: None.

Agenda Item 7: Consideration of and possible action on matters related to groundwater resource planning including Groundwater Management Area 15 Joint Planning and regional water planning.

7.0 – Report regarding Groundwater Resource Planning

Meeting Discussion: Mr. Andruss explained the representatives of Region L met on May 4, 2023, to continue efforts to develop the 2026 Regional Water Plan. Interim meetings of the Population and Water Demands Workgroup have met to review demand projections within the region. The next meeting of Region L is scheduled for August 3, 2023.

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The representatives of Management Area 15 met on July 13, 2023, to continue their joint planning efforts. The next meeting of GMA 15 is scheduled for October 12, 2023.

Board Action: None.

7.1 – GMA 15 By-Laws, Cost Sharing Agreement, and RFP for Technical Services

Meeting Discussion: Mr. Andruss explained the representatives of GMA 15 met on July 13, 2023. During the meeting, the representatives considered the By-Laws of the GMA-15 Committee, the Interlocal Agreement for Cost-Sharing, and the draft RFP for Technical Services for GMA 15 related to the 4th Cycle of Joint Planning. The representatives offered no comments or suggested revisions for the RFP.

The interlocal agreement related to cost-sharing specifies the funding requirements necessary to be a member of the GMA-15 Committee. Member districts located solely within GMA 15, such as CCGCD, are scheduled to pay $7,500.00 under the agreement while member districts located in groundwater management areas in addition to GMA 15 are scheduled to pay $3,750. If all member districts agree to the cost sharing agreement, the total funding for the 4th Joint Planning Cycle in GMA 15 will be reach $82,500.00 by January 9, 2024.

Board Action: Mr. Johnson moved to accept and approve:
1. the GMA 15 - By-Laws of the GMA-15 Committee - Rev 2023041, and
2. the GMA 15 - Interlocal Agreement for Cost-Sharing - Rev 20230413a, by resolution, and
3. the VCGCD - RFP for Technical Services for GMA 15 - 20230627, as presented.

Mr. Dierschke seconded the motion. The motion passed unanimously.

Agenda Item 8: Consideration of and possible action on matters related to groundwater policy including the Management Plan of the District, the proposed Management Plan of the District and the Rules of the District.

8.0 – Report regarding Groundwater Policy

Meeting Discussion: Mr. Andruss explained on May 16, 2023, staff submitted the management plan approved at the meeting held on April 17, 2023 to the Texas Water Development Board and other entities are required by Chapter 36.

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On July 10, 2023, staff identified the following bills on the Texas Legislature Online service that contain the phrase "groundwater" and have or will become law.

1. 88(R) HB 697 - Enrolled Version - Bill Text(relating to seller's disclosures)
2. 88(R) HB 1565 - Enrolled Version - Bill Text(relating to the functions of the Texas Water Development Board and continuation and functions of the State Water Implementation Fund for Texas Advisory Committee)
3. 88(R) HB 1699 - Enrolled Version - Bill Text (relating to the authority of the Evergreen Underground Water Conservation District to impose certain fees)
4. 88(R) HB 1971 - Enrolled Version - Bill Text (relating to the procedures for acting on a permit or permit amendment application by a Previous groundwater conservation district and the disqualification of board members of groundwater conservation districts)
5. 88(R) HB 2443 - Enrolled Version - Bill Text(relating to the authority of certain persons to petition a groundwater conservation district to change certain rules)
6. 88(R) HB 3059 - Enrolled Version - Bill Text (relating to the export fee charged for the transfer of groundwater from a groundwater conservation district)
7. 88(R) HB 3278 - Enrolled Version - Bill Text (relating to the joint planning of desired future conditions in groundwater management areas)
8. 88(R) HB 3731 - Enrolled Version - Bill Text (relating to the Bandera County River Authority and Groundwater District)
9. 88(R) HB 3744 - Enrolled Version - Bill Text (relating to the regulation of water well drillers and water well pump installers)
10. 88(R) HB 4559 - Enrolled Version - Bill Text (relating to the application of statutes that classify political subdivisions according to population)
11. 88(R) SB 317 - Enrolled Version - Bill Text (relating to appellate jurisdiction of the Public Utility Commission regarding certain water or sewer service fees)
12. 88(R) SB 785 - Enrolled Version - Bill Text (relating to the ownership of and certain insurance policy provisions regarding the geothermal energy and associated resources below the surface of land)
13. 88(R) SB 1290 - Enrolled Version - Bill Text (relating to a study of the effects of the installation, operation, removal, and disposal of solar, wind turbine, and energy storage equipment)
14. 88(R) SB 1659 - Enrolled Version - Bill Text (relating to the sunset review process and certain governmental entities subject to that process)
15. 88(R) SB 1746 - Enrolled Version - Bill Text(relating to an exemption from the requirement to obtain a permit from a groundwater conservation district for certain temporary water wells)
16. 88(R) SB 2406 - Enrolled Version - Bill Text(relating to the authority of hospitals in certain counties to drill a water well for the purpose of producing water for use in the event of an emergency or natural disaster)

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17. 88(R) SB 2440 - Enrolled Version - Bill Text (relating to a requirement that certain plats for the subdivision of land include evidence of groundwater supply)
18. 88(R) SB 2592 - Enrolled Version - Bill Text (relating to the Lavaca-Navidad River Authority, following the recommendations of the Sunset Advisory Commission; altering terms of the board of directors; specifying grounds for the removal of a member of the board of directors)

Staff will review the passed legislation and coordinate with legal counsel to develop proposed rule revisions and post the required rulemaking hearing notice for the meeting scheduled for October 16, 2023.

Board Action: None.

8.1 – Rulemaking Hearing regarding Proposed Rule Revisions

Meeting Discussion: Mr. Andruss explained on April 24, 2023, the Board considered petitions to amend the rules of the district. The Board instructed staff to prepare proposed revisions to the rules in response to petitions APAR-20230127-01 (property line offset reduction) and APAR-20230127-02 (annular seal requirement).

As instructed, staff developed proposed rule revisions intended to address the request made under the petitions. The proposed rule revisions also include needed clarifications and corrections identified as the rules adopted in January 2023 were implemented by staff that and changes to address the new requirements related to petition under 88(R) HB 2443.

The public notice of the proposed rule revisions was completed on June 25, 2023. The proposed rule revisions were published on the website of the District.

In response to APAR-20230127-01, staff proposed modifying RULE 2.2: WELL SPACING REQUIREMENTS OF WELLS as follows:

"A person drilling or having drilled a non-grandfathered well or a replacement well for a non-grandfathered well that is not a deep-saline well shall locate the non-grandfathered well in a position that is offset from the boundary of the subject tracts of contiguous ownership of land by at least one half foot (1/2 foot) of separation per one gallon per minute of production capacity of the non-grandfathered well."

In response to APAR-20230127-02, staff proposed adding the following provision to RULE 2.4: STANDARDS FOR CONSTRUCTING WELLS:

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"A person drilling a well shall seal the annular space between the wall of the borehole and casing from a depth of one hundred feet (100 feet) below the surface to the ground surface.

To address the new requirements established with the passing of 88(R) HB 2443, staff proposed modifying RULE 8.5: GENERAL PROCEDURES RELATED TO PETITIONS TO AMEND THE RULES OF THE DISTRICT as follows:

"10. The board of directors shall consider petitions to amend the rules of the district within ninety days (90 days) of receipt of an administratively complete petition form.

11. The board of directors shall deny the petition and provide an explanation for the denial or engage in rulemaking consistent with the granted petition.

12. The board of directors shall consider petitions that are designated as administratively complete, after providing public notice of the rulemaking hearing for not less than twenty days (20 days) as required by Section 36.101(d), Water Code."

Board Action: The rulemaking hearing was opened, and with no public comment was closed at 6:53 PM by motion. Mr. Johnson motioned. Mr. Dierschke seconded the motion. The motion passed unanimously.

Mr. Johnson moved to accept the proposed revision to the rules and adopt the proposed Rules of the District. Mr. Dierschke seconded the motion. The motion passed unanimously.

Agenda Item 9: Consideration of and possible action on matters related to administration and management including the minutes of previous meetings, the annual budget of the district, bank accounts, investments, financial reports of the district, bills and invoices of the district, management goals and objectives of the district, administrative policies, staffing, consultant agreements, interlocal cooperation agreements, interlocal cooperation agreements, and support services provided to and from other groundwater conservation district.

9.0 – Report regarding Administration and Management

Meeting Discussion: Mr. Andruss explained on June 29, 2023, the new website of the District was released and made publicly available. The new website includes a feature for allowing individuals to subscribe to and unsubscribe from the District's email notification lists. The lists were originally populated with email addresses for the District's existing email lists. The new electronic mail list feature will be used to transmit public notices and other important messages to interested parties.

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The next meetings of the Board are scheduled for August 28, 2023, (Budget and Tax Rate Matters), and October 23, 2023, with each meeting to convene at 5:30 PM. Regular meetings will be rescheduled as necessary and special meetings may be scheduled to address unforeseen issues.

Board Action: None.

9.1 – Minutes of the Previous Meeting

Meeting Discussion: Mr. Andruss explained the minutes for meeting held on April 24, 2023, were sent to the board members prior to the meeting.

Board Action: Mr. Johnson moved to accept and approve the meeting minutes for April 24, 2023, as drafted. Mr. Dierschke seconded the motion. The motion passed unanimously.

9.2 – Financial Reports of the District

Meeting Discussion: Mr. Andruss explained the internal control review reports and internal financial reports for March, April, and May 2023 have been compiled, reviewed and sent to the board members prior to the meeting.

Board Action: Mr. Dierschke moved to accept the internal control review and internal financial reports for March, April, and May 2023. Mr. Johnson seconded the motion. The motion passed unanimously.

9.2.1 – Financial Transaction Review

Meeting Discussion: Mr. Andruss explained as of July 20, 2023, since April 22, 2023, there have been 19 accounts payable and 15 accounts receivable transactions.

Board Action: None.

9.3 – Investments of the District

Meeting Discussion: Mr. Andruss explained the investment reports for March, April, and May 2023, have been developed, reviewed, and sent to the board members prior to the meeting.

Board Action: Mr. Johnson moved to accept the investment reports for March, April, and May 2023. Mr. Dierschke seconded the motion. The motion passed unanimously.

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9.4 – Unpaid Accounts Payable

Meeting Discussion: Mr. Andruss explained the District has outstanding accounts payable invoices that are not considered regular and routine for which the District has received the goods and services billed for under the invoices.

Board Action: Mr. Johnson moved to authorize the general manager to pay the following items:
1. ACCTP-20230703-01 - $4,500.00 - 301 South, LLC - Office Lease
2. ACCTP-20230706-01 - $7,267.49 - VCGCD - District Invoice - April 2023
3. ACCTP-20230706-02 - $7,423.29 - VCGCD - District Invoice - May 2023
4. ACCTP-20230706-03 - $7,344.69 - VCGCD - District Invoice - June 2023
5. ACCTP-20230516-02 - $818.75 - Allison, Bass & Magee
6. ACCTP-20230601-02 - $9,100.00 - Goldman, Hunt and Notz, LLP

Mr. Dierschke seconded the motion. The motion passed unanimously.

9.5 – FY2024 Budget

Meeting Discussion: Mr. Andruss explained staff will develop and present a budget for the fiscal year ending September 30, 2024 at the meeting scheduled for August 28, 2023 that attempts to fund the operations of the District in a manner that should provide for 1) the accomplishment of the management plan goals and objectives and 2) the completion of certain projects and tasks associated with the administration of the district, groundwater conservation, groundwater management and permitting, groundwater monitoring, groundwater policy development, groundwater protection, groundwater research, and groundwater resource planning, and 3) avoid a budget deficit in Fiscal Year 2023-2024.

Staff will develop the proposed budget anticipating the continued cooperation with and support of the staff of the Victoria County Groundwater Conservation to be achieved through the approval of a revised interlocal cooperation agreement that may include an increase to the monthly fees for service less than or equal to 5%.

Staff will develop the proposed budget anticipating the commitment of the monies of the Reserve Fund in Fiscal Year 2023-2024 in accordance with the following schedule:
- Groundwater Conservation: 5%
- Groundwater Management: 10%
- Groundwater Monitoring: 25%
- Groundwater Protection: 25%
- Groundwater Research: 5%

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- Groundwater Resource Planning: 5%
- Legal Contingencies: 25%

Staff will develop the proposed budget anticipating the approval of a tax rate equal to the No-New-Revenue Tax Rate calculated by the Tax Assessor - Collector for Tax Year 2023.

Board Action: Mr. Johnson moved to authorize the general manager to publish the required tax rate notices for the district based on the No-New-Revenue Tax Rate calculated by the Tax Assessor - Collector for Tax Year 2023. Mr. Dierschke seconded the motion. The motion passed unanimously.

Agenda Item 10: Consideration of and possible action on matters related to Legal Counsel Report

10.0 – Legal Counsel Report

Meeting Discussion: Mr. Allison requested that staff make the following report available to the directors during the meeting..

CCGCD - Telicon Rpt - ABM 20230721.pdf

Board Action: None.

Agenda Item 11: Adjourn

11.0 – Adjourn Meeting

Meeting Discussion: None.

Board Action: Mr. Dierschke moved to adjourn the meeting at 7:16 PM after concluding all business of the District. Mr. Johnson seconded the motion. The motion passed unanimously.

THE ABOVE AND FOREGOING MINUTES WERE READ AND APPROVED ON THIS

THE 23 DAY OF October A.D. 2023.

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Harold D. May
____
Director of the Calhoun County Groundwater Conservation District

ATTEST:
____
Director of the Calhoun County Groundwater Conservation District

MEETING RECORD

PROJECT	Project Long Mott, Environmental Report
SUBJECT:	Waters Of the U.S. Report
DATE:	4/23/2024
PARTICIPANTS:	Jonathan Bourdeau (WSP), Jayson Hudson (USACE Galveston District)
FROM:	Jonathan Bourdeau

I e-mailed Jayson Hudson, the U.S. Army Corps of Engineers (USACE) Project Manager for Project Long Mott on 4/23/2024 to check on the status of the USACE review of the Waters of the U.S. (WOTUS) report submitted on 1/9/24. In response to the email, he requested a call, as he was not aware that the USACE had an action in the matter. We spoke briefly about the WOTUS delineation report but did not discuss anything specific to the proposed project or project elements.

Mr. Hayden indicated that he had reviewed the WOTUS report and had no comments on the delineation; however, he was not going to provide anything in writing at this stage. He said Dow or the permittee could request an Approved Jurisdictional Determination (AJD), but he did not recommend doing that at this time because requesting an AJD can be a time-consuming process, and the U.S. Environmental Protection Agency was being particularly selective about the applications they were approving. He also did not recommend a Preliminary Jurisdictional Determination (PJD), as that assumes that all wetlands/streams are jurisdictional, which would not be suitable for the Project Long Mott site. He said that it would be possible to initiate project permitting without an AJD.

He thought West Coloma Creek (WCC) would be jurisdictional, and most of the other wetlands and streams would be non-jurisdictional. From what he saw in our report, WCC was a low functioning stream, but impacts would likely require compensatory mitigation. He recommended a "holistic" mitigation plan for the site that would improve both streams and wetlands and provide an offset for any impacts to the low-quality WCC.

I asked about the GBRA canal, which is adjacent to the project boundary in the WOTUS report. He was not familiar with the canal but said that typically, it is the USACE's opinion that a constructed canal to provide water for drinking/irrigation would not be considered jurisdictional. An exception might be if it was following a formerly natural channel. He said the canal might also meet the Clean Water Act "preamble" exemptions.

He mentioned Nuclear Regulatory Commission and the Department of Energy and was familiar with some of their processes. He expects to be assisting with Project Long Mott for its duration and said to contact him if we have any questions.

wsp.com

Department of Energy
Washington, DC 20585

November 6, 2024

VIA ELECTRONIC MAIL

Kreshka Young
Vice President
Long Mott Energy, LLC
1254 Enclave Parkway
Houston, TX 77077
Kyoung2@dow.com

Re: Confirmation of Active and Good Faith Negotiations for Disposal Contract with Long Mott Energy, LLC for Project Long Mott, X-energy Xe-100 Reactors, to be located at Dow Chemical Company's Seadrift, Texas facility

Dear Ms. Young:

I am writing to affirm that Long Mott Energy, LLC (LME) is actively and in good faith negotiating with the Secretary of Energy for a contract under section 302(b) of the Nuclear Waste Policy Act of 1982, as amended ("NWPA").

Although section 302(b)(1)(A)(ii) of the NWPA assigns to the Secretary of Energy the function of making the above affirmation, section 304(b) of the NWPA further provides that the director of the Office of Civilian Radioactive Waste Management (OCRWM) "shall be responsible for carrying out the functions of the Secretary under [the NWPA], subject to the general supervision of the Secretary." In 2010, OCRWM was closed and the functions relating to the Standard Contract were assigned to the Office of the General Counsel. Those functions were later assigned by the General Counsel to my office.

DOE is reviewing the issue of the appropriate contract mechanism and will be in contact for further discussions.

Sincerely,

/s/ Constance A. Barton

Constance A. Barton
Contracting Officer, Director
Office of Standard Contract Management
Office of the General Counsel

cc via email:
Feltner, Mark (M) <MFeltner@dow.com
Blaylock, Wayne (WW) <DWBlaylock@dow.com>

Long Mott Energy®

Texas General Land Office
Coastal Resources-Federal Consistency
1700 North Congress Avenue, Room 330
Austin, TX 78701-1495

March 20, 2025

RE: Federal Consistency Certification Request in Support of the Long Mott Generating Station Nuclear Regulatory Commission Construction Permit Application

Dear Sir or Madam:

Long Mott Energy, LLC (LME), a wholly owned subsidiary of the Dow Chemical Company, is submitting a consistency certification to support a construction permit application to the U.S. Nuclear Regulatory Commission (NRC) for construction of a nuclear power station to be known as Long Mott Generating Station (LMGS). The project is in Calhoun County, Texas adjacent to Dow's Union Carbide Corporation Seadrift Operations (SDO).

LMGS will construct four (4) module Xe-100 advanced reactors. Each Xe-100 reactor is a high temperature gas-cooled reactor that produces up to 200 megawatts thermal (MWt), and in an electricity-only generating mode, produces up to 80-megawatts electric (MWe). LMGS will supply steam and electric power to SDO, replacing existing fossil-fuel power generation infrastructure.

The total LMGS Site footprint is approximately 1,537 acres and the four reactor modules will occupy 34.4 acres. The total land area includes ancillary facilities, such as transmission lines, steam delivery pipelines, site-specific stormwater drainage and management ponds, access roads, and areas used temporarily during construction.

A license under Title 10 of the Code of Federal Regulations (CFR), Part 50, from the NRC is required for construction and operation of LMGS. LME submitted an Environmental Report (ER) for LMGS to the NRC. The NRC decision to issue a license for the proposed facility is a federal action subject to the National Environmental Policy Act (NEPA), which requires an environmental impact determination prepared by the NRC pursuant to 10 CFR Part 51.

As part of the NRC NEPA process, we are evaluating the effects of construction and operation on coastal zone resources. Accordingly, we submit this package pursuant to 31 TAC Chapter 30 to demonstrate that LMGS is consistent with Texas Coastal Management Program (CMP) goals and enforceable policies.

We look forward to working with the Texas General Land Office Coastal Resources Division and Coastal Coordination Advisory Committee in obtaining necessary federal consistency certification to support authorization of this important project.

If you have questions or comments, please contact me at 979-238-4173 or aross2@dow.com.

Respectfully,

Angela Ross

Angela Ross
EH&S Regional Permit Manager

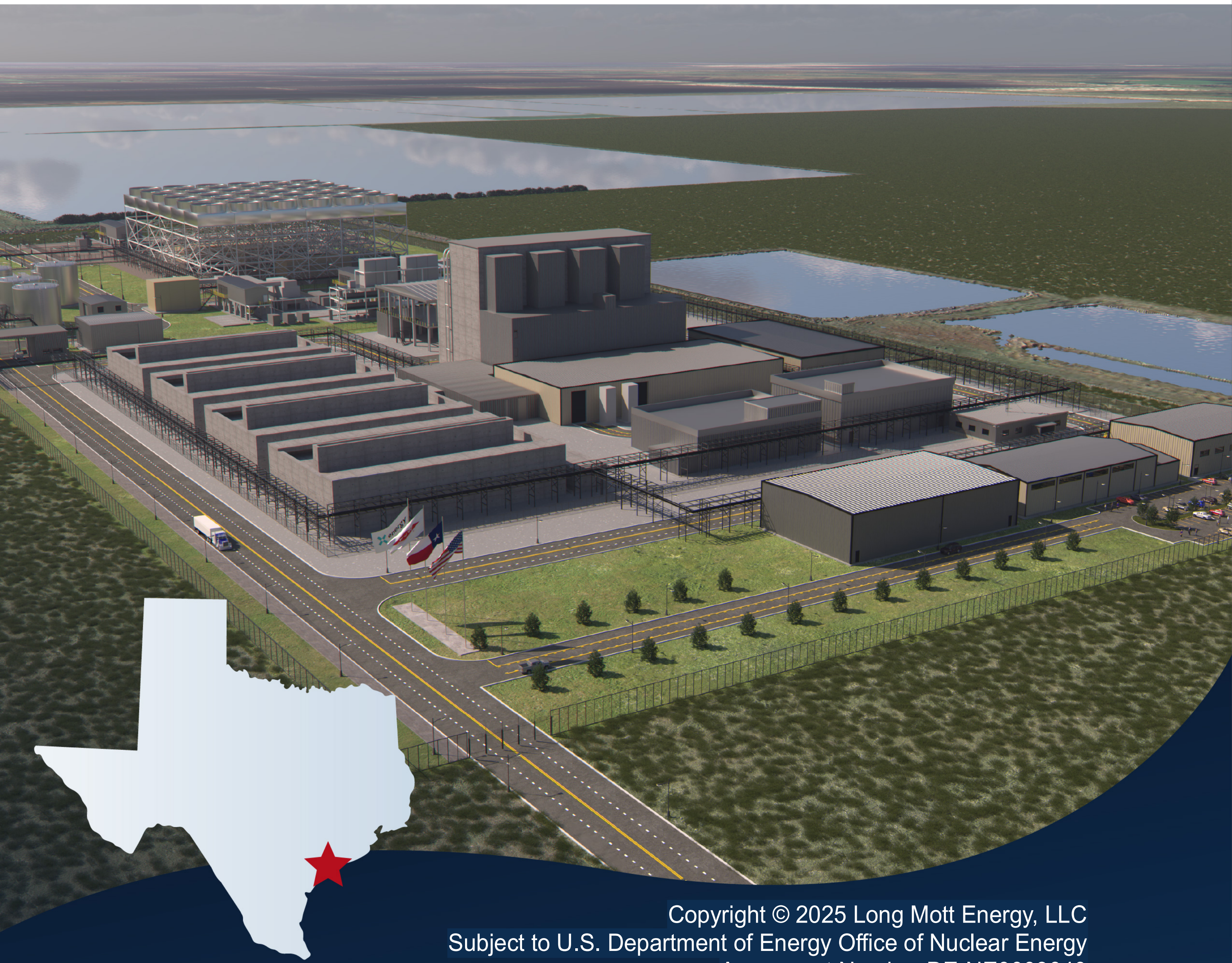
Enclosure

1.5 References

None

Long Mott Generating Station

Environmental Report
Chapter 2 - Environmental Description



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Chapter 2 - Environmental Description

Chapter 2 describes the existing environmental conditions at the Long Mott Generating Station (LMGS) site, vicinity 6 miles (mi) 10 kilometers (km), and region 50 mi. (80 km), including characteristics of the land, water (surface and groundwater), terrestrial and aquatic ecology, socioeconomic setting (including environmental justice), geology, meteorology and air quality, nonradiological health, and the radiological environment. The environmental descriptions provide sufficient detail to identify environmental resources that have the potential to be affected by the building, operation, or decommissioning of LMGS.

2.1 Station Location

The LMGS site is located on approximately 1537 acres (ac.) (622 hectares [ha]) in Calhoun County, Texas, adjacent to Seadrift Operations (SDO), the Seadrift, Texas facility owned and operated by the Union Carbide Corporation, an affiliate of The Dow Chemical Company. Figure 2.1-1 depicts the 50 mi. (80 km) regional setting. The LMGS site and immediate vicinity are shown on Figure 2.1-2. Figure 2.1-3 presents an oblique aerial photograph of the LMGS site.

The LMGS site is located within the United States Geological Survey (USGS) Green Lake Quadrangle and the Port Lavaca West Quadrangle (USGS, 2019). The LMGS site is not located within a township because the State of Texas does not use the Public Land Survey System. In Texas, original surveys were performed as part of the patenting process whereby land was transferred from the public domain. These “patent surveys”, recorded at the Texas General Land Office, constitute an official land grid for the State and are the basis for subsequent land surveys (RRC, 2021). The LMGS site falls within the following blocks of that system: Abstract 31, E Rendon and Abstract 25, M. Lopez. The term abstract refers to an original land survey describing an area transferred from the public domain by either the Republic of Texas or the State of Texas. The names correspond to the original land grantees (RRC, 2021).

The coordinates of the approximate LMGS site center point are presented in Table 2.1-1. Prior to determination of the final site layout, a site bounding limit was established around the site center point at a distance of 0.5 mi. (0.8 km). The bounding limit is conservatively established to encompass all possible locations of the Nuclear Island and all safety-related features of LMGS to mitigate revisions to the site center point based on final design. Analyses that consider distance from the site center point may use this site bounding limit as a conservative estimate of distance rather than the site center point to ensure that distances used in analyses are not sensitive to minor changes in the layout of safety-related features of LMGS within the bounding limit.

The nearest population center to the LMGS site (as defined by Title 10 of the Code of Federal Regulations [CFR] 100.3 as an area with the population of greater than 25,000) is the City of Victoria, Texas, located approximately 21 mi. (33 km) northwest of the LMGS site center point (Figure 2.1-1). The closest communities from the LMGS site center point are Long Mott, located approximately 3.2 mi. (5.1 km) south, Seadrift, located approximately 7.7 mi. (12.4 km) southeast, and Port Lavaca, located approximately 8.2 mi. (13.2 km) northeast (Figure 2.1-2).

As shown on Figure 2.1-2, the majority of the LMGS site is bounded on the north by Jesse Rigby Road and the Seadrift Industrial Rail, currently owned and operated by Watco (Watco, 2023). Other highways within the vicinity include State Highway (SH) 35, SH 185, and SH 238. SH 35 and SH 185 are the primary arterials serving the LMGS site.

The Guadalupe-Blanco River Authority (GBRA) manages water resources in a ten-county area that runs from the headwaters of the Guadalupe and Blanco River to San Antonio Bay. The GBRA statutory district includes all or parts of ten counties, including Victoria, Calhoun, and Refugio Counties. Water features within the vicinity of LMGS are shown on Figure 2.1-2. Major waterways in the vicinity of the LMGS site include the Victoria Barge Canal that extends from San Antonio Bay to Victoria County, Texas, Goff Bayou, and the GRBA Calhoun Canal System that flows eastward along the southern boundary of LMGS. Other notable water bodies in the vicinity of the LMGS site include Green Lake, Mission Lake, Buffalo Lake, and Guadalupe Bay.

The Guadalupe Delta Wildlife Management Area (WMA) is located approximately 2.69 mi (4.31 km) west of the LMGS site. It was identified by the United States Fish and Wildlife Service (USFWS) and Texas Parks and Wildlife Department (TPWD) as a wetlands area that needed preservation to protect the wildlife habitat. The area consists of four units, Mission Lake Unit (4448 ac [1800 ha]), Hynes Bay Unit (1008 ac. [408 ha]), Guadalupe River Unit (1138 ac [461 ha]), and the San Antonio Unit (818 ac [331 ha]) (TPWD, 2023a). As shown on Figure 2.1-2, the Mission Lake Unit is located within the LMGS vicinity.

Tables

Table 2.1-1: Approximate Coordinates of the Long Mott Generating Station Site Center Point

Zone	South Central Zone
Texas State Plane Coordinate System	
North y-coordinate	13382922.157 U.S. survey ft.
East x-coordinate	2687115.681 U.S. survey ft.
UTM/USNG Coordinates	
Northing	3,157,774 m
Easting	718,999 m
NGS Coordinates	
Latitude	28°31’42.00”N
Longitude	96°45’43.00”W
Abbreviations: ft. = feet; UTM = Universal Transverse Mercator; USNG = United States National Grid; m = meter; NGS = National Geodetic Survey; N = north; W = west	

Figures

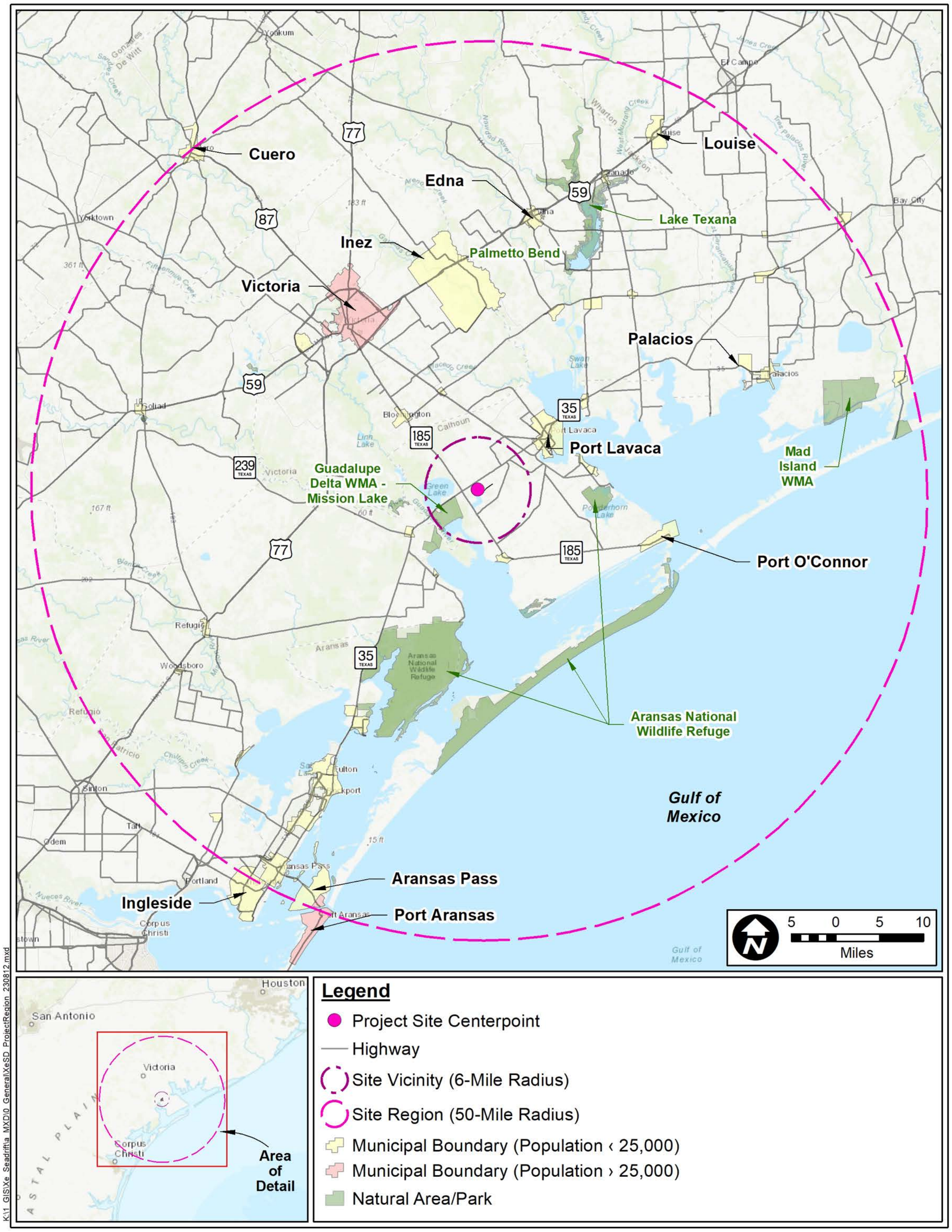


Figure 2.1-1: Long Mott Generating Station Region

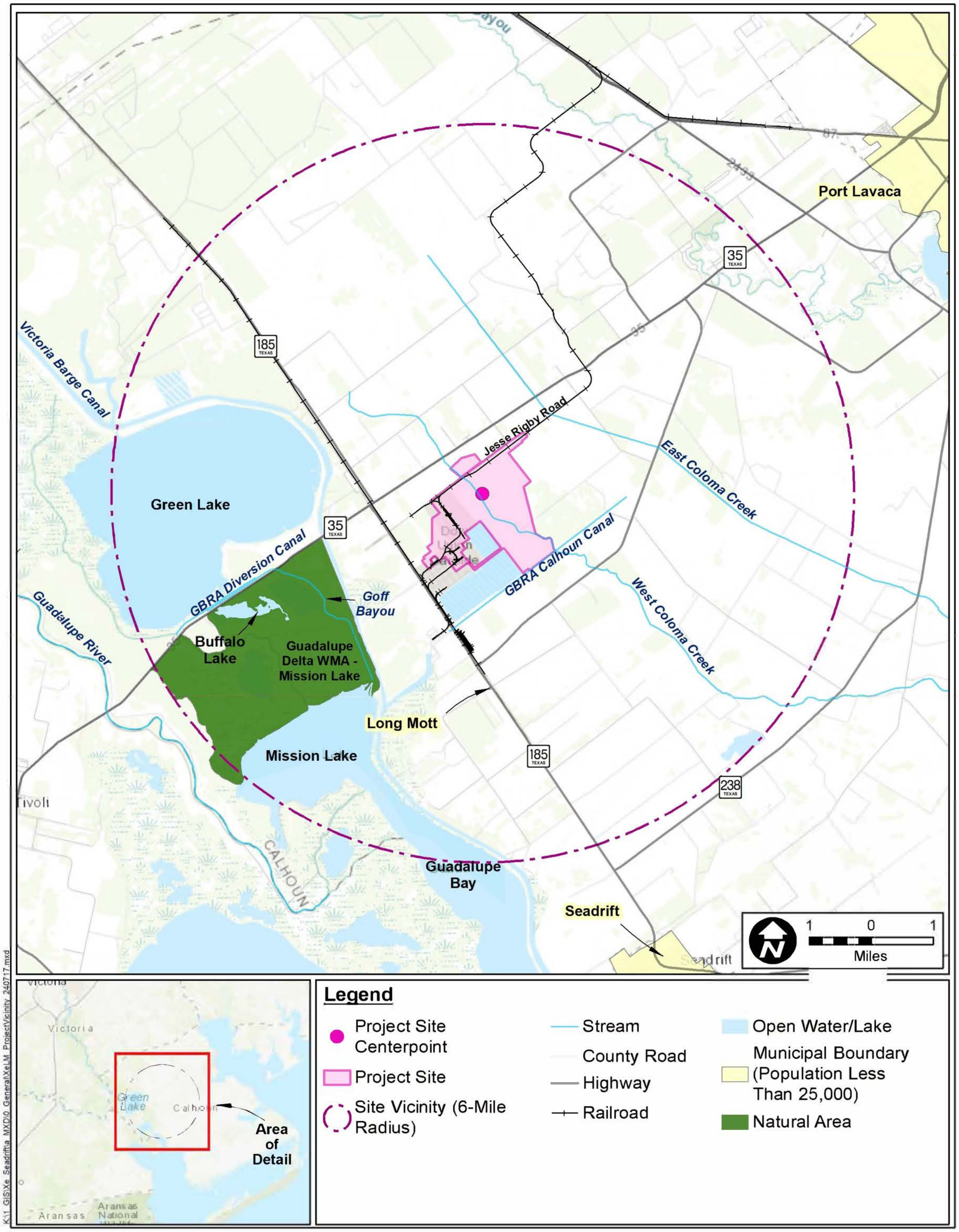


Figure 2.1-2: Long Mott Generating Station Site and Vicinity

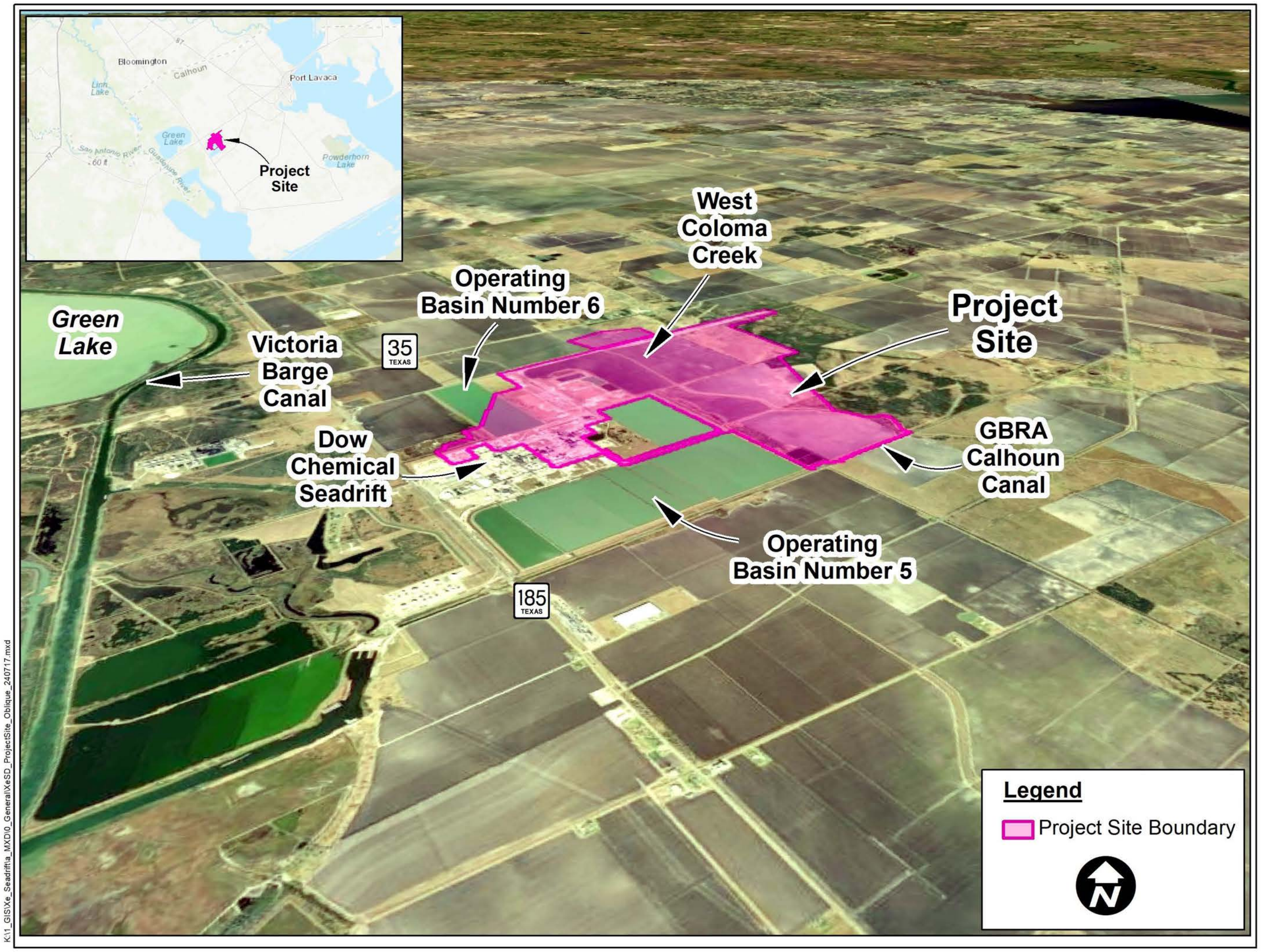


Figure 2.1-3: Oblique Aerial Photograph of the Long Mott Generating Station Site

2.2 Land

This section describes land use on the LMGS site, the vicinity (6 mi [10 km]) and the region (50 mi [80 km]). As described in Section 2.1, Station Location, the LMGS site is in Calhoun County, Texas, adjacent to the existing SDO facility (Figure 2.1-3). Land cover within the LMGS site, vicinity, and region is analyzed using the Multi-Resolution Land Characteristics (MRLC) Consortium National Land Cover Database (NLCD) (MRLC Consortium, 2021). Section 2.2.1 describes land use at the LMGS site and vicinity, Section 2.2.2 describes transmission line corridors and specific off-site areas, and Section 2.2.3 describes land use in the region around the LMGS site.

2.2.1 The Site and Vicinity

The approximate 1537 ac (622 ha) LMGS site is owned and managed by Dow. Most of the site is currently comprised of cultivated cropland and a portion of the site supports the existing SDO facility. As described in Section 2.1, Station Location, the LMGS site is bounded on the north by Jesse Rigby Road and the Seadrift Industrial Rail, which is currently owned and operated by Watco. The LMGS site is also bounded by agricultural land to the east, the Calhoun Canal to the south, and SDO to the west. The primary roadways serving the LMGS site are SH 35 and SH 185.

A USGS topographic map illustrating the geographical context of the LMGS Site is presented on Figure 2.2-1. As shown on the figure, the LMGS site is flat with surface elevations ranging from approximately 30 ft. (9.1 m) North American Vertical Datum 88 (NAVD 88) in the north to approximately 25 ft. (7.6 m) NAVD 88 in the south. Figure 2.2-2 illustrates the topography within the vicinity of the LMGS site. As described in Section 2.6, Geology, the topography in the LMGS vicinity is characteristic of the Gulf Coastal Plains with gently rolling terrain.

Figure 2.2-3 depicts the land cover within the LMGS site. Land cover categories for Figure 2.2-3 are consistent with the land use classification codes listed in MRLC Consortium NLCD. Table 2.2-1 provides the acreage of each land cover type within the LMGS site. It is primarily composed of cultivated crops, herbaceous land (which includes hay/pasture land cover), and developed lands. Developed uses include open space and other uses, with areas of varying intensity of development. Developed, open spaces are defined as areas where impervious surfaces account for less than 20 percent of total cover, developed low intensity areas are those areas where impervious surfaces account for 20 to 49 percent of the total cover, developed medium intensity areas those areas where impervious surfaces account for are 50 to 79 percent of the land cover, and developed high intensity areas are those areas where impervious surfaces account for 80 to 100 percent of the total land cover (MRLC Consortium, 2022). SDO represents much of the high intensity developed lands on the LMGS site.

Section 2.4.1.1 provides a further discussion of natural and man-made habitat types within the LMGS site. Wetlands are described in Section 2.4.1.2. Surface water features within the region, vicinity, and on the LMGS site are described in Section 2.3.1.

As described in Section 2.6, Geology, the LMGS site is located within the Coastal Prairies subprovince of the Gulf Coastal Plains physiographic province. The subprovince is composed of geologically young formations consisting of unconsolidated deltaic sands, silts, and clays sloping to the southeast that are incised by meandering streams discharging into the Gulf of Mexico. Additional information regarding site geology is provided in Section 2.6.

The LMGS site is located entirely in Calhoun County, Texas. The LMGS vicinity encompasses portions of Calhoun County, Texas, and Refugio County, Texas. Land cover in the LMGS vicinity is illustrated on Figure 2.2-3 and summarized in Table 2.2-2. Like the LMGS site, land use in the vicinity is primarily agricultural, as cultivated crops and hay/pasture. The community of Long Mott is located within the LMGS vicinity (Figure 2.2-2). As described in Section 2.1, Station Location, the communities of Seadrift and Port Lavaca are located just outside the 6 mi (10 km) vicinity.

There are no special land uses within the LMGS site. Special land uses within the LMGS vicinity are shown on Figure 2.2-4. This includes the Guadalupe Delta WMA. Additional detail regarding the WMA is discussed in Section 2.1, Station Location.

The National Coastal Zone Management Program (NCZMP) was created as a voluntary partnership between the federal government and the U.S. coastal and Great Lakes states and territories to address national coastal issues. The NCZMP provides the basis for protecting, restoring, and responsibly developing the nation’s diverse coastal communities and resources. The program takes a comprehensive approach to coastal resource management by protecting natural resources, managing development in high hazard areas, giving development priority to coastal-dependent uses, providing public access for recreation, prioritizing water-dependent uses, and coordinating state and federal actions (NOAA, 2023a).

Prime farmland is defined as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and that is available for these uses. It has the combination of soil properties, growing season, and moisture supply needed to produce sustained high yields of crops in an economic manner if it is treated and managed according to acceptable farming methods (USDA, 2015). Figure 2.2-6 illustrates the distribution of prime farmland within the LMGS site and vicinity. Acreages of prime farmland within the LMGS site and vicinity are identified in Table 2.2-3. According to the U.S. Department of Agriculture (USDA), approximately 93 percent of the soils on the LMGS site are considered prime farmland soils and a large portion of the site is cultivated land. However, approximately 25 percent of the soils mapped on the LMGS site are classified as developed land with prime farmland criteria and are not available for use as prime farmland (Table 2.2-3).

As indicated in Table 2.2-3, approximately 70 percent of the soils in the vicinity of LMGS are considered prime farmland. Cultivated cropland is the primary land use in the vicinity of LMGS (Table 2.2-2). The USDA 2017 Census of Agriculture indicates that the principal agricultural products in the vicinity are corn for grain, forage (hay/haylage), rice, sorghum for grain, and soybeans. The breakdown of agricultural product type, acreages, and yield for Calhoun County is included in Table 2.2-4 (USDA, 2017).

Major roads/highways that cross and are in the vicinity of the LMGS site are shown on Figure 2.2-7. Jesse Rigby Road is located adjacent to the LMGS site to the north and SH 35 and SH 185 are the primary arterials serving the site. No airports or ports are located within the vicinity of LMGS. A portion of the Victoria Barge Canal is located within the vicinity of LMGS (Figure 2.2-7). The Victoria Barge Canal provides transport from the Gulf Intracoastal Waterway (GIWW) to the Port of Victoria. The GIWW is further discussed in Section 2.2.3. Local and regional transportation facilities are described in Section 2.5.2.

Two existing underground pipelines cross the LMGS site (Figure 2.2-8). One pipeline traverses through approximately 1.8 mi (2.9 km) of the LMGS site and has an easement width of 50 ft. (15.2 m), while the other pipeline traverses through approximately 1.6 mi (2.6 km) of the LMGS site, with an easement ranging from 50 to 60 ft. (15.2 m to 18.3 m).

No known mineral resources within or adjacent to the LMGS site are being exploited or are of any known value (USGS NMIC, 2003).

In Texas, the ability of counties to control property development is largely limited to the reviews related to the subdivision of land. The LMGS site is classified as A0031 “variance” under the Calhoun County subdivision code, which is a form of relief granted to a subdivider by the Commissioners Court. This variance allows for exceptions to the standard subdivision regulations providing flexibility in cases where strict compliance with the regulations present unique circumstances which justify a deviation of the rules (Calhoun County, 2007a).

2.2.2 Transmission Corridors and Off-Site Areas

An overhead electric bulk power transmission line crosses through approximately 1.3 mi (2.1 km) of the LMGS site and has an easement width of 60 ft. (18.3 km). Figure 2.2-8 identifies the overhead transmission line easement. Transmission lines in the LMGS vicinity are detailed in Section 3.7, Power Transmission System.

2.2.2.1 Proposed Transmission System Modifications

Two 138 kilovolt (kV) transmission lines connect LMGS to the SDO substation. Additional details are provided in Section 3.7.2. The existing American Electric Power (AEP) substation will be closed and decommissioned. A replacement substation would be located on the SDO site, directly across from a tank farm, which separates the new substation from the existing substation (Figure 2.2-8). Because the new substation is located near the existing AEP substation, the new substation would have connection to the larger AEP grid through the power lines progressing along the western side of the SDO site. As such, there are no new transmission line corridors planned for off-site connections from the LMGS site.

2.2.2.2 Land Use

As described in Section 2.2.1, much of the LMGS site, including the transmission line corridor, is used as agricultural land or developed as part of the SDO site. Soils in the cultivated land areas are considered prime farmland. Additionally, the LMGS site including the transmission line corridor are located within the Texas CMP. However, there are no special land uses within the transmission corridor.

2.2.3 The Region

The LMGS region is defined as the area within a 50 mi (80 km) radius of the site center point. Figure 2.2-5 identifies the 14 counties within the region. These include all or parts of Texas counties: Aransas, Bee, Calhoun, Colorado, DeWitt, Goliad, Jackson, Lavaca, Matagorda, Nueces, Refugio, San Patricio, Victoria, and Wharton.

Figure 2.2-9 presents the types and distribution of land cover within the LMGS region, and Table 2.2-5 details the acreage of the land cover types within the LMGS region. Land cover within the LMGS region is primarily agriculture land with hay/pasture and cultivated crops representing the dominant land cover. Much of the region is classified as open water given the location near the shoreline of the Gulf of Mexico. In addition, because the region extends far into the Gulf of Mexico, a large portion of the land cover is not included in the NLCD and represented as unclassified in the database. However, this area is shown on Figure 2.2-9 as open water-Gulf of Mexico.

The breakdown of agricultural commodity type, acreages, and yield for the counties in the LMGS region is included in Table 2.2-4. Cultivation of crops is one of the major land uses in the LMGS region. The USDA 2017 Census of Agriculture indicates that the principal agricultural commodities in the LMGS region are corn for grain, forage (hay/haylage), rice, sorghum for grain, soybeans, cotton, pecans, and wheat for grain. The greatest acreage of land dedicated to agricultural production is in Nueces County, Texas, followed by Wharton County, Texas, and San Patricio County, Texas. Aransas County, Texas, had the fewest acres dedicated to agricultural production in the LMGS region (USDA, 2017).

Elements of the transportation system in the region, including highways, railroads, waterways, and airports are shown on Figure 2.2-7. Major highways within the LMGS region include SHs 35, 185, and 239, and U.S. Highways 77, 183, 59, and 87. Major rail lines or rail systems include the Union Pacific, Burlington Northern Santa Fe, Point Comfort and Northern Railroad, South Texas Project Railroad, and the Kansas City Southern Railway (TxDOT, 2023a). The GIWW is a major waterway transportation system located within the LMGS region. The GIWW is a 1100 mi (1880 km), man-made, shallow draft, protected waterway that connects ports along the Gulf of Mexico and along the Texas coastline (TxDOT, 2021a). Several canals are located throughout the LMGS region and provide transportation from the GIWW to various ports. Eight airports are located within the LMGS region as shown on Figure 2.2-7. The Calhoun County Airport is located 9.3 mi (15 km) from the site center point. The closest commercial airport in the LMGS region is Victoria Regional Airport, located 23.4 mi (37.7 km) from the site center point.

Special land uses within the LMGS region are illustrated on Figure 2.2-4. Several WMAs and a wildlife refuge were identified within the LMGS region. These include the Guadalupe Delta WMA (discussed in Section 2.2.1), Aransas National Wildlife Refuge, Welder Flats WMA, and

Mad Island WMA. The Aransas National Wildlife Refuge encompasses more than 115,000 ac (46,538.9 ha) of diverse habitat for migratory waterfowl and other wildlife along the Texas Gulf Coast (USFWS, 2023a). The Welder Flats WMA has 1480 ac (598.9 ha) of submerged coastal wetlands in the San Antonio Bay area in Calhoun County, Texas (TPWD, 2023b). The Mad Island WMA consists of 7200 ac (2913.7 ha) of fresh, intermediate, brackish, and saline marsh land with sparse brush and flat coastal prairie (TPWD, 2023c). Additionally, multiple protected natural areas and large (greater than 100 ac [40.5 ha]) state parks were also identified within the LMGS region and are shown on Figure 2.2-4. These include Mad Island Macrosite Conservation Lands, Dunham Point, Rattlesnake Island, Ayres Island, Robby Island, Goliad State Park, and Goose Island State Park.

Tables

Table 2.2-1: Land Cover on the Long Mott Generating Station Site

Land Cover Type	Project Site (ac.)	Project Site (percent)
Cultivated crops	730.2	47.5
Deciduous forest	0.2	0
Developed, medium intensity	196.2	12.8
Emergent herbaceous wetlands	23.5	1.5
Evergreen forest	2.2	0.1
Herbaceous (including hay/pasture)	442.4	28.8
Open water	81.9	5.3
Shrub/Scrub	57.4	3.7
Woody wetlands	3.3	0.2
Total	1537.2	100
Source: MRLC Consortium, 2021 Abbreviation: ac = acre		

Table 2.2-2: Land Cover in the Long Mott Generating Station Vicinity

Land Cover Type	LMGS Vicinity (ac.)	LMGS Vicinity (percent)
Barren Land	123	0.1
Deciduous Forest	281.3	0.3
Herbaceous	352.5	0.4
Evergreen Forest	426.6	0.5
Developed, high intensity	430.8	0.5
Woody Wetlands	479	0.6
Developed, medium intensity	572.4	0.7
Mixed Forest	754.8	0.9
Developed, low intensity	1159.8	1.4
Developed, open space	1832.5	2.2
Shrub/Scrub	2886.2	3.4
Emergent Herbaceous Wetlands	9715.7	11.4
Open Water	11,566.70	13.6
Hay/Pasture	19,496.20	23
Cultivated Crops	34,862.70	41
Total	84,940.30	100

Source: MRLC Consortium, 2021
Abbreviations: LMGS = Long Mott Generating Station; ac = acre

Table 2.2-3: Prime Farmland in the Long Mott Generating Station Site and Vicinity

Prime Farmland	LMGS Site (ac.)	LMGS Site (percent)	LMGS Vicinity (ac.)	LMGS Vicinity (percent)
All areas are prime farmland	1040.9	67.7	59,314.70	69.9
Developed land with soil criteria for prime farmland	377.7	24.6	378.3	0.5
Not prime farmland	118.6	7.7	25,061.80	29.5
Prime farmland if drained	-	-	133.6	0.2
Total	1537.2	100	84,888.30	100

Source: USDA NRCS, 2022
Abbreviations: LMGS = Long Mott Generating Station; ac = acre

Table 2.2-4: Principal Agricultural Crops as of 2017 in the Long Mott Generating Station Region (Sheet 1 of 2)

Crops	Aransas County, TX	Bee County, TX	Calhoun County, TX	Colorado County, TX	DeWitt County, TX	Goliad County, TX	Jackson County, TX	Lavaca County, TX	Matagorda County, TX	Nueces County, TX	Refugio County, TX	San Patricio County, TX	Victoria County, TX	Wharton County, TX
Corn for grain														
Area (ac.)	-	9996	12,298	13,724	5406	8698	89,140	3147	32,924	24,820	3811	19,021	25,023	69,499
Yield (bushels)	-	1,100,087	1,527,148	1,736,261	598,963	797,255	10,569,000	212,262	4,119,281	2,165,522	313,962	2,098,040	3,115,357	8,734,475
Forage (hay/haylage), all														
Area (ac.)	759	9561	3331	22,126	28,461	8717	10,831	45,637	16,248	4967	1956	5331	9678	25,779
Rice														
Area (ac.)	-	-	-	28,929	-	-	-	1685	12,187	-	-	-	-	30,369
Sorghum for grain														
Area (ac.)	-	10,068	9202	-	-	1700	6330	14,501	142,457	24,774	85,707	10,537	18,383	-
Yield (bushels)	-	668,066	853,856	77,069	-	127,144	517,954	1,314,223	10,486,736	1,994,908	6,356,318	1,090,155	2,072,922	-
Soybeans for beans														

Table 2.2-4: Principal Agricultural Crops as of 2017 in the Long Mott Generating Station Region (Continued)

Crops	Aransas County, TX	Bee County, TX	Calhoun County, TX	Colorado County, TX	DeWitt County, TX	Goliad County, TX	Jackson County, TX	Lavaca County, TX	Matagorda County, TX	Nueces County, TX	Refugio County, TX	San Patricio County, TX	Victoria County, TX	Wharton County, TX
Area (ac.)	-	-	1591	-	-	-	2412	-	-	-	-	-	6543	-
Cotton, all														
Area (ac.)	-	14,210	11,308	-	-	-	39,488	-	25,911	128,293	22,920	98,021	13,801	80,643
Pecans, all														
Area (ac.)	-	-	-	1469	2780	35	-	1271	-	-	-	-	-	-
Wheat for grain, all														
Area (ac.)	-	1463	-	-	-	-	-	-	-	3012	-	980	-	639
Yield (bushels)	-	39,121	-	-	-	-	-	-	-	65,955	-	24,900	-	16,183
Total area (ac.)	**759**	**45,298**	**37,730**	**66,248**	**36,647**	**19,150**	**148,201**	**51,740**	**101,771**	**303,549**	**53,461**	**209,060**	**65,582**	**225,312**

Note: “-” represents zero
Abbreviations: TX = Texas; ac = acre

Table 2.2-5: Land Cover in the Long Mott Generating Station Region

Land Cover Type	LMGS Region (ac.)
Developed, High Intensity	8717.4
Barren Land	16,867
Developed, Medium Intensity	26,632.10
Developed, Low Intensity	43,953.70
Developed, Open Space	77,832.10
Herbaceous	79,327.50
Evergreen Forest	116,046.30
Woody Wetlands	124,577.80
Deciduous Forest	138,131.30
Mixed Forest	141,256.20
Emergent Herbaceous Wetlands	304,373
Shrub/Scrub	515,659.50
Cultivated Crops	610,392
Open Water	787,518
Unclassified[(a)]	940,633.30
Hay/Pasture	1,195,029.10
Total	5,126,946

Source: MRLC Consortium, 2021
Note:
a)Unclassified = Open Water-Gulf of Mexico
Abbreviations: LMGS = Long Mott Generating Station; ac = acre

Figures

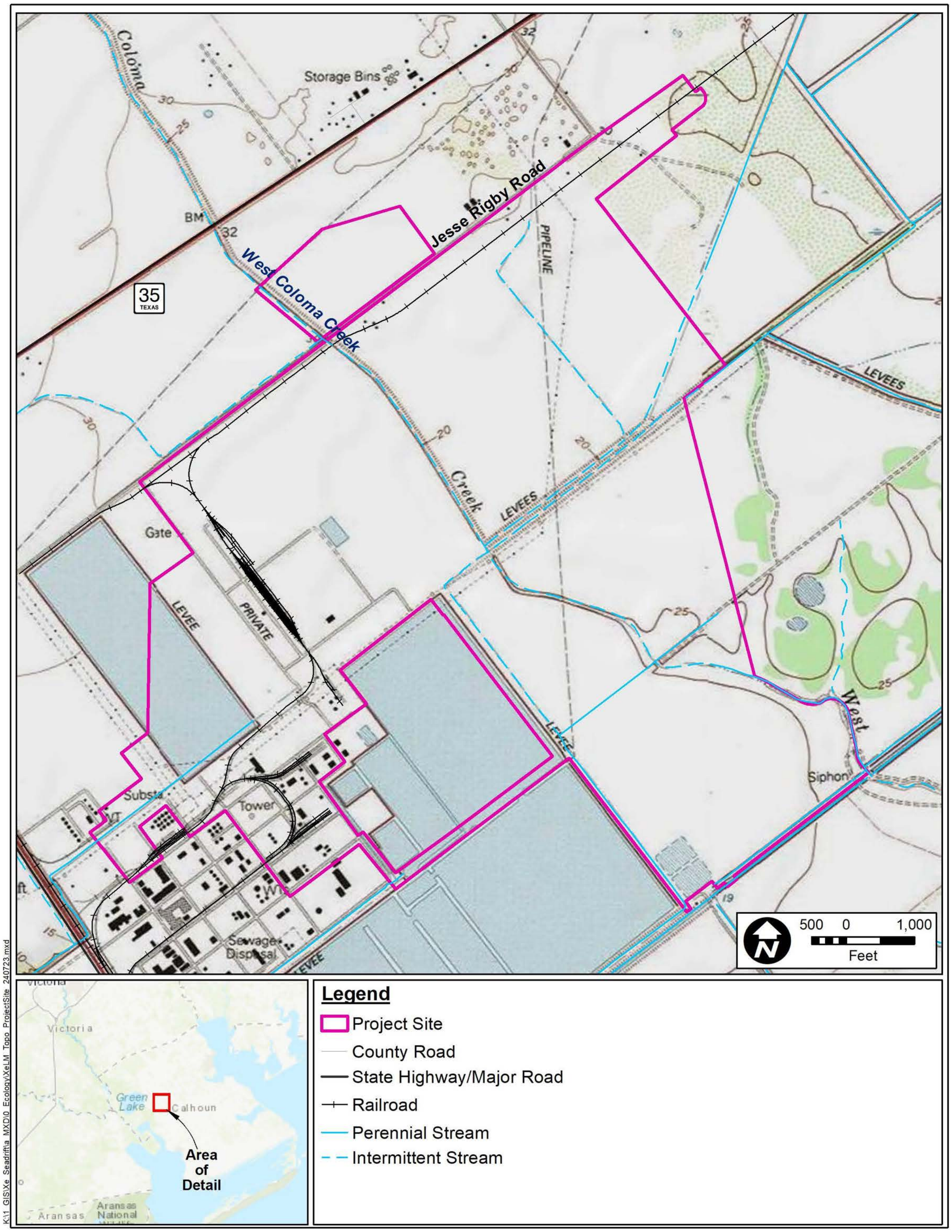


Figure 2.2-1: Topography of the Long Mott Generating Station Site

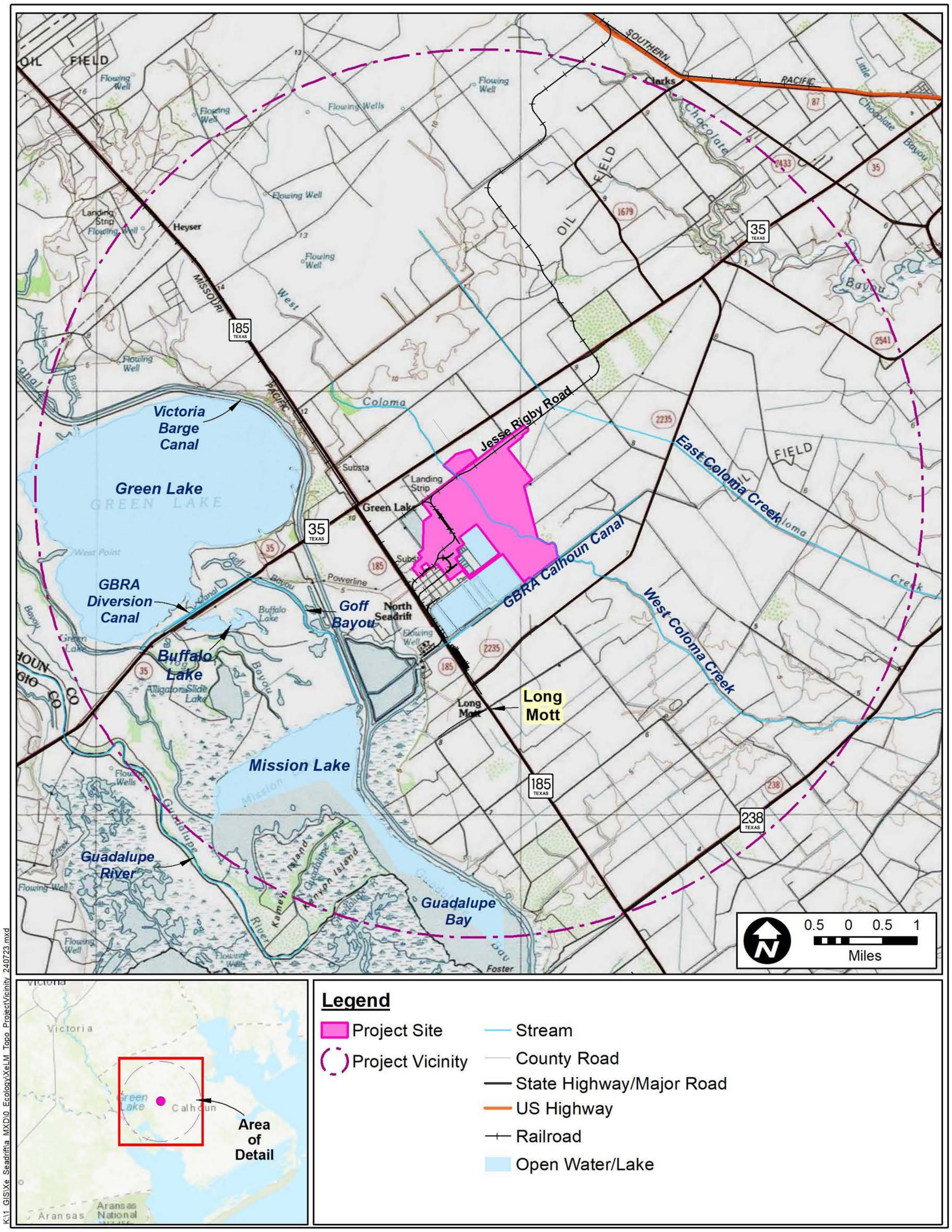


Figure 2.2-2: Topography of the Long Mott Generating Station Vicinity

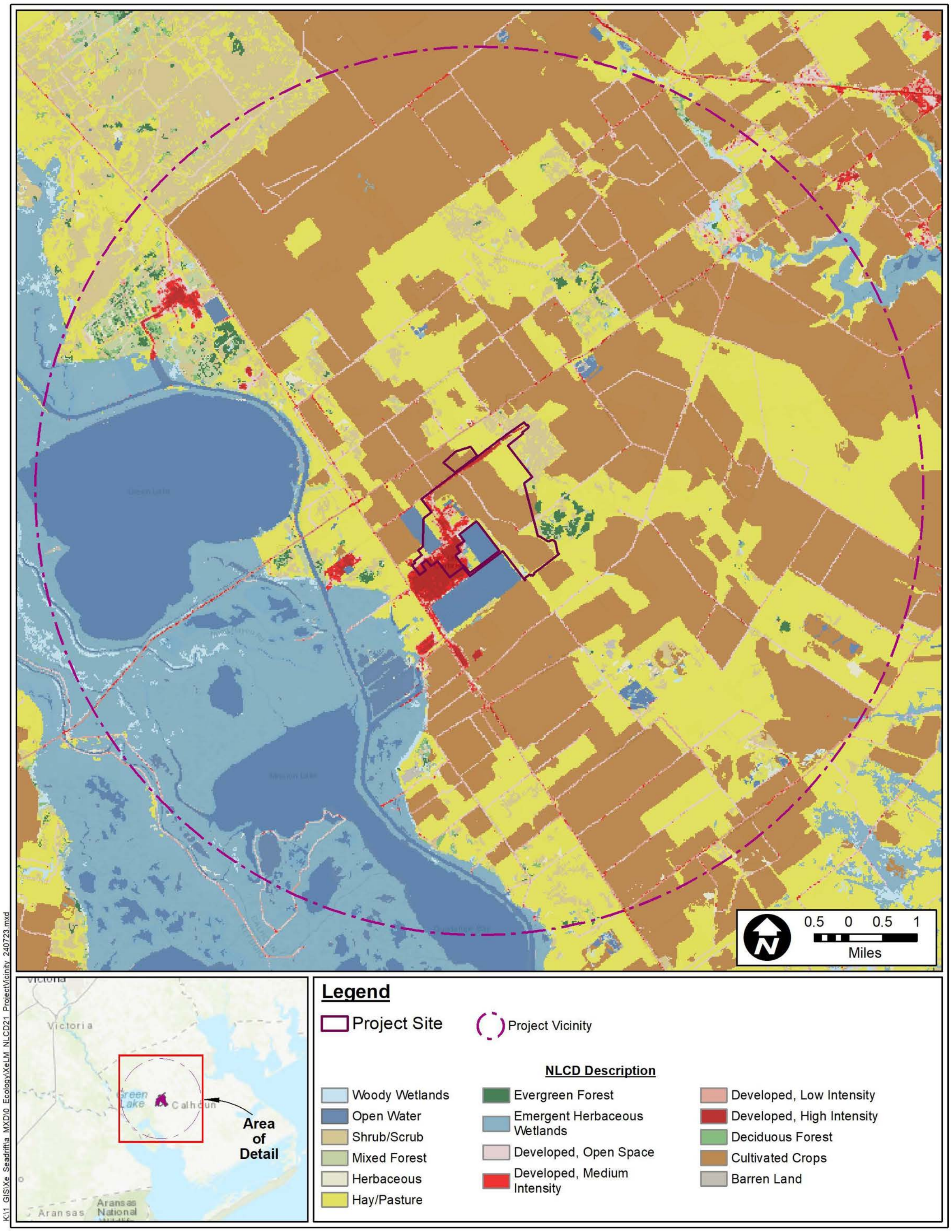


Figure 2.2-3: Land Cover within the Long Mott Generating Station Site and Vicinity

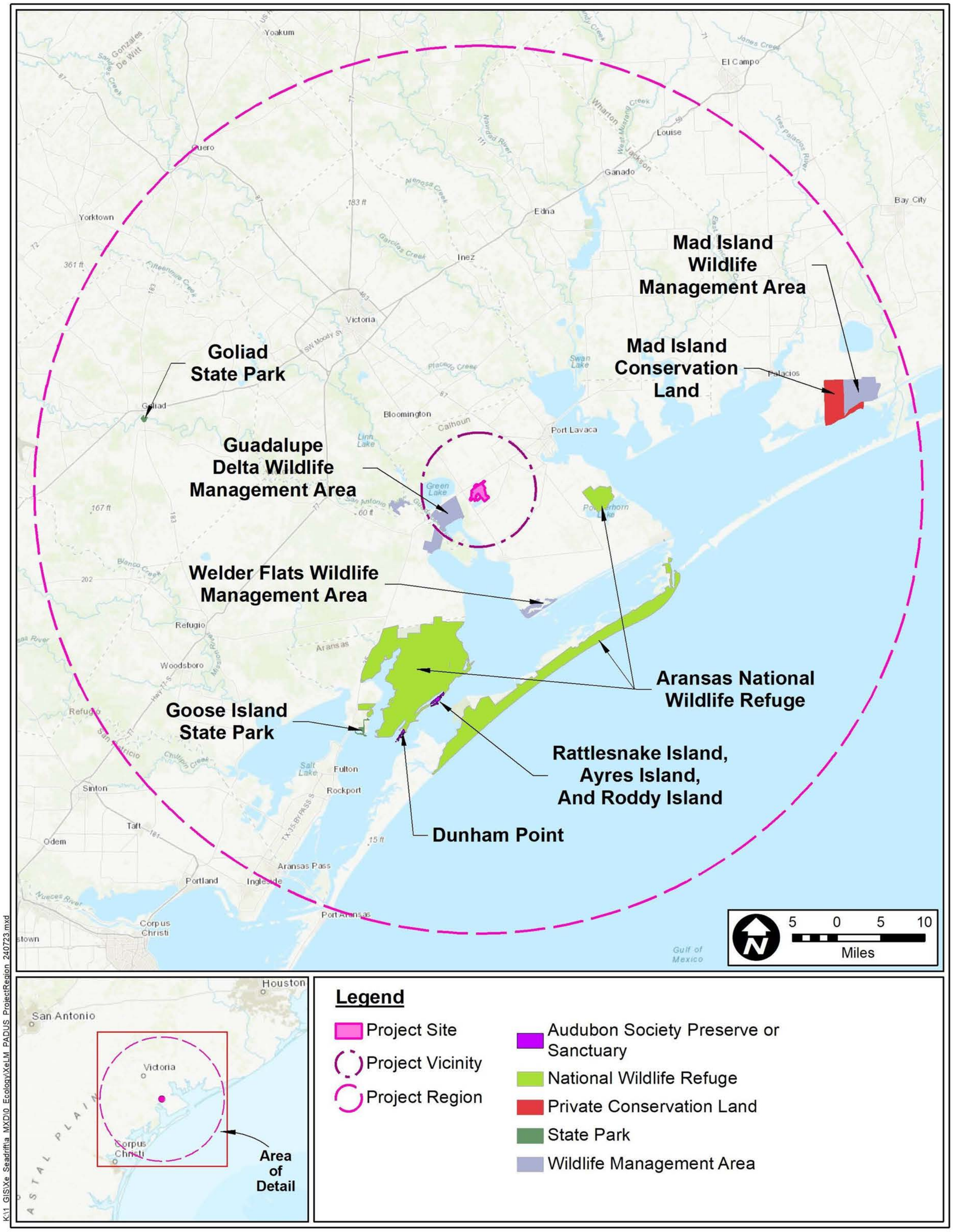


Figure 2.2-4: Special Land Uses in the Long Mott Generating Station Region

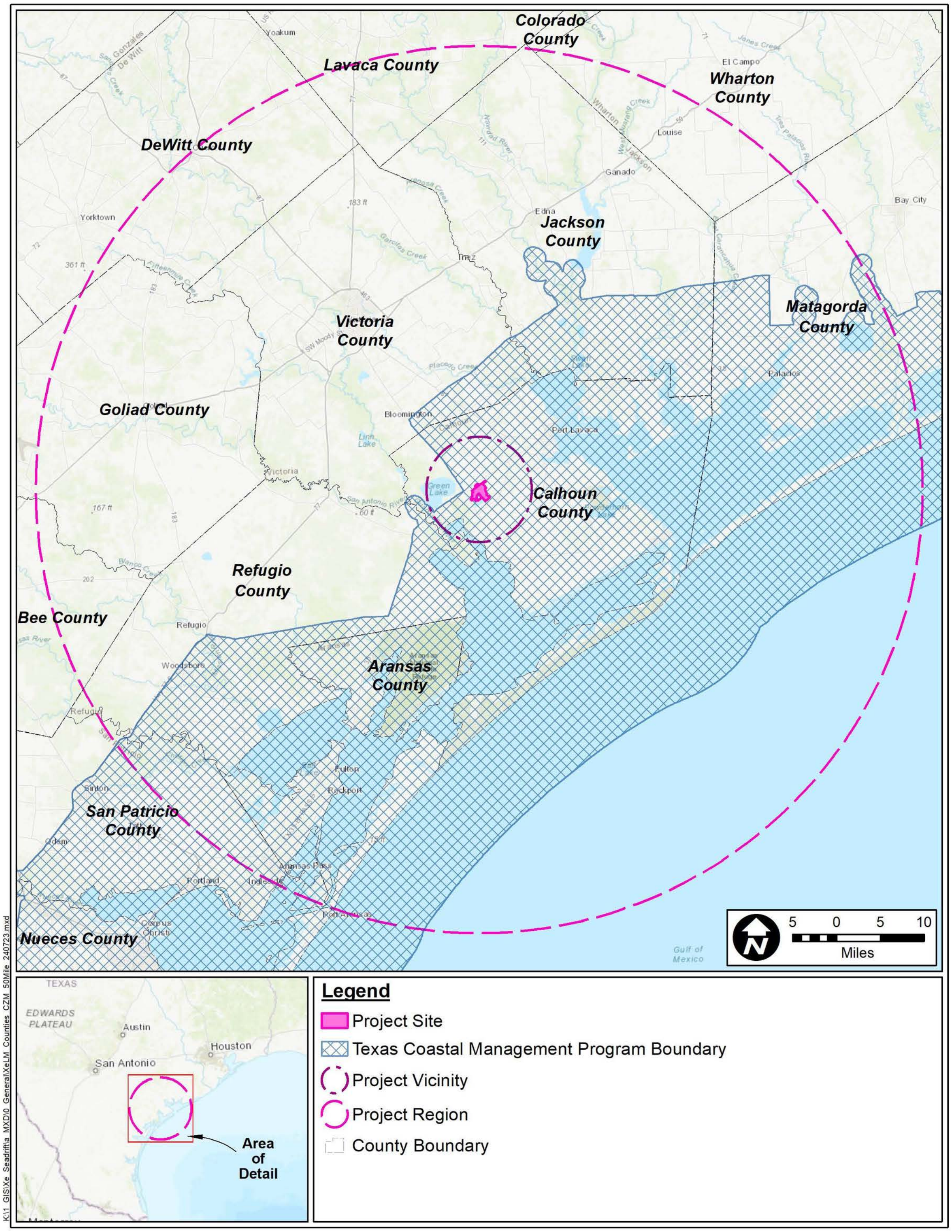


Figure 2.2-5: County and Coastal Zone Boundaries

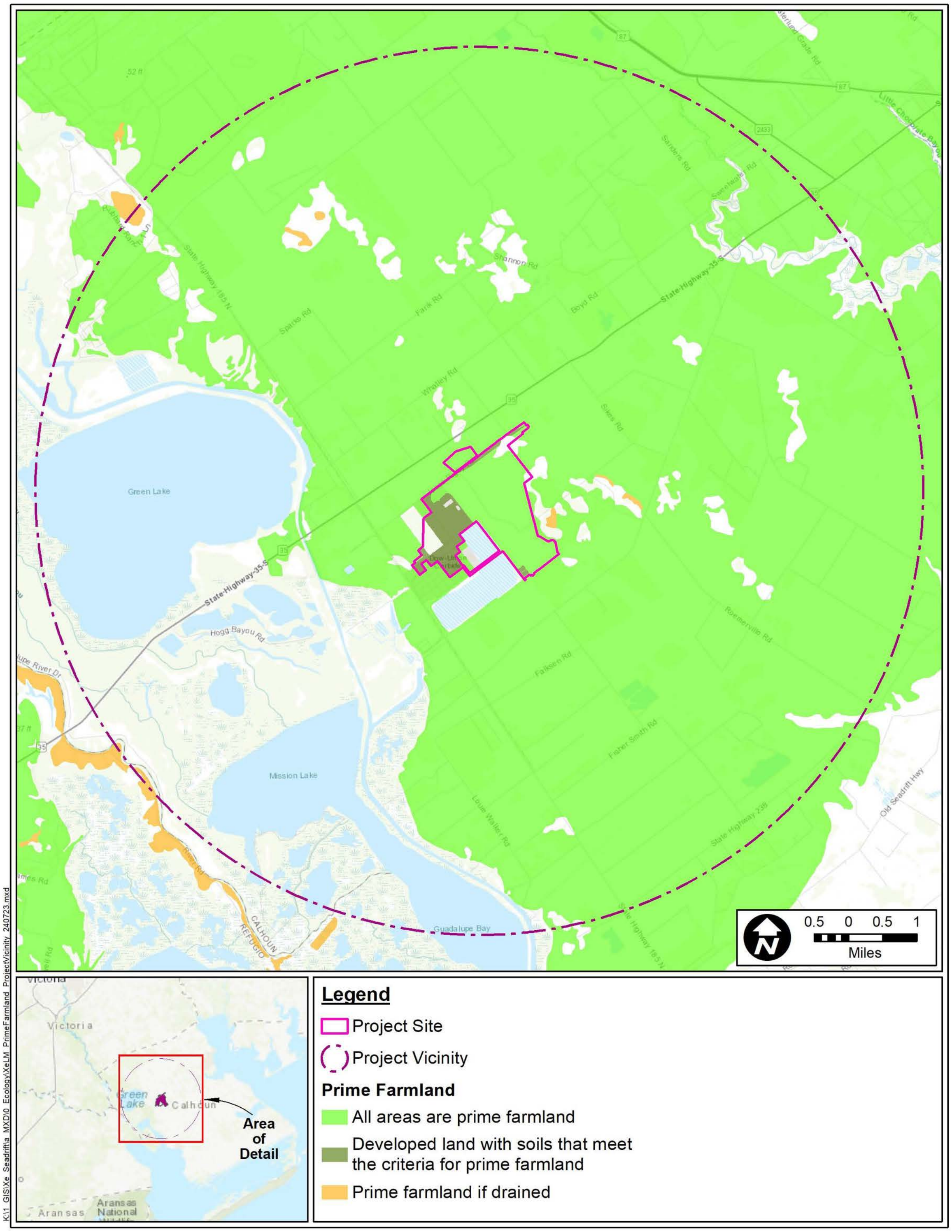


Figure 2.2-6: Prime Farmland in the Long Mott Generating Station Site and Vicinity

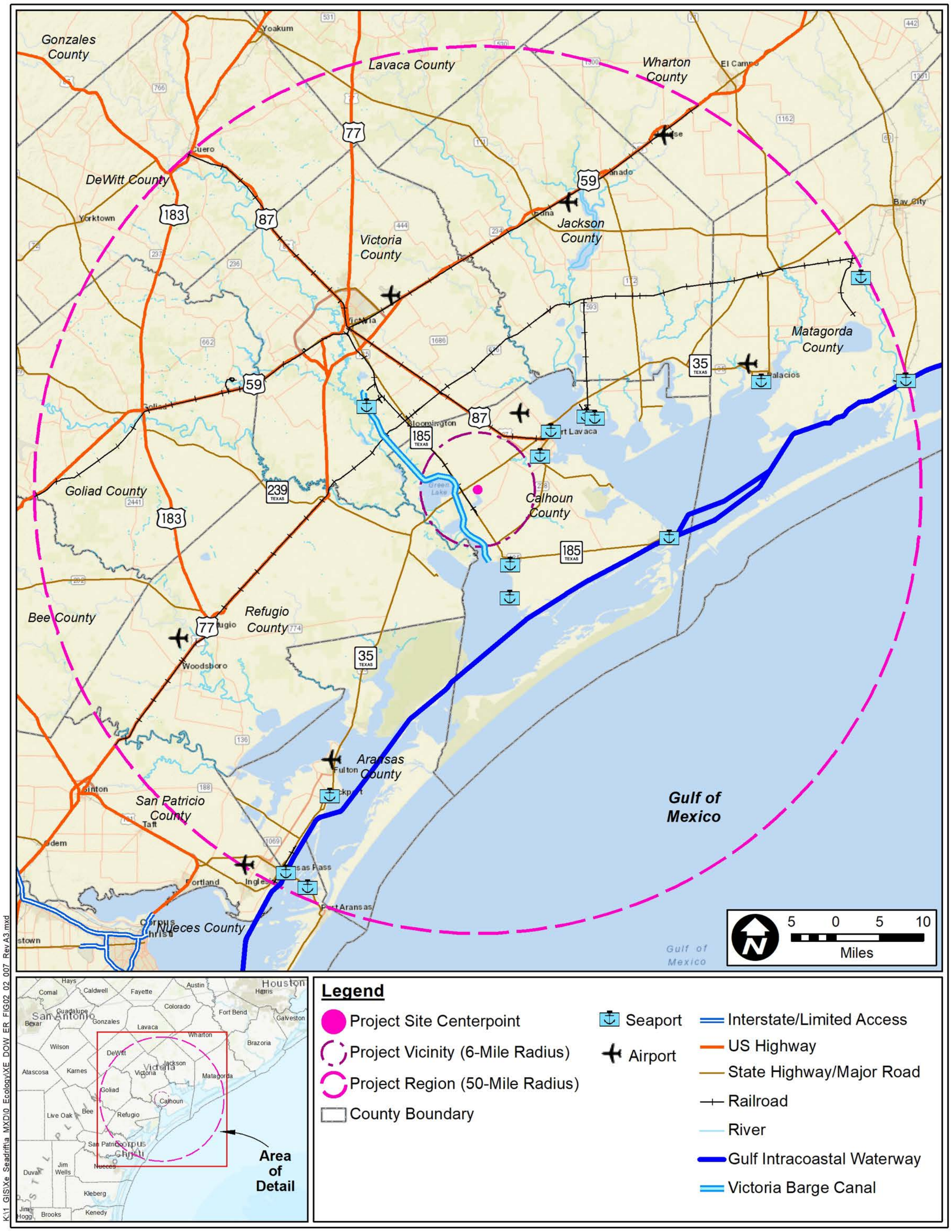


Figure 2.2-7: Transportation in the Long Mott Generating Station Region

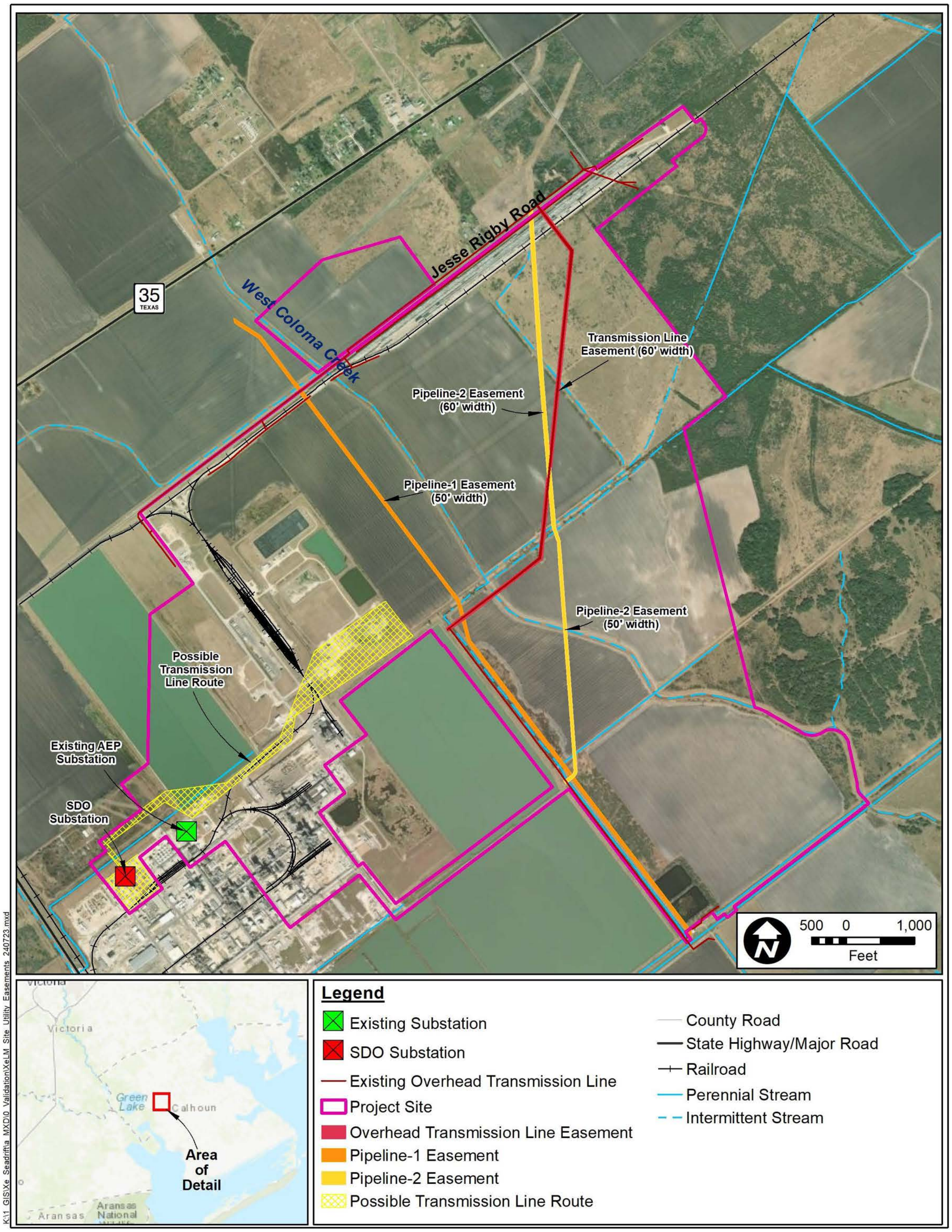


Figure 2.2-8: Long Mott Generating Station Site Utility Easements

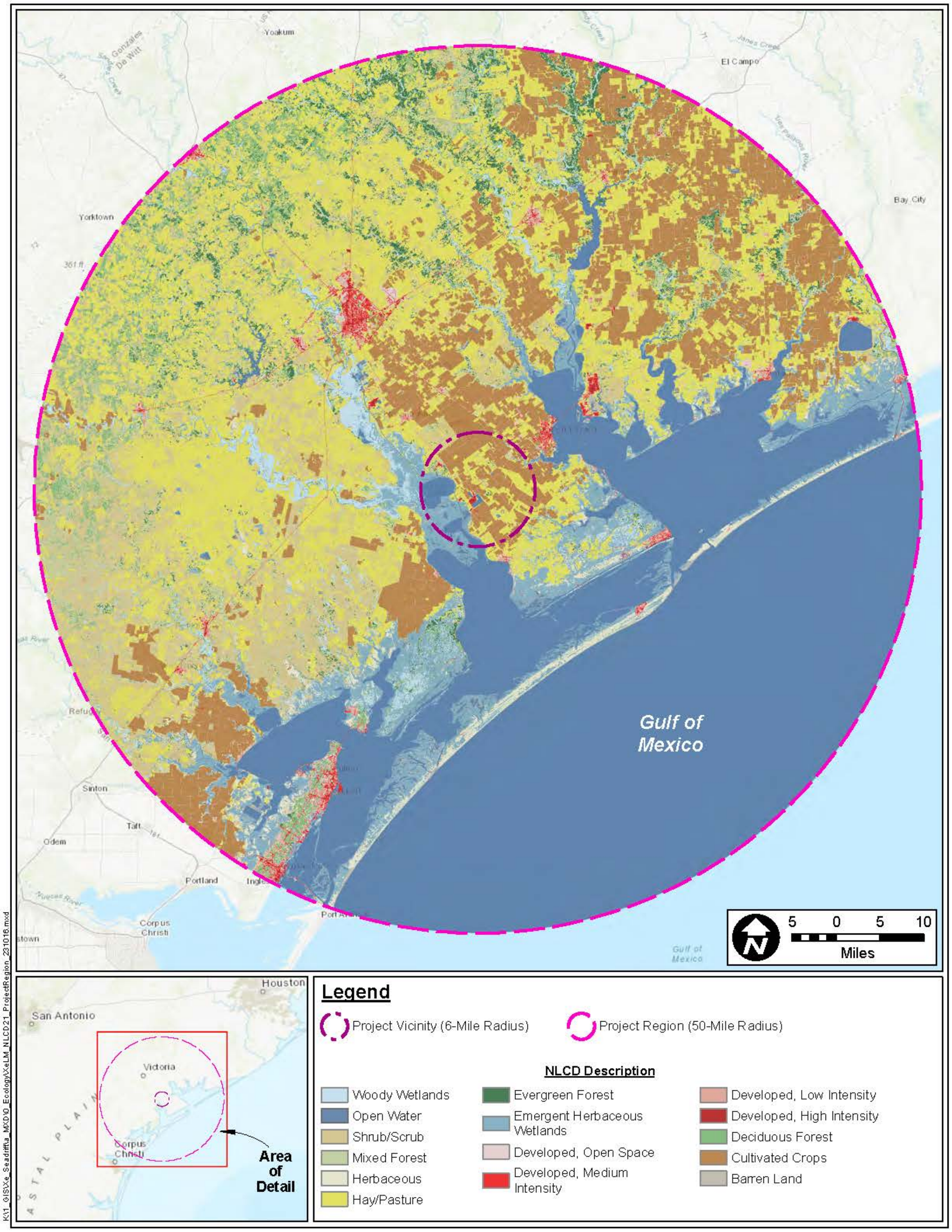


Figure 2.2-9: Land Cover in the Long Mott Generating Station Region

2.3 Water

2.3.1 Surface Water

This section presents descriptions of the surface water resources that could be affected by building and operation of LMGS. Surface water features in the region are shown on Figure 2.3.2-1. Major surface water features in the vicinity of the LMGS site are shown on Figure 2.3.2-2. The physical and hydrologic water resource characteristics of the site and region are summarized below.

2.3.1.1 Hydrologic Setting

The relevant surface water features addressed include freshwater streams, lakes and impoundments, and estuaries and oceans.

2.3.1.1.1 Freshwater Streams

The surface water hydrologic system within the project region is a complex system of interrelated natural and anthropogenically influenced surface water systems. Climate patterns vary and contribute to the historic development of surface water management systems. These systems include facilities to divert, convey, and store surface water, which provides increased and more reliable water supplies during dry periods for agricultural, industrial, and other uses.

The LMGS site is located near the outlet of the Guadalupe River to the coast and Guadalupe Estuary system (Figure 2.3.2-3). Freshwater inflow to the estuaries has been reduced by water diversions for consumptive uses, such as agricultural irrigation. Reduced freshwater inflows result in more extensive and/or more frequent salinity intrusions to the upper reaches of estuaries and coastal streams. A saltwater barrier dam has been constructed on the Guadalupe River near the LMGS site to limit salinity intrusion above the barrier (Figure 2.3.2-2). In Texas, diversions from streams are regulated by the State through water rights allocations. Multiple local, regional, and state governmental agencies and organizations are involved in various aspects of the surface water systems in Texas. There are several long-term USGS streamflow stations that provide data for Guadalupe River flow and flow diverted to the GBRA Calhoun Canal from which SDO obtains its water supply.

The natural surface water environment near the LMGS site includes a complex of topographically flat upland areas, including the site itself, located near the coast where the Guadalupe River and other streams discharge to bayous, wetlands, and transitional coastal areas.

As shown on Figure 2.3.2-2 and Figure 2.3.2-3, several major streams and rivers are located in the vicinity of the LMGS site, including the Guadalupe River and West Coloma Creek. West Coloma Creek passes through the LMGS site. Other major surface water features near the LMGS site include the GBRA Calhoun Canal and the Victoria Barge Canal. The eastern portion of the LMGS site drains to West Coloma Creek. West Coloma Creek flows southeasterly and passes through Powderhorn Lake into Matagorda Bay and the Lavaca-Colorado Estuary system (also known as the Tres Palacios Estuary system or the Matagorda Bay system). The Matagorda Bay system is the adjacent estuary system north of the Guadalupe Estuary (TDWR, 1980a). The drainage area to Lavaca-Colorado Estuary is approximately 44,000 mi^2 (114,600 km^2) (TDWR, 1980a).

2.3.1.1.1.1 Streamflow Data for Freshwater Streams

The USGS lists 106 active and inactive surface water daily streamflow and facility (e.g., canal) systems flow stations in the overall Guadalupe River basin. These include 23 stations on the Guadalupe River, 15 stations on the San Antonio River, the largest tributary to the Guadalupe River, and three stations associated with the pumped diversion of water from the Guadalupe River to the GBRA Calhoun Canal. The stations that are hydrologically nearest and of primary relevance to LMGS are listed in Table 2.3.1-1.

Freshwater inflows to the Guadalupe Estuary, and other estuaries, have been a topic of significant importance to the State of Texas and various stakeholders since at least the 1970s. State legislation has been passed requiring certain related actions aimed at protection of the estuaries. Numerous investigations relating directly to the Guadalupe River flow to the estuary and to the effects of freshwater flows to estuary salinity and ecological resources have been performed (Carothers et al., 2015; Guthrie, 2010a, 2010b, 2010c; Johns, 2012; Sullivan et al., 2020; Montagna et al., 2017; Pulich et al., 1998; San Antonio Bay Partnership, Inc. et al., 2015; TDWR, 1980b; TWDB 2024a, 2024b, and 2024c; Wetz and Chin, 2020; and Zhu et al., 2020). Pulich et al. (1998) used data collected and methods developed to relate freshwater inflow to ecological productivity to develop recommended minimum freshwater inflow targets.

Flow data from the Guadalupe River near Tivoli Station (No. 08188800), which is located southwest of Green Lake and upstream from SH 35, reflect flow that is passed downstream from the saltwater barrier located at Schulz Road, after flow diversion to the GBRA Diversion Canal that is located 550 ft (168 m) upstream of the saltwater barrier. The USGS monthly mean flow data, based on mean daily flows adjusted for tidal influences, are presented in Table 2.3.1-2. The monthly mean flows diverted to the GBRA Calhoun Canal, as measured at USGS Station 08188590 for the period June 2016 through September 2023 near Long Mott, are presented in Table 2.3.1-3.

River flows upstream of Station 08188800, including the tributary San Antonio River, may be influenced by numerous diversions, altering the Guadalupe River flows that occur immediately upstream of the GBRA Diversion Canal. Surface water management in the Guadalupe River basin is complicated with the many surface water allocations and flows controlled by storage reservoirs; therefore, the Texas Commission on Environmental Quality (TCEQ) uses a computer model, the Guadalupe-San Antonio River Basin (GSA) Water Availability Model (WAM), to manage water continuously (Black & Veatch, 2020; Brandes et al., 2011).

Because of the complex and dynamic surface water management system, a low flow frequency relationship is less applicable than water management goals and target conditions.

The TCEQ has estimated a firm water supply for the GBRA/Dow Water Rights of 8870 acre-feet per year (ac-ft/yr) (10,940,984 cubic meters per year [m^3/yr]), or approximately 5.1 percent of the GBRA/Dow Water Rights total annual diversion allocation. The diversion allocation authorized by six different permits is 172,501 ac-ft/yr (212,776,851 m^3/yr). The South Central Texas Regional Water Planning Group (SCTRWPG) has developed plans for additional stormwater management facilities (e.g., storage reservoirs). One of the SCTRWPG's alternative plans includes building an off-channel reservoir just east of the LMGS site. (Black & Veatch, 2020). However, the location and scope of this potential facility is conceptual at this time.

In the GSA WAM, TCEQ must define acceptable criteria and limitations including environmental flows for freshwater streams. Various methods such as the Hydrology-based Environmental Flow Regime (HEFR) (Brandes et al., 2011) have been developed to assist in selecting the required environmental flows. WAM has been applied to estimate natural Guadalupe River flow to the Guadalupe Estuary for use in managing the river flows. The Texas Water Development Board (TWDB) has made available the estimated naturalized monthly flow volumes from the Guadalupe River to the Guadalupe Estuary for the period 1990 through 2023 (TWDB, 2024c). A comparison of the estimated natural flows into the estuary from 2001 through 2023 to observed flows at the two USGS stations near the outflow is provided in Figure 2.3.2-4. The estimated naturalized flows account for diverted flow and storage in the river basin. The estimated average naturalized mean daily flow for that period is 3002 cubic feet per second (cfs) (85.01 cubic meters per second [m^3/s]) with an average annual flow volume of 2,174,215 ac-ft (2,681,850,718 m^3). The USGS observed flows at the Guadalupe River at Tivoli, Texas, station for the same period were an average flow of 1582 cfs (44.80 m^3/s) and average annual volume of 95,436 ac-ft (117,718,573 m^3), or approximately 4.3 percent of the TWDB's estimated naturalized flow volume. Some months are missing data in the Guadalupe River at Tivoli record (Table 2.3.1-2) and those missing monthly data were estimated from the mean daily flow record or, when available, the USGS Guadalupe River at SH 35 near Tivoli, Texas, data (Table 2.3.1-3).

The annual water volume diverted by pumps to the GBRA Calhoun Canal has been measured by the USGS since 1971 (USGS Stations No. 08188600 from 1971 through September 2016 and No. 08188590 from October 2016 through 2023) (USGS, 2024). The annual volume has declined through that period at a relatively steady rate from an average of approximately 76,326 ac-ft (94,146,735 m^3) for the 10-year period from 1971 to 1980, to an average of 41,762 ac-ft (51,512,669 m^3) for the 10-year period from 2014 to 2023. The month of minimum average diversion was February. The maximum diversion month was June during the 1971 to 2016 period and August for the 2017 to 2023 period.

2.3.1.1.1.2 Floodplains and Floodways

The U.S. Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for Calhoun County, Texas (FEMA, 2018a) is shown on Figure 2.3.2-5. The LMGS site is located in Zone X, Area of Minimal Flood Hazard. Streams with detailed flood hazard study included Guadalupe River; West Coloma Creek was not studied. Coastal flood hazard studies included Coastal Transect No. 18 (Figure 2.3.2-5), which trends southeast to northwest and roughly parallels West Coloma Creek in the vicinity of the LMGS site approximately 10,473 ft. (3192 m) to the west. The LMGS site Zone X flood hazard reflects the coastal flood wave hazard with the flood elevation at Coastal Transect No. 18 (FEMA, 2018b) being approximately 16 to 17 ft (4.9 to 5.2 m). LMGS site ground surface elevations are 26 ft (7.6 m) or greater, except for the West Coloma Creek channel.

A floodway is defined on the FIRM for the Guadalupe River. Nearest the LMGS site, the Guadalupe River floodway eastern boundary is located at approximately the levee located along the eastern shoreline of Green Lake. West Coloma Creek was not studied, and no West Coloma Creek floodplain or floodway are defined on the FIRM; therefore, there are no mapped floodways within the LMGS site.

The USGS has published regional regression equations for flood flows in unregulated Texas streams (Asquith and Slade, 1997; Asquith and Roussel, 2009). Application of the Asquith and Roussel (2009) regression equations to the West Coloma Creek watershed at the upstream LMGS site boundary provides the discharge frequency estimates in Table 2.3.1-4.

2.3.1.1.1.3 Temperature Characteristics

As described in Section 3.4.1.5, LMGS uses a passive cooling system that does not use water. Makeup water from the GBRA does not serve as an active nuclear safety-related makeup water supply for ultimate heat sink cooling. Because surface water bodies are not used as heat sinks, there are no relevant water temperature data.

Surface water temperatures were monitored as a part of quarterly surface water quality monitoring on-site in and the vicinity of the LMGS site in 2023 to 2024 and are discussed in Section 2.3.1.3.

2.3.1.1.1.4 Streams on the LMGS Site

Two perennial streams, two intermittent channels, and six ephemeral ditches were delineated within the LMGS site (Table 2.3.1-5, Figure 2.3.2-6). All channels, with the exception of SD-STR-01 and SD-STR-10, drain into West Coloma Creek. SD-STR-10 eventually drains into the Victoria Barge Canal off-site based on review of aerial imagery. Preliminary determinations of jurisdictional waters subject to U.S. Army Corps of Engineers (USACE) authority under Section 404 of the Clean Water Act (CWA) are also indicated in Table 2.3.1-5 and Appendix 1A. Based on initial coordination with the USACE, the USACE concurs with the preliminary jurisdictions included in Table 2.3.1-5. However, final jurisdictional determination will be made by the USACE subject to receipt of a permit application for LMGS. Limited erosion and sediment accumulation was observed along the stream channels during field investigations. The relatively flat terrain and stream grades reduces the potential for significant erosion and sedimentation along the streams.

2.3.1.1.1.4.1 Jurisdictional Streams

Four surface water features were identified as potential jurisdictional waters. These included SD-STR-02, SD-STR-03, SD-STR-04 and SD-STR-10 as described below:

- SD-STR-02 (West Coloma Creek) is a perennial stream that generally bisects the Project Area. Within the LMGS site, the stream has been channelized and has a continuous bed and bank. The average bankfull width and height is 50 ft (15.2 m) and 20 ft (6.1 m), respectively, and the ordinary high water mark (OHWM) width and depth is 15 ft (4.6 m) and 3 ft (0.9 m), respectively. Evidence of an OHWM includes clear shoreline, natural shelving, a natural bank line, soil change, vegetation loss, and presence of litter/debris. Habitat crossed by the stream consists of mostly cropland and some rangeland. West Coloma Creek is jurisdictional as it flows into Coloma Creek and eventually to Matagorda Bay.
- SD-STR-03 is a straightened intermittent channel that extends along the northwestern boundary of the LMGS site and drains into West Coloma Creek. The average bankfull width and height is 50 ft (15.2 m) and 15 ft (4.6 m), respectively, and the OHWM width and depth is 2 ft (0.6 m) and 0.5 ft (0.2 m), respectively. Evidence of an OHWM includes clear natural shelving and natural bank line. Habitat crossed by the stream consists of cropland to the north and a roadway to the south. The channel is considered jurisdictional due to its connectivity to West Coloma Creek.
- SD-STR-04 is a straightened intermittent channel located near the center of the LMGS site that drains into West Coloma Creek. The average bankfull width and height is 50 ft. (15.2 m) and 15 ft (4.6 m), respectively, and the OHWM width and depth is 2 ft (0.6 m) and 0.5 ft (0.2 m), respectively. Evidence of an OHWM includes clear natural shelving and natural bank line. Habitat crossed by the stream consists of cropland and an industrial area. The channel is considered jurisdictional due to its connectivity to West Coloma Creek.
- SD-STR-10 is a perennial stream located in the southwestern corner of the LMGS site, that drains into the Victoria Barge Canal located to the southwest of the LMGS site. The average bankfull width and height is 50 ft (15.2 m) and 20 ft (6.1 m), respectively, and the channel width and depth is 6 ft (1.8 m) and 3 ft (0.9 m), respectively. Evidence of OHWM observed included clear shoreline, natural shelving, natural back line, and soil change. Habitat crossed by the stream consists of industrial and abandoned industrial land. The channel is considered jurisdictional due to its connection with the Victoria Barge Canal.

2.3.1.1.1.4.2 Non-Jurisdictional Surface Water Features

Surface water features identified as potentially non-jurisdictional include SD-STR-01, and SD-STR-05 to SD-STR-09. Each of these features represent ephemeral channels that are part of artificial drainage systems within the LMGS site. Habitat within these features is limited and of low quality. These channelized features are considered non-jurisdictional based on current USACE interpretations.

2.3.1.1.1.5 Physical Characteristics of Selected Surface Waters on the LMGS Site

This section provides a characterization of the physical attributes of selected surface waters that include the GBRA Calhoun Canal and West Coloma Creek. These waters were selected based on consistency of annual flow and channel size.

Surface water levels were monitored at two locations on West Coloma Creek in 2023 and 2024. Water levels at Site 1 (WCC-1), located directly upstream of the LMGS site, are shown in Figure 2.3.2-7. No water was observed at this location from later September to mid-November 2023. The maximum observed water level occurred on July 27, 2024, with a mean daily water level of 4.49 ft (1.37 m) measured from the transducer installed at the bottom of the gage on the stream bed. West Coloma Creek at WCC-1 can be characterized as intermittent, with extended dry periods where no water was present at this location during fall 2023. Water levels at Site 3 (WCC-3), located downstream of the LMGS site at the intersection of West Coloma Creek and Farm-to-Market Road No. 2235, are shown in Figure 2.3.2-8. Water levels at WCC-3 ranged from -0.28 ft (-0.08 m) to 4.25 ft (1.29 m) measured from the transducer installed at the bottom of the gage on the stream bed. Negative values reflect measurements where the water level falls below the transducer zero reference point. Maximum water depth was observed on July 27, 2024, with a mean daily water level of 3.17 ft (0.97 m). Low water levels were observed from January 6, 2024, through March 31, 2024; increased water levels were observed in the month of April. Thereafter, water levels remained steady from April to July.

Cross-sectional profile data of the GBRA Calhoun Canal were collected opportunistically in November 2023 at two locations that correspond to surface water quality sampling locations GBRA-02 and GBRA-03. This profile is shown in Figure 2.3.2-9. Maximum depth recorded was 6 ft (1.8 m) at GBRA-03. Canal width was approximately 60 ft (18.3 m) at both locations. Mean relative depth across the canal at the two measured locations was 3.3 ft (1 m).

Figure 2.3.2-10 provides a representative cross section of West Coloma Creek within the LMGS site based on LiDAR (light detection and ranging) mapping. West Coloma Creek is channelized within the entire LMGS site and is characterized as having a deep incised channel that is flanked by banks that are elevated above the surrounding terrain within the LMGS site.

2.3.1.1.1.6 Wetlands

Section 2.4.1.2 provides a detailed discussion of wetlands in the LMGS site and vicinity.

2.3.1.1.2 Lakes and Impoundments

Lakes and impoundments within the vicinity of the LMGS site are shown on Figure 2.3.2-2. Green Lake is a large, open waterbody (open-water area of approximately 6050 ac [2448 ha]) located near the Guadalupe River Delta area. The Guadalupe River channel and Hog Bayou convey flow through the delta along the west side of Green Lake. The Victoria Barge Canal was constructed along the eastern side of Green Lake. The saltwater barrier on the Guadalupe River forms a small impoundment on the river along the western side of Green Lake.

2.3.1.1.2.1 SDO Basins

Several man-made off-channel storage basins have been constructed to provide water to the SDO. These basins serve as industrial cooling ponds for SDO. These are cooling ponds and do not have outfalls that are monitored as discharges from SDO. As their use is primarily industrial, these basins are considered as treatment ponds that would not be regulated under the CWA.

Basic characteristics of these basins, based on the USACE National Inventory of Dams database (USACE, 2023), are summarized in Table 2.3.1-6. The TCEQ regulates the dams forming these basins. Water is diverted from the Guadalupe River and ultimately to the GBRA Calhoun Canal, from which water is pumped into the basins to maintain a water storage volume for use at SDO. The total basin surface area is approximately 1192 ac (4,823,853 m^2), a total normal storage volume of approximately 6774 ac-ft (8,355,606 m^3), and a maximum storage capacity of approximately 10,365 ac-ft (12,785,039 m^3). The dams range in height up to approximately 13 ft (4 m).

2.3.1.1.2.2 Basin Operating Rules

The basins at SDO are off-channel storage facilities with inflow coming from pumped diversions from the GBRA Calhoun Canal. Water is pumped from the canal as needed to maintain basin water levels. Operating rules are to simply pump water into the basin as needed to maintain a near-constant water level. Basin outflows are primarily associated with the SDO water use demands and losses that include net evaporation and seepage.

2.3.1.1.2.3 Intake and Discharge Structures

The SDO basins are off-channel storage facilities with inflow being pumped diversions from the GBRA Calhoun Canal. Water is pumped from the canal as needed to maintain basin water levels. Water is pumped/withdrawn from the basins as needed to satisfy SDO water demands. A channel diagram of the GBRA Calhoun Canal at the existing GBRA intake is shown on Figure 3.4-2, and additional GBRA Calhoun Canal cross-sections are provided on Figure 2.3.2-9.

2.3.1.1.2.4 Flow

Basin inflows, outflows, water surface elevations, and storage volumes are influenced by water use withdrawals (Section 2.3.1.2), pumped inflows to maintain the operating water levels, as well as direct precipitation into and evaporation from the basin surfaces. Existing SDO water rights do not guarantee that the annual diversion will be available; cumulative issued water rights volumes may exceed the available diversion volume during drought conditions.

2.3.1.1.2.5 Surface Water Evaporation

TWDB provides data characterizing historic precipitation, gross lake evaporation, and net lake evaporation (TWDB, 2024b). The annual (calendar year) and monthly statistics for precipitation, gross evaporation, and net evaporation are provided in Table 2.3.1-7 for the period from 1954 to 2022. Positive net evaporation values indicate that evaporation exceeds precipitation and negative values indicate that precipitation depth exceeded evaporation. The data indicate a significant level of variability for annual and monthly net evaporation. January, September, November, and December have slightly negative average net evaporation. July and August have the largest average monthly net evaporation.

Applying the TWDB net evaporation data to the SDO basins identified in Figure 2.3.2-2, an annual average net evaporative loss from the basins is 10.26 in. (26.06 cm), or 1019 ac-ft (1,256,918 m^3). This annual water volume must be supplied by the permitted water allocation in addition to the actual facility water use. There are no known data based on measurements for seepage loss of basin water to groundwater or seepage loss through levees. The natural surface soils in the area are clayey soils with low permeability, so seepage loss to groundwater is small.

2.3.1.1.2.6 Water Surface Elevation and Current Patterns

SDO basins are off-channel storage facilities with water levels maintained at a near-constant level by pumped diversion from the GBRA Calhoun Canal. Currents in the basins are influenced primarily by wind and pumped inflows and withdrawals to a minor extent.

2.3.1.1.3 Estuaries and Oceans

Estuaries and oceans in the vicinity and region are shown on Figure 2.3.2-1, Figure 2.3.2-2 and Figure 2.3.2-3. The LMGS site is located near the Guadalupe River outlet to a complex of lakes and bays leading to San Antonio Bay and the Gulf of Mexico (Figure 2.3.2-2 and 2.3.1-3). The Guadalupe River flows into Guadalupe Bay via two short distributaries, the North Guadalupe River and the South Guadalupe River. A water body identified as Mission Lake is located at the upstream end of Guadalupe Bay. These lakes and bays form an estuary system with salinity varying with freshwater inflows from the Guadalupe River and other smaller tributaries as well as tidal influences. A saltwater barrier is located in the Guadalupe River a short distance upstream from Guadalupe Bay (Figure 2.3.2-3). The estuary is sheltered from the Gulf of Mexico coastal waters by Matagorda Island (Figure 2.3.2-1) with a direct connection existing only periodically through Cedar Bayou (TWDB, n.d. [a]).

Water supply for the SDO is provided by the GBRA Calhoun Canal that is supplied by a pumped diversion from the Guadalupe River. The pump station for the diversion is identified in Figure 2.3.2-3. The diversion from Goff Bayou is located upstream of the saltwater barrier. The GBRA Calhoun Canal diversion is permitted by the TCEQ and includes seven individual water rights allocations to GBRA/SDO which are discussed in more detail in Section 2.3.1.2.3. Given its distance from the upper estuary, the LMGS site is not influenced by the estuary system and does not influence the estuary system directly. However, the SDO and LMGS obtain water from the GBRA Calhoun Canal, which is supplied by diversion of water from the Guadalupe River via Goff Bayou. Freshwater inflow to the Guadalupe Estuary is described in some detail in this section.

2.3.1.1.3.1 Circulation and Freshwater Flow

NOAA established the Seadrift, Texas, Tides and Currents station, Station ID 8773037 on February 9, 2004 (NOAA, 2024). The station is located at latitude 28 24.4 N longitude 96 42.7 W near the end of Second Street at Seadrift. The mean tidal range is 0.32 ft. (0.10 m). The station minimum and maximum water levels are -1.69 ft (-0.52 m) mean lower-low water (MLLW) on January 16, 2018, and 5.57 ft (1.70 m) mean higher-high water (MHHW) on August 26, 2017, respectively. MLLW is station elevation 0.00 ft (0.00 m) equivalent to -0.99 ft (0.30 m) North American Vertical Datum of 1988 (NAVD 88). MHHW elevation is station elevation 0.35 ft (0.11 m) relative to MLLW, or 1.34 ft (0.41 m) NAVD 88.

Sea-level rise in the Western Gulf of Mexico is predicted to be larger than global sea-level rise (Sweet et al., 2022). The Western Gulf of Mexico has a projected intermediate probability rise projection of 1.87 ft (0.57 m) by 2050 relative to the year 2000.

Freshwater inflows from the Guadalupe River to the upper estuary occur via a complex delta system consisting of river channels, bayous, and man-made diversions and flow control structures. The existence of relatively small conveyance channels and thick vegetation (e.g., water hyacinth, *Eochhornia crassipes*) has been determined to further complicate the hydrodynamics. To better understand the hydrodynamics of this delta area, Carothers et al. (2015) collected updated topographic and bathymetric data for the area, collected water level and flow data, and developed a preliminary two-dimensional hydrodynamic model for the delta area. The hydrodynamic model was applied for a limited set of conditions and is considered a preliminary model of flows through the primary network of conveyances and water levels producing dynamic inundation and conveyance connectivity conditions over the delta area.

Hydrodynamic modeling of the Guadalupe Estuary has been advancing since the 1970s as part of the Texas estuaries program. Modeling initially used linked models, HYDELT and MTDELT, to predict estuary hydrodynamics (TDWR, 1980b). Estuary circulation from that modeling effort indicated a complex current pattern. Model current patterns and average salinity patterns for June and August conditions are provided in Figure 2.3.2-11 and Figure 2.3.2-12. A model known as TxBLEND is the primary hydrodynamic model that has been applied since 2010 and periodically updated to reflect newly collected data for calibration (Guthrie, 2010b, 2010c) with the primary objective of understanding conditions associated with salinity and effects of freshwater inflows.

2.3.1.1.3.2 Water Temperature and Salinity Distribution

Long-term salinity measurements for three monitoring stations in San Antonio Bay / Guadalupe Estuary are available on the TWDB's Water Data for Texas web pages (TWDB, 2024a). These include the station near Mosquito Point and the connection to the coastal waters (MOSQ), the station near the midpoint of San Antonio Bay and Swan Point (SANT), and the station near the Seadrift Station and located near the outlet of Guadalupe Bay into San Antonio Bay (DELT). Daily salinity data for each of these three stations indicate widely varying salinities from near zero to Gulf levels near 35 psu. The typical salinity gradient varies with the coincident daily SANT and DELT station salinities being approximately 5 psu and 8 psu lower than the MOSQ station.

The Guadalupe Estuary has lower salinity than two other nearby estuaries, Lavaca-Colorado and Nueces (Montagna et al., 2017). The mean measured salinity over these three estuaries during the period from the late 1980's through 2015 were 15.36 psu, 22.85 psu, and 30.65 psu in the Guadalupe, Lavaca-Colorado, and Nueces Estuaries, respectively. Within the Guadalupe Estuary, the average salinity gradient from the northern upstream freshwater inflow location to the lower estuary boundary has been reported based on four monitoring locations (Montagna et al., 2017). Based on seven sampling events during the period from January 2016 to July 2017 the average salinity varied from 16.69 psu nearest the Guadalupe River inflow to 21.06 psu near the estuary midpoint to 24.90 psu and 26.71 psu along the lower estuary boundary. The estuary is sheltered from the Gulf coastal waters by Matagorda Island with a direct connection existing only periodically through Cedar Bayou.

The Guadalupe Estuary is characterized as having a shallow depth. The NOAA Nautical Chart 11315 (NOAA, 2023) indicates typical maximum depth in the middle estuary is approximately 5 to 6 ft (1.5 to 1.8 m) MLLW and 2 to 3 ft (0.6 to 0.9 m) in the upper estuary. Guadalupe Bay depths are approximately 2 ft (0.6 m) MLLW.

The vertical salinity distribution data are available at two short-term stations, GEA and GEB, from TWDB. Data are available for September 8, 2017, to October 16, 2017 (GEB in the middle estuary), and for February 23, 2018, to July 18, 2018 (GEA located in the upper estuary near the delta). Hourly surface and bottom salinity values are available as well as coincident water depth data that were collected by unvented pressure sensors and the pressures (depths) are uncorrected for atmospheric pressure changes. The bottom salinities may reflect water having a higher salinity that accumulated in these deeper locations and may indicate a greater density stratification near these monitoring locations than that which is representative of the shallower overall estuary. Stratification would be limited by the shallowness of the water in general. GEA was located at latitude 28.394, longitude -96.772 and GEB was located at latitude 28.348, longitude -96.746 (TWDB, 2024a)

Long-term water temperature data are also available at the MOSQ, SANT, and DELT stations. Station SANT is located in the middle estuary. Daily water temperatures over the period from 1987 to 2016 ranged from regular minimum winter temperatures in January to February of approximately 36 to 40 degrees Fahrenheit (°F) (2.2 to 4.4 degrees Celsius [°C]) and maximum summer temperatures in July to August of approximately 56 to 57 °F (13 to 14 °C).

2.3.1.1.3.3 Sediment Transport and Shoreline Erosion Characteristics

There are no known significant shoreline erosion or sediment transport concerns in the Guadalupe Estuary or Guadalupe River Delta system. The river delivery of freshwater into the estuary is a complex system consisting of river channels, bayous, and man-made diversions and flow control structures. The system of channels in the Guadalupe River Delta are frequently heavily vegetated, including water hyacinth, that slows water flow and reduces wave size (Carothers et al., 2015).

2.3.1.1.3.4 Bathymetry

There is no LMGS water intake structure or discrete outfall located within the Guadalupe Estuary. Water for LMGS is withdrawn via a new intake structure located on the existing Basin #5. Water to maintain the Basin #5 water level is withdrawn from the GBRA Calhoun Canal via a new GBRA pumping station as shown on Figure 3.1-3. A channel cross-section of the GBRA Calhoun Canal at the existing GBRA intake is shown on Figure 3.4-2. Additional GBRA Calhoun Canal cross-sections are provided on Figure 2.3.2-9. Bathymetry at Goff Bayou and Victoria Barge Canal is not required as they are located in the project vicinity and are not subject to functional or structural alteration as part of the LMGS project.

2.3.1.1.3.5 Discharge and Flushing Characteristics

The Guadalupe River and overall freshwater inflows to the Guadalupe Estuary are described in Section 2.3.1.1.1. Estuary flushing characteristics in the form of salinity levels, salinity intrusion, and management of freshwater inflows have been investigated extensively and described above. The flushing potential for the Guadalupe Estuary is significantly reduced from historic conditions prior to development of extensive water diversion systems. This is based on the Guadalupe River basin water diversions and reduction in high flows reflected by a comparison of TCEQ estimated naturalized flows to USGS observed flows into the estuary described in Section 2.3.1.1.1.1.

2.3.1.2 Surface Water Use

This subsection describes surface water uses that could affect or be affected by building and operation of LMGS and associated on-site transmission corridors. Consumptive and nonconsumptive water uses are identified. Descriptions of the types of consumptive and nonconsumptive water uses, identification of their locations, and quantification of water withdrawals, consumptions, and returns are included. In addition, this subsection describes statutory and legal restrictions on water use.

2.3.1.2.1 Regional Surface Water Use

LMGS is located near the city of Long Mott in Calhoun County, Texas. Major surface water features in the region of the LMGS site are shown on Figure 2.3.2-1. Permitted surface water uses from counties located within 50 mi (80 km) of the LMGS site are indicated in Table 2.3.1-8 along with volumes of water used for each use category. Permitted uses of surface water bodies include municipal, manufacturing, mining, power, irrigation, and livestock (TWDB, 2021). Municipal, manufacturing, and mining uses of surface water in the region include both withdrawals and returns whereas power, irrigation, and livestock uses are presumed consumptive in nature (TWDB, 2023a).

The Guadalupe River, under the authority of the GBRA, provides many communities with municipal drinking water, power, and recreational opportunities throughout its river basin, including supplies derived from storage reservoirs and run-of-river water rights (TSHA, 2022; Black & Veatch, 2020). The San Antonio River's largest water rights are associated with major reservoirs located in Medina and Bexar Counties near San Antonio and are used for irrigation, municipal water supply, domestic water supply, livestock, and steam-electric power generation (Black & Veatch, 2020).

In addition to the uses identified in Table 2.3.1-8, other nonconsumptive uses such as navigation and recreation are prevalent throughout the region and within the hydrologic system of the project region. For example, the bays and estuaries of Texas, including the San Antonio Bay, which receives freshwater from the Guadalupe River and San Antonio River, provide saltwater recreational fishing opportunities that generate an estimated $2 billion annually and contribute to the tourism of Texas' coast (Rosen, 2014). Recreational opportunities provided by the Guadalupe River include swimming, fishing, and camping in and along the river (TPWD, n.d.). The San Antonio River also provides recreational opportunities such as swimming, skiing, fishing, kayaking/canoeing, and rafting throughout its basin (SARA, 2023).

2.3.1.2.2 Surface Water Use in the Project Vicinity

Notable surface water bodies located within 6 mi (10 km) of the LMGS site are depicted on Figure 2.3.2-2 and include those solely within Calhoun County in the lower Guadalupe River hydrologic system. These water bodies consist of Green Lake, Victoria Barge Canal, the GBRA Canal System, Mission Lake, and the Guadalupe Bay.

Green Lake is one of Texas' largest natural freshwater lakes. The lake is surrounded with grassy freshwater marsh habitat and drains through Mission Lake into the Guadalupe Bay (TSHA, 1995). Green Lake was purchased by Calhoun County in 2012 after having been privately owned for more than 20 years (Calhoun County Appraisal District, 2023) using funds from the U.S. Fish and Wildlife Service Coastal Impact Assistance Program (Calhoun County Parks, 2021). The Calhoun County Parks Board is working with the National Park Service to develop a master plan for Green Lake Nature Park, which will provide recreational opportunities such as fishing, birding, canoeing, kayaking, picnicking, camping, and hiking (Calhoun County Parks, 2021).

The Victoria Barge Canal is 35 mi (56 km) long and is operated by the USACE. It was originally constructed for and continues to provide a navigable waterway from the Port of Victoria to the GIWW at the confluence with San Antonio Bay in Calhoun County. Water in the canal does not come directly from any perennial rivers or streams, but from freshwater inflow from industrial wastewater effluent and stormwater runoff (GBRA, 2023).

The GBRA Calhoun Canal System is a water delivery system operated by GBRA that diverts untreated freshwater from the Guadalupe River to Calhoun County water users for municipal, agricultural, and industrial uses. Municipal users include the City of Port Lavaca, Calhoun County Rural Water Supply Corporation, and the Port O'Connor Municipal Utility District. Agricultural uses consist of rice irrigation, row crops, pasture, aquaculture, and waterfowl operations. More detail on the operation of the GBRA Calhoun Canal System as it relates to the SDO Facility and existing water rights is discussed in Section 2.3.1.2.3.

Mission Lake and Guadalupe Bay are both part of the Guadalupe Estuary (TWDB, n.d. [a]; TARL, 2009). The eastern shorelines of Mission Lake and Guadalupe Bay are private property thereby limiting public recreational access (Atkins, 2012). Conversely, public access to Mission Lake is made possible through the Guadalupe Delta WMA Mission Lake Unit which is managed by the TPWD and allows access to the northern shoreline of Mission Lake for waterfowl hunting, bird watching, hiking, and fishing (TPWD, 2023). Additional information on recreation within the WMA is provided in Section 2.5.2.5. The Guadalupe Bay is a subdivision of the larger San Antonio Bay and its position and physical relationship with respect to Mission Lake and San Antonio Bay has changed through time with natural alterations in the Guadalupe River Delta (TARL, 2009). Ultimately, the San Antonio Bay, which includes the Guadalupe Bay, is a significant part of the commercial fishing industry of Texas, generating approximately $7.6 million in labor income in Texas annually (Ropicki et al., 2016).

Other water users having associated water rights are located on both the Guadalupe and San Antonio Rivers with water right locations in both Calhoun and Victoria Counties. Water use within the LMGS vicinity is diverse and covers many different uses. Table 2.3.1-9 identifies the surface water uses by water rights within Calhoun and Victoria Counties. The table also includes the surface water user, body of water from which withdrawals are made, and the permitted maximum volume of surface water withdrawal, where available, for the Guadalupe-San Antonio River Basin. The locations of these surface water users are plotted on Figure 2.3.2-13 using latitude and longitude information provided by TCEQ.

Two water rights identified on Table 2.3.1-9 and shown in Figure 2.3.2-13 are located in the vicinity of the LMGS site, permits 3746 and 3864. These water right permits are both used for irrigation and withdraw water from the Victoria Barge Canal and Hog Bayou, respectively. Also, three water rights identified in Table 2.3.1-9 and shown on Figure 2.3.2-13 are located downstream of the SDO water rights. These are permit 3864 (located in the Vicinity), and permits 4276 and 5639 (not in the Vicinity). Each of these rights have priority dates later than those owned by SDO.

2.3.1.2.3 Surface Water Use for the LMGS Site

Water used within the LMGS site originates from a diversion on the Guadalupe River downstream of its confluence with the San Antonio River and just upstream of the GBRA's saltwater barrier. SDO and GBRA, individually and collectively, own surface water rights at this diversion which are reflected in water rights 5173 through 5178 (Table 2.3.1-9). Water from this diversion is designated for industrial, irrigation, mining, stock-raising, and municipal uses. The monthly mean flows diverted to the GBRA Calhoun Canal as measured at USGS Station 08188590 for the period June 2016 through September 2023 are shown in Table 2.3.1-3. Water from this diversion flows from the GBRA Diversion Canal into the Hog Bayou (Figure 2.3.2-2), through the Hog Bayou to a continuation of the GBRA Diversion Canal, and then into Goff Bayou. A pump station pumps water from the Goff Bayou to the GBRA Calhoun Canal. The pump station is owned and operated by SDO for GBRA. Water within Goff Bayou that is not pumped into the canal system flows to Mission Lake, Guadalupe, Bay, San Antonio Bay, and the Gulf of Mexico.

The main water supply of the GBRA Calhoun Canal flows eastward along the southern boundary of SDO where it flows to water users located further east and south of SDO in the Seadrift and Port Lavaca areas of Calhoun County. Water is also pumped from the main canal through a GBRA pipeline to the industrial users located north of SDO. As shown in Table 2.3.1-8, surface water within Calhoun County is predominantly used for irrigation and manufacturing. As stated in Section 2.3.1.1.1.1, the annual water volume diverted into the GBRA Calhoun Canal over the last 10 years equates to approximately 41,762 ac-ft (51,512,669 m^3).

SDO obtains makeup water to its basins from the GBRA Calhoun Canal via an intake structure located approximately 1400 ft (426.7 m) east of SH 185. This water is not only used in cooling and other operations at the facility but is also used for consumption as the facility produces three grades of water for operational and consumptive use. Water withdrawn from the GBRA Calhoun Canal by SDO was calculated based on intake pump curves and time in operation, which for 2022 equated to an average flow of approximately 7011 gallons per minute (gpm) (31,872 liters per minutue [L/min]), or 11,309 ac-ft/yr (13,949,446 m^3/yr). Because water is held within the basins at SDO prior to use, usage rates change seasonally depending on evaporation and rainfall. In 2022, maximum usage occurred in May with a flow rate of approximately 13,626 gpm (61,945 L/min), or 21,979 ac-ft/yr (27,110,697 m^3/yr); and minimum usage occurred in February with a flow rate of approximately 3870 gpm (17,593 L/min) or 6242 ac-ft/yr (7,699,394 m^3/yr).

Treated wastewater from SDO is discharged into the Victoria Barge Canal at a combined outfall that includes some of the facility's stormwater discharge. The combined outfall receives flow from two outfalls which individually discharge water between approximately 1000 to 3500 gpm (4546 to 15,911 L/min) during normal conditions. During rainfall events, these flow rates may be higher due to additional stormwater runoff. Additional stormwater discharges are made through outfalls that ultimately discharge to the Victoria Barge Canal, West Coloma Creek, or unnamed irrigation ditches; all of which drain to either the Lavaca-Guadalupe

Coastal Basin, San Antonio Bay/Hynes Bay/Guadalupe Bay, or Matagorda Bay/Powderhorn Lake.

2.3.1.2.4 Water Use Regulations

The use of surface water in Texas is regulated through a system of water rights that are administered by TCEQ per Texas Water Code Chapter 5, 11, and 12, as well as Title 30 of the Texas Administrative Code. Water diverted from state surface water resources is used for a variety of purposes including livestock, irrigation for agriculture, mining, industrial operations, municipal, and domestic. However, as stated in Section 2.3.1.1.1.1 water use at SDO is supplied with water diverted under multiple permits which are owned either individually or collectively by GBRA and SDO. These permits are shown in Table 2.3.1-9 under permit numbers 5173 to 5178 and 3863; and are summarized in Table 2.3.1-10. In total, SDO can divert water at a rate of 175,501 ac-ft/yr (216,477,297 m^3/yr).

2.3.1.2.4.1 Water Availability

The TWDB was created by legislative act and constitutional amendment in 1957 and its main responsibilities include collecting and disseminating water-related data, assisting with regional water supply and flood planning, administering financial programs for water supply, wastewater treatment, flood control, and water conservation projects (TWDB, n.d. [b]). The TWDB is composed of 16 water planning regions and the LMGS site is located within the SCTRWPG (Black & Veatch, 2020).

The SCTRWPG includes the San Antonio and Guadalupe River basins. Because the Guadalupe and San Antonio Rivers join prior to discharge into the San Antonio Bay system, the SCTRWPG considers the two watersheds as one (the Guadalupe-San Antonio River basin) when evaluating surface water supplies available under existing water rights. This arrangement is due, in part, to the large concentration of senior water rights below the confluence of the two rivers (Black & Veatch, 2020). Senior water right holders have priority when stream flows are low, as in periods of drought. Priority dates indicate the seniority of one water right over another. In times of drought, water rights with the earliest dates have the right to divert water before those with more recent dates. This priority renders junior rights less reliable during droughts (Black & Veatch, 2020).

Surface water supplies available to each water right within the SCTRWPG river basins are computed using TCEQ's GSA WAM, which is the baseline surface water availability model used to establish firm diversions of run-of-river water rights. Firm diversions are the maximum water volumes available each year under repeat drought-of-record conditions assuming all senior water rights are totally utilized, and all permit conditions are met (Black & Veatch, 2020). Water reliability for each water right owned in whole or in part by Dow for the SDO are summarized in Table 2.3.1-10. Out of a total permitted water diversion flow rate of 175,501 ac-ft/yr (216,477,297 m^3/yr), water at a rate of approximately 159,719 ac-ft/yr (197,010,487 m^3/yr), or 91 percent, would be reliable in repeat drought of record conditions for the permits currently held by SDO.

2.3.1.3 Surface Water Quality

This section describes water quality characteristics of surface water bodies that could be affected by building and operation of LMGS, or affect plant water use and effluent disposal. Regional and site-specific physical, chemical, and biological characteristics are described.

2.3.1.3.1 Water Quality of the Site and the Vicinity

Salinity of water resources in the vicinity of the LMGS site is discussed in Section 2.3.1.1.3. As noted in that subsection, salinity intrusion has been known to impact water quality of freshwater streams in the vicinity of the LMGS site.

Seasonal surface water quality sampling was conducted in 2023 and 2024 at locations indicated in Figure 2.3.2-14. Results of this surface water quality sampling program are indicated in Table 2.3.1-11. Surface water sampling focused on West Coloma Creek, the GBRA Calhoun Canal, and the Dow Drainage Canal. As described in Section 2.3.1.1.1.4, the GBRA Calhoun Canal is an artificial water distribution system that is not subject to regulation by the USACE or TCEQ under the Clean Water Act (CWA). However, the use of water from the GBRA Calhoun Canal is subject to authorization by GBRA. As such, water quality information was obtained to characterize this surface water resource. Exceedances of Texas water quality regulatory (TCEQ, 2022a) values and EPA Maximum Concentration Levels (MCL) (EPA, 2007) for locations within the project vicinity were observed for the following:

- Total aluminum, dissolved oxygen, manganese, lead and chlorophyll-a exceeded Texas Water Quality Standards in at least one sample from all three water bodies
- E. coli, selenium, total chromium, and total thallium exceeded Texas Surface Water Quality Standards in at least one sample from West Coloma Creek
- Nitrogen (nitrate) exceeded Texas Surface Water Quality Standards in at least one sample from the GBRA Calhoun Canal and West Coloma Creek
- Total mercury exceeded Texas Surface Water Quality Standards in at least one sample from the GBRA Calhoun Canal and the Dow Drainage Canal
- Total phosphorus exceeded Texas Surface Water Quality Standards in at least one sample from the GBRA Calhoun Canal and West Coloma Creek
- Total arsenic exceeded Texas Surface Water Quality Standards and EPA MCLs in at least one sample from West Coloma Creek
- Nitrogen (nitrite) exceeded EPA MCLs in at least one sample from West Coloma Creek

Texas Surface Water Quality regulatory standards and EPA MCLs are provided, for informational purposes only, as reference points for assessing the quality of the water in general terms. To be clear, the above-listed exceedances do not necessarily indicate, and are not intended to imply, any regulatory violations.

The existing SDO has an active Texas Pollutant Discharge Elimination System (TPDES) permit. Water quality at the permitted discharge of this facility into surface waters in the vicinity of the existing SDO at Outfall 001 and Outfall 002 are described in Table 2.3.1-12. The SDO TPDES permitted Outfall 002 is located near the Victoria Barge Canal at the discharge point from the Dow Drainage Canal. The drainage canal is an artificial conveyance feature that is not considered a jurisdictional water body. Surface water quality of this resource was characterized to provide information on existing SDO stormwater discharge. Additionally, multiple stormwater discharge outfalls are permitted for the SDO, all of which are regulated under the existing TPDES permit No. 0000447000. Water quality monitoring in the Victoria Barge Canal is conducted by the TCEQ. Mean surface water quality values for 2020 to 2023 in the Victoria Barge Canal are shown in Table 2.3.1-13.

Temperature, salinity, and turbidity were measured in the field as a part of surface water quality sampling conducted in 2023 and 2024. Maximum values from field measures are shown in Table 2.3.1-11. Temperatures in West Coloma Creek ranged from 13.62° to 37.3 °C (56.52° to 99.14 °F). Temperatures in the GBRA Calhoun Canal ranged from 17.51° to 34.50 °C (63.52° to 94.10 °F). Temperatures in the Dow Drainage Canal ranged from 14.54° to 34.76 °C (58.17° to 94.57 °F). Salinity ranged from 0.16 to 2.1 parts per trillion in all monitored locations. Salinity was highest in the Dow Drainage Canal. Turbidity ranged from 4.2 to over 1000 Nephelometric turbidity units, with the highest turbidity being observed in West Coloma Creek.

2.3.1.3.1.1 Factors Affecting Water Quality

A civil lawsuit regarding nurdle pollution was filed in 2017 in the Southern District Court of Texas, in which it was demonstrated that Formosa Plastics was responsible for discharging nurdle pollution from its Point Comfort, Texas facility. The lawsuit, titled “San Antonio Bay Estuarine Waterkeeper and S. Diane Wilson v. Formosa Plastics Corp., Texas, and Formosa Plastic Corp.,” resulted in a settlement in which Formosa Plastics agreed to, among other things, end all discharge of plastic from the Point Comfort Facility (Goldberg Segalla, 2023), which is located to the east of the LMGS site.

Nurdles are generally under 5 mm in diameter and are the basis from which plastic products are formed (Goldberg Segalla, 2023). Nurdles have been shown to accumulate environmental contaminants, such as heavy metals and persistent organic compounds (Jiang et al., 2021). Other impacts of nurdles are related to ingestion by aquatic organisms (Jiang et al., 2021). As of 2023, nurdles are not federally classified as pollutants or hazardous materials by the EPA.

2.3.1.3.2 Impaired Waters

The TCEQ released a 2022 Integrated Report (IR), which describes the status of the state's waters, as required by Section 305(b) and 303(d) of the federal Clean Water Act and was approved by the EPA on July 7, 2022, (TCEQ, 2022b). The IR summarizes the condition of the state's surface waters including fitness for use by aquatic species and other wildlife, concerns for public health, and specific pollutants and their possible sources. Surface water resources are categorized from one to five based on their ability to attain the dedicated uses established for that resource with categories 4 and 5 being designated as the most impaired.

Category 4 waters are impaired or threatened for one or more uses but do not need a total maximum daily load (TMDL) completed for the pollutant because one has already been completed, the waters are expected to meet the required water quality standards, or they are not impaired by a pollutant. Category 5 waters are impaired or threatened by one or more pollutants for one or more designated uses and require the completion of a TMDL (TCEQ, 2022a).

Coloma Creek downstream of the intersection with SH 238 south of the LMGS site was evaluated in by TCEQ in 2022. Coloma Creek is not listed on the 303(d)-impairment list (TCEQ, 2022b). Coloma Creek feeds into Powderhorn Lake downstream of the LMGS site. Powderhorn Lake ultimately drains to Matagorda Bay. Powderhorn Lake and Matagorda Bay were evaluated for impairment in 2022 and are not listed on the 303(d)-impairment list (TCEQ, 2022a).

The Victoria Barge Canal, located within the LMGS vicinity is considered a tidal stream and was evaluated for the IR from the confluence with San Antonio Bay in Calhoun County to Victoria Turning Basin in Victoria County. Victoria Barge Canal is not listed on the 303(d)-impairment list (TCEQ, 2022b).

San Antonio Bay, Hynes Bay, Guadalupe Bay, and Mission Lake comprise a single segment for the purposes of the 303(d) list. This water body is located to the west of the LMGS site, within the 6 mi (9.7 km) vicinity. This segment is listed on the 303(d) List as a Category 5 water due to bacteria in oyster water (fecal coliform), which affects the use of fish and shellfish consumption (TCEQ, 2022a). In 2002, data obtained by TCEQ showed that 14 bay segments, including the Lavaca-Guadalupe coastal basin, were not safe for harvesting shellfish because of elevated bacteria concentrations. No TMDLs have been established for the Bays of the Middle Texas Coast at this time. The Middle Texas Coast Oyster Waters project has been initiated to determine the extent and severity of the bacteria impairments in the Middle Texas Coast Oyster Waters, including Mission Lake (TCEQ, 2022b).

Chocolate Bayou, which feeds Chocolate Bay and is located within the LMGS vicinity, was evaluated from the high tide line to the intersection with SH 35. This water body was listed on the 303(d) List as a Category 5 water due to the presence of dioxin, polychlorinated biphenyls, and bacteria in the water. There is no current TMDL for this water body (TCEQ, 2022b).

2.3.2 Groundwater

This section presents a description of the groundwater resources that could be affected by building and operation of LMGS. A cross section of the regional aquifer system is shown on Figure 2.3.2-16. Major geologic units near the LMGS site are shown on Figure 2.3.2-20. The physical and hydrologic groundwater resource characteristics of the site and region are summarized below.

2.3.2.1 Hydrologic Setting

This subsection describes the hydrogeologic conditions present at, or in the region and vicinity of, the LMGS site that could be affected by building and operation of LMGS. Regional and site-specific data on the physical and hydrogeologic characteristics of these groundwater resources are summarized to provide the basic data for an evaluation of potential impacts on the aquifers of the area.

2.3.2.1.1 Physiography and Geomorphology

The LMGS site is situated in the Coastal Prairies subprovince of the Gulf Coastal Plains physiographic province, which extends as a broad band parallel to the Texas Gulf Coast (Figure 2.6-1). The subprovince is composed of geologically young formations generally consisting of unconsolidated deltaic sands, silts, and clays sloping to the southeast that are incised by meandering streams discharging into the Gulf of Mexico (Chowdhury and Turco, 2006).

Topography is characteristic of the Gulf Coastal Plains with nearly flat prairies. Ground surface elevation in the Coastal Prairies subprovince varies from approximately 0 ft along the coast to approximately 300 ft (91.4 m) along the western boundary of the subprovince (TBEG, 1996). As described in Section 2.2.1, the LMGS site is flat with surface elevations ranging from approximately 30 ft (9.1 m) NAVD 88 in the north to approximately 25 ft (7.6 m) NAVD 88 in the south (Figure 2.2-1). As described in Section 2.3.1, jurisdictional surface water features on the LMGS site are limited to West Coloma Creek, two channelized drainage ditches, and perennial stream (Table 2.3.1-5).

2.3.2.1.2 Regional Hydrology

The LMGS site and surrounding region are underlain by a thick wedge of southeasterly dipping, sedimentary deposits that range in age from Oligocene to Holocene. The region overlies what has been referred to as the Coastal Lowlands aquifer system. This aquifer system contains numerous local aquifers in a thick sequence of mostly unconsolidated Coastal Plain sediments of alternating and interfingering beds of clay, silt, sand, and gravel. The sediments reach thicknesses of thousands of feet and contain groundwater that ranges from fresh to saline. Large amounts of groundwater are withdrawn from the aquifer system for municipal, industrial, and irrigation needs (Ryder, 1996).

The lithology of the aquifer system reflects three depositional environments: continental (alluvial plain), transitional (delta, lagoon, and beach), and marine (continental shelf). The depositional basin thickens toward the Gulf of Mexico, resulting in a wedge-shaped configuration of hydrogeologic units. Numerous oscillations of ancient shorelines resulted in a complex, overlapping mixture of sand, silt, and clay (Ryder, 1996). This massive thickness of sediments forms a homocline that slopes gently toward the Gulf of Mexico; therefore, progressively younger sediments outcrop toward the Gulf Coast (Chowdhury and Turco, 2006).

As part of the USGS Regional Aquifer-System Analysis program, the Coastal Lowlands aquifer system was subdivided into five permeable zones and two confining units. The term “Gulf Coast aquifer” is generally used in Texas to describe the Coastal Lowlands aquifer system. A comparison of the USGS aquifer system nomenclature to that used in Texas is shown in Figure 2.3.2-15 (Ryder, 1996). A regional cross section through the Gulf Coast aquifer is shown in Figure 2.3.2-16 (Chowdhury and Turco, 2006).

Texas nomenclature is used to describe the regional Gulf Coast aquifer. As shown on Figure 2.3.2-15, the hydrogeologic units commonly used to describe the aquifer system (from shallow to deep) are as follows:

- The Chicot aquifer, which consists of the Willis Formation, Lissie Formation (undifferentiated Bentley and Montgomery Formations), Beaumont Formation, and surficial alluvial deposits
- The Evangeline aquifer, which consists of the Goliad sand
- The Burkeville Confining System, which consists of the Fleming Formation and the Lagarto clay
- The Jasper aquifer, which consists of the Oakville sandstone and the Fleming Formation. The upper part of the Fleming Formation forms the Burkeville confining system
- The Catahoula confining system, which includes the Frio Formation, Anahuac Formation, and the Catahoula tuff or sandstone

The base of the aquifer ranges from a few hundred feet above sea level near the updip limit, with the updip limit being located up the slope of a dipping plane, to as much as 6000 ft (1828.8 m) below sea level in areas about midway between the updip limit and the coastline, as shown in Figure 2.3.2-17 (Ryder, 1996).

The Gulf Coast aquifer is recharged by the infiltration of precipitation that falls on topographically high aquifer outcrop areas in the northern and western portion of the province. Discharge occurs by evapotranspiration, loss of water to streams and rivers as base flow, upward leakage to shallow aquifers in low lying coastal areas or in the Gulf of Mexico, and pumping (Ryder, 1996).

Groundwater in the Gulf Coast aquifer is generally under confined conditions, except for shallow zones in outcrop areas. In the shallow zones, the specific yield for sandy deposits generally ranges from 10 percent to 30 percent. For confined aquifers, the storage coefficient is estimated to range from 1E-4 to 1E-3 (Ryder, 1996).

The productivity of the aquifer system is directly related to the thickness of the sands in the aquifer system that contain freshwater. The thickness of the aggregated sand within the aquifer ranges from 0 ft at the updip limit of the aquifer system to as much as 2000 ft (609.6 m) in the east. Groundwater flow in the Gulf Coast Aquifer is further complicated by numerous clay lenses (some less than 6 ft [1.83 m] thick) contained within the water-bearing units of the sand beds that retard vertical movement locally and may provide different hydraulic heads to each sand bed (Chowdhury and Turco, 2006).

As illustrated in the conceptual model for recharge and discharge of Gulf Coast aquifer (Figure 2.3.2-18), regional groundwater flow is conveyed from the uplands east toward the Gulf of Mexico. River channels may also act as localized areas of recharge and discharge for the underlying Chilcot aquifer system. Regional groundwater flow within the Chilcot aquifer is, in general, southeasterly from the recharge areas north and west, to the Gulf of Mexico (Figure 2.3.2-19).

The principal aquifer used in the region is the Chicot aquifer, which is the shallowest aquifer in the Gulf Coast aquifer system and outcrops across the entirety of Calhoun County. The Chicot aquifer is comprised of (from youngest to oldest) Holocene alluvium in river valleys and the Pleistocene-age Beaumont, Montgomery, and Bentley Formations, and the Willis Sand (Chowdhury and Turco, 2006) The Chicot aquifer geologic units used for groundwater supply are the Lissie and Beaumont Formations and the more localized Holocene alluvium (CCGCD, 2017). The following paragraphs describe the pertinent details of these units. Additional detail is provided in Section 2.6, Geology.

Holocene alluvium of the Guadalupe River floodplain occurs in a relatively narrow band that parallels the river. As noted in Section 2.6, Geology, Holocene deposits locally outcrop at the Guadalupe River south of the LMGS site. Groundwater flow in the Holocene sand deposits is strongly influenced by surface water bodies and tides in lowland areas. Because the alluvial materials are deposited in a channel incised into the Beaumont Formation, it is likely that the alluvium is in contact with shallow aquifer units in the Beaumont Formation (Jacobs, 2022).

The Beaumont Formation is contained between the underlying Lissie Formation and the overlying Holocene-aged stream deposits and wind-blown sands. As described in Section 2.6.2 the Beaumont Formation is composed of poorly bedded, marly, reddish-brown clay interbedded with lenses of sand, gypsum, and occasionally caliche. The Beaumont Formation is locally water-bearing and outcrops at the LMGS site.

The Lissie Formation is unconformably contained between the underlying Willis sand and the overlying Beaumont Formation. The sediments of the Lissie Formation consist of reddish, orange, and gray fine- to coarse-grained, cross bedded sands. interbedded with sandy clay, clay, and gravel. Caliche deposits often mark the base of the formation (Chowdhury and Turco., 2006).

2.3.2.1.3 Hydrogeology of the Vicinity

2.3.2.1.3.1 General Project Vicinity

As described in Section 2.3.1, the Victoria Barge Canal, the GBRA Calhoun Canal, West Coloma Creek, Green Lake, Mission Lake, and the Guadalupe Bay, are the major surface water bodies in the 6 mi (10 km) vicinity that may exert an effect on groundwater hydrology (Figure 2.3.2-2). Local groundwater is also influenced by many ephemeral streams within the vicinity. Ephemeral streams are characterized by stream flow largely influenced by precipitation.

2.3.2.1.3.2 Groundwater Hydrology Immediately Adjacent to the LMGS Site

The North Landfill (NLF) and the North Landfill Expansion Cell (NLFEC) are located immediately adjacent to the LMGS site. The NLF is a closed and capped Resource Conservation and Recovery Act (RCRA) permitted hazardous waste landfill covering approximately 2 ac (0.81 ha) that started receiving hazardous and nonhazardous waste in 1983 and was closed in 1998. The NLFEC is an active RCRA hazardous waste landfill covering approximately 3.7 ac (1.5 ha) that started receiving waste in 1991.

Previous investigations have identified 11 localized stratigraphic units within the upper (approximately 170 ft [51.8 m]) Beaumont Formation underlying the project vicinity. A generalized cross section and stratigraphic column depicting the SDO Site adjacent to the LMGS site is provided as Figure 2.3.2-21 and Figure 2.3.2-22, respectively. The strata in Figure 2.3.2-21 are sequentially numbered from youngest to oldest (I through XI), and sand units are referred to by their letter designations assigned in previous reports: the “D”, “A”, “B”, “C”, and “E” Sands, respectively. The “A,” “B,” “C,” and “E” Sands belong to the Beaumont Formation, while the “D” Sand is part of the Holocene deposits that outcrop at the Guadalupe River valley, south of the LMGS site (Jacobs, 2022).

There are eight wells screened in the A Sand around the NLF and the NLFEC and 13 wells screened in the C Sand around the NLF and the NLFEC. Due to the C Sand being greater than 30 ft (9.1 m) thick, there are four wells screened in the lower interval of the C Sand (Jacobs, 2022).

The water elevation in the A Sand is influenced by the surface water basin to the south and is generally higher to the west-southwest and lower to the east-northeast. Figure 2.3.2-23 is a representative potentiometric map of the NLF area which illustrates that water in the A Sand is flowing to the east-northeast in the direction of the LMGS site. From 2019 to 2021, the hydraulic gradient in the A Sand ranged from 0.0035 feet per foot (ft/ft) to 0.007 ft/ft, and flow velocity ranged from 0.27 to 1.38 ft/yr (0.08 to 0.42 m/yr) (Jacobs, 2020, 2021, 2022).

The water elevation in the C Sand is generally higher to the northeast and lower to the southwest. In contrast to the directional flow of the A Sand groundwater, water in the C Sand is therefore flowing west-southwest, away from the LMGS site (Figure 2.3.2-24). From 2019 to 2021, the hydraulic gradient within the C Sand ranged from 0.0004 to 0.0009 ft/ft, and the flow velocity ranged from 22 to 54 ft/yr (6.7 to 16.5 m/yr) (Jacobs, 2020, 2021, 2022).

2.3.2.1.4 Groundwater at the LMGS site

2.3.2.1.4.1 Groundwater Hydrology of the LMGS site

The stratigraphy and hydrogeology at the LMGS site are similar to those described for the project vicinity in Section 2.3.2.1.3. A subsurface investigation was conducted at the LMGS site from October 2023 through November 2024 to provide relevant site-specific information. As described in Section 2.4.12 of the Preliminary Safety Analysis Report (PSAR), characterization of site hydrogeology is based on groundwater observation and test wells and a variety of other site investigations including geotechnical borings, geologic/geophysical borings, cone penetrometer tests, and shallow test pits.

Well installations within the LMGS site encompassed strata to a depth of approximately 200 ft (61 m) below ground surface (bgs). As such, this includes the A Sand (and the overlying Stratum III clay), the C Sand (and the overlying Stratum V/VII clay), and the E Sand (and the overlying Stratum IX clay). All of these strata are interpreted as belonging to the Chicot aquifer. Deeper aquifers (e.g., Evangeline aquifer) were not investigated. Stratigraphic designations are informal and are based on nomenclature adopted for investigations performed at the neighboring SDO facility (Jacobs, 2022). A location map identifying the primary well array is presented as Figure 2.3.2-25.

A summary of well identifications, well construction details, and the hydrogeologic unit for each well is presented in Table 2.3.2-1. A conceptual hydrostratigraphic model was developed from the geotechnical cross sections to describe the shallow portion of the Chicot aquifer at the site. This model subdivided the Chicot aquifer into three aquifer units: a semi-confined to confined shallow A Sand zone; a confined intermediate depth C Sand zone; and a deep, confined E Sand zone. Each sand zone has an associated overlying clay unit.

Field investigations, as they relate to groundwater, included the following:

- Groundwater observation wells: Six three-well groundwater observation well clusters (18 individual observation wells) were installed throughout the LMGS site. Each cluster included one well screened in the A Sand, one well screened in the C Sand, and one well screened in the E Sand. These wells were completed to depths ranging from approximately 17.5 to 200.5 ft (5.3 to 61.1 m) bgs and were installed to provide an adequate distribution for determining groundwater flow directions and hydraulic gradients beneath the LMGS site. Well pairs were selected to determine vertical gradients between sand layers.
- Aquifer pumping tests: Two aquifer pumping test well clusters were installed, as described in PSAR Section 2.4.12. Each cluster consists of one test well (pumping well) and numerous water level sentinel (observation) wells. One C Sand and one E Sand test well were installed to depths of approximately 100 ft (30.5 m) and 162 ft (49.4 m) bgs, respectively.
- Slug tests: Field hydraulic conductivity tests (slug tests) were conducted in each of the 18 observation wells and 12 of the sentinel wells (PSAR Section 2.4.12).

The conceptual site model developed and incorporated into a groundwater flow model consists of three sand layers and three clay layers chosen to represent the aquifer units. Based on geotechnical investigations of the LMGS site, representative hydrogeologic cross sections within the site are presented in Figure 2.3.2-26 through Figure 2.3.2-29. These cross-sections show the hydrolithologic units labeled consistent with site nomenclature and the conceptual model of the stratigraphy beneath the LMGS site (Figure 2.3.2-22). The vadose zone is comprised mainly of clay with lesser amounts of silt and sand with a thickness ranging from approximately 5 to 10 ft (1.5 to 3.0 m) at the site. Additional cross sections and other details regarding site hydrogeology are provided in PSAR Section 2.4.12.

2.3.2.1.4.1.1 Observation Well Network

As summarized in Table 2.3.2-1, the total depths of the A Sand wells range from 17.0 to 34.2 ft (5.2 to 10.4 m) bgs. The total depths of the C Sand wells range from 62.7 to 111 ft (19.1 to 33.8 m) bgs. The total depths of the E Sand wells range from 151.7 to 199.6 ft (46.2 to 60.8 m) bgs. Well screen lengths range from 5.0 to 20.0 ft (1.5 to 6.1 m) based on the varying thickness of water-bearing zones at different locations. The water-bearing units across all three zones were composed of fine-grained silty sands and fine- to medium-grained sands, while the layers between the water-bearing units were mainly composed of fat clays, lean silty clays, and lean sandy clays with thin layers of clayey sands or silty sands interbedded.

2.3.2.1.4.1.2 Groundwater Level Monitoring

Groundwater levels are recorded under a 10 CFR 50, Appendix B Quality Assurance program and are therefore, qualified for use in safety-related calculations. Depth to groundwater was measured manually from a designated reference mark on the top of casing with a calibrated electronic water level meter. Depth to groundwater was recorded prior to well purging and sampling during each sampling event and monthly between sampling events from December 2023 to November 2024. Reference marks were later surveyed, and water level measurements were converted from depth below top of casing to elevations using the NAVD 88.

The groundwater level elevations are used to evaluate groundwater flow patterns and to better understand the seasonal variances and the hydraulic communication between surface water and groundwater at and near the LMGS site.

Groundwater levels measured within wells installed at the LMGS site are identified in Table 2.3.2-2. Monthly trends in groundwater levels and daily rainfall data collected at the Victoria Regional Airport (KVCT) are illustrated in Figure 2.3.2-30 and Figure 2.3.2-31. Water levels measured within each of the three aquifer zones (A Sand, C Sand, E Sand) reflect general consistency in water levels over the course of the monitoring program.

Water levels in the A Sand wells ranged from approximately 17 to 26 ft (5.2 to 7.9 m) NAVD 88 across the surveyed area. Among individual A Sand wells, the water levels fluctuated no more than 4 ft (1.2 m) over the recording period. Among all C Sand wells, water levels ranged from approximately 7 to 9 ft (2.1 to 2.7 m) NAVD 88. Among individual C Sand wells, the water levels fluctuated no more than 1 ft (0.3 m) over the recording period. Among all E Sand wells, water levels ranged from approximately 2 to 4 ft (0.8 to 1.2 m) NAVD 88. Among individual E Sand wells, the water levels fluctuated no more than 1.5 ft (0.5 m) over the recording period with the exception of anomalous February groundwater levels for wells MW-4E and MW-102E. Generally, among the A Sand wells, water level elevations decreased from March through

June 2024, then increased through July 2024 before decreasing again through November 2024. Similar trends are observed but at smaller magnitudes in the C Sand and E Sand wells.

Monthly rainfall data collected from the Victoria Regional Airport suggests that for lower water levels in the A Sand in April through June and higher water levels in July and August appear to correlate with periods preceded by lower and higher rainfall amounts. There is little apparent effect of rainfall on water levels in the C Sand and E Sand wells. Temporal variability in water levels was greater among wells established in the A Sand as compared to the C Sand and E Sand aquifers, which reflected increased stability of water levels over the course of the monitoring period.

Potentiometric maps depicting seasonal water levels and directional flow of groundwater within each of the water bearing zones within the LMGS site are provided in Figure 2.3.2-32, Figure 2.3.2-33, Figure 2.3.2-34 and Figure 2.3.2-35 for winter, spring, summer and fall 2024, respectively. Generally, groundwater in the A Sand flows from southwest to northeast in the western portion of the study area, while flow in the eastern part of the study area is generally to the east. Groundwater in the C Sand generally flows from northeast to southwest. Groundwater in the E Sand generally flows from northwest to southeast. The seasonal potentiometric contours indicate that there is variability in groundwater flow direction between seasons.

2.3.2.1.4.1.3 Site-Specific Groundwater Recharge and Discharge

The Beaumont Formation crops out throughout the LMGS site and receives recharge from infiltration of precipitation (Figure 2.3.2-18). Surface recharge is higher in the northeastern part of the site, where the Beaumont Formation is comprised mostly of sand with less amounts of clay. The Holocene alluvium, which outcrops approximately 0.25 mi (0.40 km) west of the LMGS site, receives recharge from infiltration of precipitation. Local recharge occurs under transient conditions from surface water features such as rivers, streams and perched surface water basins. Depending on seepage rates, SDO basins may contribute to groundwater recharge to upper sand formations (i.e., A Sand).

The primary areas for groundwater discharge typically include areas where creek and river channels have been incised into the underlying saturated zone, lake and ponds, and seeps and springs. At the LMGS site, these areas are primarily limited to where West Coloma Creek transects the central portion of the site (Figure 2.3.2-25). Groundwater discharge may occur to a limited extent in areas where West Coloma Creek incises sandier zones of the Beaumont Formation; however, based on the geologic map (Figure 2.3.2-20), the Beaumont is mostly clay-rich where West Coloma Creek crosses the LMGS site and little groundwater discharge is expected. Water from the Chilcot aquifer is ultimately conveyed to the east where it ultimately is discharged to the Gulf of Mexico (Figure 2.3.2-18).

2.3.2.1.4.1.4 Other Selected Groundwater Attributes

Characteristics of groundwater are needed to understand the nature of groundwater flow and transport. Parameters of interest may include hydraulic gradients, permeabilities, total and effective porosities, advective travel times, bulk density, and storage coefficients. Table 2.3.2-3 provides a list of selected parameters and their associated values determined for the LMGS site in conjunction with site investigations. A full description analysis of these parameters is in PSAR Section 2.4.12 and Section 2.4.13.

The horizontal hydraulic gradient (i_h) represents the slope of the potentiometric surface and is measured perpendicular to potentiometric contour lines in Figure 2.3.2-32 through Figure 2.3.2-35. Calculated average and maximum i_h are highest in the A Sand unit (0.0017 ft/ft under average i_h and 0.0042 ft/ft under maximum i_h), while i_h in the C Sand and E Sand units are lower overall (Table 2.3.2-3).

The vertical hydraulic gradient (i_v) is calculated by dividing the difference in hydraulic head between well pairs by the vertical distance between the screens. The vertical flow path length is assumed to be the difference between the midpoint of each screened interval. Aquifer systems typically have a downward vertical gradient in groundwater recharge areas, whereas upward vertical gradients are more prevalent in groundwater discharge areas. Vertical gradients measuring greater than zero have a downward flow potential; vertical gradients less than zero have an upward flow potential. Vertical gradients equal to zero would be considered flat (i.e., no upward or downward flow potential). Based on the monthly water level data provided in Table 2.3.2-2, all analyzed well pairs exhibited a downward flow potential. Vertical gradients were relatively high between the A and C Sand wells but decreased in the A to E Sand wells and were relatively low to moderate between the C and E Sand wells.

The following vertical gradient trends (summarized in Table 2.3.2-3) were observed over the monitoring period:

- Among the A to C Sand wells, the monthly average vertical gradient for each well cluster ranged from 0.128 ft/ft at MW-102 to 0.271 ft/ft at MW-2. The overall average for A to C Sand wells was 0.199 ft/ft
- Among the A to E Sand wells, the monthly average vertical gradient for each well cluster ranged from 0.108 ft/ft at MW-102 to 0.152 ft/ft at MW-1. The overall average for A to E Sand wells was 0.124 ft/ft
- Among the C to E Sand wells, the monthly average vertical gradient for each well cluster ranged from 0.029 ft/ft at MW-2 to 0.097 ft/ft at MW-102. The overall average was 0.071 ft/ft

Hydraulic conductivity was estimated from the slug test method, which evaluates the aquifer response to an instantaneous change in water level in the test well. Slug tests were conducted in 42 wells at the LMGS site. A more detailed discussion of the methods employed for on-site groundwater monitoring is presented in PSAR Section 2.4.12.

Two methods were used for slug test analysis: Hvorslev and Bouwer-Rice. According to Brown et al., Bouwer-Rice is a preferred method for partially penetrating wells (i.e., wells that are not screened across the entire aquifer thickness) (Brown et al., 1995). Table 2.3.2-3 includes Hvorslev results for fully penetrating wells and Bouwer-Rice results for partially penetrating wells. The data presented in Table 2.3.2-3 suggest variations in the materials tested, indicative of heterogeneous conditions at the LMGS site. Hydraulic conductivity values in the A Sand are widely spread and do not suggest any particular spatial pattern. The distribution of hydraulic conductivity in the C Sand and E Sand zones also do not appear to be related to any consistent hydrogeologic conditions. The test results indicate an area of lower hydraulic conductivity in C Sand that trends southeast to northwest across the western portion of the LMGS site.

The arithmetic and geometric mean of hydraulic conductivity values, computed from slug tests, for each confined unit were selected along with average and maximum horizontal hydraulic gradients to calculate flow velocities. Effective porosity values were selected based on grain size distribution in each unit. Similar to i_h, calculated average and maximum flow velocity are highest in the A Sand unit, ranging from 0.03 to 0.07 ft/day under average i_h and 0.08 to 0.18 ft/day under maximum i_h, while flow velocities in the C and E Sands are lower overall (Table 2.3.2-3). Since the A Sand is separated from the lower C Sand and E Sand units by sequences of low permeability silts and clays, only horizontal flow rates were considered in this calculation.

2.3.2.2 Groundwater Use

This subsection provides a description of the groundwater use at, and in the region and vicinity of, the LMGS site. This subsection also describes the regional and local groundwater resources that could be affected by building and operation of LMGS.

2.3.2.2.1 Regional Groundwater Use

As discussed in Section 2.3.2.1.2, the LMGS site overlies the Gulf Coast aquifer. Groundwater use as estimated by the TWDB for 2021 by each of the three counties identified within the region of influence (ROI) of the LMGS site (Section 2.5, Socioeconomics) is summarized in Table 2.3.2-4. During 2021, the TWDB estimated that groundwater use in Calhoun County from the Gulf Coast aquifer totaled 1546 ac-ft/yr (1.38 million gpd). As summarized in Table 2.3.2-4, groundwater usage based on the TWDB's water use categories for 2021 in Calhoun County were:

- Municipal: 35 percent
- Manufacturing: 18 percent
- Irrigation: 34 percent
- Livestock: 12 percent
- Power Generation: 1 percent
- Mining: 0 percent

Groundwater from several major and minor aquifers is the primary source of drinking water for 7 of the 12 counties within the 50 mi (80 km) project region. Irrigation systems are the largest users (79.6 percent) of groundwater in the 50 mi (80 km) region, followed by municipal water supply systems (13 percent), and livestock (2.8 percent). Smaller amounts of groundwater are used by manufacturing, power generation, and mining (TWDB, 2024d).

There are numerous water planning authorities within the state of Texas. Most of the LMGS region lies within the Region L of the SCTRWPA, which extends from the Gulf Coast to the Hill Country and includes all or parts of 21 counties, portions of nine river and coastal basins, the Guadalupe Estuary, and San Antonio Bay (Figure 2.3.2-36). The portion of the Gulf Coast aquifer that includes the LMGS site lies within Groundwater Management Area (GMA) 15 and the Calhoun County Groundwater Conservation District (CCGCD) (Figure 2.3.2-37).

Water planning in the region is particularly complex because of the intricate relationships between the region's surface and groundwater resources (TWDB, 2024e). Since the late 1990s, the TWDB has commissioned the development of mathematical groundwater availability models (GAMs) for the north, south, and central portions of the Gulf Coast aquifer to predict how the aquifer might respond to increased pumping and drought. The groundwater availability models were developed with substantial stakeholder input. The goal is to provide reliable projections of groundwater availability to ensure adequate supplies or identify inadequate supplies over the current planning period (Waterstone, 2003).

The regional water plan adopted by Region L in 2021 defines groundwater availability as the amount of groundwater available for use in the region as determined by analysis of aquifer recharge, existing groundwater demands, projected groundwater demands, limits of drawdown, and the annual groundwater availability calculations provided in each of the Region L groundwater conservation district's (GCD) comprehensive water plans. A summary of water demand projections through 2070 by use type is shown in Figure 2.3.2-38 (Black & Veatch, 2020).

Region L's water plan relies upon the TWDB application of GAMs to illustrate projected changes in regional aquifer levels (desired future conditions) consistent with modeled available groundwater (MAG) estimates and portray spring discharges and surface water/groundwater interactions at the end of a planning period.

According to the GAMs summarized in Region L's water plan, the groundwater supplies available from the Gulf Coast aquifer in the region are projected to generally increase from 2020 to 2070. The projected groundwater supply available in Calhoun County from the Gulf Coast aquifer is 7565 ac-ft/yr (6.75 million gpd) throughout the 2020-through-2070 projection period (Black & Veatch, 2020).

2.3.2.2.2 Sole-Source Aquifers

A sole-source aquifer is defined as the sole or principal source of drinking water that supplies 50 percent or more of drinking water for an area, with no reasonably available alternative source should the aquifer become contaminated (EPA, 2024a). The Gulf Coast aquifer has not been declared a sole-source aquifer by the EPA (EPA, 2024b). The nearest Texas sole-source aquifer is the Edwards I and II Aquifer system, which is more than 115 mi (185 km) north of the LMGS site (EPA, 2024b). The identified sole-source aquifers are beyond the project vicinity and project region boundaries. As such, there are no sole-source aquifers within the 50 mi (80 km) project region, including downgradient of the LMGS site. The Edwards aquifer system is upgradient and beyond the boundaries of the local and regional hydrogeologic systems associated with the LMGS site.

2.3.2.2.3 Groundwater Use in the Vicinity of LMGS

Groundwater in the vicinity of the site is primarily used for domestic purposes, with irrigation and livestock purposes making up a smaller percent of the well usages. A data query of the TWDB statewide well database on water wells located within project vicinity is summarized in Table 2.3.2-5, and the locations of the wells are shown in Figure 2.3.2-39 (TWDB, 2023b).

A TCEQ public water systems database query indicates that the nearest public water system (TX-0290076) is located more than 4 mi (6.4 km) northeast of the LMGS site, as shown in Figure 2.3.2-40 (TCEQ, 2024a). It consists of one well at an RV campground (Sweetwater RV Campground, Water System No. TX0290076) that produces water from the Chicot aquifer. The well has a total production capacity of approximately 56 ac-ft/yr (0.05 million gpd) and serves a population of 67 people (TCEQ, 2024b). Table 2.3.2-6 summarizes the public water supply wells located within project vicinity.

2.3.2.2.4 Groundwater Use Regulations

The TWDB offers General Guidelines for Regional Water Plan Development with regard to evaluation of groundwater availability. Their guidelines state that groundwater supplies in the region are based on the MAG estimates on an average annual basis to achieve a desired future condition (DFC) established by a GMA pursuant to House Bill 1763 of the 79th Texas Legislature as well as the permitting authority of GCDs (Black & Veatch, 2020).

Groundwater is regulated locally by GCDs except in locations that do not have a district. In areas that do not have a district, water availability may be set by a county commissioners' court pursuant to Texas Water Code Section 35.019. There are several Priority Groundwater Management Areas (PGMAs) within the state. PGMAs are established to ensure management of groundwater in areas with critical groundwater problems and to consider the need for creating GCD. PGMAs are designated or delineated by the TCEQ for areas that are experiencing or are expected to experience critical groundwater problems within 50 years, including shortages of surface water or groundwater, land subsidence resulting from groundwater withdrawal, or contamination of groundwater supplies. GCDs may issue permits that regulate pumping of groundwater and spacing of wells within their jurisdictions. Multiple districts within a single GMA determine the DFCs of relevant aquifers within that area. DFCs are the desired, quantified conditions of groundwater resources, such as water levels, water quality, spring flows, or volumes at a specified time or times in the future or in perpetuity (Black & Veatch, 2020).

The CCGCD develops water conservation and management strategies for long-term sustainability within Calhoun County, as well as develops rules governing the production and protection of the groundwater resources within the county. Those rules, referred to as Rules of the District, have been adopted pursuant to the authority of Section 36.101, Texas Water Code, for the purpose of conserving, preserving, protecting, and recharging groundwater in the district, and they are adopted under the district's statutory authority to prevent waste and to protect the rights of owners' interests in groundwater. The Rules of the District (CCGCD, 2024) articulate the regulatory policies of the district by specifying:

- Key terms
- Well spacing requirements
- Production limitations
- Required activities of persons engaged in the development of groundwater resources in the district (e.g., well owners, well drillers, authorized operators) and the representatives of the district
- Prohibited activities of persons engaged in the development of groundwater resources in the district (e.g., well owners, well drillers, authorized operators) and the representatives of the district

Public water systems in Texas that have groundwater sources that may be susceptible to fecal contamination are subject to the Groundwater Rule (GWR). The GWR provides increased public health protection against microbial pathogens. Details on the GWR is found primarily in 30 Texas Administrative Code Section 290.109 and Section 290.116 and may be found in Title 30 of the Texas Administrative Code Chapter 290 Subchapter F (TCEQ, 2024c).

2.3.2.3 Groundwater Quality

This subsection describes the groundwater quality characteristics that could directly be affected by plant building and operation or that could affect plant water use and effluent disposal within the region and vicinity of the LMGS site. Site-specific water quality data were obtained through the LMGS site groundwater quality monitoring program.

2.3.2.3.1 Regional Groundwater Quality

The base of the Gulf Coast aquifer is identified as either its contact with the top of the Vicksburg-Jackson Confining Unit or the approximate depth at which the concentration of total dissolved solids in groundwater exceeds 10,000 mg/L (Ryder, 1996).

Groundwater quality in the Gulf Coast aquifer is generally good northeast of the San Antonio River but declines to the southwest due to increased chloride concentrations and saltwater encroachment near the coast (Mace et al., 2006). From youngest to oldest, the Gulf Coast aquifer is composed of three distinct water-bearing units: the Chicot, Evangeline, and Jasper aquifers (Section 2.3.2.1.2 for a detailed description of the Gulf Coast aquifer system) (CCGCD, 2017).

Groundwater salinity is a function of total dissolved solids (TDS), with 95 percent of solids consisting of calcium, sodium, potassium, magnesium, bicarbonate, chloride, and sulfate. The scale for salinity is as follows: fresh water (less than 1000 milligrams per liter [mg/L]), slightly saline (1000 to 3000 mg/L), moderately saline (3000 to 10,000 mg/L), very saline (10,000 mg/L to 35,000 mg/L), and brine (greater than 35,000 mg/L). The Gulf Coast aquifer is generally fresh in the outcrop region and becomes more saline toward the coast (Chowdhury et al., 2006). Groundwater in the central and northern parts of the Gulf Coast aquifer such as in Karnes County generally contains less than 500 mg/L of TDS, but salinity increases to the south, with the groundwater typically containing 1000 to more than 10,000 mg/L of TDS (Black & Veatch, 2020; SCTRWPG, 2006). From the San Antonio River basin southwestward to Mexico, groundwater quality deterioration is evident in the form of increased chloride concentration and saltwater encroachment along the coast (SCTRWPG, 2006).

Water quality is generally good in the shallower portion of the Gulf Coast aquifer. Groundwater containing less than 500 mg/L of TDS is typically encountered to a maximum depth of 3200 ft (975 m) from the San Antonio River Basin northeastward to Louisiana (SCTRWPG, 2006). Freshwater saturated thickness across the entire Gulf Coast aquifer averages approximately 1000 ft (304.8 m) (Black & Veatch, 2020). Groundwater becomes more saline with depth and near discharge areas due to the long groundwater residence times and continued reaction with the aquifer minerals (Chowdhury et al., 2006).

Elevated levels of naturally occurring radionuclides are found in Harris County in the outcrop of the Beaumont and Lissie Formations, as well as in South Texas (Black & Veatch, 2020). Groundwater from the Evangeline aquifer in Harris County and in the south of Bee County have elevated concentrations of alpha activity compared to the rest of the water-bearing units in the Gulf Coast aquifer. Radioactivity generally increases from north to south in the Gulf Coast aquifer but occurs irregularly with depth and shows no trend in composition. Roughly one percent of samples in the Chicot aquifer and 6 percent of the samples in the Evangeline aquifer exceed in gross-alpha activity. High concentrations of radium in the Gulf Coast aquifer are likely related to uranium occurrences in the aquifer materials, while in deeper brine formations, higher concentrations of radium-226 were attributed to formation water and mineral matrix reactions and preferential retention of radium-226 ions in solution (Chowdhury et al., 2006).

2.3.2.3.2 Site Groundwater Quality

2.3.2.3.2.1 Groundwater Quality from Adjacent Wells

The NLF and the NLFEC have six point-of-compliance (POC) wells for the A Sand and 10 POC wells for the C Sand. There are also two background (BKG) wells for the A Sand and 3 BKG wells for the C Sand. All 21 wells are sampled semiannually for benzene, bis(2-chloroethyl)ether, methyl isobutyl ketone, naphthalene, toluene, chromium, and lead.

The results of every sampling event from 2019 through 2021 in the A Sand show that all five organic constituents (benzene, bis[2-chloroethyl]ether, methyl isobutyl ketone, naphthalene, toluene) were reported below the laboratory's reporting limit in all eight A Sand wells. The reporting limit for each constituent was equal to or below the associated Background Threshold Value for all sampling events. Specific conductivity microSiemens per centimeter (µS/cm) in the A Sand ranged from 5640 to 16,640 µS/cm and pH ranged from 6.49 to 7.06 throughout the same time period. Specific Conductivity and pH values in individual wells were consistent across all sampling events.

The results of every sampling event from 2019 through 2021 in the C Sand show that all five organic constituents (benzene, bis[2-chloroethyl]ether, methyl isobutyl ketone, naphthalene, toluene) were reported below the laboratory's reporting limit in all C Sand wells. The inorganic constituents (chromium and lead) were also reported below the laboratory's reporting limit in the C Sand wells. The reporting limit for each constituent was equal to or below the associated Background Threshold Value for all sampling events.

The reporting limit for each constituent was equal to or below the associated Background Threshold Value for all sampling events. Specific conductivity in the C Sand ranged from 526 to 13,050 µS/cm and pH ranged from 6.35 to 7.33 throughout the same time period. Specific Conductivity and pH values in individual wells were consistent across all sampling events (Jacobs 2020; Jacobs 2021; Jacobs 2022).

2.3.2.3.2.2 Preapplication Monitoring Program

Groundwater observation wells were installed to characterize the hydrogeology at the LMGS site. Monitoring well borings were completed with an 8 in. outside diameter casing for hole stability while advancing a 4 in. (20.32 cm) casing with casing shoe to act as a core barrel to provide a 4 in.-diameter core sample. Monitoring wells were completed as single-cased monitoring wells.

Groundwater quality sample collection was performed for four quarters using low flow (low purge) sampling methodology with a peristaltic pump. Sampling was completed at the 18 observation wells identified for water quality sampling (Table 2.3.2-1) in December 2023, February 2024, April 2024, and August 2024. Collected samples were submitted for laboratory analyses and other water quality field parameters including pH, dissolved oxygen (DO), oxidation reduction potential (ORP), temperature, specific conductance, and turbidity were measured and recorded during purging prior to sampling and at the time of sampling.

The analytes selected for analysis included those listed in NUREG-1555 along with other voluntary selected parameters. Samples for all events were released and transported to the analytical laboratory in accordance with chain of custody procedures. All downhole sampling equipment was decontaminated before and in between wells being sampled.

Groundwater analytical values from the wells on the LMGS site are summarized by the maximum values observed during each monitoring period. These values are compared to the Texas Primary and Secondary water quality standards as well as EPA MCLs in Table 2.3.2-7, Table 2.3.2-8 and Table 2.3.2-9 for A, C and E Sands, respectively. In general, maxima results from all wells are below or consistent with the EPA and Texas water quality standard values for all MCL parameters except calcium and uranium in the A sands; arsenic and nitrogen (nitrite) in the C sands; beryllium, calcium, and nitrogen (nitrate and nitrite) in the E sands. TCEQ does not provide water quality standards for calcium (Table 2.3.2-7 through

Table 2.3.2-9). Concentration values of alpha and beta radionuclides (measured in picocuries per liter [pCi/L]) in the A Sand wells were reported to range from 59.4 to 87.3 and 27.8 to 32.2, respectively. By comparison, alpha and beta particle concentration values of radionuclides in both the C Sand and E Sand wells were reported lower at less than 20.0 pCi/L for both parameters. Additionally, maxima results are in exceedance of State water quality standards for which calculation of a human health protective concentration limits (PCL) is not required. These water quality standards are not necessarily of concern from a human health standpoint. They are established as guidelines to assist public water systems in managing their drinking water for aesthetic considerations, such as taste, color, and odor (TCEQ, 2007). These include iron, chloride, and sulfate in the A and C Sands; and iron and chloride in the E Sands (Table 2.3.2-7 through Table 2.3.2-9). As described in Section 2.3.2.1.4.1, monitoring wells installed at the LMGS site encompassed strata to a depth of approximately 200 ft (61 m) bgs. The water bearing zones included in this investigation are not used for potable water supply; therefore, the water quality standards discussed in this section represent anecdotal values and are not indicators of an impaired groundwater drinking source.

Tables

Table 2.3.1-1: USGS Streamflow and Facility Stations Nearest the Long Mott Generating Station Site

Station Name	Station No.	Drainage Area (mi^2)	Status	Period of Record (mean daily flow)
Guadalupe River at Victoria, TX	8176500	5198	A	Nov 1934 - Cur
Guadalupe River near Bloomington, TX	8177520	5816	A	Oct 2011 - Cur
Guadalupe River near Tivoli, TX	8188800	10,128	A	Aug 2000 - Cur
Guadalupe River at SH 35 near Tivoli, TX	8188810	10,280	A	Mar 2013 - Cur
San Antonio River near McFaddin, TX	8188570	4134	A	Dec 2005 - Cur
San Antonio River at Goliad, TX	8188500	3921	A	Jul 1924 - Cur
North end of GBRA Calhoun Canal near Long Mott, TX	8188590	NA	A	May 2016 - Cur
GBRA Calhoun Canal Pump Station near Long Mott, TX	8188600	NA	I	Oct 1970 - Sep 2016
GBRA Calhoun Canal – Flume No. 2 near Long Mott, TX	8188750	NA	I	Jul 1972 - Mar 1986

Source: USGS National Water Information System: Web Interface, 2024

Abbreviations: mi^2 = square miles; TX = Texas; A = active; Cur = current time; GBRA = Guadalupe-Blanco River Authority; I = inactive; NA = Not Available

Table 2.3.1-2: USGS Station 08188800 Guadalupe River Near Tivoli, TX – Monthly Average Discharges

Year	Monthly Mean in cfs (Calculation Period: 2000-09-01 to 2023-07-31)												Annual
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
2000	-	-	-	-	-	-	-	-	419.1	894.7	2484	2502	-
2001	2471	2472	2499	2208	2450	1528	1010	762.2	3437	2450	2551	3014	2234
2002	2536	2251	1727	2071	1301	1032	3498	2556	2868	2828	2826	2686	2351
2003	2773	2803	2813	2490	1917	1900	2212	1494	1971	1859	1636	1473	2107
2004	1840	2080	2117	2826	2838	2763	2848	2608	2425	2590	2998	3049	2584
2005	2916	2918	2989	2626	2640	2308	1642	1463	1384	1272	1072	1294	2039
2006	1,260	1226	1070	900.4	1093	1220	1052	700.4	922.7	872.3	720.9	785.2	984
2007	1930	1463	2131	2888	2814	2873	3216	3174	3022	2772	2516	2303	2599
2008	1880	1741	1696	1317	1085	798.9	939.9	1147	924.1	694.6	683.7	689.7	1130
2009	730.2	662.1	621.5	1264	1037	531.3	345.5	322.1	772.2	2597	2653	2475	1170
2010	2481	2880	2720	2630	2891	2629	2443	1344	2865	1735	1245	1147	2245
2011	1697	1230	990.8	743.5	565.9	461.6	376.8	273.1	267.3	551.5	447.1	737.6	693
2012	946.6	2562	1899	1571	1840	800.1	1191	587	855.3	1014	617.1	515.9	1191
2013	892.9	650.3	558.2	680.2	1071	1360	526.7	350.4	439.7	1232	1733	860.1	863
2014	686.5	608.2	620.5	455.3	892.4	1321	584.5	249.9	306.7	357.1	741.5	606.4	618
2015	851.4	785.6	1936	1951	2378	2541	2104	1170	1015	1155	2546	2457	1746
2016	2215	1656	2303	1966	2736	2949	2324	2236	2409	2150	1831	2541	2281
2017	2374	2424	2730	2532	1695	1551	1009	1558	2481	1641	1148	1531	1885
2018	1202	1108	1198	2004	1093	1124	908.3	465	2174	2808	2913	2845	1654
2019	2912	2579	2136	2109	2586	2442	1934	989.8	840.2	879.3	1036	901.7	1774
2020	1023	1043	1114	1552	1640	1598	740.3	621.6	1042	517.5	555.7	743.5	1014
2021	784.3	788.8	650.6	572.4	2750	-	-	1652	782.4	-	1913	1342	-
2022	1081	1725	1091	829.9	736.4	487.6	401.8	281.6	511.5	260.2	487.6	805	718
2023	698	668.5	614.3	2221	2911	1281	410.5	-	-	-	-	-	-
Mean of Monthly Discharges	1660	1670	1660	1760	1870	1610	1440	1180	1480	1510	1620	1620	1589

Source: USGS, 2024
Parameter Code 72137, Tidally filtered discharge (corrected for tidal influence)
Abbreviation: cfs = cubic feet per second

Table 2.3.1-3: USGS Station 08188590 North End of GBRA Calhoun Canal Near Long Mott, TX Monthly Average Discharges

Year	Monthly Mean in cfs (Calculation Period: 2016-06-01 to 2023-09-30)												Annual
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
2016	-	-	-	-	-	79.6	83.9	70.6	60.9	69.8	65.6	47.8	-
2017	54.9	54.1	51.2	54.3	57.2	46.4	58.6	46.6	55.1	52.7	73.6	42.4	54
2018	44.3	41.6	36.9	52.9	71.8	53.7	58.7	64.4	45.1	50	53.4	38.2	51
2019	61.1	44.6	38.1	31.1	41.7	48.9	52.9	70.2	53.8	55.4	66.8	51.9	51
2020	52.9	56.4	54.4	61.1	54.9	41.6	64.8	76.2	66	70.7	65.6	48.5	59
2021	48.9	50.6	42.5	54.4	41.6	72.9	79.8	80.8	90.6	65.3	73.5	69.5	64
2022	64.4	45.1	47.7	63.9	105.1	100.7	88.8	90.7	77.4	66	55.4	48.6	71
2023	53	51.3	47.2	30.2	56.7	81.1	84	80.1	72.5	44.7	49	41.8	58
Mean of monthly discharges	54	49	45	50	61	66	71	72	65	59	63	50	-

Source: USGS, 2024
Abbreviation: cfs = cubic feet per second

Table 2.3.1-4: West Coloma Creek Peak Discharge Frequency Estimates

Frequency (Years)	Flow[(a)] (cfs)
2	833
5	1464
10	1934
25	2603
50	3137
100	3708
200	4336
250	4538
500	5181

Source: Asquith, W.H., and Roussel, M.C., 2009; regression equations with OmegaEM parameter

Notes: a) Based on Drainage Area = 13 mi^2, channel slope = 0.0006 t/ft; mean annual precipitation = 39.8 inches; OmegaEM = 0.169

Abbreviations: cfs = cubic feet per second; mi^2 = square miles

Table 2.3.1-5: Potential Jurisdictional Streams Identified within the Long Mott Generating Station Site

Feature ID (Site)	Channel Length (feet)[a]	Designation	Preliminary Jurisdictional Determination[b, c]	Latitude	Longitude
SD-STR-01	3421	Ephemeral Channel	NJ	28.519683	-96.768073
SD-STR-02 (West Coloma Creek)	12,242	Perennial Stream	J	28.52158	-96.755831
SD-STR-03	85	Intermittent Channel	J	28.532381	-96.767583
SD-STR-04	1342	Intermittent Channel	J	28.522876	-96.762035
SD-STR-05	625	Ephemeral Channel	NJ	28.511128	-96.750377
SD-STR-06	2666	Ephemeral Channel	NJ	28.512542	-96.746479
SD-STR-07	1456	Ephemeral Channel	NJ	28.518003	-96.754467
SD-STR-08	3595	Ephemeral Channel	NJ	28.526733	-96.755526
SD-STR-09	368	Ephemeral Channel	NJ	28.532635	-96.766853
SD-STR-10	1440	Perennial Stream	J	28.513625	-96.776395

Notes:
a) Length of the feature within the Project Area only
b) Based on current interpretations of the WOTUS Rule
c) NJ= Not Jurisdictional; J= Jurisdictional. Based on WSP's professional opinion and pending USACE confirmation

Table 2.3.1-6: SDO Basins Summary from USGS NID Database

Name	ID	Year Constructed	Dam Height (ft)	Dam Length (ft)	Storage (Ac-Ft)		Surface Area (ac)	Average Normal Depth (ft)
					Normal	NID		
Operating Basin #1	TX03687	1957	13	14,400	2016	3155	480	4.2
Operating Basin #6	TX03686	1968	11	10,450	586	1004	121	4.8
Boiler Feed Basin	TX04742	1957	12	6800	362	504	48	7.5
Operating Basins #1-5	TX04743	1965	11.5	24,890	3810	5702	543	7
Total SDO Basins				56,540	6774	10,365	1192	

Source: USACE, 2023

Abbreviations: ID = identification; ft = feet; ac = acre; NID = USGS National Inventory of Dams; SDO = Seadrift Operations

Table 2.3.1-7: Monthly Precipitation, Lake Evaporation, and Net Lake Evaporation

	Precipitation (inches)			Gross Evaporation (inches)			Net Evaporation (inches)		
	Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.
Annual	39.86	61.61	17.47	50.12	60.55	32.15	10.26	37.06	-20.11
January	2.81	9.96	0.16	3.33	6.09	1.26	-0.72	2.64	-8.63
February	2.32	7.21	0.15	3.9	8.24	1.45	0.05	3.21	-4.64
March	2.14	11.9	0.22	4.4	8.56	1.58	1.35	5.23	-8.05
April	2.27	8.34	0.08	4.59	8.56	1.45	1.97	5.93	-5.08
May	4.12	13.09	0.06	4.72	8.8	1.45	0.7	5.65	-10.11
June	4.24	13.99	0.35	4.59	9.02	1.85	1.72	8.45	-8.73
July	3.32	17.56	0.17	4.33	9.56	1.23	3.24	8.59	-13.88
August	3.39	13.46	0.51	4.42	8.68	2	2.78	9	-9.15
September	5.46	16.67	0.58	4.22	7.71	1.77	-0.54	5.56	-14.01
October	4.19	14.01	0.05	3.87	8.41	1.33	0.11	4.59	-10.21
November	3.07	9.35	0.15	3.79	7.09	1.49	-0.13	3.66	-6.76
December	2.53	7.82	0.4	3.97	7.8	1.24	-0.27	3.8	-6.37

Source: TWDB, 2024b
Note:Sea Drift Quad; Quad 911, Annual – calendar year, Period of record: 1954 – 2022
Abbreviations: Avg. = average; Max. = maximum; Min. = minimum

Table 2.3.1-8: Surface Water Use (Acre-Feet per Year) by County within 50 mi Radius of the Long Mott Generating Station Site (2021)

County	Population	Municipal	Manufacturing	Mining	Power	Irrigation	Livestock	Total
		(ac-ft)	(ac-ft)	(ac-ft)	(ac-ft)	(ac-ft)	(ac-ft)	(ac-ft)
Aransas	24,510	3269	0	0	0	0	15	3284
Bee	30,924	2546	0	0	0	0	108	2654
Calhoun	19,727	2084	30,624	0	0	8939	80	41,727
Dewitt	19,918	0	0	0	0	0	634	634
Goliad	7163	0	0	0	5544	0	144	5688
Jackson	15,121	0	468	0	0	1	219	688
Lavaca	20,544	0	0	0	0	58	472	530
Matagorda	36,344	0	9165	0	79,715	44,579	324	133,783
Nueces	353,079	39,325	32,304	0	5441	0	7	77,077
Refugio	6756	0	0	0	0	0	46	46
San Patricio	69,699	7186	12,933	0	953	35	140	21,247
Victoria	90,964	10,720	9122	0	13	8	343	20,206
Wharton	41,721	0	0	0	0	46,446	252	46,698
Total	**736,470**	**65,130**	**94,616**	**0**	**91,666**	**100,066**	**2,784**	**354,262**
Percent Total Use	**-**	**18.4**	**26.7**	**0**	**25.9**	**28.2**	**0.8**	**100**

Source: TWDB, 2021
Abbreviation: ac-ft = acre-feet

Table 2.3.1-9: Water Uses by Right within Calhoun and Victoria Counties, Texas, 2021 (Sheet 1 of 5)

Water Right #	Type	Latitude	Longitude	River Basin	Stream Name	Priority Date	Owner Name	Amount (ac-ft/yr)	Use	Remarks
Calhoun County										
3746	Permit	28.55146	-96.82664	Lavaca-Guadalupe Coastal	Victoria Barge Canal	5/27/1980	Anthony Duke	2000	Irrigation	None
3864	Adj.	28.48693	-96.81518	Lavaca-Guadalupe Coastal	Hog Bayou, Tributary of Mission Lake, Tributary of Guadalupe Bay	12/31/1955	Stofer-McNeel Trusts	50	Irrigation	Amend. 04/04/1984
4223	Permit	28.67808	-96.42278	Colorado-Lavaca Coastal	Carancahua Bay	5/29/1985	Ocean Ventures, Inc.	1263	Industrial	None
4276	Permit	28.46236	-96.83963	Guadalupe, Lavaca-Guadalupe Coastal	Guadalupe River	11/5/1985	Del and Gloria Williams, d/b/a Crawfish Isle Plantation	272	Industrial	None
4789	Adj.	28.64193	-96.32344	Colorado-Lavaca Coastal	Matagorda Bay	1/12/1970	Texas Parks and Wildlife Department	315	Industrial	None
4792	Adj.	28.66387	-96.52551	Colorado-Lavaca Coastal	Cox's Creek, tributary of Lavaca Bay	7/30/1956	Point Comfort Water Company	3992	Industrial	Amend. 04/04/1984
4793	Adj.	28.64539	-96.54363	Colorado-Lavaca Coastal	Lavaca Bay	2/10/1971	Central Power and Light Company	862,000	Industrial	None
4794	Adj.	28.65969	-96.56536	Colorado-Lavaca Coastal	Lavaca Bay	5/4/1970 1/20/1981	Aluminum Company of America	56,455	Industrial	Amend. 04/14/1981
5173	Adj.	28.50583	-96.88416	Colorado, Colorado-Lavaca Coastal, Guadalupe, Lavaca, Lavaca-Guadalupe Coastal, San Antonio, and San Antonio-Nueces Coastal	Goff Bayou, Green Lake, Guadalupe River, Hogg Bayou, Mission Bay,	2/3/1941	Guadalupe-Blanco River Authority & Union Carbide Corporation	2500 1000	Industrial Irrigation	Amend. 04/10/1991, 05/21/2004, 07/27/2004, 05/01/2007, 02/13/2014

Table 2.3.1-9: Water Uses by Right within Calhoun and Victoria Counties, Texas, 2021 (Continued) (Sheet 2 of 5)

Water Right #	Type	Latitude	Longitude	River Basin	Stream Name	Priority Date	Owner Name	Amount (ac-ft/yr)	Use	Remarks
5174	Adj.	28.50583	-96.88416	Colorado, Colorado-Lavaca Coastal, Guadalupe, Lavaca, Lavaca-Guadalupe Coastal, San Antonio, and San Antonio-Nueces Coastal	Goff Bayou, Green Lake, Guadalupe River, Hogg Bayou, Mission Bay	6/15/1944	Guadalupe-Blanco River Authority & Union Carbide Corporation	1870	Industrial Irrigation	Amend. 04/10/1991, 05/21/2004, 07/27/2004, 05/01/2007, 02/13/2014
5175	Adj.	28.50583	-96.88416	Colorado, Colorado-Lavaca Coastal, Guadalupe, Lavaca, Lavaca-Guadalupe Coastal, San Antonio, and San Antonio-Nueces Coastal	Goff Bayou, Green Lake, Guadalupe River, Hogg Bayou, Mission Bay	2/13/1951	Guadalupe-Blanco River Authority & Union Carbide Corporation	940	Industrial Irrigation Mining Stock-raising	Amend. 04/10/1991, 05/21/2004, 07/27/2004, 05/01/2007, 02/13/2014
5176	Adj.	28.50583	-96.88416	Colorado, Colorado-Lavaca Coastal, Guadalupe, Lavaca, Lavaca-Guadalupe Coastal, San Antonio, and San Antonio-Nueces Coastal	Goff Bayou, Green Lake, Guadalupe River, Hogg Bayou, Mission Bay	6/21/1951	Guadalupe-Blanco River Authority & Union Carbide Corporation	9944	Industrial Irrigation Municipal	Amend. 04/10/1991, 05/21/2004, 07/27/2004, 05/01/2007, 02/13/2014
5177	Adj.	28.50583	-96.88416	Colorado, Colorado-Lavaca Coastal, Guadalupe, Lavaca, Lavaca-Guadalupe Coastal, San Antonio, and San Antonio-Nueces Coastal	Goff Bayou, Green Lake, Guadalupe River, Hogg Bayou, Mission Bay	1/3/1944 1/26/1948	Guadalupe-Blanco River Authority	32615 8632 10,000	Industrial Irrigation Municipal Industrial Irrigation Industrial Irrigation Municipal	Amend. 04/10/1991, 05/21/2004, 07/27/2004, 05/01/2007, 02/13/2014

Table 2.3.1-9: Water Uses by Right within Calhoun and Victoria Counties, Texas, 2021 (Continued) (Sheet 3 of 5)

Water Right #	Type	Latitude	Longitude	River Basin	Stream Name	Priority Date	Owner Name	Amount (ac-ft/yr)	Use	Remarks
5178	Adj.	28.50583	-96.88416	Colorado, Colorado-Lavaca Coastal, Guadalupe, Lavaca, Lavaca-Guadalupe Coastal, San Antonio, and San Antonio-Nueces Coastal	Goff Bayou, Green Lake, Guadalupe River, Hogg Bayou, Mission Bay	01/07/1952 05/05/1954 01/11/1957 07/08/1964 09/06/1968	Guadalupe-Blanco River Authority & Union Carbide Corporation	106,000	Industrial Irrigation Municipal	Amend. 04/10/1991, 05/21/2004, 07/27/2004, 05/01/2007, 02/13/2014
5484	Adj.	28.50583	-96.88416	Guadalupe	Guadalupe River	5/15/1964	Guadalupe-Blanco River Authority	600	Industrial Irrigation Mining Municipal Stock-raising	Maintenance for existing impoundment at the salt water barrier and diversion dam.
5639	Permit	28.47891	-96.63095	Lavaca-Guadalupe Coastal	Coloma Creek	8/2/2000	Terr and Vicki Whitaker	40	Irrigation	None
13363	Permit	28.63993	-96.61041	Lavaca-Guadalupe Coastal, Colorado	Lavaca Bay	8/13/2020	Oppenheimer Biotechnology Inc.	0.006	Industrial	None
Victoria County										
3606	Permit	28.64637	-96.96284	Guadalupe, Lavaca-Guadalupe Coastal	Guadalupe River, Victoria Barge Canal	7/10/1978	Victoria County Navigation District City of Victoria	5000 4676	Industrial Industrial Irrigation Mining Municipal	Amend. 04/23/2014, 04/17/2014
3726	Permit	28.9181	-97.14711	Guadalupe	Guadalupe River	4/14/1980	Nelson Pantel	100	Irrigation	None
3771	Permit	28.8803	-97.09945	Guadalupe	Guadalupe River	10/6/1980	Jay M. Easley	90	Irrigation	None
3844	Adj.	28.80964	-97.03426	Guadalupe, Lavaca-Guadalupe Coastal	Guadalupe River	8/16/1918	City of Victoria	608	Industrial Irrigation Mining Municipal	Amend. 06/19/2012
3853	Permit	28.90758	-97.13666	Guadalupe	Guadalupe River	3/1/1982	Maxine Robson Kyle and Son, William Allen Kyle Jr.	200	Irrigation	None

Table 2.3.1-9: Water Uses by Right within Calhoun and Victoria Counties, Texas, 2021 (Continued) (Sheet 4 of 5)

Water Right #	Type	Latitude	Longitude	River Basin	Stream Name	Priority Date	Owner Name	Amount (ac-ft/yr)	Use	Remarks
3858	Adj.	28.80964	-97.03426	Guadalupe, Lavaca-Guadalupe Coastal	Guadalupe River	6/27/1951	City of Victoria	1000	Industrial Irrigation Mining Municipal	Amend. 02/21/2012
3859	Adj.	28.89327	-97.13642	Guadalupe	Guadalupe River	2/18/1964	South Texas Electric Cooperative, Inc.	110,000	Industrial	Consumptive use not to exceed 1,900 ac-ft/yr
3860	Adj.	28.80964	-97.03426	Guadalupe, Lavaca-Guadalupe Coastal	Guadalupe River	8/15/1951	City of Victoria	260	Municipal	Amend. 08/12/2005
3861	Adj.	28.66192	-96.96687	Guadalupe, Lavaca-Guadalupe Coastal	Guadalupe River	8/16/1948 2/14/1963	INVISTA S.a r.l., DBA INVISTA S.a r.l, LLC	55,000	Industrial	Consumptive use not to exceed 30,250 Amend. 08/06/2010
3862	Adj.	28.80964	-97.03426	Guadalupe, Lavaca-Guadalupe Coastal	Guadalupe River	12/12/1951	City of Victoria	262.7	Industrial Irrigation Mining Municipal	Amend. 04/23/2014
3863	Adj.	28.50583	-96.88416	Guadalupe, San Antonio, Lavaca, San Antonion-Nueces Coastal, Lavaca-Guadalupe Coastal	Guadalupe River	3/1/1951	Jess Yell Womack, II, Individual and Trustee. Guadalupe-Blanco River Authority	200 3000	Irrigation Domestic Industrial Irrigation Mining Municipal	Amend. 08/01/2002 Amend. 08/07/2002, 01/29/2019, 02/13/2014, 10/01/2020
3981	Permit	28.84616	-97.01091	Guadalupe	Spring Creek	5/9/1983	Spring Creek Development Company	N/A	Recreation	Right for impoundment of on-channel reservoir only
4117	Permit	28.80964	-97.03426	Guadalupe, Lavaca-Guadalupe Coastal	Guadalupe River	5/29/1984	City of Victoria	200	Industrial Irrigation Mining Municipal	Amend. 09/21/2011
5012	Permit	28.50849	-96.91951	Guadalupe, San Antonio	Elm Bayou	1/28/1986	Joe D. Hawes	140	Irrigation	None
5376	Permit	28.83442	-97.01757	Guadalupe	Spring Creek	11/13/1991	Heldenfels Brothers, Inc.	2	Industrial	None

Table 2.3.1-9: Water Uses by Right within Calhoun and Victoria Counties, Texas, 2021 (Continued) (Sheet 5 of 5)

Water Right #	Type	Latitude	Longitude	River Basin	Stream Name	Priority Date	Owner Name	Amount (ac-ft/yr)	Use	Remarks
5424	Permit	28.86819	-97.00939	Guadalupe	Unnamed Tributary of Spring Creek	19/23/1992	San Antonio Federal Credit Union Vista Management Co.	N/A	Recreation	Right for impoundment of on-channel reservoir only
5466	Permit	28.80964	-97.03426	Guadalupe, Lavaca-Guadalupe Coastal	Guadalupe River	1/29/1996	City of Victoria	20,000	Municipal	Amend. 12/28/1999, 01/13/2012
5485	Adj.	28.788	-97.01098	Guadalupe	Guadalupe River	18/15/1951	Victoria WLE, LP	209,189	Industrial (Steam Electric)	Amend. 05/20/2021
5486	Adj.	28.88352	-97.13184	Guadalupe	Coleto Creek Guadalupe River	1/7/1952 1/10/1977	Coleto Creek Power, LP	20,000	Industrial (Steam Electric)	Amend. 06/30/2010
5489	Permit	28.53348	-96.94169	Guadalupe, San Antonio	Cushman Bayou, Elm Bayou, Kuy Creek	10/11/1994	Jess Y. Womack, II	750	Waterfowl/ Wetland Habitat	None

Source: TCEQ, 2021

Notes: The Owner Name “Union Carbide Corporation” is synonymous with SDO

Abbreviations: Adj. = Certificate of Adjudication; ac = acre; ft = feet; yr = year; N/A = Not Applicable; Amend. = Amended

Table 2.3.1-10: Water Reliability and Availability by Water Right

Certificate of Adjudication	Priority Date	Annual Diversion (ac-ft/yr)	Ownership	Authorized Use	Authorized Diversion (ac-ft/yr)	Volume Reliability (percent)	Minimum Annual Supply (ac-ft/yr)	Reliable Total (ac-ft/yr)
18-5173	2/3/1941	2,500	GBRA/DOW	Irrigation	1250	100	1250	1250
				Industrial	1250	100	1250	1250
18-5174	6/15/1944	1,870	GBRA/DOW	Industrial	935	99.48	0	930
18-5175	2/13/1951	940	GBRA/DOW	Industrial	470	99.3	0	467
18-5176	6/21/1951	9,944	GBRA/DOW	Irrigation	3315	98.93	0	3280
18-5177	1/3/1944	10,000	DOW	Industrial	10,000	99.67	0	9967
	1/3/1944	32,615	GBRA/DOW	Industrial	10,763	100	10,763	10,763
				Irrigation	10,763	100	10,763	10,763
				Municipal	11,089	99.97	9642.5	11,086
	1/26/1948	8,632	GBRA/DOW	Municipal	4316	99.37	0	4289
18-5178	1/7/1952	106,000	GBRA/DOW	Municipal	30,525	98.4	0	30,037
				Industrial	30,525	97.65	0	29,808
				Irrigation	44,950	95.34	0	42,855
18-3863	3/1/1951	3,000	DOW	Irrigation	1237	99.04	0	1225
				Irrigation	1767	99.04	0	1750
18-5484[(a)]	5/15/1964	N/A	GBRA	Impoundment	-	-	-	-
Total		**175,501**						**159,719**

Source: Black & Veatch, 2021

Notes: a) This permit authorizes the impoundment of 600 ac-ft of water at the saltwater barrier for use by permits 18-5173, 18-5174, 18-5175, 18-5176, 18-5177, and 18-5178

Abbreviations: ac = acre; ft = feet; yr = year; GBRA = Guadalupe-Blanco River Authority; N/A = Not Applicable

Table 2.3.1-11: Maximum Surface Water Quality Values by Water Body in the Vicinity of the Long Mott Generating Station Site, May 2023 — January 2024 (Sheet 1 of 4)

Chemical Name	Analytic Method	Fraction	Units	Dow Drainage Canal	GBRA Calhoun Canal	West Coloma Creek	TX Water Quality Standard[a]	EPA MCLs[b]
Alkalinity, Bicarbonate (as $CaCO_3$)	A2320B	-	mg/l	270	254	156	-	-
Alkalinity, Total (as $CaCO_3$)	A2320B	-	mg/l	270	254	156	-	-
Alpha Radiation Particles	E900	-	pci/l	< 19 UJ	< 11.7 UJ	186 J	-	15
Aluminum	E200.7	Total	ug/l	1730 JH	915	37,200	991	-
Aluminum	E200.8	Total	ug/l	4380	2420	3480	991	-
Ammonia	E350.1	-	mg/l	< 0.051 U	0.252	< 0.345 UL	-	-
Antimony	E200.8	Total	ug/l	2.42	3.13	< 1.05 U	6	6
Arsenic	E200.8	Total	ug/l	9.1	6.7	18	10	10
Barium	E200.7	Total	ug/l	200	142	378	-	2000
Barium	E200.8	Total	ug/l	242	76.9	149	2,000	2000
Beryllium	E200.7	Total	ug/l	< 1.07	< 1.07 U	< 1.07 U	-	4
Beryllium	E200.8	Total	ug/l	0.353 JQ	0.184 JQ	0.35 JQ	-	4
Beta Particles & Photon Emitters	E900	-	pci/l	25.5	13	1,340	-	4 mrem/yr
Biochemical Oxygen Demand (BOD)	A5210B	-	mg/l	3.92 B	< 3 U	13.2	-	-
Biochemical Oxygen Demand (BOD)	SM5210B	-	mg/l	3.08 B	3.51 B	< 30 U	-	-
Boron	E200.7	Total	ug/l	503	419	1540	-	-
Boron	E200.8	Total	ug/l	413	87.8	191	-	-
Cadmium	E200.8	Total	ug/l	0.258 U	< 0.258 U	0.304 JQ	5	5
Calcium	E200.7	Total	ug/l	149,000	99,000	630,000	-	-
Calcium	E200.8	Total	ug/l	197,000	50,700	105,000	-	-
Carbon dioxide	SM4500-CO2 D	-	mg/l	235 J	228	138	-	-
Chemical Oxygen Demand (COD)	HACH 8000M	-	mg/l	66	64	256	-	-
Chloride	E300	-	mg/l	767	171	7340	-	-
Chlorophyll-a	SM10200H	-	mg/m^3	40.3	320	187	14.1	-
Chlorophyll-a, corrected for Pheophytin	SM10200H	-	mg/m^3	23.5	465	160	-	-
Chromium	E200.7	Total	ug/l	< 4.02 U	< 4.02 U	27.0 J	15.7	100

Table 2.3.1-11: Maximum Surface Water Quality Values by Water Body in the Vicinity of the Long Mott Generating Station Site, May 2023 — January 2024 (Continued) (Sheet 2 of 4)

Chemical Name	Analytic Method	Fraction	Units	Dow Drainage Canal	GBRA Calhoun Canal	West Coloma Creek	TX Water Quality Standard[(a)]	EPA MCLs[(b)]
Chromium	E200.8	Total	ug/l	4.04	2.12 JQ	< 2.85 UB	15.7	100
Cobalt	E200.7	Total	ug/l	1.34 U	< 1.34 U	3.78 JQ	-	-
Cobalt	E200.8	Total	ug/l	2.47	0.783 JQ	1.94 JQ	-	-
Copper	E200.7	Total	ug/l	8.52 JQ	< 3.86 U	13.0 JQ	1300	1300
Copper	E200.8	Total	ug/l	14.9	3.07 JQ	3.99 JQ	1300	1300
Corrosivity	SW9040C	-	pH units	8.7 J	8.3 J	8.3 J	-	-
Cyanide, Free	E1677	-	ug/l	< 5.00 U	< 5.00 U	< 5.00 U	45.8	200
Dissolved Oxygen	Field Measure	-	mg/l	10.94	8.47	114.1	1.5	-
E,coli MPN	Colilert-18	-	mpn/100ml	186	488.4	49.6	540	-
E,coli MPN	Colisure	-	mpn/100ml	74.3	73.3	2419.6 J	540	-
E,coli MPN	SM9223B	-	mpn/100ml	99 R	411 R	29 R	540	-
Fluoride	E300	-	mg/l	0.597 JQ	0.363 JQ	0.152 JQ	4	4
Hardness, Calcium (as CaCO3)	SM2340B	-	mg/l	492	127	384	-	-
Hardness, Magnesium (as $CaCO_3$)	SM2340B	-	mg/l	130	21.7	122	-	-
Hardness, Total as $CaCO_3$	SM2340B	-	mg/l	622	340	3310	-	-
Iron	E200.7	Total	ug/l	1340	784	23,100	-	-
Iron	E200.8	Total	ug/l	3790	2040	2530	-	-
Lead	E200.8	Total	ug/l	4.15	1.71 JQ	14.9	1.15	15
Magnesium	E200.7	Total	ug/l	39,600	22,600	454,000	-	-
Magnesium	E200.8	Total	ug/l	31,500	5,280	29,600	-	-
Manganese	E200.7	Total	ug/l	85.6	75.3	1050	50	-
Manganese	E200.8	Total	ug/l	257	66.2	255	50	-
Mercury	E245.1	Total	ug/l	0.256	0.239	<0.0525 U	0.0122	2
Nickel	E200.7	Total	ug/l	4.82 JQ	4.16 JQ	15.2	332	-
Nickel	E200.8	Total	ug/l	9.75	2.83	6	332	-
Nitrogen, nitrate	E300	-	mg/l	0.86	5.78	2.27	1.95	10
Nitrogen, nitrite	E300	-	mg/l	0.226	0.274	1.80 J	-	1
Nitrogen, Total Organic	CALC	-	mg/l	3.74	3.06	5.80 J	-	-

Table 2.3.1-11: Maximum Surface Water Quality Values by Water Body in the Vicinity of the Long Mott Generating Station Site, May 2023 — January 2024 (Continued) (Sheet 3 of 4)

Chemical Name	Analytic Method	Fraction	Units	Dow Drainage Canal	GBRA Calhoun Canal	West Coloma Creek	TX Water Quality Standard[a]	EPA MCLs[b]
Oxidation Reduction Potential	Field Measure	-	mV	218	224	192	-	-
pH, Field	Field Measure	-	pH units	8.59	8.09	8.29	-	-
pH, Laboratory	SW9040C	-	pH units	8.7	8.3 J	8.3 J	-	-
Phosphate as P, Ortho	E365.1	-	mg/l	0.909 JL	0.843	1.04	-	-
Phosphorus, Total as P	E365.1	-	mg/l	0.598 JL	1.22	0.935	0.69	-
Potassium	E200.7	Total	ug/l	21,000	14,000	96,900	-	-
Potassium	E200.8	Total	ug/l	14,100	7880	7190	-	-
Salinity	Field Measure	-	ppt	2.1	0.7	0.48	-	-
Selenium	E200.8	Total	ug/l	< 1.46 UB	2.39 B	21.6	20	50
Silver	E200.7	Total	ug/l	< 4.07 U	< 4.07 U	< 4.07 U	0.8	-
Silver	E200.8	Total	ug/l	0.120 JQ	< 0118 U	< 0.118 U	0.8	-
SiO_2 Silica (Quartz)	E200.7	Dissolved	ug/l	24,700	42,200	56,100	-	-
SiO_2 Silica (Quartz)	E200.7	Total	ug/l	35,700	29,100	168,000	-	-
Sodium	E200.7	Total	ug/l	510,000	139,000	3,610,000	-	-
Sodium	E200.8	Total	ug/l	416,000	17,200	147,000	-	-
Specific Conductance	Field Measure	-	ms/cm	3.93	3.49	83.6	-	-
Sulfate	E300	-	mg/l	397	112	1200	-	-
Temperature, Field	Field Measure	-	deg C	34.76	34.5	37.3	-	-
Temperature, Laboratory	SW9040C	-	deg C	22.2	22.4 J	22.6	-	-
Thallium	E200.8	Total	ug/l	< 0.260 U	< 0.260 U	0.295 JQ	0.12	2
Total Coliforms	Colisure	-	mpn/100ml	2420	2420 J	2420	-	5.00%
Total Coliforms	SM9223B	-	mpn/100ml	1120	2420	2420	-	5.00%
Total Dissolved Solids (TDS)	A2540C	-	mg/l	2420	740	18,000	-	-
Total Kjeldahl Nitrogen	E351.2	-	mg/l	3.74	3.06	5.80 J	-	-
Total Suspended Solids (TSS)	A2540D	-	mg/l	305 J	77	512 J	-	-
Turbidity	Field Measure	-	NTU	353	141	1000 >	-	-
Uranium	E200.8	Total	ug/l	3.21	1.4	8.76	-	30
Vanadium	E200.7	Total	ug/l	16.9 JQ	11.5 JQ	42.1	-	-

Table 2.3.1-11: Maximum Surface Water Quality Values by Water Body in the Vicinity of the Long Mott Generating Station Site, May 2023 — January 2024 (Continued) (Sheet 4 of 4)

Chemical Name	Analytic Method	Fraction	Units	Dow Drainage Canal	GBRA Calhoun Canal	West Coloma Creek	TX Water Quality Standard[(a)]	EPA MCLs[(b)]
Vanadium	E200.8	Total	ug/l	23.9	8.21	11.5	-	-
Zinc	E200.7	Total	ug/l	22.3 JQ	19.5 JQ	94.8 J	7400	-
Zinc	E200.8	Total	ug/l	45.2	45.7	65.5 J	7400	-

Sources:

a) TCEQ, 2023

b) EPA, 2009

Note:

Data Qualifier Definitions: B = Estimated, blank contamination; J = Detected, estimated value based on QC criteria; JH = Detected, possibly biased high; JQ = Detected between the Method Detection Limit (MDL) and the Reporting Limit (RL); R = Data rejected based on QC criteria; U = Not Detected at the associated MDL; UB = Not Detected, estimated due to blank contamination; UJ = Not Detected, estimated based on QC; > = greater than the associated value

Abbreviations: deg C = degrees Celsius; mg/l = milligrams per liter; mg/m^3 = milligrams per cubic meter; mpn/100ml = most probable number per 100 milliliters; ms/cm = millisiemens per centimeter; mV = millivolts; NTU = nephelometric turbidity unit; pci/l = picocuries per liter; ppt = parts per thousand; ug/l = micrograms per liter; EPA MCL = U.S. Environmental Protection Agency Maximum Concentration Level; mrem/yr = millirem per year

Table 2.3.1-12: Water Quality at the SDO Facility Outfalls 001 and 002, 2019 (Sheet 1 of 2)

Pollutant	Outfall 001	Outfall 002	
	Average (mg/L)	Average (mg/L)	
Biological oxygen demand (BOD) (5-day)	5	2.2	
Carbonaceous biochemical oxygen demand (CBOD) (5-day)	4.8	< 2	
Chemical oxygen demand	83	89	
Total organic carbon	11.6	7.9	
Dissolved oxygen	-	-	
Ammonia nitrogen	0.7	0.09	
Total suspended solids	10.3	-	
Nitrate nitrogen	< 0.24	0.16	
Total organic nitrogen	5.8	2.16	
Total phosphorus	0.24	0.09	
Oil and grease	< 5	< 5	
Total residual chlorine	-	0.03	
Total dissolved solids	1178	2415	
Sulfate	168	479	
Chloride	184	930	
Fluoride	0.56	0.58	
Total alkalinity (mg/L as $CaCO_3$)	519	131	
Temperature (deg F)	-	72.2	
pH (standard units) (daily averages)	7.49-7.54	7.48-7.58	
	Average (µg/L)	**Average (µg/L)**	**MAL (µg/L)**
Aluminum, total	27.4	190	2.5
Antimony, total	< 0.8	< 0.8	5
Arsenic, total	4.06	6.66	0.5
Barium, total	36.2	181	3
Beryllium, total	< 0.3	< 0.3	0.5
Cadmium, total	< 0.3	< 0.3	1
Chromium, total	< 3	< 3	3
Chromium, hexavalent	< 3	< 3	3
Chromium, trivalent	< 3	< 3	N/A
Copper, total	< 1	4.66	2
Cyanide, available	< 10	< 10	10-Feb
Lead, total	0.524	0.55	0.5
	Average (µg/L)	**Average (µg/L)**	**MAL (µg/L)**
Mercury, total	0.0067	0.00796	0.005/0.0005
Nickel, total	< 1	2.81	2
Selenium, total	< 2	< 2	5
Silver, total	< 0.5	< 0.5	0.5

Table 2.3.1-12: Water Quality at the SDO Facility Outfalls 001 and 002, 2019 (Continued)

Pollutant	Outfall 001	Outfall 002	
	Average (mg/L)	Average (mg/L)	
Thallium, total	< 0.5	< 0.5	0.5
Zinc, total	19.2	20.4	5

Source: TPDES Permit No. 0000447000

Notes: Averages are the mean value of five grab samples at each outfall location

Abbreviations: $CaCO_3$ = calcium carbonate; deg F = degrees Fahrenheit; µg/L = micrograms per liter; MAL= minimum analytical limits; mg/L = milligrams per liter; mg/m^3 = milligrams per cubic meter; N/A = not available

Table 2.3.1-13: Mean Water Quality Values for the Victoria Barge Canal, 2020–2023

Parameter	Mean	Unit
Alkalinity, total	187	mg/L
Ammonia-nitrogen	0.16	mg/L
Chloride	5530	mg/L
Chlorophyll a	33	µg/L
Enterococcus	17.5	cfu/100mL
Fluoride	0.32	mg/L
Nitrate + Nitrite	0.4	mg/L
Nitrogen	0.8	mg/L
Organic carbon	4.61	mg/L
Dissolved Oxygen	6.8	mg/L
pH	8.2	
Phosphorus	0.17	mg/L
Salinity	10.4	ppt
Specific conductance	17,483	µS/cm
Sulfate	781	mg/L
Total suspended solids	35	mg/L
Total volatile solids	10	mg/L
Temperature	24.1	deg C

Source: USGS, 2024

Abbreviations: µg/L = micrograms per liter; µS/cm= microsiemens per centimeter; deg C = degrees Celsius; mg/L = milligrams per liter; cfu/100mL = colony forming units per one hundred milliliters; ppt = parts per thousand

Table 2.3.2-1: Summary of Observation Wells Installed for Groundwater Monitoring Program (Sheet 1 of 2)

Well ID[a]	Northing[b] US ft, NAD83	Easting[b] US ft, NAD83	TOC Elevation (ft., NAVD88)	Total Depth (ft., bgs)	Screen Length (ft.)	Sampling Program	Target Aquifer
MW-XE-1A	13,381,701.67	2,686,123.10	29.1	17	5	WL, WQ	Chicot
MW-XE-1C	13,381,707.48	2,686,109.83	29.1	85	20	WL, WQ	Chicot
MW-XE-1E	13,381,692.73	2,686,106.94	29.2	151.7	20	WL, WQ	Chicot
MW-XE-2A	13,382,471.14	2,685,446.47	29.5	20.5	5	WL, WQ	Chicot
MW-XE-2C	13,382,461.37	2,685,449.80	28.5	77	10	WL, WQ	Chicot
MW-XE-2E	13,382,469.84	2,685,457.01	29.6	199.6	10	WL, WQ	Chicot
MW-XE-3A	13,383,546.38	2,686,910.67	29	22	5	WL, WQ	Chicot
MW-XE-3C	13,383,549.07	2,686,928.70	28.8	94.4	20	WL, WQ	Chicot
MW-XE-3E	13.383,561,55	2,686,915.79	28.9	167.6	10	WL, WQ	Chicot
MW-XE-4A	13,382,618.33	2,688,082.37	28.9	22	5	WL, WQ	Chicot
MW-XE-4C	13,382,603.75	2,688,075.80	28.9	102.3	20	WL, WQ	Chicot
MW-XE-4E	13,3826,22.13	2,688,075.90	28.8	166.2	20	WL, WQ	Chicot
MW-XE-5A	13,381,262.90	2,687,393.53	28.9	22	5	WL, WQ	Chicot
MW-XE-5C	13,381,264.97	2,687,403.96	29.3	102.6	20	WL, WQ	Chicot
MW-XE-5E	13,3812,75.30	2,687,394.10	29.2	159.5	20	WL, WQ	Chicot
MW-XE-6A	13,380,964.32	2,686,573.97	29.5	22	5	WL, WQ	Chicot
MW-XE-6C	13,380,963.03	2,686,580.99	29.2	111	20	WL, WQ	Chicot
MW-XE-6E	13,380,958.53	2,686,586.22	29	186.6	20	WL, WQ	Chicot
MW-XE-101A	13,382,656.97	2,684,165.30	30.4	27.5	10	WL	Chicot
MW-XE-101C	13,382,642.06	2,684,173.83	30.3	92.5	20	WL	Chicot
MW-XE-101E	13,382,654.70	2,684,187.95	30.5	187.4	15	WL	Chicot
MW-XE-102A	13,380,787.44	2,688,525.04	29.1	22.7	10	WL	Chicot
MW-XE-102C	13,380,796.13	2,688,509.39	28.7	95.2	10	WL	Chicot
MW-XE-102E	13,380,805.01	2,688,525.31	28.2	158.7	20	WL	Chicot
MW-XE-103A	13,383,944.68	2,688,492.72	29.2	17.5	5	WL	Chicot

Table 2.3.2-1: Summary of Observation Wells Installed for Groundwater Monitoring Program (Continued) (Sheet 2 of 2)

Well ID[a]	Northing[b] US ft, NAD83	Easting[b] US ft, NAD83	TOC Elevation (ft., NAVD88)	Total Depth (ft., bgs)	Screen Length (ft.)	Sampling Program	Target Aquifer
MW-XE-103C	13,383,935.75	2,688,486.57	29.3	97.5	10	WL	Chicot
MW-XE-103E	13,383,931.17	2,688,497.37	29.4	170.6	20	WL	Chicot
MW-XE-104A	13,383,948.78	2,686,013.35	29.4	34.2	10	WL	Chicot
MW-XE-104C	13,383,938.92	2,686,017.24	29.6	93.4	20	WL	Chicot
MW-XE-104E	13,383,955.84	2,686,022.98	28.9	177.8	10	WL	Chicot

Notes:
a) “A” suffix wells are installed in the A Sand zone; “C” suffix wells are screened in the C Sand; “E” suffix wells are screened in the E Sand
b) Northings and Eastings are in Texas South Central State Plane coordinates
Abbreviations: NAD83 = North American Datum of 1983; NAVD 88 = North American Vertical Datum of 1988; TOC = top of casing; ft bgs = feet below ground surface; WL = Water Level; WQ = Water Quality

Table 2.3.2-2: Recorded Monthly Water Levels from Monitoring Wells Installed at the Long Mott Generating Station Site (Sheet 1 of 10)

Monitoring Well ID	Date Gauged	TOC Elevation (NAVD88)	Depth to Groundwater (ft. BTOC)	Groundwater Elevation (NAVD88)
MW-XE-1A	12/20/2023	29.07	7.7	21.4
	1/3/2024		6.6	22.5
	2/29/2024		5.9	23.2
	3/25/2024		5.7	23.4
	4/22/2024		6.8	22.3
	5/21/2024		7.2	21.9
	6/17/2024		7.5	21.6
	7/4/2024		6.8	22.3
	8/4/2024		5.2	23.9
	9/24/2024		7.2	21.9
	10/22/2024		7.8	21.3
	11/22/2024		8	21
MW-XE-1C	12/20/2023	29.3	21.5	7.8
	1/3/2024		21.4	7.9
	2/29/2024	29.13	21	8.1
	3/25/2024		20.8	8.3
	4/22/2024		21.1	8
	5/21/2024		21.2	7.9
	6/17/2024		21.4	7.7
	7/4/2024		21.3	7.8
	8/4/2024		21	8.1
	9/24/2024		21.4	7.7
	10/22/2024		21.6	7.5
	11/22/2024		21.7	7.4
MW-XE-1E	12/20/2023	29.6	27.1	2.5
	1/3/2024		26.7	2.9
	2/29/2024	29.22	26.2	3
	3/25/2024		26	3.2
	4/22/2024		26	3.2
	5/21/2024		26.1	3.1
	6/17/2024		26.2	3
	7/4/2024		26	3.2
	8/4/2024		25.7	3.5
	9/24/2024		26.1	3.1
	10/22/2024		26.1	3.1
	11/22/2024		26.6	2.7

Table 2.3.2-2: Recorded Monthly Water Levels from Monitoring Wells Installed at the Long Mott Generating Station Site (Sheet 2 of 10)

Monitoring Well ID	Date Gauged	TOC Elevation (NAVD88)	Depth to Groundwater (ft. BTOC)	Groundwater Elevation (NAVD88)
MW-XE-2A	12/20/2023	29.52	8.9	20.6
MW-XE-2A	1/3/2024	29.52	8.6	20.9
MW-XE-2A	2/29/2024	29.52	6.3	23.2
MW-XE-2A	3/25/2024	29.52	6	23.5
MW-XE-2A	4/22/2024	29.52	7.2	22.3
MW-XE-2A	5/21/2024	29.52	7.7	21.8
MW-XE-2A	6/17/2024	29.52	8.2	21.3
MW-XE-2A	7/4/2024	29.52	7.6	21.9
MW-XE-2A	8/4/2024	29.52	5.7	23.8
MW-XE-2A	9/24/2024	29.52	7.6	21.9
MW-XE-2A	10/22/2024	29.52	8.4	21.1
MW-XE-2A	11/22/2024	29.52	8.1	21.4
MW-XE-2C	12/20/2023	29.5	21.9	6.6
MW-XE-2C	1/3/2024	29.5	21.8	6.7
MW-XE-2C	2/29/2024	29.5	21.4	7.1
MW-XE-2C	3/25/2024	29.5	21.2	7.3
MW-XE-2C	4/22/2024	29.5	21.5	7
MW-XE-2C	5/21/2024	29.5	21.6	6.9
MW-XE-2C	6/17/2024	29.5	21.8	6.7
MW-XE-2C	7/4/2024	29.5	21.7	6.8
MW-XE-2C	8/4/2024	29.5	21.4	7.1
MW-XE-2C	9/24/2024	29.5	21.8	6.7
MW-XE-2C	10/22/2024	29.5	22	7.5
MW-XE-2C	11/22/2024	29.5	22.2	7.3
MW-XE-2E	12/20/2023	29.9	27.2	2.7
MW-XE-2E	1/3/2024	29.9	26.9	3
MW-XE-2E	2/29/2024	29.58	26.3	3.3
MW-XE-2E	3/25/2024	29.58	26.2	3.4
MW-XE-2E	4/22/2024	29.58	26.2	3.4
MW-XE-2E	5/21/2024	29.58	26.3	3.3
MW-XE-2E	6/17/2024	29.58	26.3	3.3
MW-XE-2E	7/4/2024	29.58	26.1	3.5
MW-XE-2E	8/4/2024	29.58	25.9	3.7
MW-XE-2E	9/24/2024	29.58	26.2	3.4
MW-XE-2E	10/22/2024	29.58	26.3	3.3
MW-XE-2E	11/22/2024	29.58	26.9	2.7

Table 2.3.2-2: Recorded Monthly Water Levels from Monitoring Wells Installed at the Long Mott Generating Station Site (Sheet 3 of 10)

Monitoring Well ID	Date Gauged	TOC Elevation (NAVD88)	Depth to Groundwater (ft. BTOC)	Groundwater Elevation (NAVD88)
MW-XE-3A	12/20/2023	30.1	11.7	18.4
	1/3/2024		11.5	18.6
	2/29/2024	28.96	9	20
	3/25/2024		8.5	20.5
	4/22/2024		9	20
	5/21/2024		8.8	20.2
	6/17/2024		8.6	20.4
	7/4/2024		7.7	21.3
	8/4/2024		7.7	21.3
	9/24/2024		8.4	20.6
	10/22/2024		8.8	20.1
	11/22/2024		9	19.9
MW-XE-3C	12/20/2023	29.4	21	8.4
	1/3/2024		20.8	8.6
	2/29/2024	28.79	19.8	9
	3/25/2024		19.6	9.2
	4/22/2024		19.8	9
	5/21/2024		19.9	8.9
	6/17/2024		20.2	8.6
	7/4/2024		20.1	8.7
	8/4/2024		19.9	8.9
	9/24/2024		20.2	8.6
	10/22/2024		20.5	8.3
	11/22/2024		20.5	8.3
MW-XE-3E	12/20/2023	29.9	27.3	2.6
	1/3/2024		26.9	3
	2/29/2024		25.6	3.3
	3/25/2024	28.94	25.4	3.5
	4/22/2024		25.4	3.5
	5/21/2024		25.5	3.4
	6/17/2024		25.6	3.3
	7/4/2024		25.4	3.5
	8/4/2024		25.2	3.7
	9/24/2024		25.5	3.4
	10/22/2024		25.6	3.4
	11/22/2024		26.2	2.8

Table 2.3.2-2: Recorded Monthly Water Levels from Monitoring Wells Installed at the Long Mott Generating Station Site (Sheet 4 of 10)

Monitoring Well ID	Date Gauged	TOC Elevation (NAVD88)	Depth to Groundwater (ft. BTOC)	Groundwater Elevation (NAVD88)
MW-XE-4A	12/20/2023	29.1	11.7	17.4
	1/3/2024		11.6	17.5
	2/29/2024	28.92	10.4	18.5
	3/25/2024		9.7	19.2
	4/22/2024		9.9	19
	5/21/2024		9.7	19.2
	6/17/2024		9.5	19.4
	7/4/2024		8.6	20.3
	8/4/2024		8.2	20.7
	9/24/2024		8.9	20
	10/22/2024		9.2	19.7
	11/22/2024		9.4	19.5
MW-XE-4C	12/20/2023	28.88	20.3	8.6
	1/3/2024		20.4	8.5
	2/29/2024		19.7	9.2
	3/25/2024		19.5	9.4
	4/22/2024		19.8	9.1
	5/21/2024		19.9	9
	6/17/2024		20.1	8.8
	7/4/2024		20	8.9
	8/4/2024		19.8	9.1
	9/24/2024		20.1	8.8
	10/22/2024		20.4	8.5
	11/22/2024		20.4	8.5
MW-XE-4E	12/20/2023	28.83	27.1	1.7
	1/3/2024		26.7	2.1
	2/29/2024		27.6	1.2[a]
	3/25/2024		25.5	3.3
	4/22/2024		25.7	3.1
	5/21/2024		25.5	3.3
	6/17/2024		25.6	3.2
	7/4/2024		25.4	3.4
	8/4/2024		25.2	3.6
	9/24/2024		25.5	3.3
	10/22/2024		25.6	3.2
	11/22/2024		26.1	2.7

Table 2.3.2-2: Recorded Monthly Water Levels from Monitoring Wells Installed at the Long Mott Generating Station Site (Sheet 5 of 10)

Monitoring Well ID	Date Gauged	TOC Elevation (NAVD88)	Depth to Groundwater (ft. BTOC)	Groundwater Elevation (NAVD88)
MW-XE-5A	12/20/2023	29.4	8.9	20.5
	1/3/2024		8.2	21.2
	2/29/2024		8.1	20.9
	3/25/2024	28.95	8	21
	4/22/2024		8.3	20.7
	5/21/2024		8.4	20.6
	6/17/2024		8.8	20.2
	7/4/2024		8.4	20.6
	8/4/2024		7.8	21.2
	9/24/2024		8.5	20.5
	10/22/2024		8.9	20.1
	11/22/2024		8.9	20.1
MW-XE-5C	12/20/2023	29.6	21.3	8.3
	1/3/2024		21.2	8.4
	2/29/2024	29.3	20.7	8.6
	3/25/2024		20.5	8.8
	4/22/2024		20.8	8.5
	5/21/2024		20.9	8.4
	6/17/2024		21.1	8.2
	7/4/2024		21.1	8.2
	8/4/2024		20.7	8.6
	9/24/2024		21.1	8.2
	10/22/2024		21.4	7.9
	11/22/2024		21.4	8
MW-XE-5E	12/20/2023	29.19	27.1	2.1
	1/3/2024		26.7	2.5
	2/29/2024		26.2	3
	3/25/2024		26	3.2
	4/22/2024		26.1	3.1
	5/21/2024		26.1	3.1
	6/17/2024		26.2	3
	7/4/2024		26	3.2
	8/4/2024		25.7	3.5
	9/24/2024		26.1	3.1
	10/22/2024		26.1	3.1
	11/22/2024		26.6	2.6

Table 2.3.2-2: Recorded Monthly Water Levels from Monitoring Wells Installed at the Long Mott Generating Station Site (Sheet 6 of 10)

Monitoring Well ID	Date Gauged	TOC Elevation (NAVD88)	Depth to Groundwater (ft. BTOC)	Groundwater Elevation (NAVD88)
MW-XE-6A	12/20/2023	29.53	7.3	22.2
	1/3/2024		5.8	23.7
	2/29/2024		6	23.5
	3/25/2024		6.2	23.3
	4/22/2024		7	22.5
	5/21/2024		7.2	22.3
	6/17/2024		7.4	22.1
	7/4/2024		6.9	22.6
	8/4/2024		5.9	23.6
	9/24/2024		7.2	22.3
	10/22/2024		7.8	21.8
	11/22/2024		7.6	21.9
MW-XE-6C	12/20/2023	29.4	21.4	8
	1/3/2024		21.3	8.1
	2/29/2024	29.2	20.9	8.3
	3/25/2024		20.7	8.5
	4/22/2024		20.9	8.3
	5/21/2024		21.1	8.1
	6/17/2024		21.3	7.9
	7/4/2024		21.2	8
	8/4/2024		20.8	8.4
	9/24/2024		21.3	7.9
	10/22/2024		21.5	7.7
	11/22/2024		21.5	7.7
MW-XE-6E	12/20/2023	29.03	27	2
	1/3/2024		26.7	2.3
	2/29/2024		26.2	2.8
	3/25/2024		25.9	3.1
	4/22/2024		26	3
	5/21/2024		26	3
	6/17/2024		26.1	2.9
	7/4/2024		25.9	3.1
	8/4/2024		25.6	3.4
	9/24/2024		26	3
	10/22/2024		26.1	3
	11/22/2024		26.5	2.5

Table 2.3.2-2: Recorded Monthly Water Levels from Monitoring Wells Installed at the Long Mott Generating Station Site (Sheet 7 of 10)

Monitoring Well ID	Date Gauged	TOC Elevation (NAVD88)	Depth to Groundwater (ft. BTOC)	Groundwater Elevation (NAVD88)
MW-XE-101A	12/20/2023	30.37	NM	
	1/3/2024		NM	
	2/29/2024		5.5	24.9
	3/25/2024		5.8	24.6
	4/22/2024		7.3	23.1
	5/21/2024		7.5	22.9
	6/17/2024		7.7	22.7
	7/4/2024		6.1	24.3
	8/4/2024		4.7	25.7
	9/24/2024		7.5	22.9
	10/22/2024		8.4	22
	11/22/2024		8.6	21.7
MW-XE-101C	12/20/2023	30.29	NM	
	1/3/2024		NM	
	2/29/2024		22.3	8
	3/25/2024		22.2	8.1
	4/22/2024		22.4	7.9
	5/21/2024		22.5	7.8
	6/17/2024		22.7	7.6
	7/4/2024		22.6	7.7
	8/4/2024		22.4	7.9
	9/24/2024		22.7	7.6
	10/22/2024		23	7.3
	11/22/2024		23	7.3
MW-XE-101E	12/20/2023	30.49	NM	
	1/3/2024		NM	
	2/29/2024		26.9	3.6
	3/25/2024		26.8	3.7
	4/22/2024		26.9	3.6
	5/21/2024		26.9	3.6
	6/17/2024		27	3.5
	7/4/2024		26.8	3.7
	8/4/2024		26.6	3.9
	9/24/2024		26.9	3.6
	10/22/2024		27.1	3.4
	11/22/2024		27.5	3

Table 2.3.2-2: Recorded Monthly Water Levels from Monitoring Wells Installed at the Long Mott Generating Station Site (Sheet 8 of 10)

Monitoring Well ID	Date Gauged	TOC Elevation (NAVD88)	Depth to Groundwater (ft. BTOC)	Groundwater Elevation (NAVD88)
MW-XE-102A	12/20/2023	29.07	NM	
	1/3/2024		NM	
	2/29/2024		11.4	17.7
	3/25/2024		10.1	19
	4/22/2024		11.4	17.7
	5/21/2024		11.4	17.7
	6/17/2024		11.6	17.5
	7/4/2024		11.6	17.5
	8/4/2024		11.1	18
	9/24/2024		11.5	17.6
	10/22/2024		11.7	17.4
	11/22/2024		11.7	17.4
MW-XE-102C	12/20/2023	28.7	NM	
	1/3/2024		NM	
	2/29/2024		20.1	8.6
	3/25/2024		19.9	8.8
	4/22/2024		20.2	8.5
	5/21/2024		20.3	8.4
	6/17/2024		20.5	8.2
	7/4/2024		20.4	8.3
	8/4/2024		20.1	8.6
	9/24/2024		20.5	8.2
	10/22/2024		20.7	8
	11/22/2024		20.7	8
MW-XE-102E	12/20/2023	28.16	NM	
	1/3/2024		NM	
	2/29/2024		27.1	1.1[a]
	3/25/2024		25.1	3.1
	4/22/2024		25.2	3
	5/21/2024		25.3	2.9
	6/17/2024		25.4	2.8
	7/4/2024		25.1	3.1
	8/4/2024		24.9	3.3
	9/24/2024		25.3	2.9
	10/22/2024		25.2	2.9
	11/22/2024		25.6	2.5

Table 2.3.2-2: Recorded Monthly Water Levels from Monitoring Wells Installed at the Long Mott Generating Station Site (Sheet 9 of 10)

Monitoring Well ID	Date Gauged	TOC Elevation (NAVD88)	Depth to Groundwater (ft. BTOC)	Groundwater Elevation (NAVD88)
MW-XE-103A	12/20/2023	29.24	NM	
	1/3/2024		NM	
	2/29/2024		8.5	20.7
	3/25/2024		8.1	21.1
	4/22/2024		9	20.2
	5/21/2024		9.1	20.1
	6/17/2024		8.9	20.3
	7/4/2024		6.5	22.7
	8/4/2024		6.4	22.8
	9/24/2024		8.5	20.7
	10/22/2024		9.1	20.2
	11/22/2024		9.4	19.2
MW-XE-103C	12/20/2023	29.33	NM	
	1/3/2024		NM	
	2/29/2024		20	9.3
	3/25/2024		19.9	9.4
	4/22/2024		20.1	9.2
	5/21/2024		20.2	9.1
	6/17/2024		20.4	8.9
	7/4/2024		20.4	8.9
	8/4/2024		20.1	9.2
	9/24/2024		20.5	8.8
	10/22/2024		20.7	8.6
	11/22/2024		20.7	8.6
MW-XE-103E	12/20/2023	29.39	NM	
	1/3/2024		NM	
	2/29/2024		26	3.4
	3/25/2024		25.8	3.6
	4/22/2024		25.8	3.6
	5/21/2024		25.9	3.5
	6/17/2024		26	3.4
	7/4/2024		25.7	3.7
	8/4/2024		25.5	3.9
	9/24/2024		25.9	3.5
	10/22/2024		26	3.4
	11/22/2024		26.6	2.8

Table 2.3.2-2: Recorded Monthly Water Levels from Monitoring Wells Installed at the Long Mott Generating Station Site (Sheet 10 of 10)

Monitoring Well ID	Date Gauged	TOC Elevation (NAVD88)	Depth to Groundwater (ft. BTOC)	Groundwater Elevation (NAVD88)
MW-XE-104A	12/20/2023	29.36	NM	
	1/3/2024		NM	
	2/29/2024		8.7	20.7
	3/25/2024		8.3	21.1
	4/22/2024		9.1	20.3
	5/21/2024		9.4	20
	6/17/2024		9.5	19.9
	7/4/2024		8.5	20.9
	8/4/2024		7.9	21.5
	9/24/2024		9	20.4
	10/22/2024		9.8	19.6
	11/22/2024		9.8	19.6
MW-XE-104C	12/20/2023	29.64	NM	
	1/3/2024		NM	
	2/29/2024		20.9	8.7
	3/25/2024		20.8	8.8
	4/22/2024		21	8.6
	5/21/2024		21.1	8.5
	6/17/2024		21.3	8.3
	7/4/2024		21.2	8.4
	8/4/2024		21	8.6
	9/24/2024		21.4	8.2
	10/22/2024		21.6	8
	11/22/2024		21.6	8
MW-XE-104E	12/20/2023	28.94	NM	
	1/3/2024		NM	
	2/29/2024		25.5	3.4
	3/25/2024		25.3	3.6
	4/22/2024		25.3	3.6
	5/21/2024		25.4	3.5
	6/17/2024		25.4	3.5
	7/4/2024		25.2	3.7
	8/4/2024		25.1	3.8
	9/24/2024		25.4	3.5
	10/22/2024		25.6	3.4
	11/22/2024		26.2	2.8

Note: a) Water level measurement is anomalous and not representative of site conditions

Abbreviations: TOC = top of casing; BTOC = below top of casing; ft = feet; ID = identification; NAVD 88 = North American Vertical Datum of 1988; NM = not measured (Well had not been installed and/or developed at time of measuring event)

Table 2.3.2-3: Values of Selected Groundwater Parameters at the Long Mott Generating Station Site

Hydrostratigraphic Unit	A Sand	C Sand	E Sand
Aquifer Type	Confined	Confined	Confined
Horizontal Hydraulic Gradient			
i_h(avg)[a] (ft./ft.)	0.0017	0.0005	0.0003
i_h(max)[a] (ft./ft.)	0.0042	0.0009	0.0008
Vertical Hydraulic Gradient[b]			
i_v(overall avg) (ft./ft.)	0.199	0.124	0.071
i_v(max avg) (ft./ft.)	-	-	-
Hydraulic Conductivity[c]			
Minimum Hydraulic Conductivity (ft./day)	0.18	0.59	0.05
Maximum Hydraulic Conductivity (ft./day)	42.32	51.93	320.1
Average Hydraulic Conductivity (ft./day)	8.28 (Hvorslev)	27.38 (Hvorslev)	11.82 (Hvorslev)
	2.66 (Bouwer-Rice)	17.51 (Bouwer-Rice)	26.13 (Bouwer-Rice)
Geometric Mean[d] (ft./day)	3.85 (Hvorslev)	20.15 (Hvorslev)	10.2 (Hvorslev)
	1.43 (Bouwer-Rice)	11.26 (Bouwer-Rice)	8.0 (Bouwer-Rice)
Specific Yield[e]			
Effective Porosity[f]	0.2	0.25	0.25
Transmissivity (ft.^{2}/day)	-	1011.8	594
Storativity (n)	-	1.52E-03	4.63E-05
Flow Velocity[g]			
Average Flow Velocity (Geometric mean) (ft./day)	0.03	0.03	0.01
Average Flow Velocity (Arithmetic mean) (ft./day)	0.07	0.04	0.05
Maximum Flow Velocity (Geometric mean) (ft./day)	0.08	0.05	0.03
Maximum Flow Velocity (Arithmetic mean) (ft./day)	0.18	0.08	0.13

Notes: Screen elevations are in ft NAVD 88 (North American Vertical Datum of 1988)

a) Represents 8-month average or maximum hydraulic gradient for each unit

b) I_v is determined by the vertical head differential between adjacent wells in the A and C Sand wells, A and E Sand wells, and C and E Sand wells

c) Selection of average of falling and rising head slug test results calculated by Hvorslev Method or selection of result from Bouwer-Rice Method for only those wells identified as having screens that are partially penetrating the confined unit

d) Geometric mean = geometric mean of the average value for the analytical method results per well

e) Specific yield values derived from sentinel (observation) wells S-1 through S-27

f) Effective porosity values were selected based on grain size distribution in each unit

g) The arithmetic and geometric mean of hydraulic conductivity values, computed from slug tests, for each unit were selected along with average and maximum horizontal hydraulic gradients to calculate flow velocities

Abbreviations: ft/ft. = feet per foot; ft/day = feet per day; ft^2/day = square feet per day; i_h = horizontal hydraulic gradient; i_v = vertical hydraulic gradient; i_h(avg) = average hydraulic gradient, typically calculated from highest to lowest contour interval across the site; i_h(max) = maximum hydraulic gradient, typically calculated in vicinity of the nuclear island; n = unitless value

Table 2.3.2-4: Historical Water Use Estimates (Includes Reuse) by Counties within the Region of Influence (2021)

County	Calhoun	Jackson	Victoria
Population	19,727	15,121	90,964
Municipal	2628	1643	14,492
Manufacturing	32,701	496	9412
Mining	0	0	4
Power	18	0	780
Irrigation	9460	53,924	8889
Livestock	267	626	857
Municipal Ground Water	544	1643	3772
Municipal Surface Water	2084	0	10,720
Municipal Reuse	0	0	0
MFG Ground Water	276	28	290
MFG Surface Water	30,624	468	9122
MFG Reuse	1801	0	0
Mining Ground Water	0	0	4
Mining Surface Water	0	0	0
Mining Reuse & Brackish	0	0	0
Power Ground Water	18	0	767
Power Surface Water	0	0	13
Power Reuse	0	0	0
Irrigation Ground Water	521	53,923	8881
Irrigation Surface Water	8939	1	8
Irrigation Reuse	0	0	0
Livestock Ground Water	187	407	514
Livestock Surface Water	80	219	343
Livestock Reuse	0	0	0

Source: Groundwater Estimates from TWDB, 2021

Notes: All volumes are in acre-feet unless otherwise noted. 1 Acre-Foot = 325,851 gallons

Table 2.3.2-5: Wells Within 6 Mi. Radius of the Long Mott Generating Station (Sheet 1 of 11)

Well Report Tracking Number/State Well Number	Well Owner	Latitude (DD)	Longitude (DD)	Well Type	Well Use	Depth (ft.)	Aquifer Listed
6250	Fritz Wilke	28.58306	-96.709723	New Well	Domestic	260	-
12464	John Smith	28.455	-96.702223	Replacement	Domestic	308	-
15452	Charles Crober	28.56361	-96.751112	New Well	Domestic	115	-
28747	John F. Smith	28.46278	-96.703334	New Well	Domestic	225	-
30324	Aaron Vasquez	28.48472	-96.763334	New Well	Domestic	180	-
30328	David Lundine	28.45111	-96.711945	New Well	Domestic	212	-
30337	E. O. Ruddick	28.54195	-96.761945	New Well	Domestic	165	-
31608	Joe Sterling	28.59139	-96.688056	New Well	Domestic	75	-
40609	Gable O'briant	28.55222	-96.7375	New Well	Domestic	98	-
43952	Travis Tatum	28.53	-96.718611	New Well	Domestic	72	-
43955	M.G. Simons	28.52111	-96.727222	New Well	Domestic	365	-
43959	Eddie Stribling	28.5075	-96.675	New Well	Domestic	265	-
44125	Charles Willoughby	28.60222	-96.719167	New Well	Domestic	247	-
45893	Doris Mills	28.56472	-96.779167	New Well	Domestic	170	-
46128	Doris Mills	28.56472	-96.779167	New Well	Domestic	170	-
64179	Jimmy Vasquez	28.48528	-96.763612	New Well	Domestic	180	-
65926	Kevin Mckamey	28.61694	-96.733611	New Well	Domestic	225	-
99538	Willie Wooldridge	28.46361	-96.741667	New Well	Domestic	90	-
104115	Calvin Hammet	28.56083	-96.755556	New Well	Domestic	90	-
106046	C & E Operating	28.48722	-96.724722	New Well	Domestic	320	-
106049	C & E Operating	28.53528	-96.675	New Well	Domestic	290	-
128946	Corey Wilke	28.58222	-96.710001	New Well	Domestic	117	-
134625	Stanley + Mary Matson	28.56694	-96.762223	New Well	Domestic	95	-
136049	Corey Wilke	28.58222	-96.710001	New Well	Domestic	208	-
154603	Devra Hunter	28.57	-96.762223	New Well	Domestic	80	-
171014	Bobby Townsend	28.48306	-96.849722	New Well	Domestic	195	-
186394	Ricky Whatley	28.47861	-96.775833	New Well	Domestic	190	-

Table 2.3.2-5: Wells Within 6 Mi. Radius of the Long Mott Generating Station (Continued) (Sheet 2 of 11)

Well Report Tracking Number/State Well Number	Well Owner	Latitude (DD)	Longitude (DD)	Well Type	Well Use	Depth (ft.)	Aquifer Listed
197201	Crystal Priest	28.52444	-96.717778	Replacement	Domestic	265	-
252253	Willam Hahn	28.54111	-96.706945	New Well	Domestic	258	-
252254	Ed Myers	28.57472	-96.717222	Replacement	Domestic	240	-
263759	Chuck Matson	28.55945	-96.719167	New Well	Domestic	255	-
264076	Chuck Mattson	28.55945	-96.719167	New Well	Domestic	255	-
326654	Gilbert Garza	28.59583	-96.735278	New Well	Domestic	86	-
349101	Mr. Evans	28.46583	-96.740278	New Well	Domestic	92	-
351514	Troy Brousard	28.56861	-96.717222	New Well	Domestic	252	-
351515	Laura Willoghby	28.59917	-96.735834	New Well	Domestic	215	-
366643	Chuck Mattson	28.55945	-96.718889	Replacement	Domestic	58	-
386558	Art Henkel	28.4925	-96.851389	New Well	Domestic	160	-
401932	Barney Geryk	28.58111	-96.678333	New Well	Domestic	247	-
415480	Belle Smith	28.55365	-96.749433	New Well	Domestic	88	-
415481	Belle Smith	28.54672	-96.760817	New Well	Domestic	103	-
422502	Maria Plascencia	28.58093	-96.70125	New Well	Domestic	230	-
465028	Jennifer Cabrera	28.54208	-96.772417	New Well	Domestic	93	-
466177	Robert Penland	28.57778	-96.7075	New Well	Domestic	56	-
467382	Steve De La Cruz	28.59723	-96.733833	New Well	Domestic	205	-
481847	Kavin Griffith	28.58378	-96.696394	New Well	Domestic	330	-
480605	Carlos Cabrera	28.5424	-96.77245	New Well	Domestic	97	-
499468	Walter White	28.55077	-96.817508	New Well	Domestic	202	-
499469	Tom & Sandra Crenshaw	28.575	-96.691667	New Well	Domestic	222	-
514885	Jenny Mcgrew	28.57406	-96.764861	Replacement	Domestic	84	-
519853	Clark Constructors, LLC	28.59328	-96.770167	New Well	Domestic	325	-
531072	Karena Mendez	28.54922	-96.76316	New Well	Domestic	72	-
535017	Iron Horse Acres, LLC	28.5825	-96.806889	New Well	Domestic	137	-
535019	Karen Henderson	28.5486	-96.7847	New Well	Domestic	165	-
540039	Geranimo O. Trevinio	28.59748	-96.734917	New Well	Domestic	210	-
555425	Jose Rodriguez	28.58889	-96.683889	New Well	Domestic	238	-

Table 2.3.2-5: Wells Within 6 Mi. Radius of the Long Mott Generating Station (Continued) (Sheet 3 of 11)

Well Report Tracking Number/State Well Number	Well Owner	Latitude (DD)	Longitude (DD)	Well Type	Well Use	Depth (ft.)	Aquifer Listed
560358	Kevin D. Haun	28.5275	-96.728333	New Well	Domestic	253	-
563074	James Brown	28.58994	-96.698031	New Well	Domestic	68	-
563079	Robert Penland	28.58077	-96.708614	New Well	Domestic	54	-
574626	William D. Wooldridge	28.45833	-96.759444	New Well	Domestic	208	-
574685	Knute L. Dietze 11	28.57389	-96.763056	New Well	Domestic	128	-
586700	Maricela Narvaes Rodriguez	28.46138	-96.741683	New Well	Domestic	210	-
593024	Clayton H. Boerm	28.59389	-96.691389	New Well	Domestic	238	-
598123	Colton P. Kveton	28.57639	-96.697222	New Well	Domestic	268	-
609598	Mallory P. Galloway	28.49255	-96.74468	New Well	Domestic	83	-
646937	Hose Huerta	28.44508	-96.72192	New Well	Domestic	205	-
126994	Ineos USA, LLC	28.52222	-96.786945	New Well	Environmental Soil Boring	45	-
126999	Ineos USA, LLC	28.52222	-96.786945	New Well	Environmental Soil Boring	50	-
127003	Ineos USA, LLC	28.52222	-96.786945	New Well	Environmental Soil Boring	35	-
127075	Ineos USA, LLC	28.52222	-96.786945	New Well	Environmental Soil Boring	40	-
127076	Ineos USA, LLC	28.52222	-96.786945	New Well	Environmental Soil Boring	45	-
127078	Ineos USA, LLC	28.52222	-96.786945	New Well	Environmental Soil Boring	45	-
127080	Ineos USA, LLC	28.52222	-96.786945	New Well	Environmental Soil Boring	45	-
145981	Ineos USA LLC	28.5725	-96.824444	New Well	Environmental Soil Boring	35	-
145986	Ineos USA LLC	28.5725	-96.824444	New Well	Environmental Soil Boring	35	-
145989	Ineos USA LLC	28.5725	-96.824444	New Well	Environmental Soil Boring	35	-
187218	Ineos Nitriles	28.55583	-96.858334	New Well	Environmental Soil Boring	43	-
412199	Texas Department of Transportation	28.49935	-96.838901	New Well	Environmental Soil Boring	15	-

Table 2.3.2-5: Wells Within 6 Mi. Radius of the Long Mott Generating Station (Continued) (Sheet 4 of 11)

Well Report Tracking Number/State Well Number	Well Owner	Latitude (DD)	Longitude (DD)	Well Type	Well Use	Depth (ft.)	Aquifer Listed
412200	Texas Department of Transportation	28.49935	-96.838901	New Well	Environmental Soil Boring	15	-
412204	Texas Department of Transportation	28.49935	-96.838901	New Well	Environmental Soil Boring	15	-
412205	Texas Department of Transportation	28.49935	-96.838901	New Well	Environmental Soil Boring	15	-
412207	Texas Department of Transportation	28.49935	-96.838901	New Well	Environmental Soil Boring	15	-
412208	Texas Department of Transportation	28.49935	-96.838901	New Well	Environmental Soil Boring	15	-
412211	Texas Department of Transportation	28.49935	-96.838901	New Well	Environmental Soil Boring	15	-
412213	Texas Department of Transportation	28.49935	-96.838901	New Well	Environmental Soil Boring	15	-
412216	Texas Department of Transportation	28.49935	-96.838901	New Well	Environmental Soil Boring	15	-
412349	Texas Department of Transportation	28.49935	-96.838901	New Well	Environmental Soil Boring	15	-
412678	Ineos Nitriles USA, LLC	28.57156	-96.83	New Well	Environmental Soil Boring	15	-
412679	Ineos Nitriles USA, LLC	28.57156	-96.83	New Well	Environmental Soil Boring	15	-
412680	Ineos Nitriles USA, LLC	28.57156	-96.83	New Well	Environmental Soil Boring	15	-
412681	Ineos Nitriles USA, LLC	28.57156	-96.83	New Well	Environmental Soil Boring	15	-
412686	Ineos Nitriles USA, LLC	28.57156	-96.83	New Well	Environmental Soil Boring	15	-
412702	Ineos Nitriles USA, LLC	28.57156	-96.83	New Well	Environmental Soil Boring	15	-
412705	Ineos Nitriles USA, LLC	28.57156	-96.83	New Well	Environmental Soil Boring	15	-
412706	Ineos Nitriles USA, LLC	28.57156	-96.83	New Well	Environmental Soil Boring	15	-
412708	Ineos Nitriles USA, LLC	28.57156	-96.83	New Well	Environmental Soil Boring	15	-
412709	Ineos Nitriles USA, LLC	28.57156	-96.83	New Well	Environmental Soil Boring	15	-
412789	Ineos Nitriles USA, LLC	28.57156	-96.83	New Well	Environmental Soil Boring	100	-

Table 2.3.2-5: Wells Within 6 Mi. Radius of the Long Mott Generating Station (Continued) (Sheet 5 of 11)

Well Report Tracking Number/State Well Number	Well Owner	Latitude (DD)	Longitude (DD)	Well Type	Well Use	Depth (ft.)	Aquifer Listed
412769	Ineos Nitriles USA, LLC	28.57156	-96.83	New Well	Environmental Soil Boring	40	-
412711	Ineos Nitriles USA, LLC	28.57156	-96.83	New Well	Environmental Soil Boring	25	-
412719	Ineos Nitriles USA, LLC	28.57156	-96.83	New Well	Environmental Soil Boring	25	-
412721	Ineos Nitriles USA, LLC	28.57156	-96.83	New Well	Environmental Soil Boring	25	-
412723	Ineos Nitriles USA, LLC	28.57156	-96.83	New Well	Environmental Soil Boring	5	-
412724	Ineos Nitriles USA, LLC	28.57156	-96.83	New Well	Environmental Soil Boring	20	-
412727	Ineos Nitriles USA, LLC	28.57156	-96.83	New Well	Environmental Soil Boring	20	-
412728	Ineos Nitriles USA, LLC	28.57156	-96.83	New Well	Environmental Soil Boring	20	-
412730	Ineos Nitriles USA, LLC	28.57156	-96.83	New Well	Environmental Soil Boring	20	-
412682	Ineos Nitriles USA, LLC	28.57156	-96.83	New Well	Environmental Soil Boring	15	-
412683	Ineos Nitriles USA, LLC	28.57156	-96.83	New Well	Environmental Soil Boring	15	-
412685	Ineos Nitriles USA, LLC	28.57156	-96.83	New Well	Environmental Soil Boring	15	-
412687	Ineos Nitriles USA, LLC	28.57156	-96.83	New Well	Environmental Soil Boring	15	-
412688	Ineos Nitriles USA, LLC	28.57156	-96.83	New Well	Environmental Soil Boring	15	-
412689	Ineos Nitriles USA, LLC	28.57156	-96.83	New Well	Environmental Soil Boring	15	-
412692	Ineos Nitriles USA, LLC	28.57156	-96.83	New Well	Environmental Soil Boring	15	-
412809	Ineos Nitriles USA, LLC	28.57156	-96.83	New Well	Environmental Soil Boring	15	-
412811	Ineos Nitriles USA, LLC	28.57156	-96.83	New Well	Environmental Soil Boring	15	-
412812	Ineos Nitriles USA, LLC	28.57156	-96.83	New Well	Environmental Soil Boring	15	-
412813	Ineos Nitriles USA, LLC	28.57156	-96.83	New Well	Environmental Soil Boring	15	-

Table 2.3.2-5: Wells Within 6 Mi. Radius of the Long Mott Generating Station (Continued) (Sheet 6 of 11)

Well Report Tracking Number/State Well Number	Well Owner	Latitude (DD)	Longitude (DD)	Well Type	Well Use	Depth (ft.)	Aquifer Listed
412814	Ineos Nitriles USA, LLC	28.57156	-96.83	New Well	Environmental Soil Boring	15	-
552629	Texas Department of Transportation	28.49934	-96.839426	New Well	Environmental Soil Boring	5	-
552652	Texas Department of Transportation	28.49934	-96.839426	New Well	Environmental Soil Boring	13	-
42141	C&E Operating	28.50528	-96.741389	New Well	Industrial	240	-
103768	C & E Operating	28.52472	-96.721111	New Well	Industrial	320	-
152355	Ridge Property Trust	28.49195	-96.764167	New Well	Industrial	300	-
171007	C & E Operating	28.49167	-96.735278	New Well	Industrial	260	-
171024	C & E Operating	28.55222	-96.708889	New Well	Industrial	280	-
171146	C & E Operating	28.52056	-96.726111	New Well	Industrial	320	-
26070	Joe D. Brett	28.55389	-96.733889	New Well	Irrigation	420	-
264087	Fred Arnald	28.57472	-96.716944	New Well	Irrigation	275	-
510239	Hatchbend Country Club	28.58952	-96.702533	New Well	Irrigation	221	-
510240	Hatchbend Country Club	28.58952	-96.702733	New Well	Irrigation	221	-
117236	Seadrift Coke L.P.	28.51472	-96.795	New Well	Monitor	40	-
117237	Seadrift Coke L.P.	28.51472	-96.793334	New Well	Monitor	35	-
117239	Seadrift Coke L.P.	28.51389	-96.799445	New Well	Monitor	40	-
117247	Seadrift Coke L.P.	28.51111	-96.798889	New Well	Monitor	40	-
117248	Seadrift Coke L.P.	28.51111	-96.796111	New Well	Monitor	40	-
117251	Seadrift Coke L.P.	28.51056	-96.794445	New Well	Monitor	40	-
117259	Seadrift Coke L.P.	28.51306	-96.796667	New Well	Monitor	45	-
117267	Seadrift Coke L.P.	28.5125	-96.795834	New Well	Monitor	45	-
117276	Seadrift Coke L.P.	28.5125	-96.795834	New Well	Monitor	40	-
125772	Ineos Usa, Inc.	28.52222	-96.786945	New Well	Monitor	60	-
125775	Ineos Usa, Inc.	28.52222	-96.786945	New Well	Monitor	60	-
125777	Ineos Usa, Inc.	28.52222	-96.786945	New Well	Monitor	60	-
125780	Ineos Usa, Inc.	28.52222	-96.786945	New Well	Monitor	57.5	-
126965	Ineos USA, LLC	28.52222	-96.786945	New Well	Monitor	30	-

Table 2.3.2-5: Wells Within 6 Mi. Radius of the Long Mott Generating Station (Continued) (Sheet 7 of 11)

Well Report Tracking Number/State Well Number	Well Owner	Latitude (DD)	Longitude (DD)	Well Type	Well Use	Depth (ft.)	Aquifer Listed
126968	Ineos USA, LLC	28.52222	-96.786945	New Well	Monitor	40	-
126975	Ineos USA, LLC	28.52222	-96.786945	New Well	Monitor	30	-
126979	Ineos USA, LLC	28.52222	-96.786945	New Well	Monitor	25	-
126991	Ineos USA, LLC	28.52222	-96.786945	New Well	Monitor	35	-
126992	Ineos USA, LLC	28.52222	-96.786945	New Well	Monitor	40	-
126993	Ineos USA, LLC	28.52222	-96.786945	New Well	Monitor	25	-
136176	Seadrift Coke L.P.	28.51917	-96.786389	New Well	Monitor	56	-
136180	Seadrift Coke L.P.	28.51917	-96.786389	New Well	Monitor	55	-
136185	Seadrift Coke L.P.	28.51917	-96.786389	New Well	Monitor	15	-
136320	Seadrift Coke, L.P.	28.51056	-96.797222	New Well	Monitor	51.5	-
136327	Seadrift Coke, L.P.	28.51056	-96.797222	New Well	Monitor	60	-
136329	Seadrift Coke, L.P.	28.50833	-96.7975	New Well	Monitor	15	-
136331	Seadrift Coke, L.P.	28.50833	-96.7975	New Well	Monitor	50	-
136332	Seadrift Coke, L.P.	28.51111	-96.795278	New Well	Monitor	50	-
136334	Seadrift Coke, L.P.	28.5125	-96.795278	New Well	Monitor	62	-
136337	Seadrift Coke, L.P.	28.5125	-96.795278	New Well	Monitor	67	-
136338	Seadrift Coke, L.P.	28.51361	-96.796111	New Well	Monitor	57	-
136363	Seadrift Coke, L.P.	28.50833	-96.7975	New Well	Monitor	75	-
136373	Seadrift Coke, L.P.	28.50833	-96.7975	New Well	Monitor	57.5	-
136376	Seadrift Coke, L.P.	28.50833	-96.7975	New Well	Monitor	54	-
136380	Seadrift Coke, L.P.	28.50833	-96.7975	New Well	Monitor	45	-
136382	Seadrift Coke, L.P.	28.50833	-96.7975	New Well	Monitor	108	-
136384	Seadrift Coke, L.P.	28.50833	-96.7975	New Well	Monitor	50	-
145994	Ineos USA LLC	28.5725	-96.824444	New Well	Monitor	40	-
145997	Ineos USA LLC	28.5725	-96.824444	New Well	Monitor	45	-
148776	Ineos USA LLC	28.55917	-96.854445	New Well	Monitor	35	-
173611	Seadrift Coke, L.P.	28.51917	-96.786389	New Well	Monitor	35	-
187201	Ineos Nitriles	28.55583	-96.858334	New Well	Monitor	35	-
187208	Ineos Nitriles	28.55583	-96.858334	New Well	Monitor	46	-

Table 2.3.2-5: Wells Within 6 Mi. Radius of the Long Mott Generating Station (Continued) (Sheet 8 of 11)

Well Report Tracking Number/State Well Number	Well Owner	Latitude (DD)	Longitude (DD)	Well Type	Well Use	Depth (ft.)	Aquifer Listed
187212	Ineos Nitriles	28.55583	-96.858334	New Well	Monitor	39	-
187216	Ineos Nitriles	28.55583	-96.858334	New Well	Monitor	38	-
253316	Seadrift Coke, L.P.	28.51333	-96.791667	New Well	Monitor	50	-
253318	Seadrift Coke, L.P.	28.51333	-96.791667	New Well	Monitor	55	-
253321	Seadrift Coke, L.P.	28.51333	-96.791667	New Well	Monitor	57	-
253323	Seadrift Coke, L.P.	28.51333	-96.791667	New Well	Monitor	60	-
294250	Seadrift Coke	28.53583	-96.807223	New Well	Monitor	15	-
294254	Seadrift Coke	28.51972	-96.798334	New Well	Monitor	47	-
294257	Seadrift Coke	28.51222	-96.794722	New Well	Monitor	50	-
303029	Seadrift Coke, L.P.	28.51917	-96.786389	New Well	Monitor	45	-
303036	Seadrift Coke, L.P.	28.51917	-96.786389	New Well	Monitor	49	-
303041	Seadrift Coke, L.P.	28.51917	-96.786389	New Well	Monitor	52	-
303044	Seadrift Coke, L.P.	28.51917	-96.786389	New Well	Monitor	65	-
343226	Union Carbide Corporation,	28.51667	-96.7675	New Well	Monitor	20	-
389679	Union Carbide Corporation	28.51056	-96.769444	Replacement	Monitor	20	-
412737	Ineos Nitriles USA, LLC	28.57156	-96.83	New Well	Monitor	22.5	-
412779	Ineos Nitriles USA, LLC	28.57156	-96.83	New Well	Monitor	65	-
412783	Ineos Nitriles USA, LLC	28.57156	-96.83	New Well	Monitor	60	-
412787	Ineos Nitriles USA, LLC	28.57156	-96.83	New Well	Monitor	70	-
412805	Ineos Nitriles USA, LLC	28.57156	-96.83	New Well	Monitor	77.5	-
478359	Dow	28.51214	-96.762344	Replacement	Monitor	35	-
478362	Dow	28.51457	-96.763239	Replacement	Monitor	25	-
552641	Texas Department of Transportation	28.49934	-96.839426	New Well	Monitor	11	-
567166	Ineos Nitriles USA, LLC	28.56853	-96.836681	New Well	Monitor	45	-
567167	Ineos Nitriles USA, LLC	28.57486	-96.831722	New Well	Monitor	50	-
630567	Ineos Nitriles USA, LLC	28.55941	-96.857525	New Well	Monitor	62	-
630570	Ineos Nitriles USA, LLC	28.55941	-96.857525	New Well	Monitor	65	-
630571	Ineos Nitriles USA, LLC	28.55941	-96.857525	New Well	Monitor	65	-

Table 2.3.2-5: Wells Within 6 Mi. Radius of the Long Mott Generating Station (Continued)
(Sheet 9 of 11)

Well Report Tracking Number/State Well Number	Well Owner	Latitude (DD)	Longitude (DD)	Well Type	Well Use	Depth (ft.)	Aquifer Listed
630573	Ineos Nitriles USA, LLC	28.55941	-96.857525	New Well	Monitor	45	-
612886	Harold L. Evans	28.49592	-96.71747	New Well	Other	70	-
93560	Bob Mccarn	28.46528	-96.697778	New Well	Rig Supply	220	-
123249	C & E Operating	28.47139	-96.691667	New Well	Rig Supply	300	-
251970	C&E Operating	28.51167	-96.703612	New Well	Rig Supply	300	-
403001	Edde Drilling	28.6	-96.750001	New Well	Rig Supply	200	-
462821	B & L Exploration	28.5835	-96.7501	New Well	Rig Supply	200	-
492376	B & L Exploration LLC	28.61314	-96.739778	New Well	Rig Supply	200	-
70497	William H. Hahn	28.52583	-96.737222	New Well	Stock	70	-
71746	David Hahn	28.52917	-96.719722	New Well	Stock	95	-
158335	Joe D. Brett	28.56278	-96.675278	New Well	Stock	120	-
254750	David Hahn	28.52056	-96.741945	Replacement	Stock	83	-
270820	Willie Wooldridge	28.45389	-96.755556	New Well	Stock	210	-
273767	Richard Williams	28.5525	-96.736945	New Well	Stock	80	-
274965	Ray Mccaskill	28.56917	-96.784167	New Well	Stock	80	-
274966	Ray Mccaskill	28.59028	-96.689722	New Well	Stock	230	-
277210	Shawkat A. Khan	28.55111	-96.751945	New Well	Stock	82	-
292181	Troy Broussard	28.56972	-96.717222	New Well	Stock	233	-
310005	Joey + Mallery Gallaway	28.48889	-96.741111	New Well	Stock	98	-
414609	Mike Hahn	28.51672	-96.683533	New Well	Stock	272	-
510507	Edward P. Powers	28.58375	-96.70205	New Well	Stock	342	-
522633	Albert Malaer	28.57111	-96.731667	New Well	Stock	140	-
531147	Tom & Sandy Crenshaw	28.57775	-96.674167	New Well	Stock	260	-
606897	John Daniel	28.55827	-96.70731	New Well	Stock	80	-
609567	Edward Powers	28.58306	-96.700833	New Well	Stock	63	-
646938	Honath Family Trust	28.49198	-96.736071	New Well	Stock	80	-
117231	Seadrift Coke L.P.	28.51417	-96.795278	New Well	Test Well	40	-
117277	Seadrift Coke L.P.	28.5125	-96.795834	New Well	Test Well	40	-
117281	Seadrift Coke L.P.	28.5125	-96.795834	New Well	Test Well	13	-

Table 2.3.2-5: Wells Within 6 Mi. Radius of the Long Mott Generating Station (Continued) (Sheet 10 of 11)

Well Report Tracking Number/State Well Number	Well Owner	Latitude (DD)	Longitude (DD)	Well Type	Well Use	Depth (ft.)	Aquifer Listed
117284	Seadrift Coke L.P.	28.5125	-96.795834	New Well	Test Well	13	-
117286	Seadrift Coke L.P.	28.5125	-96.795834	New Well	Test Well	13	-
117287	Seadrift Coke L.P.	28.5125	-96.795834	New Well	Test Well	10	-
117288	Seadrift Coke L.P.	28.5125	-96.795834	New Well	Test Well	15	-
802690	J. C. Williams	28.53861	-96.760278	Withdrawal of Water	Domestic	887	112BMLS - Beaumont Clay and Lissie Formation
8034302	Howard L. Shafer	28.46389	-96.755556	Withdrawal of Water	Domestic	285	112GLFC - Gulf Coast Aquifer
8026502	Charles Krause, Jr.	28.55306	-96.795834	Withdrawal of Water	Domestic	80	112GLFC - Gulf Coast Aquifer
8035401	Isabella Walker	28.44333	-96.723055	Withdrawal of Water	Domestic	59	112BMNT - Beaumont Clay
8026602	Stanley Matson	28.57667	-96.765556	Withdrawal of Water	Domestic	75	112BMNT - Beaumont Clay
8027401	Edward L. Arnold	28.55472	-96.708889	Withdrawal of Water	Domestic	110	112GLFC - Gulf Coast Aquifer
8027701	Stofer-Eiband	28.51056	-96.735556	Withdrawal of Water	Domestic	62	112BMNT - Beaumont Clay
8034303	Union Carbide Co.	28.49861	-96.774167	Withdrawal of Water	Domestic	90	112BMNT - Beaumont Clay
8026604	Michael Hahn	28.57048	-96.752553	Withdrawal of Water	Domestic		-
8026903	O. B. Cassell	28.5225	-96.784167	Withdrawal of Water	Domestic	899	112BMLS - Beaumont Clay and Lissie Formation
8027802	Quintana Petroleum Co.	28.52806	-96.692778	Withdrawal of Water	Industrial	240	112BMNT - Beaumont Clay
8026603	Otto Marek	28.55806	-96.778055	Withdrawal of Water	Irrigation	269	112BMNT - Beaumont Clay
8026901	O.B. Cassell	28.52083	-96.780555	Withdrawal of Water	Irrigation	295	112BMNT - Beaumont Clay
8034601	Margaret Roemer	28.44972	-96.762778	Withdrawal of Water	Stock	90	112BMNT - Beaumont Clay
8026802	Clyde Bauer	28.52083	-96.798889	Withdrawal of Water	Stock	230	112BMNT - Beaumont Clay
8026804	Richard Lucas	28.50306	-96.812778	Withdrawal of Water	Stock	113	112BMNT - Beaumont Clay

Table 2.3.2-5: Wells Within 6 Mi. Radius of the Long Mott Generating Station (Continued) (Sheet 11 of 11)

Well Report Tracking Number/State Well Number	Well Owner	Latitude (DD)	Longitude (DD)	Well Type	Well Use	Depth (ft.)	Aquifer Listed
8034603	H. V. Heyland	28.44056	-96.753612	Withdrawal of Water	Stock	68	112BMNT - Beaumont Clay
8026801	Clyde Bauer	28.52667	-96.804445	Withdrawal of Water	Stock	90	112BMNT - Beaumont Clay
8027801	George Duncan	28.51195	-96.683055	Withdrawal of Water	Stock	240	112BMNT - Beaumont Clay
8026803	Clyde Bauer	28.51639	-96.804723	Withdrawal of Water	Stock	105	112BMNT - Beaumont Clay
8026501	R.E. Whatley	28.54907	-96.802317	Withdrawal of Water	Unused	267	112BMNT - Beaumont Clay
8026601	W.H. Crober	28.55611	-96.768055	Withdrawal of Water	Unused	234	112BMNT - Beaumont Clay
8034602	H. V. Heyland	28.44611	-96.758056	Withdrawal of Water	Unused	240	112BMNT - Beaumont Clay
8027402	J. A. Martin	28.58278	-96.7225	Withdrawal of Water	Unused	48	112BMNT - Beaumont Clay
8034301	Lester Shafer	28.46361	-96.755556	Withdrawal of Water	Unused	281	112BMNT - Beaumont Clay
8027501	A.G. Shafer	28.58083	-96.695834	Withdrawal of Water	Unused	258	112BMNT - Beaumont Clay
8027103	Johnson Spring	28.61667	-96.744722	Spring	-	-	-
8026701	Cr Gwtd	28.52111	-96.854445	Oil or Gas	-	-	-

Source: TWDB Groundwater Data Viewer, 2024

Abbreviations: DD = Decimal degrees; ft = feet; LLC = Limited Liability Company; LP = Limited Partnership, Inc. = Incorporated, Co = Company

Table 2.3.2-6: Public Water Supply Wells Within 6 Miles of the Long Mott Generating Station

TCEQ PWS No.	State Well No.	System Name	Latitude	Longitude	Drill Date	Well Depth (ft.)	Aquifer
TX-0290076	466177	SWEETWATER RV CAMPGROUNDS	28.578849	-96.707571	10/10/2017	56	Chicot

Source: TCEQ Drinking Water Watch, 2024

Abbreviations: TCEQ = Texas Commission on Environmental Quality; PWS = public water system; No. = Number; ft = feet, RV = recreational vehicle

Table 2.3.2-7: Maximum Groundwater Analytical Results for "A" Sands Wells (Sheet 1 of 3)

Analytical Method	Chemical Name	Fraction	Units	Q1 Dec. 2023	Q2 Feb. 2024	Q3 Apr. 2024	Q4 Aug. 2024	TX Water Quality Standard[(a)]	EPA MCLs[(b)]
A2320B	Alkalinity, Bicarbonate (as $CaCO_3$)	-	mg/L	382	371	350	370	-	-
A2320B	Alkalinity, Total (as $CaCO_3$)	-	mg/L	382	399	350	370	-	-
A2540C	Total Dissolved Solids (TDS)	-	mg/L	8450	7880	9930	7780	-	-
A2540D	Total Suspended Solids (TSS)	-	mg/L	9	5.5	8.7	0	-	-
CALC	Nitrogen, Total Organic	-	mg/L	0.724	0.744	0.536	0.749	-	-
Colilert-18	E. coli MPN	-	mpn/100 ml	0	0	0	0	-	-
Colisure	Total Coliform	-	mpn/100 ml	201	0	2420	24.3	-	5%[c]
E200.7	Aluminum	Total	µg/L	136	114	104	0	24000	-
E200.7	Barium	Total	µg/L	33.9	27.9	31.7	33.2	2000	2000
E200.7	Beryllium	Total	µg/L	0	0	0	0	4	4
E200.7	Boron	Total	µg/L	4420	3940	4200	4140	4900	-
E200.7	Calcium	Total	µg/L	630,000	700,000	700,000	705,000	-	100
E200.7	Chromium	Total	µg/L	11.1	0	41.7	10.4	100	100
E200.7	Cobalt	Total	µg/L	2.46	1.94	3.12	11.4	240	-
E200.7	Copper	Total	µg/L	7.35	12.3	10.1	0	1300	1300
E200.7	Iron	Total	µg/L	115	116	116	338	300[d]	-
E200.7	Magnesium	Total	µg/L	253,000	266,000	275,000	283,000	-	-
E200.7	Manganese	Total	µg/L	223	549	238	486	1100	-
E200.7	Nickel	Total	µg/L	9.88	8.72	14.3	5.56	490	-
E200.7	Potassium	Total	µg/L	7790	7890	11,200	11,500	-	-
E200.7	Silver	Total	µg/L	16.9	0	6.21	0	120	-
E200.7	SiO_2 Silica (Quartz)	Total	µg/L	39,400	36,200	37,500	39,200	-	-
E200.7	Sodium	Total	µg/L	1,390,000	1,450,000	1,410,000	1,400,000	-	-

Table 2.3.2-7: Maximum Groundwater Analytical Results for "A" Sands Wells (Continued) (Sheet 2 of 3)

Analytical Method	Chemical Name	Fraction	Units	Q1 Dec. 2023	Q2 Feb. 2024	Q3 Apr. 2024	Q4 Aug. 2024	TX Water Quality Standard[(a)]	EPA MCLs[(b)]
E200.7	Vanadium	Total	µg/L	7.91	6.49	5.27	0	44	-
E200.7	Zinc	Total	µg/L	34.4	21	17.7	50.9	7300	-
E200.8	Antimony	Total	µg/L	2.36	0	1.7	1.7	6	6
E200.8	Arsenic	Total	µg/L	1.53	2.14	3.02	4.02	10	10
E200.8	Cadmium	Total	µg/L	0	0	0	0	5	5
E200.8	Lead	Total	µg/L	0.369	0	0	0	15	15
E200.8	Selenium	Total	µg/L	7.77	4.36	3.38	8.84	50	50
E200.8	Thallium	Total	µg/L	0	0	0	0	2	2
E200.8	Uranium	Total	µg/L	71	70.5	77.7	76.9	30	30
E245.1	Mercury	Total	µg/L	0.097	0.119	0.113	0.076	2	2
E300	Chloride	-	mg/L	1680	1710	1600	1860	250[d]	-
E300	Fluoride	-	mg/L	1.83	1.14	1.88	1.11	4	4
E300	Nitrogen, Nitrate	-	mg/L	0.447	0.293	0.738	0.441	10	10
E300	Nitrogen, Nitrite	-	mg/L	0	0	0	0.189	1	1
E300	Sulfate	-	mg/L	2730	2680	2760	2840	250[d]	-
E350.1	Ammonia	-	mg/L	0.23	0	0	0.083	-	-
E351.2	Total Kjeldahl Nitrogen	Total	mg/L	0.724	0.744	0.536	0.749	-	-
E365.1	Phosphate as P, Ortho	-	mg/L	0.0197	0.03	0.228	0.0261	-	-
E365.1	Phosphorus, Total as P	Total	mg/L	0.038	0.036	0.039	0.478	-	-
E900	Alpha, Gross	-	pci/L	87.3	59.4	68.7	76.7	-	15
E900	Beta, Gross	-	pci/L	32.2	27.8	30	9.09	-	4 mrem/yr
Field Measure	Dissolved Oxygen	-	mg/L	5.29	8.44	5.14	76	-	-
Field Measure	Oxidation Reduction Potential	-	mV	548	555	542	136	-	-
Field Measure	pH, Field	-	pH units	7.09	7.3	7.27	7.46	-	-
Field Measure	Specific Conductance	-	ms/cm	9.22	9.46	9.11	5.76	-	-

Table 2.3.2-7: Maximum Groundwater Analytical Results for "A" Sands Wells (Continued) (Sheet 3 of 3)

Analytical Method	Chemical Name	Fraction	Units	Q1 Dec. 2023	Q2 Feb. 2024	Q3 Apr. 2024	Q4 Aug. 2024	TX Water Quality Standard[(a)]	EPA MCLs[(b)]
Field Measure	Temperature	-	deg C	23.93	23.16	27.3	34.54	-	-
Field Measure	Turbidity	-	NTU	11.2	18.2	3	11.9	-	-
HACH 8000	Chemical Oxygen Demand	-	mg/L	47	45	61	76	-	-
OIA1677	Cyanide, Free	-	µg/L	199	22.5	118	136	200	200
SM10200H	Chlorophyll-a	-	mg/m^3	1.31	NA	NA	NA	-	-
SM10200H	Chlorophyll-a, corrected for Pheophytin	-	mg/m^3	0.89	NA	NA	NA	-	-
SM2340B	Hardness, Total as $CaCO_3$	Total	mg/L	2610	2840	2830	2930	-	-
SM4500-CO2 D	Carbon dioxide	-	mg/L	384	431	355	473	-	-
SM5210B	Biochemical Oxygen Demand	-	mg/L	5.29	8.44	5.14	0.83	-	-

Sources:

a) TCEQ, 2023

b) Source: EPA, 2007

d) Source: TCEQ, 2007

Notes:

a) Values include general use, those values protective of human health, and those protective of aquatic life, whichever is most conservative

c) For a system that collects at least 40 samples per month, if no more than 5.0 percent of the samples collected during a month are total coliform-positive, the system is in compliance with the MCL for total coliforms. For a system that collects fewer than 40 samples per month, if no more than one sample collected during a month is total coliform-positive, the system is in compliance with the MCL for total coliforms.

d) Values are Secondary MCLs. These compounds are not necessarily of concern from a human health standpoint, therefore calculation of human health-based values is not required. However, aesthetics and ecological criteria would still apply. See table entitled "Compounds for which Calculation of a Human Health PCL is Not Required" available on the TCEQ website at http://www.tceq.state.tx.us/remediation/trrp/trrp.html.

Abbreviations: Q# = quarter during year; deg C = degrees Celsius; mg/l = milligrams per liter; mg/m^3 = milligrams per cubic meter; mpn/100 ml = most probable number per 100 milliliters; mV = millivolts; NA = Not Analyzed; NTU = nephelometric turbidity unit; pci/l = picocuries per liter; TX = Texas; µg/l = micrograms per liter; ms/cm = milliSiemens per centimeter; EPA MCL = U.S. Environmental Protection Agency Maximum Concentration Level

Table 2.3.2-8: Maximum Groundwater Analytical Results for "C" Sands Wells (Sheet 1 of 3)

Analytical Method	Chemical Name	Fraction	Units	Q1 Dec. 2023	Q2 Feb. 2024	Q3 Apr. 2024	Q4 Aug. 2024	TX Water Quality Standard[a]	EPA MCLs[b]
A2320B	Alkalinity, Bicarbonate (as $CaCO_3$)	-	mg/L	361	385	331	351	-	-
A2320B	Alkalinity, Total (as $CaCO_3$)	-	mg/L	361	385	331	351	-	-
A2540C	Total Dissolved Solids (TDS)	-	mg/L	1520	1530	1620	1720	-	-
A2540D	Total Suspended Solids (TSS)	-	mg/L	22.6	31.4	10.9	6.5	-	-
CALC	Nitrogen, Total Organic	-	mg/L	0.634	0.432	0.554	0.18	-	-
Colilert-18	E. coli MPN	-	mpn/100 ml	0	0	0	0	-	-
Colisure	Total Coliform	-	mpn/100 ml	41	0	2420	0	-	5%[c]
E200.7	Aluminum	Total	µg/L	335	349	67.7	0	24,000	-
E200.7	Barium	Total	µg/L	177	108	100	92.2	2000	2000
E200.7	Beryllium	Total	µg/L	0	0	0	0	4	4
E200.7	Boron	Total	µg/L	563	549	560	580	4900	-
E200.7	Calcium	Total	µg/L	168,000	192,000	180,000	183,000	-	100
E200.7	Chromium	Total	µg/L	0	0	0	0	100	100
E200.7	Cobalt	Total	µg/L	1.62	0	1.75	4.29	240	-
E200.7	Copper	Total	µg/L	0	0	0	0	1300	1300
E200.7	Iron	Total	µg/L	5260	6290	3910	3010	300[d]	-
E200.7	Magnesium	Total	µg/L	52,400	49,800	51,900	52,600	-	-
E200.7	Manganese	Total	µg/L	689	351	303	281	1100	-
E200.7	Nickel	Total	µg/L	2.34	2.13	0	0	490	-
E200.7	Potassium	Total	µg/L	9210	8250	8290	8320	-	-
E200.7	Silver	Total	µg/L	7.74	0	7.22	0	120	-
E200.7	SiO_2 Silica (Quartz)	Total	µg/L	32,700	35,700	33,600	34,500	-	-
E200.7	Sodium	Total	µg/L	300,000	309,000	273,000	281,000	-	-

Table 2.3.2-8: Maximum Groundwater Analytical Results for “C” Sands Wells (Continued) (Sheet 2 of 3)

Analytical Method	Chemical Name	Fraction	Units	Q1 Dec. 2023	Q2 Feb. 2024	Q3 Apr. 2024	Q4 Aug. 2024	TX Water Quality Standard[(a)]	EPA MCLs[(b)]
E200.7	Vanadium	Total	µg/L	0	0	0	0	44	-
E200.7	Zinc	Total	µg/L	68.4	37.2	0	31.8	7300	-
E200.8	Antimony	Total	µg/L	2.43	1.81	0	1.27	6	6
E200.8	Arsenic	Total	µg/L	8.21	19.2	14.9	6.77	10	10
E200.8	Cadmium	Total	µg/L	0	0	0	0	5	5
E200.8	Lead	Total	µg/L	0.258	0.298	0	0	15	15
E200.8	Selenium	Total	µg/L	0.912	1.17	1.37	6.05	50	50
E200.8	Thallium	Total	µg/L	0	0	0	0	2	2
E200.8	Uranium	Total	µg/L	8.31	14.6	14.6	25.2	30	30
E245.1	Mercury	Total	µg/L	0.055	0.056	0	0.067	2	2
E300	Chloride	–	mg/L	419	419	436	421	250[d]	-
E300	Fluoride	–	mg/L	0.441	0.316	0.381	0.258	4	4
E300	Nitrogen, Nitrate	–	mg/L	0.222	0.109	0.0986	0.109	10	10
E300	Nitrogen, Nitrite	–	mg/L	0.414	0	0	2.85	1	1
E300	Sulfate	–	mg/L	296	278	239	247	250[d]	-
E350.1	Ammonia	–	mg/L	0.426	0.531	0.611	4.24	-	-
E351.2	Total Kjeldahl Nitrogen	Total	mg/L	1.06	0.775	0.941	0.815	-	-
E365.1	Phosphate as P, Ortho	–	mg/L	0.0205	0.0638	0.0371	0.0462	-	-
E365.1	Phosphorus, Total as P	Total	mg/L	0.0513	0.076	0.067	0.229	-	-
E900	Alpha, Gross	–	pci/L	15.8	15.1	14.1	15.9	-	15
E900	Beta, Gross	–	pci/L	19.6	13.8	10.1	7.14	-	4 mrem/yr
Field Measure	Dissolved Oxygen	–	mg/L	1.23	0.79	1.42	0.76	-	-
Field Measure	Oxidation Reduction Potential	–	Mv	-81	-121	-119	-110	-	-
Field Measure	pH, Field	–	pH units	7.23	7.23	7.03	7.68	-	-
Field Measure	Specific Conductance	–	ms/cm	2.28	2.43	2.37	1.76	-	-

Table 2.3.2-8: Maximum Groundwater Analytical Results for "C" Sands Wells (Continued) (Sheet 3 of 3)

Analytical Method	Chemical Name	Fraction	Units	Q1 Dec. 2023	Q2 Feb. 2024	Q3 Apr. 2024	Q4 Aug. 2024	TX Water Quality Standard[(a)]	EPA MCLs[(b)]
Field Measure	Temperature	–	deg C	23.28	25.51	26.55	32.38	-	-
Field Measure	Turbidity	-	NTU	28.9	59.1	4.6	4.1	-	-
HACH 8000	Chemical Oxygen Demand	-	mg/l	17	14	63	9	-	-
OIA1677	Cyanide, Free	-	µg/L	6.04	15.6	103	0	200	200
SM10200H	Chlorophyll-a	-	mg/m^3	0.972	NA	NA	NA	-	-
SM10200H	Chlorophyll-a, corrected for Pheophytin	-	mg/m^3	0.89	NA	NA	NA	-	-
SM2340B	Hardness, Total as $CaCO_3$	Total	mg/L	592	682	659	674	-	-
SM4500-CO2 D	Carbon dioxide	-	mg/L	336	369	327	391	-	-
SM5210B	Biochemical Oxygen Demand	-	mg/L	0	34	0	0	-	-

Sources:

a) TCEQ, 2023

b) Source: EPA, 2007

d) Source: TCEQ, 2007

Notes:

a) Values include general use, those values protective of human health, and those protective of aquatic life, whichever is most conservative.

c) For a system that collects at least 40 samples per month, if no more than 5.0 percent of the samples collected during a month are total coliform-positive, the system is in compliance with the MCL for total coliforms. For a system that collects fewer than 40 samples per month, if no more than one sample collected during a month is total coliform-positive, the system is in compliance with the MCL for total coliforms.

d) Values are Secondary MCLs. These compounds are not necessarily of concern from a human health standpoint, therefore calculation of human health-based values is not required. However, aesthetics and ecological criteria would still apply. See table entitled "Compounds for which Calculation of a Human Health PCL is Not Required" available on the TCEQ website at http://www.tceq.state.tx.us/remediation/trrp/trrp.html.

Abbreviations: Q# - Quarter during year; deg C = degrees Celsius; mg/l = milligrams per liter; mg/m^3 = milligrams per cubic meter; mpn/100 ml = most probable number per 100 milliliters; mV = millivolts; NA = Not Analyzed; NTU = nephelometric turbidity unit; pci/l = picocuries per liter; TX = Texas; µg/l = micrograms per liter; ms/cm = milliSiemens per centimeter; EPA MCL = U.S. Environmental Protection Agency Maximum Concentration Level; mrem/yr = millirem per year

Table 2.3.2-9: Maximum Groundwater Analytical Results for "E" Sands Wells (Sheet 1 of 3)

Analytical Method	Chemical Name	Fraction	Units	Q1 Dec. 2023	Q2 Feb. 2024	Q3 Apr. 2024	Q4 Aug. 2024	TX Water Quality Standard[(a)]	EPA MCLs[(b)]
A2320B	Alkalinity, Bicarbonate (as $CaCO_3$)	-	mg/L	314	367	318	311	-	-
A2320B	Alkalinity, Total (as $CaCO_3$)	-	mg/L	314	367	375	391	-	-
A2540C	Total Dissolved Solids (TDS)	-	mg/L	1420	1390	1900	2070	-	-
A2540D	Total Suspended Solids (TSS)	-	mg/L	470	56	43	8	-	-
CALC	Nitrogen, Total Organic	-	mg/L	2.32	1.12	0.975	0.323	-	-
Colilert-18	E. coli MPN	-	mpn/100 ml	0	0	0	0	-	-
Colisure	Total Coliform	-	mpn/100 ml	201	0	2420	79.8	-	5%[c]
E200.7	Aluminum	Total	µg/L	436	641	62.3	0	24,000	-
E200.7	Barium	Total	µg/L	199	259	354	503	2000	2000
E200.7	Beryllium	Total	µg/L	0	0	4.54	0	4	4
E200.7	Boron	Total	µg/L	462	485	480	496	4900	-
E200.7	Calcium	Total	µg/L	135,000	126,000	132,000	127,000	–	100
E200.7	Chromium	Total	µg/L	0	0	57.4	8.15	100	100
E200.7	Cobalt	Total	µg/L	0	4.81	8.95	3.37	240	-
E200.7	Copper	Total	µg/L	0	0	9.31	0	1300	1300
E200.7	Iron	Total	µg/L	2710	3150	3820	4070	300[d]	-
E200.7	Magnesium	Total	µg/L	36,500	35,500	40,300	37,200	-	-
E200.7	Manganese	Total	µg/L	234	887	597	432	1100	-
E200.7	Nickel	Total	µg/L	3.92	2.63	10.8	12.6	490	-
E200.7	Potassium	Total	µg/L	6900	6060	24000	21700	-	-
E200.7	Silver	Total	µg/L	5.91	0	0	0	120	-
E200.7	SiO_2 Silica (Quartz)	Total	µg/L	24,000	26,800	28,700	26,500	-	-
E200.7	Sodium	Total	µg/L	341,000	460,000	324,000	318,000	-	-

Table 2.3.2-9: Maximum Groundwater Analytical Results for "E" Sands Wells (Continued) (Sheet 2 of 3)

Analytical Method	Chemical Name	Fraction	Units	Q1 Dec. 2023	Q2 Feb. 2024	Q3 Apr. 2024	Q4 Aug. 2024	TX Water Quality Standard[(a)]	EPA MCLs[(b)]
E200.7	Vanadium	Total	µg/L	0	0	4.7	0	44	-
E200.7	Zinc	Total	µg/L	171	34.4	0	25.6	7300	-
E200.8	Antimony	Total	µg/L	2.04	2.07	6.5	4.07	6	6
E200.8	Arsenic	Total	µg/L	2.43	6.3	6.06	6.5	10	10
E200.8	Cadmium	Total	µg/L	0	0	0	0	5	5
E200.8	Lead	Total	µg/L	0.839	0.355	0	0	15	15
E200.8	Selenium	Total	µg/L	1.55	1.62	1.75	6.83	50	50
E200.8	Thallium	Total	µg/L	0	0	0	0	2	2
E200.8	Uranium	Total	µg/L	1.96	2.81	1.73	1.22	30	30
E245.1	Mercury	Total	µg/L	0.063	0.057	0	0.076	2	2
E300	Chloride	-	mg/L	537	510	541	573	250[d]	-
E300	Fluoride	-	mg/L	0.427	0.464	0.284	0.453	4	4
E300	Nitrogen, Nitrate	-	mg/L	0.151	0.102	0.414	608	10	10
E300	Nitrogen, Nitrite	-	mg/L	0.481	0	0	2.83	1	1
E300	Sulfate	-	mg/L	67	90.1	59.7	55.2	250[d]	-
E350.1	Ammonia	-	mg/L	0.478	0.601	1.02	1.15	-	-
E351.2	Total Kjeldahl Nitrogen	Total	mg/L	2.52	1.44	1.5	1.42	-	-
E365.1	Phosphate as P, Ortho	-	mg/L	0.0224	0.0854	0.0257	0.0395	-	-
E365.1	Phosphorus, Total as P	Total	mg/L	0.166	0.051	0.03	0.371	-	-
E900	Alpha, Gross	-	pci/L	15.6	14.1	18.6	0	-	15
E900	Beta, Gross	-	pci/L	11.9	11.4	20	11.3	-	4 mrem/yr
Field Measure	Dissolved Oxygen	-	mg/L	2.55	0.83	1.51	1.51	-	-
Field Measure	Oxidation Reduction Potential	-	mV	43	-116	-59	-91	-	-
Field Measure	pH, Field	-	pH units	8.02	8.02	10.51	11.64	-	-
Field Measure	Specific Conductance	-	ms/cm	2.36	2.26	2.37	0.21	-	-

Table 2.3.2-9: Maximum Groundwater Analytical Results for “E” Sands Wells (Continued) (Sheet 3 of 3)

Analytical Method	Chemical Name	Fraction	Units	Q1 Dec. 2023	Q2 Feb. 2024	Q3 Apr. 2024	Q4 Aug. 2024	TX Water Quality Standard[a]	EPA MCLs[b]
Field Measure	Temperature	-	deg C	23.6	26.55	26.94	31.49	-	-
Field Measure	Turbidity	-	NTU	426	137	84.6	10.9	-	-
HACH 8000	Chemical Oxygen Demand	-	mg/L	39	37	57	40	-	-
OIA1677	Cyanide, Free	-	µg/L	0	24.1	0	0	200	200
SM10200H	Chlorophyll-a	-	mg/m^3	0.685	NA	NA	NA	-	-
SM10200H	Chlorophyll-a, corrected for Pheophytin	-	mg/m^3	1.78	NA	NA	NA	-	-
SM2340B	Hardness, Total as $CaCO_3$	Total	mg/L	478	459	496	470	-	-
SM4500-CO2 D	Carbon dioxide	-	mg/L	292	346	299	294	-	-
SM5210B	Biochemical Oxygen Demand	-	mg/L	3.02	19.1	11.3	18.5	-	-

Sources:

a) TCEQ, 2023

b) Source: EPA, 2007

d) Source: TCEQ, 2007

Notes:

a) Values include general use, those values protective of human health, and those protective of aquatic life, whichever is most conservative.

c) For a system that collects at least 40 samples per month, if no more than 5.0 percent of the samples collected during a month are total coliform-positive, the system is in compliance with the MCL for total coliforms. For a system that collects fewer than 40 samples per month, if no more than one sample collected during a month is total coliform-positive, the system is in compliance with the MCL for total coliforms.

d) Values are Secondary MCLs. These compounds are not necessarily of concern from a human health standpoint, therefore calculation of human health-based values is not required. However, aesthetics and ecological criteria would still apply. See table entitled “Compounds for which Calculation of a Human Health PCL is Not Required” available on the TCEQ website at http://www.tceq.state.tx.us/remediation/trrp/trrp.html

Abbreviations: Q# - Quarter during year; deg C = degrees Celsius; mg/l = milligrams per liter; mg/m^3 = milligrams per cubic meter; mpn/100 ml = most probable number per 100 milliliters; mV = millivolts; NA = Not Analyzed; NTU = nephelometric turbidity unit; pci/l = picocuries per liter; TX = Texas; µg/l = micrograms per liter; ms/cm = milliSiemens per centimeter; EPA MCL = U.S. Environmental Protection Agency Maximum Concentration Level; mrem/yr = millirem per year

Figures

Figure 2.3.2-1: Major Surface Water Features in the Region of the Long Mott Generating Station

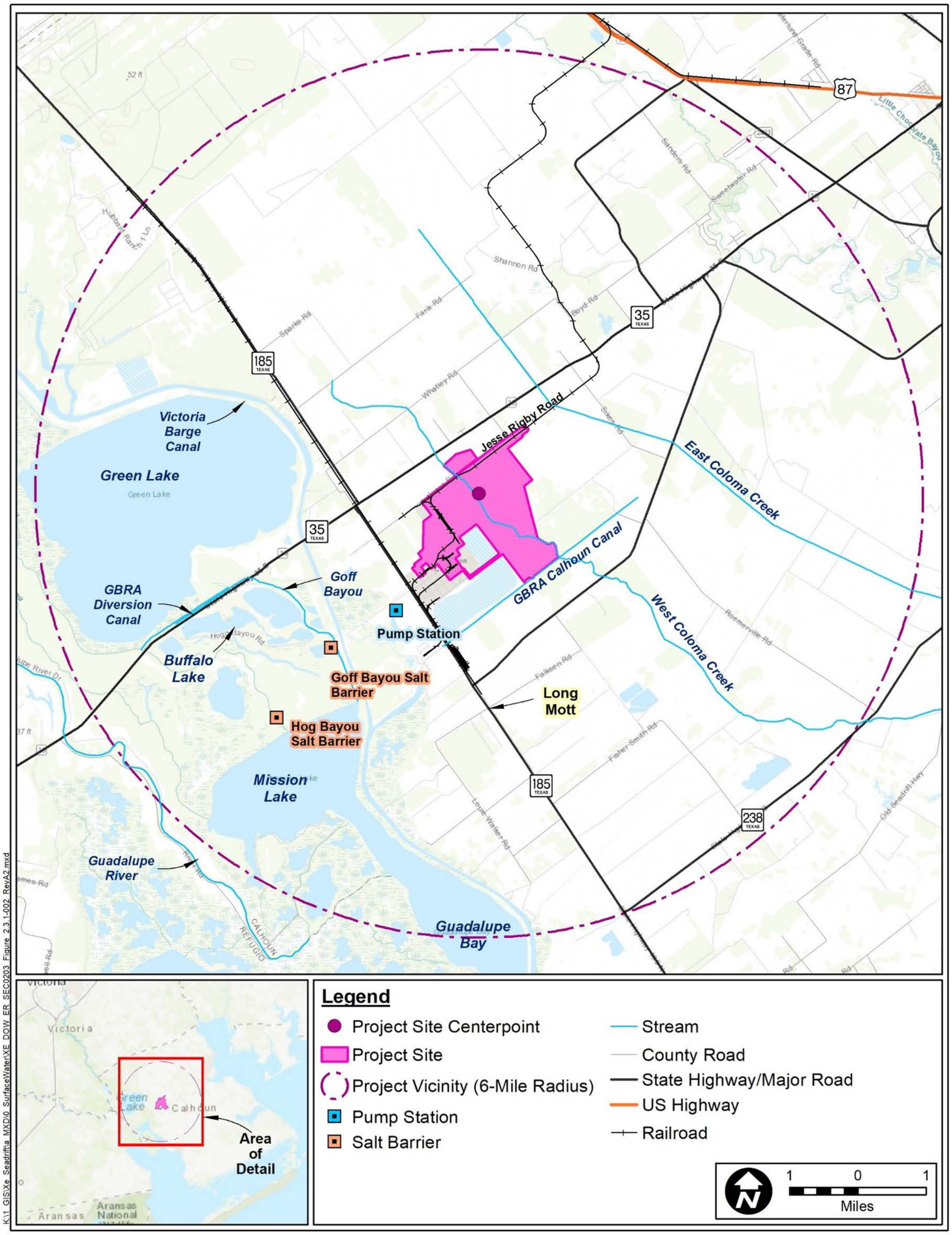


Figure 2.3.2-2: Major Surface Water Features in the Vicinity of the Long Mott Generating Station

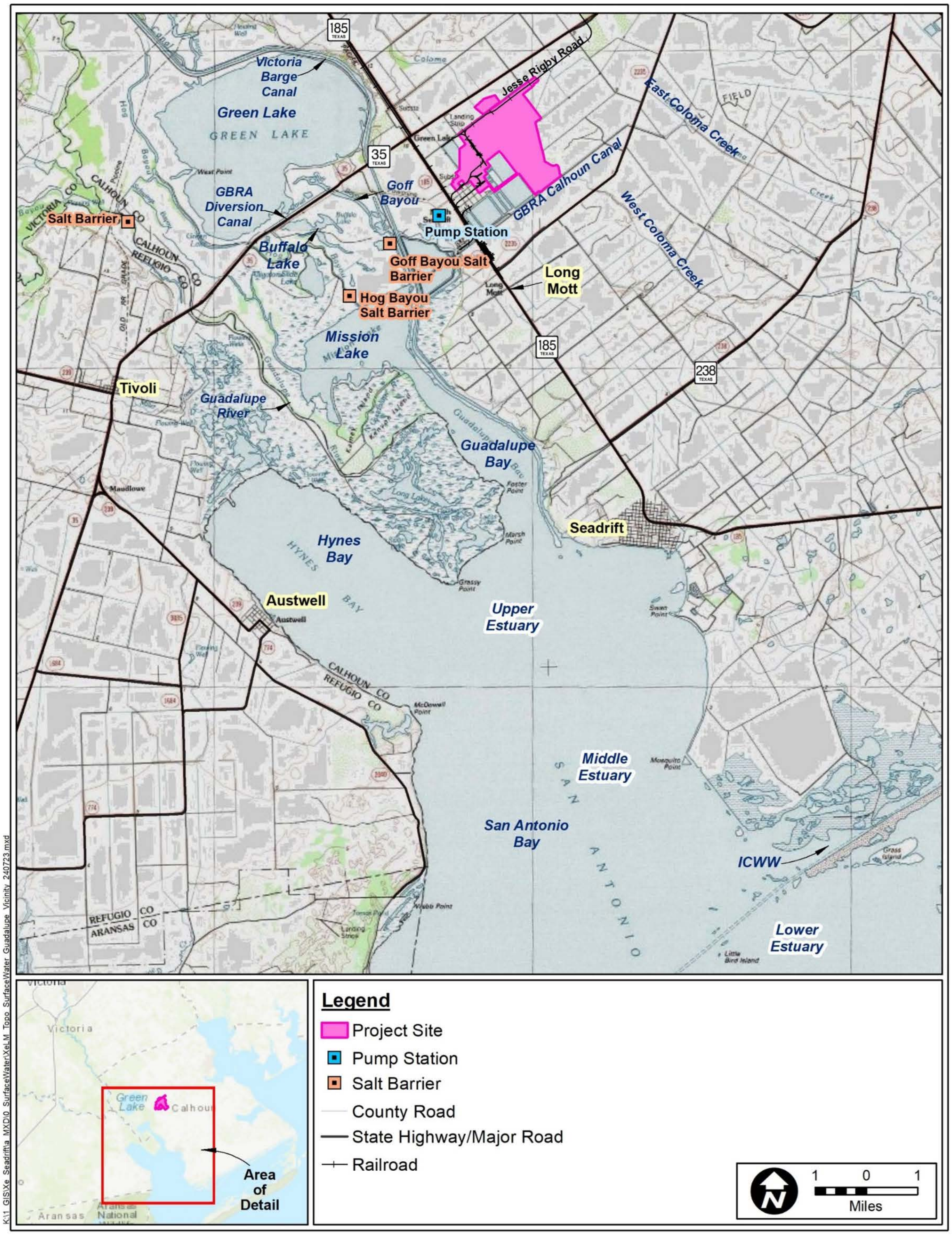


Figure 2.3.2-3: Surface Water Features of the Guadalupe Estuary in the Vicinity of the Long Mott Generating Station

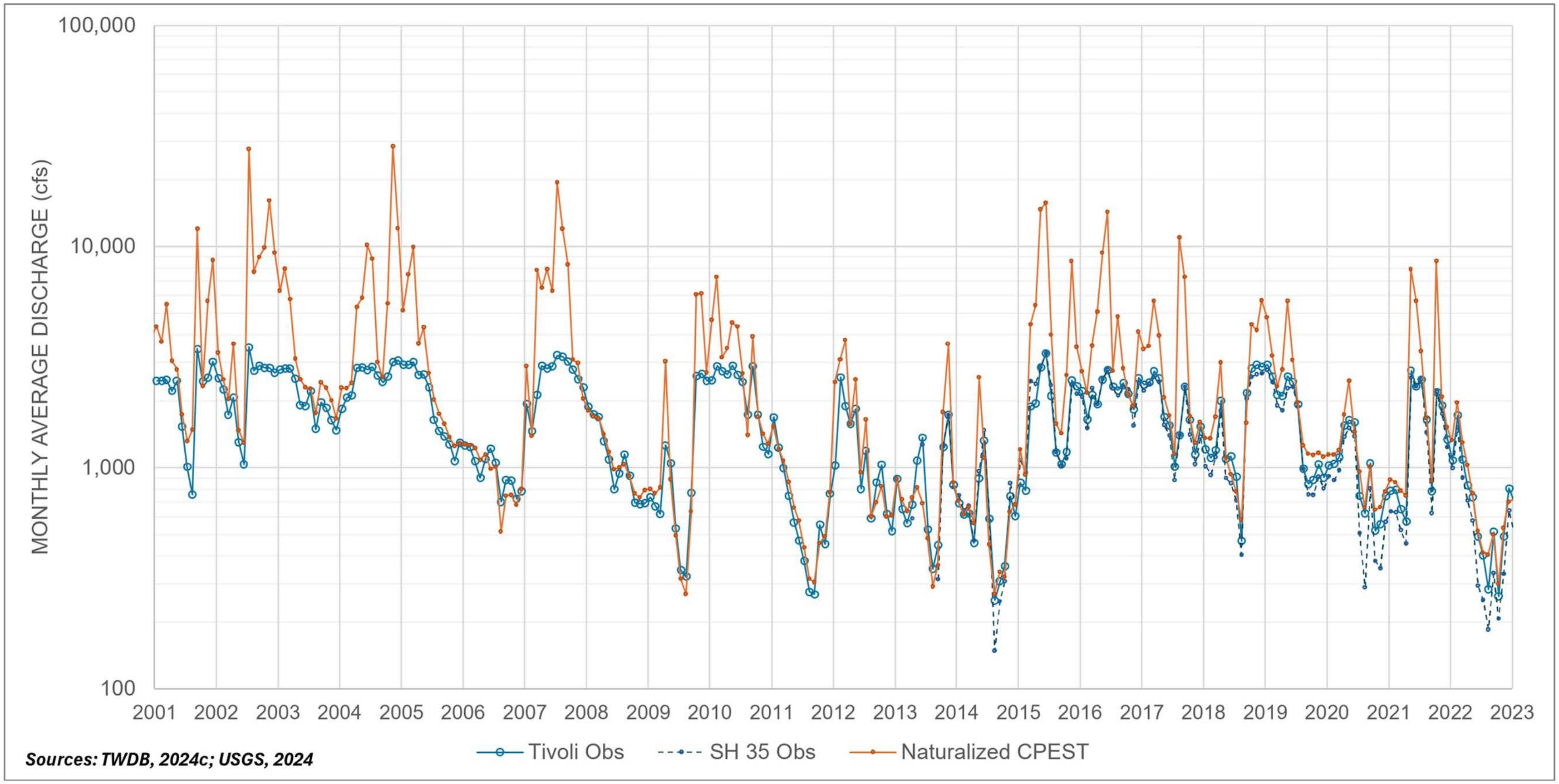


Figure 2.3.2-4: Observed and Estimated Naturalized Surface Flows to the Guadalupe Estuary (2001-2023)

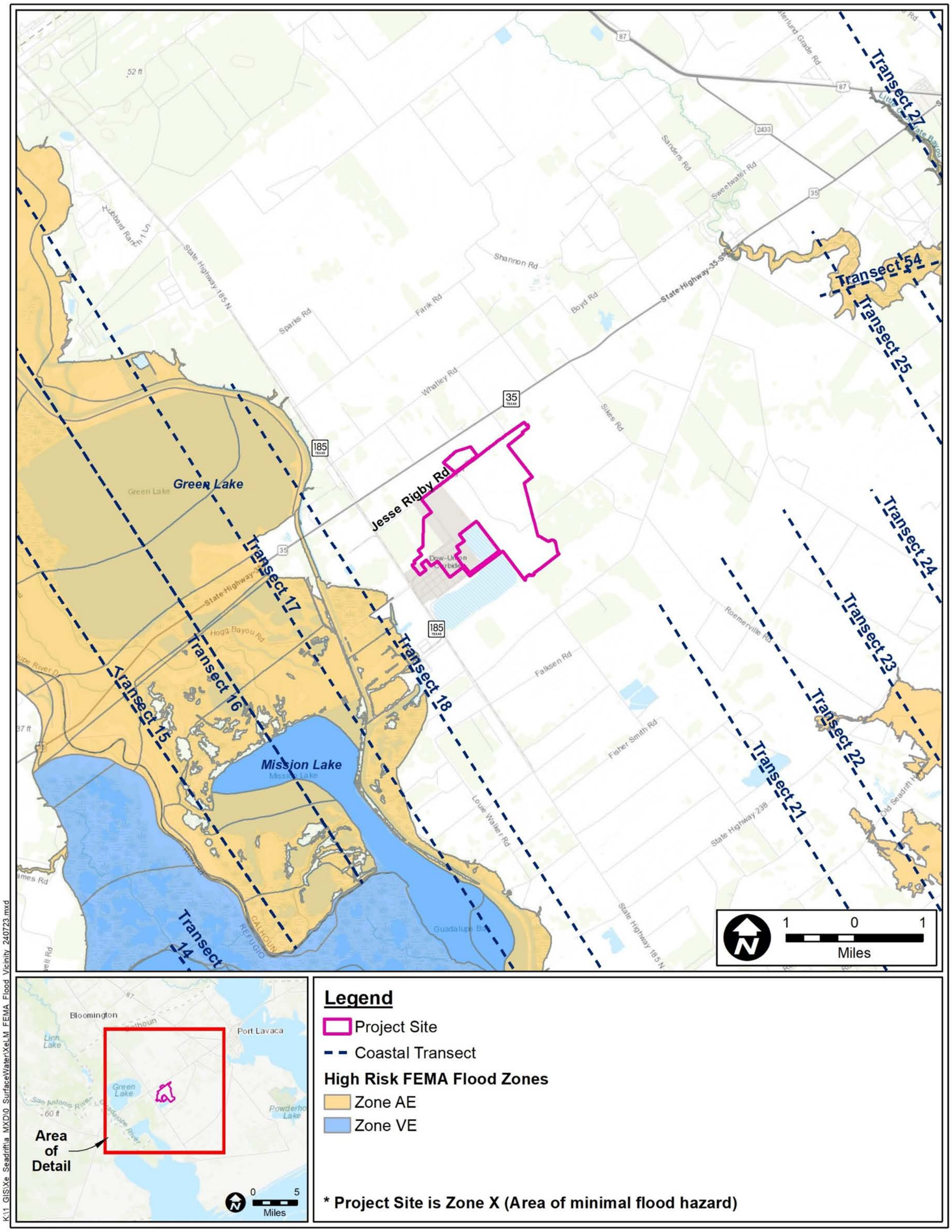


Figure 2.3.2-5: Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM)

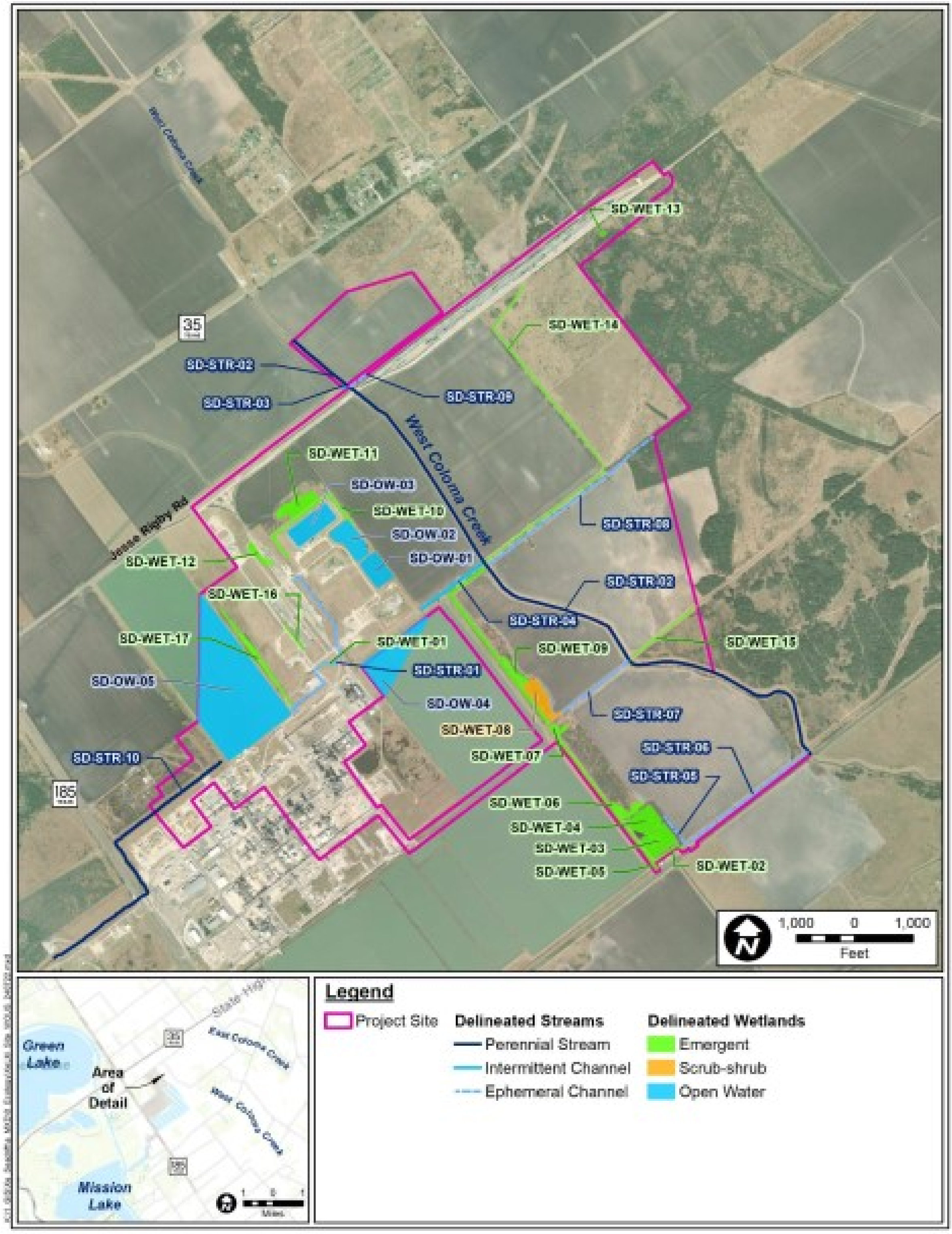


Figure 2.3.2-6: Potential Jurisdictional Waters on the Long Mott Generating Station Site

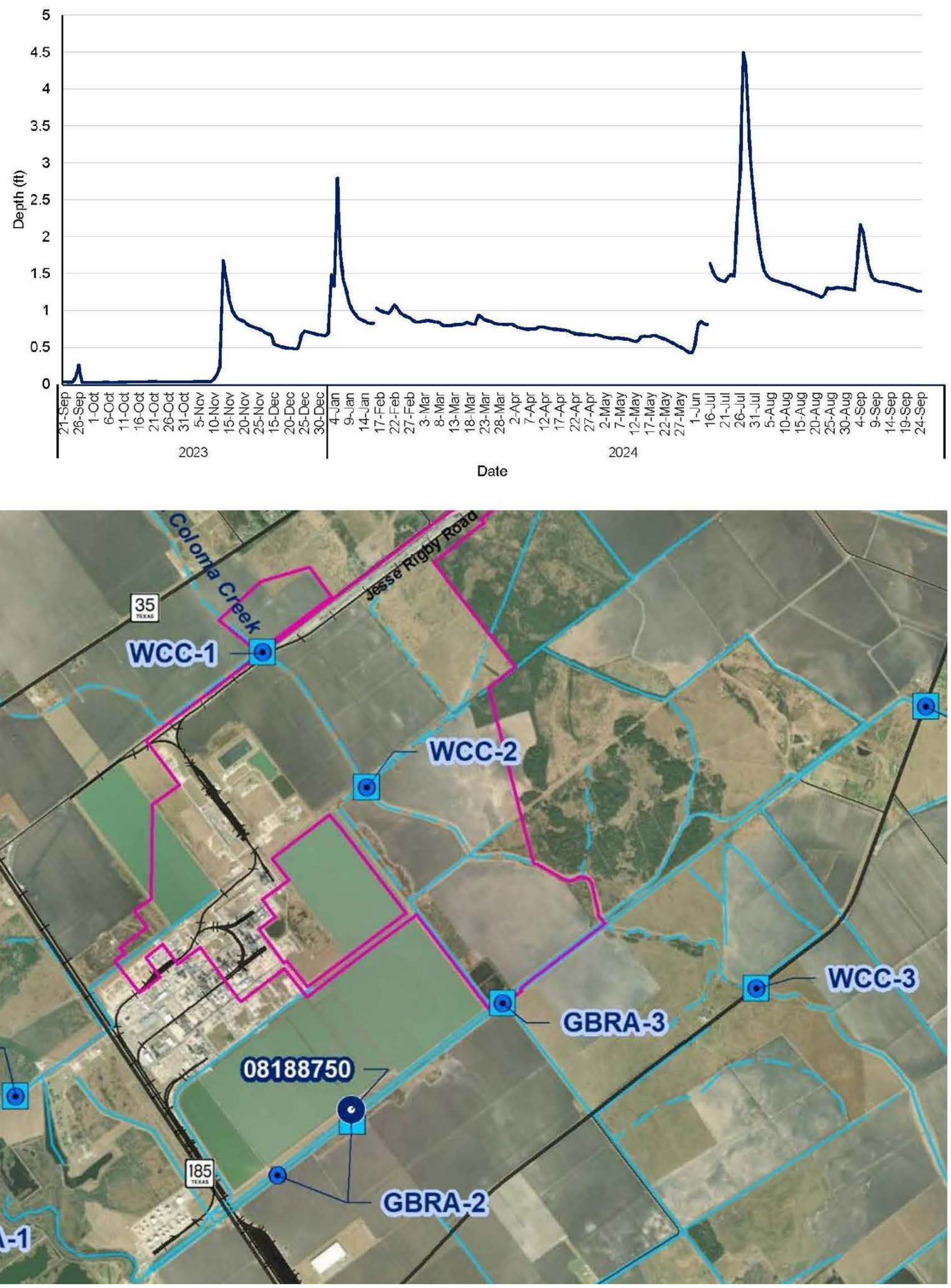
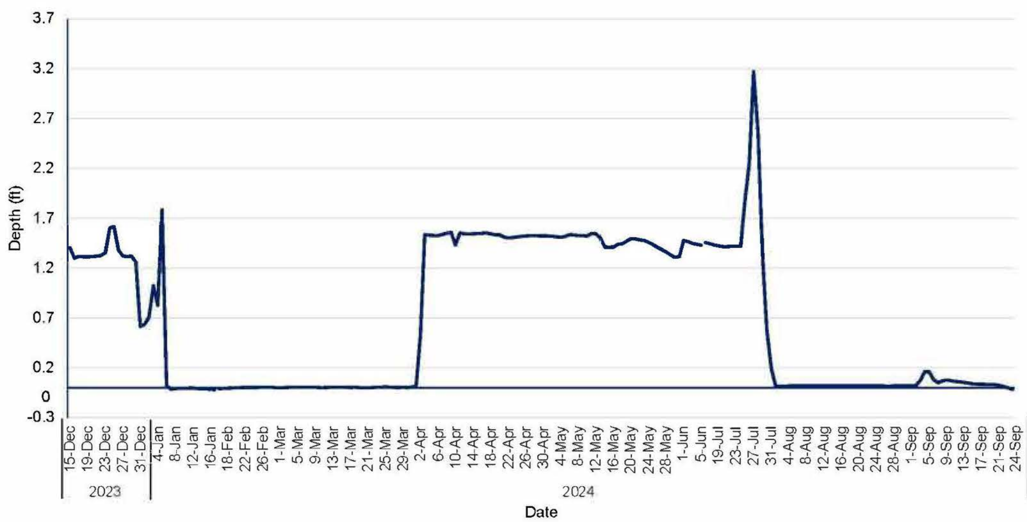


Figure 2.3.2-7: Mean Daily Surface Water Levels for West Coloma Creek Site 1 (WCC-1), September 21, 2023 — September 24, 2024



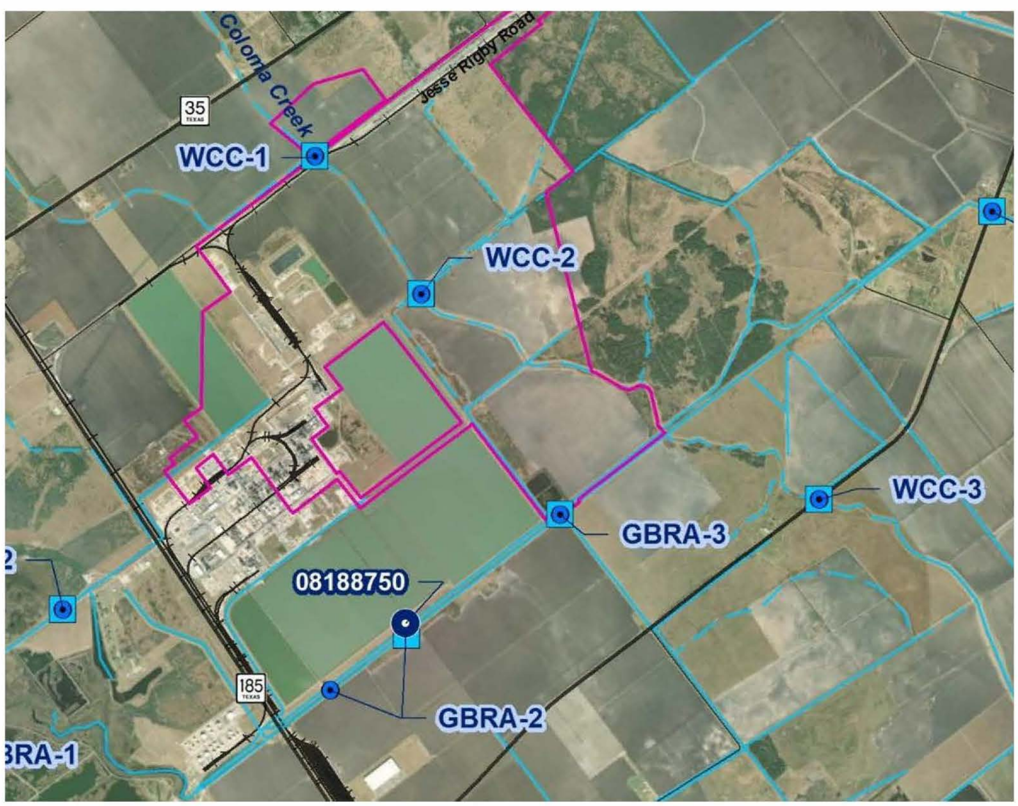
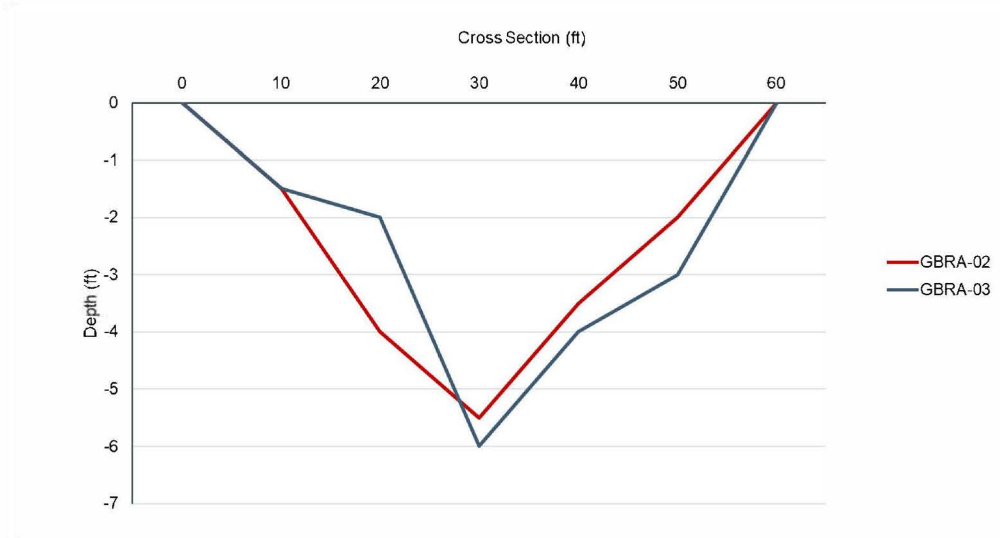


Figure 2.3.2-8: Mean Daily Surface Water Levels for West Coloma Creek Site 3 (WCC-3), December 15, 2023 — September 24, 2024



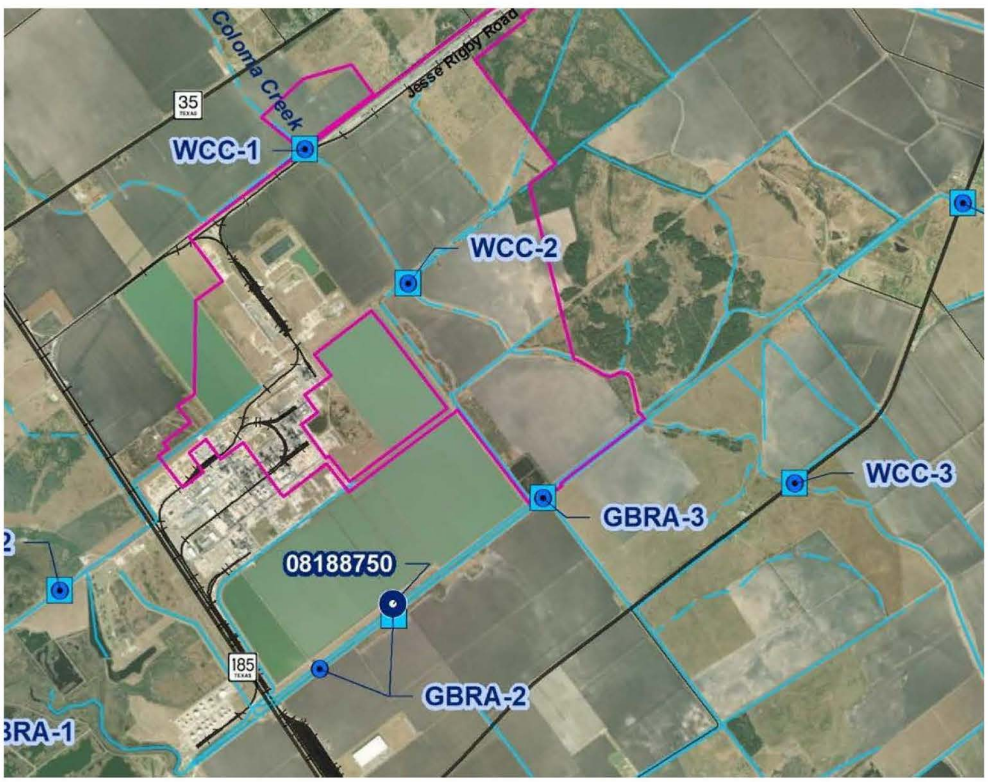


Figure 2.3.2-9: Representative Cross Sections of GBRA Calhoun Canal Near the Long Mott Generating Station Site

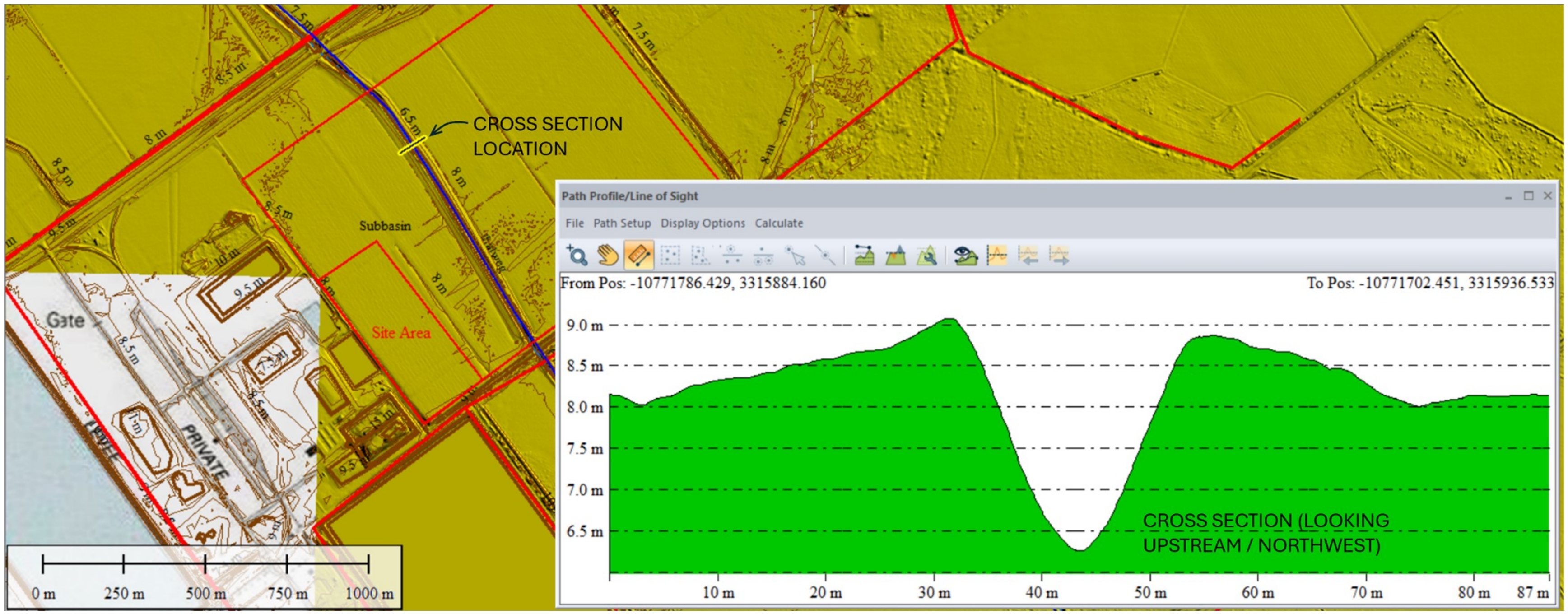


Figure 2.3.2-10: Representative Cross Sectional Profile of West Coloma Creek within the Long Mott Generating Station Site

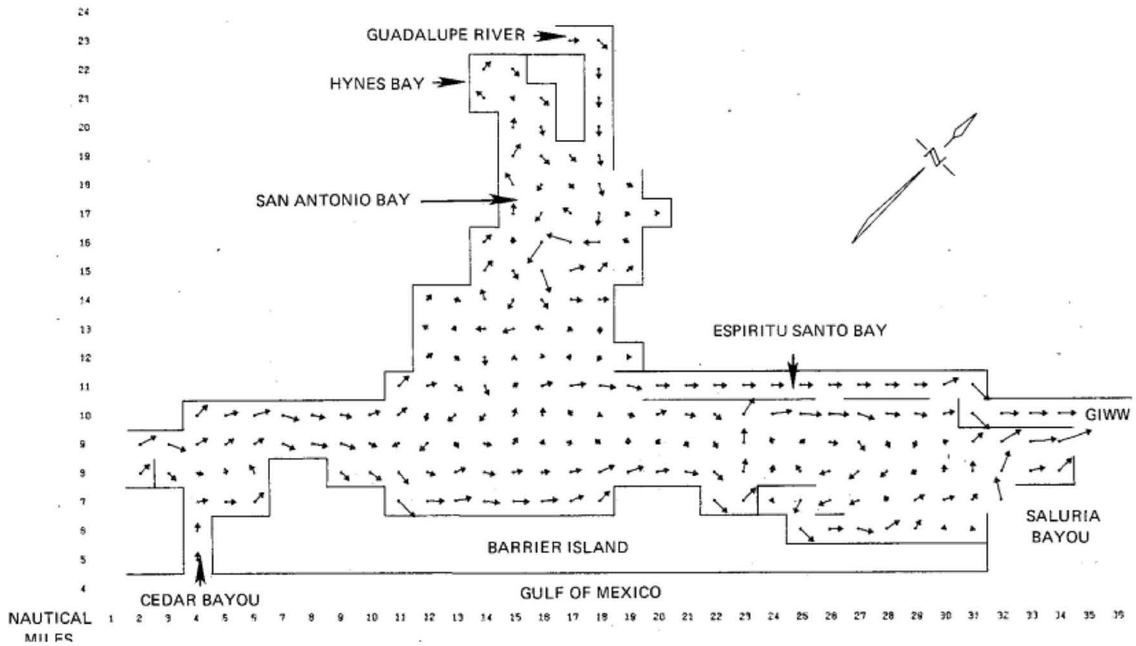


Figure 9-18. Simulated Net Steady-State Flows in the Guadalupe Estuary Under August Freshwater Inflow Needs, Alternative I

Source: TWDB, 1980

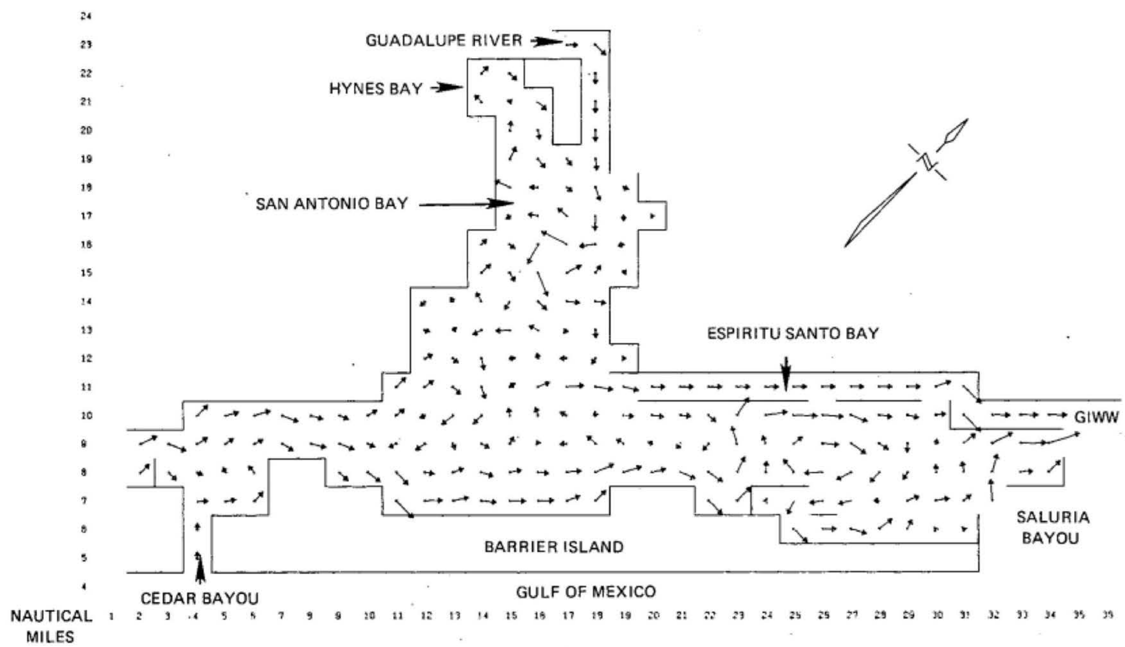


Figure 9-16. Simulated Net Steady-State Flows in the Guadalupe Estuary Under June Freshwater Inflow Needs, Alternative I

Source: TWDB, 1980

Figure 2.3.2-11: Simulated Guadalupe Estuary Current Patterns for June and August, 1980

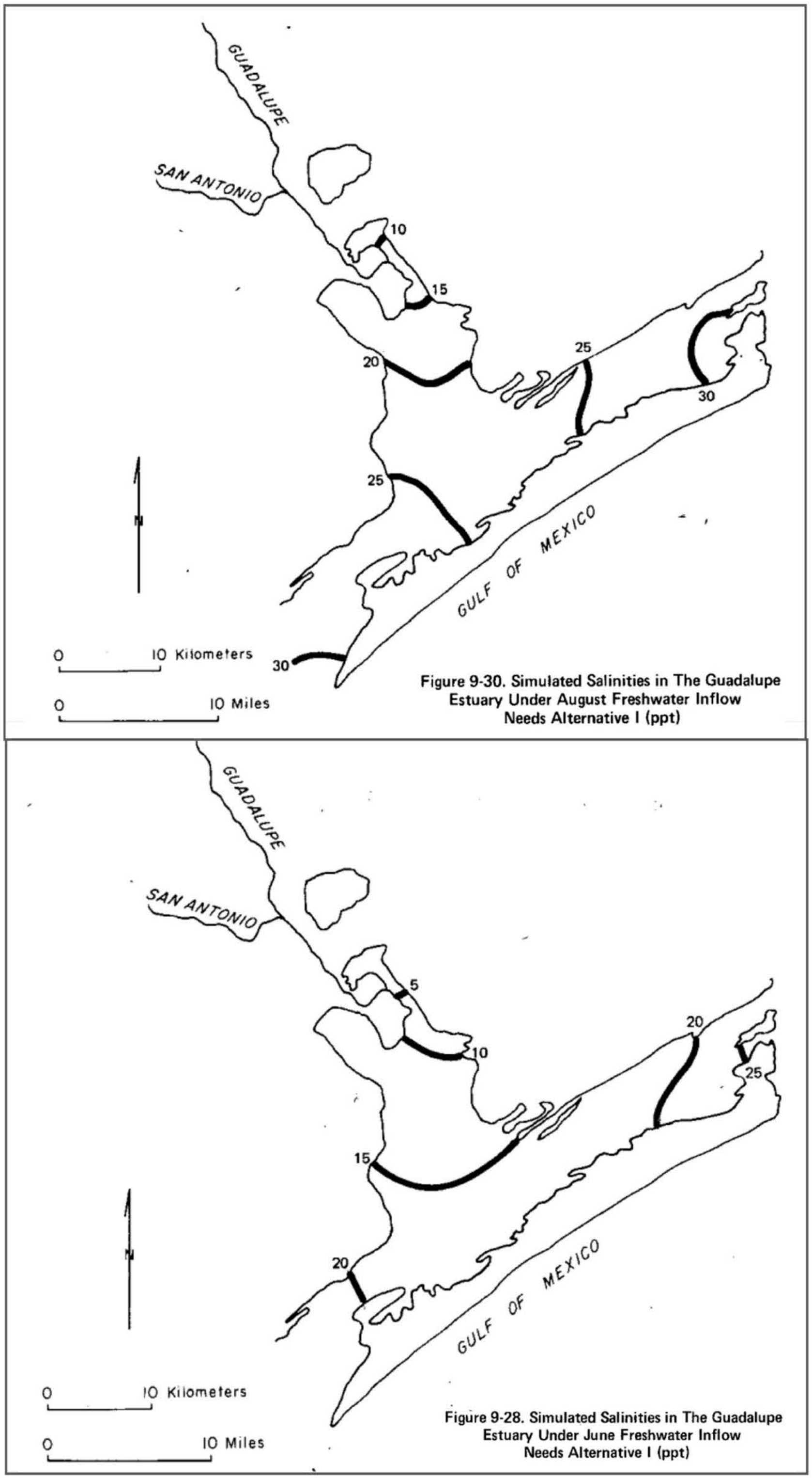


Figure 9-30. Simulated Salinities in The Guadalupe Estuary Under August Freshwater Inflow Needs Alternative I (ppt)

Figure 9-28. Simulated Salinities in The Guadalupe Estuary Under June Freshwater Inflow Needs Alternative I (ppt)

Source: TWDB, 1980

Figure 2.3.2-12: Simulated Guadalupe Estuary Salinity Patterns for May through August, 1980

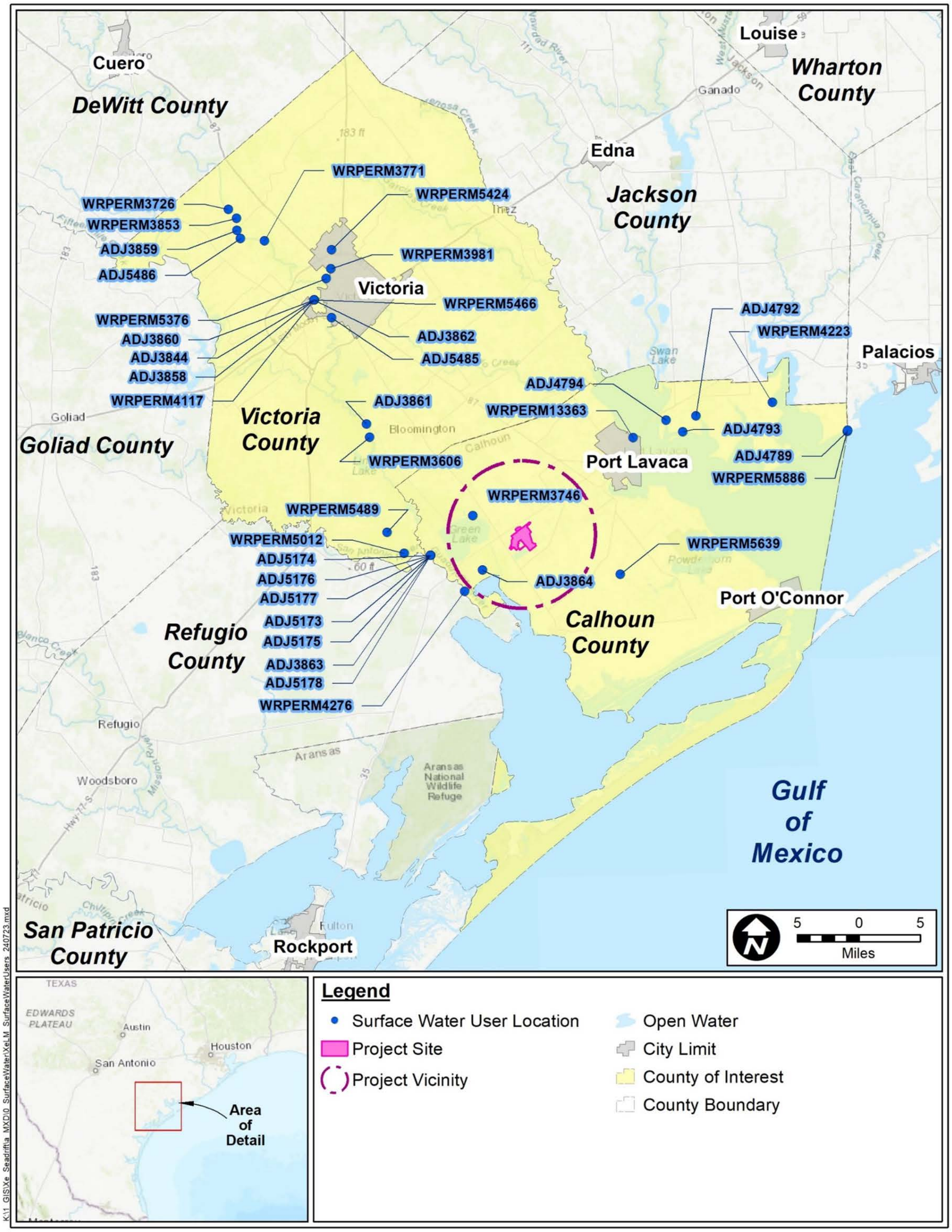


Figure 2.3.2-13: Surface Water Users Other than SDO within Calhoun and Victoria Counties

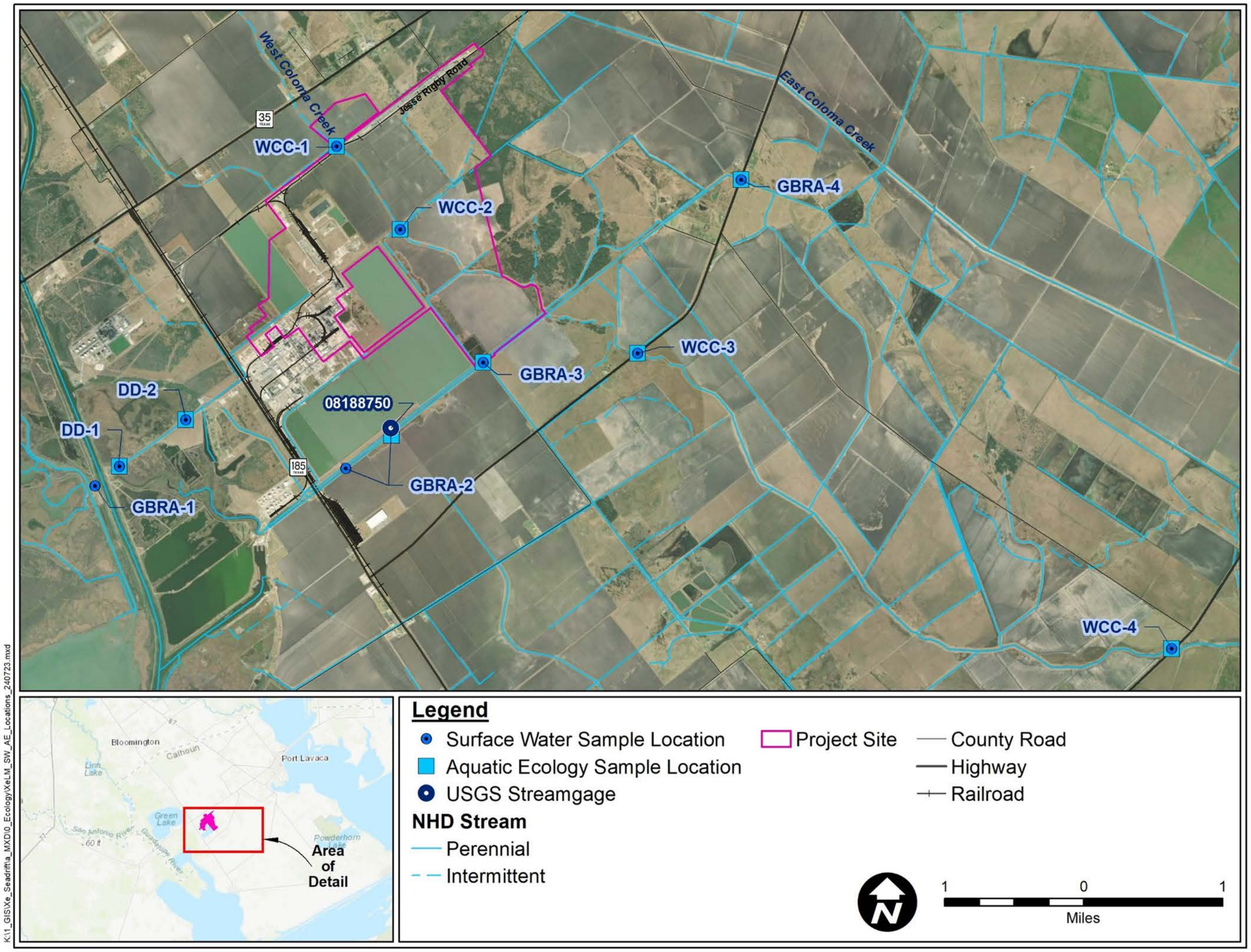


Figure 2.3.2-14: Surface Water Quality Sampling Locations

Era	System	Series	Stratigraphic unit (Modified from Baker, 1979)	Lithology	Hydrogeologic unit commonly used in Texas (Modified from Baker, 1979)	Hydrogeologic nomenclature used by USGS (Modified from Weiss, 1992)	
Cenozoic	Quaternary	Holocene	Alluvium	Sand, silt, and clay	Chicot aquifer	Permeable zone A	Coastal lowlands aquifer system
Cenozoic	Quaternary	Pleistocene	Beaumont Formation Montgomery Formation Bentley Formation Willis Sand	Sand, silt, and clay	Chicot aquifer	Permeable zone B	Coastal lowlands aquifer system
Cenozoic	Tertiary	Pliocene	Goliad Sand	Sand, silt, and clay	Evangeline aquifer	Permeable zone C	Coastal lowlands aquifer system
Cenozoic	Tertiary	Miocene	Fleming Formation	Clay, silt and sand	Burkeville confining unit	Zone D confining unit [1]	Coastal lowlands aquifer system
Cenozoic	Tertiary	Miocene	Oakville Sandstone	Sand, silt, and clay	Jasper aquifer	Permeable zone D	Coastal lowlands aquifer system
Cenozoic	Tertiary	Miocene / Oligocene	Catahoula Sandstone or Tuff [2]; Anahuac Formation [1]	Clay, silt and sand	Catahoula confining unit (restricted); Jasper aquifer	Zone E confining unit [1]	Coastal lowlands aquifer system
Cenozoic	Tertiary	Oligocene	Catahoula Sandstone or Tuff [2]; Frio Formation [1]	Sand, silt, and clay	Catahoula confining unit (restricted); Jasper aquifer	Permeable zone E	Coastal lowlands aquifer system
Cenozoic	Tertiary	Oligocene	Frio Clay [3]; Vicksburg Formation [1]	Clay and silt	Vicksburg-Jackson confining unit	Vicksburg-Jackson confining unit	
Cenozoic	Tertiary	Eocene	Jackson Group: Whitsett Formation, Manning Clay, Wellborn Sandstone, Caddell Formation	Clay and silt	Vicksburg-Jackson confining unit	Vicksburg-Jackson confining unit	

[1] Present only in the subsurface
[2] Called Catahoula Tuff west of Lavaca County
[3] Not recognized at surface east of Live Oak County

Modfied from Ryder, 1996.

Figure 2.3.2-15: Gulf Coast Aquifer Nomenclature

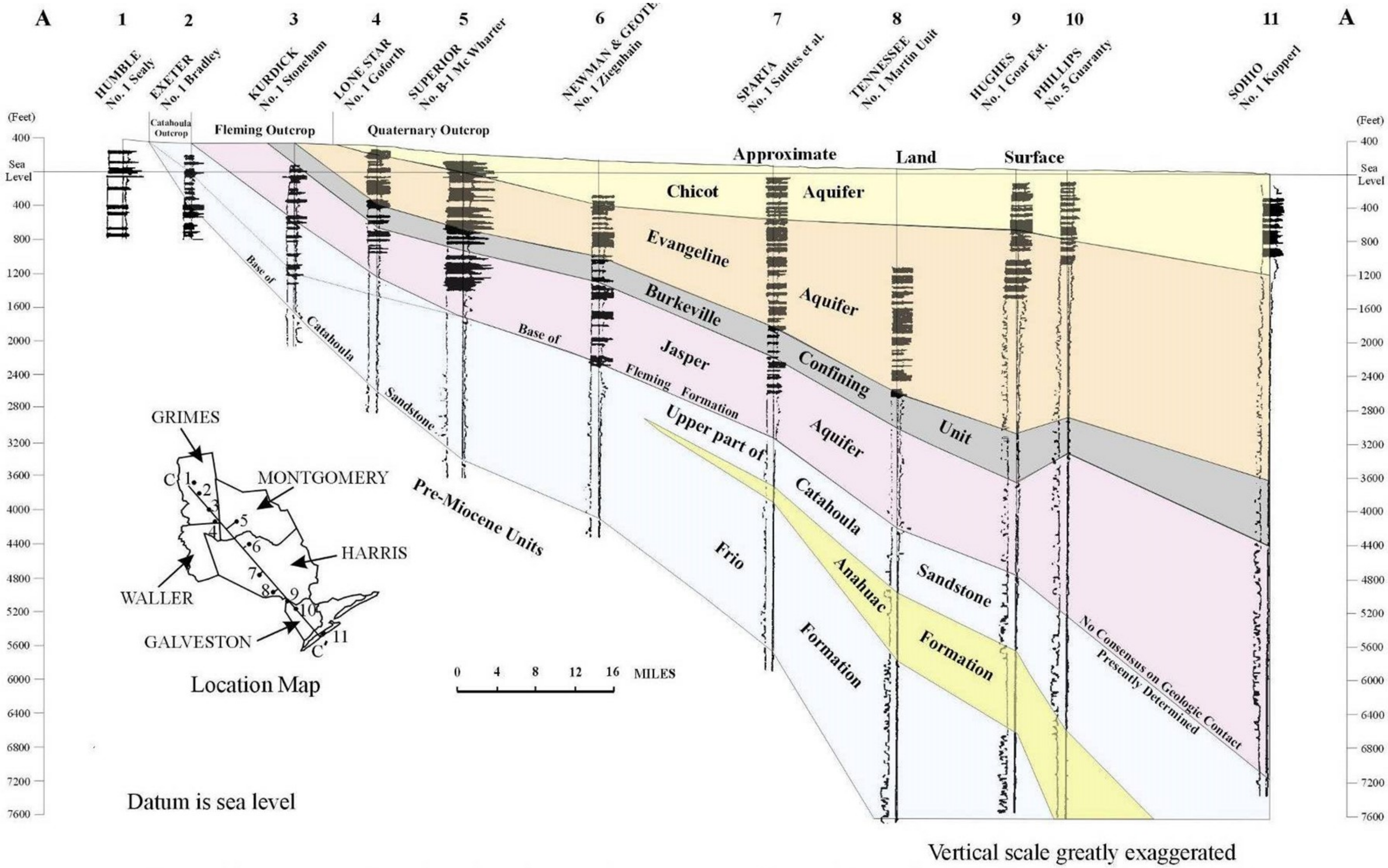


Figure 2.3.2-16: Regional Aquifer Cross Section

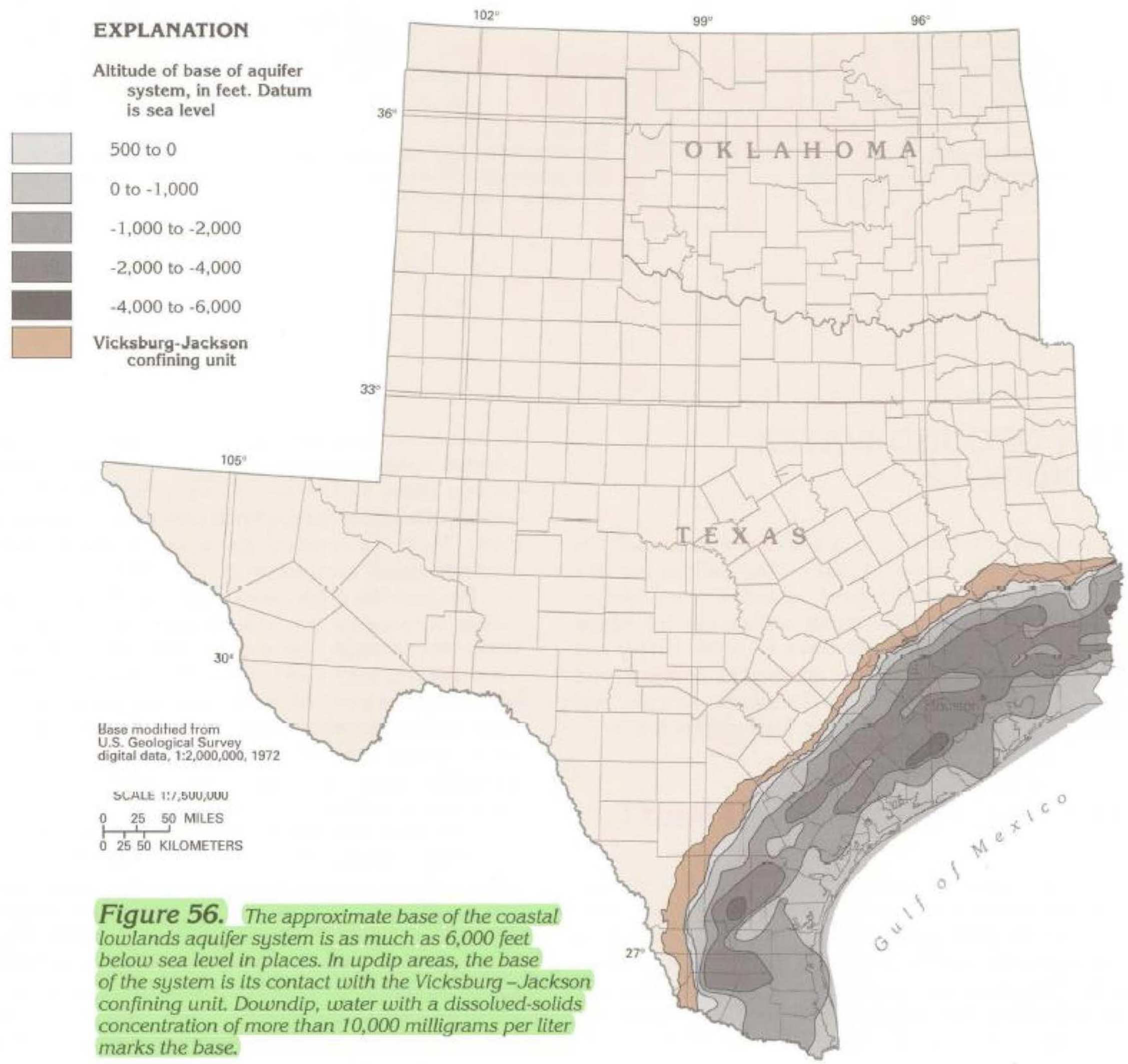
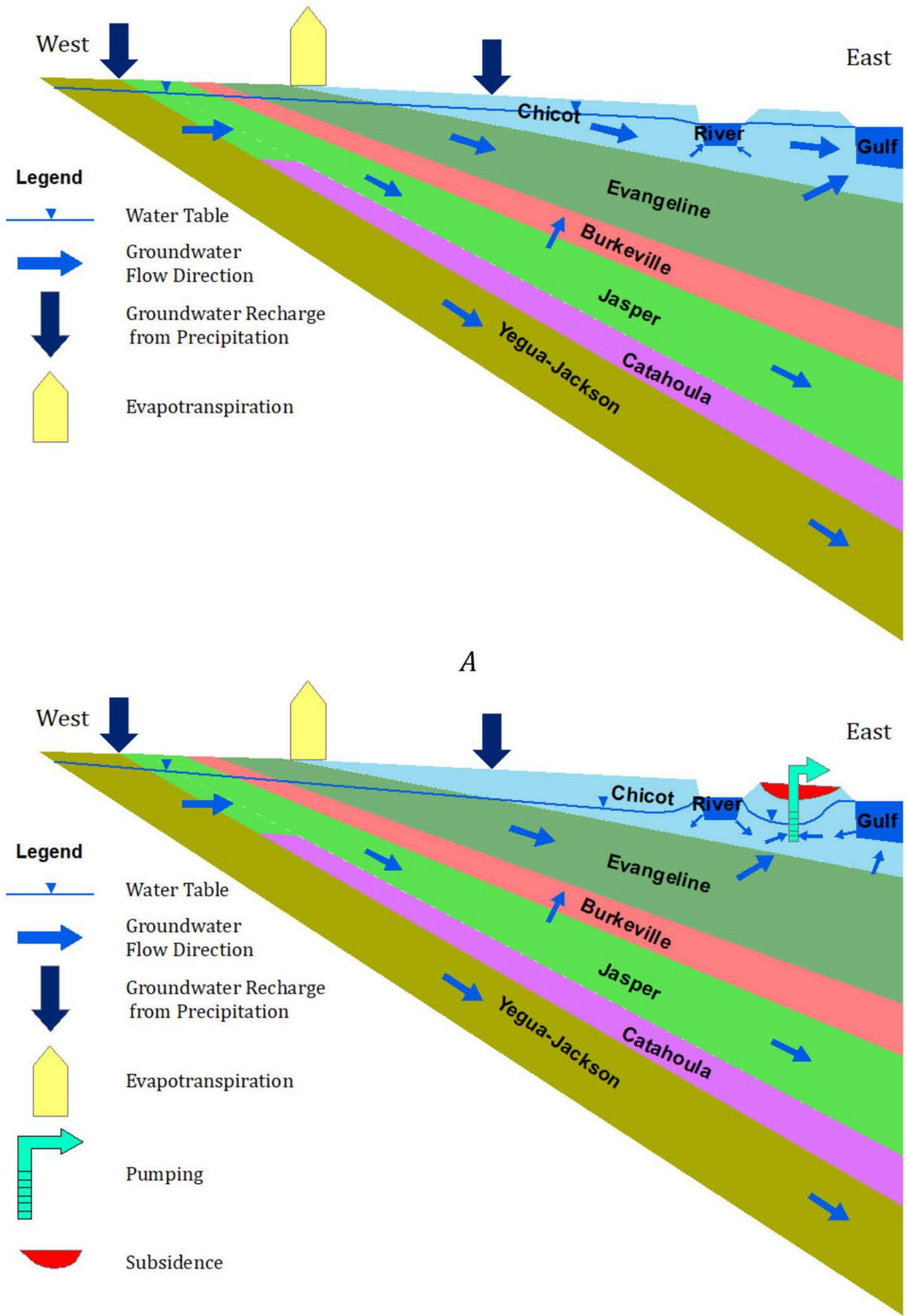


Figure 2.3.2-17: Depths of Gulf Coast Aquifer System in Texas

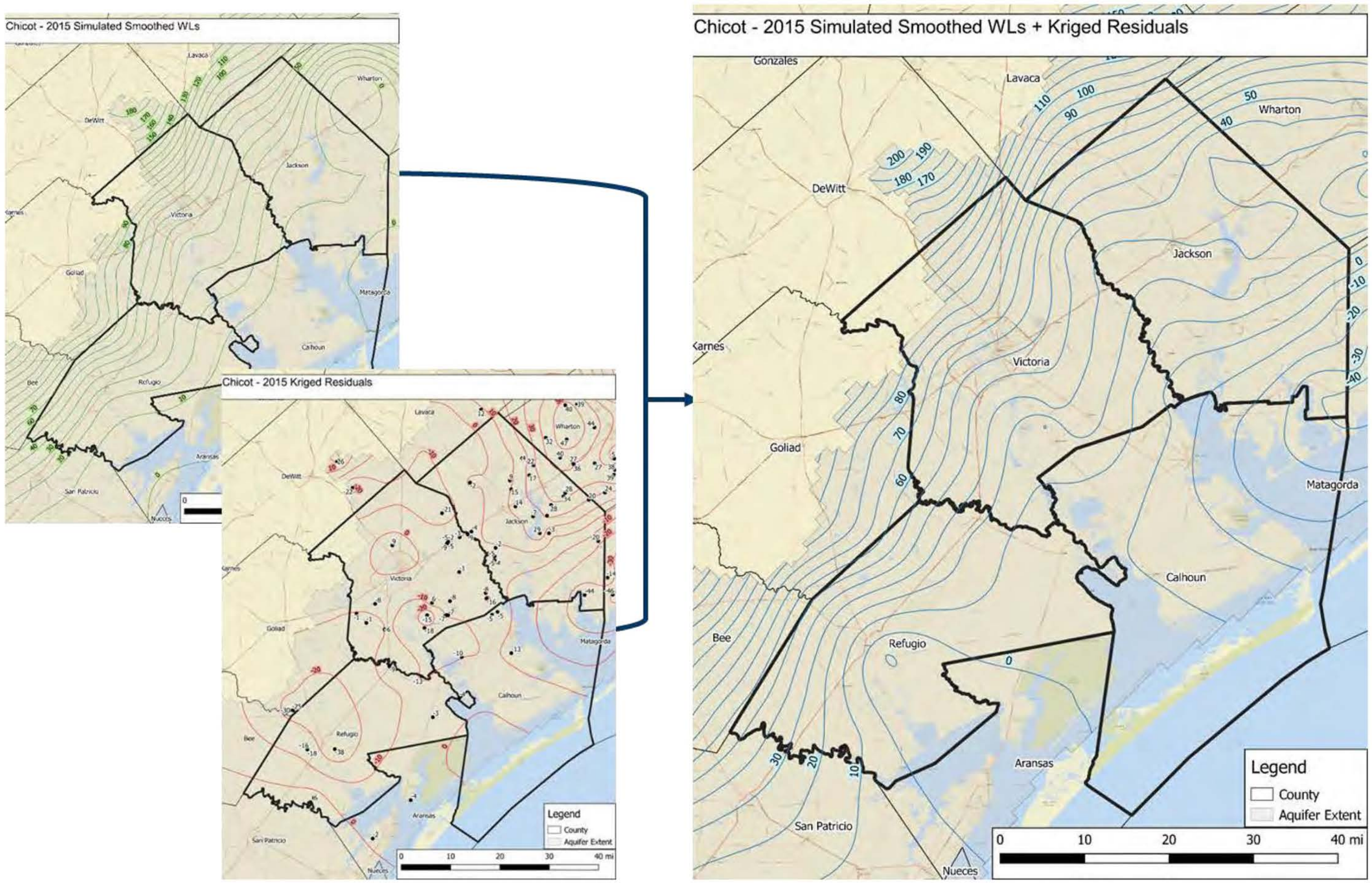
Groundwater Availability Model for the Central and Southern Portions of Gulf Coast Aquifer System in Texas: Numerical Model Report



Block diagram of pseudo-steady-state (A) and transient conditions (B) from the conceptual model report by Shi and others (2022).

Figure 2.3.2-18: Conceptual Model for Recharge and Discharge of Gulf Coast Aquifer

Final: Application of Geostatistical Techniques to Quantify Changes in Water Levels



Combining the trend water level surface and the Kriged water level residual surface to produce the final surface for the 2015 Chicot water levels

Figure 2.3.2-19: Chicot Aquifer Modeled Water Level Map — 2015

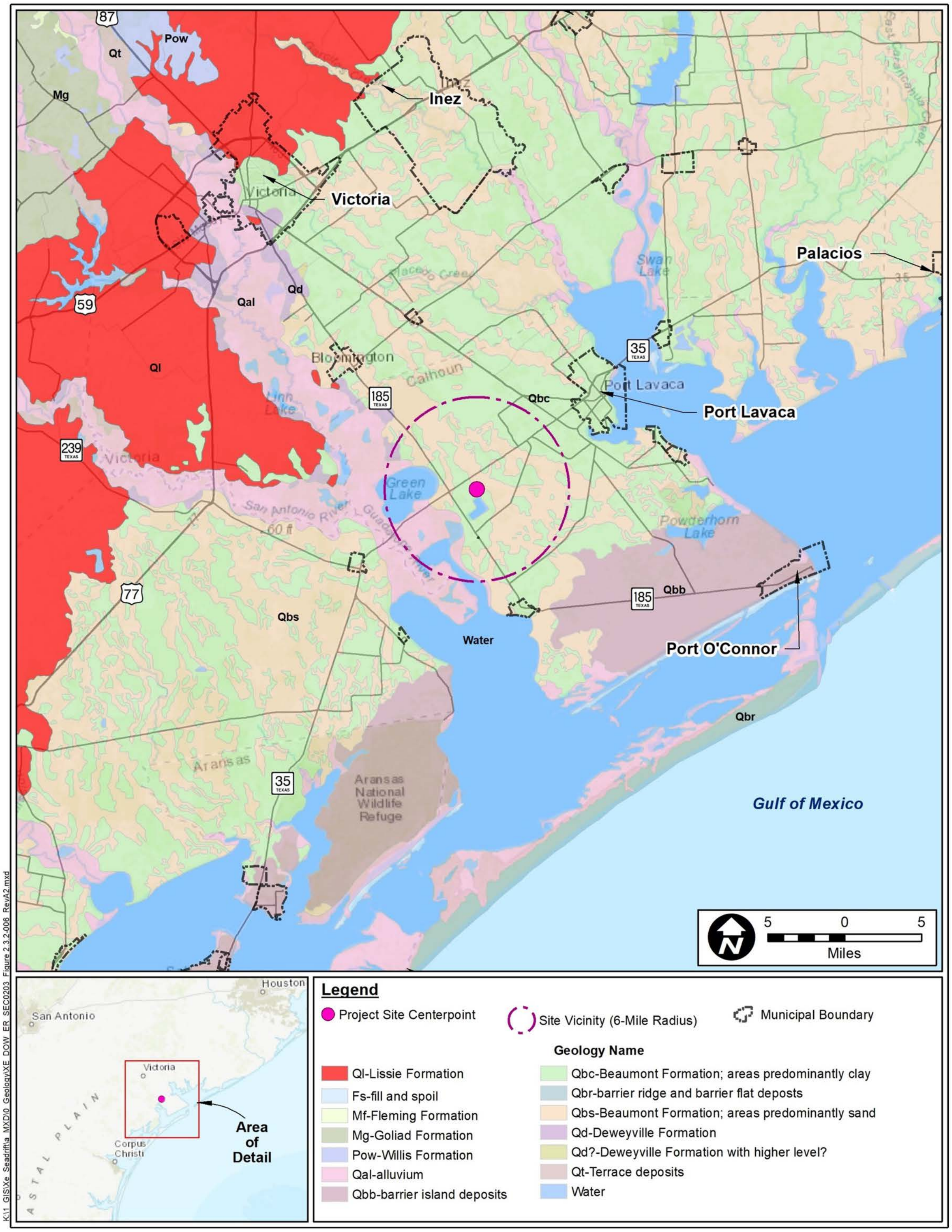
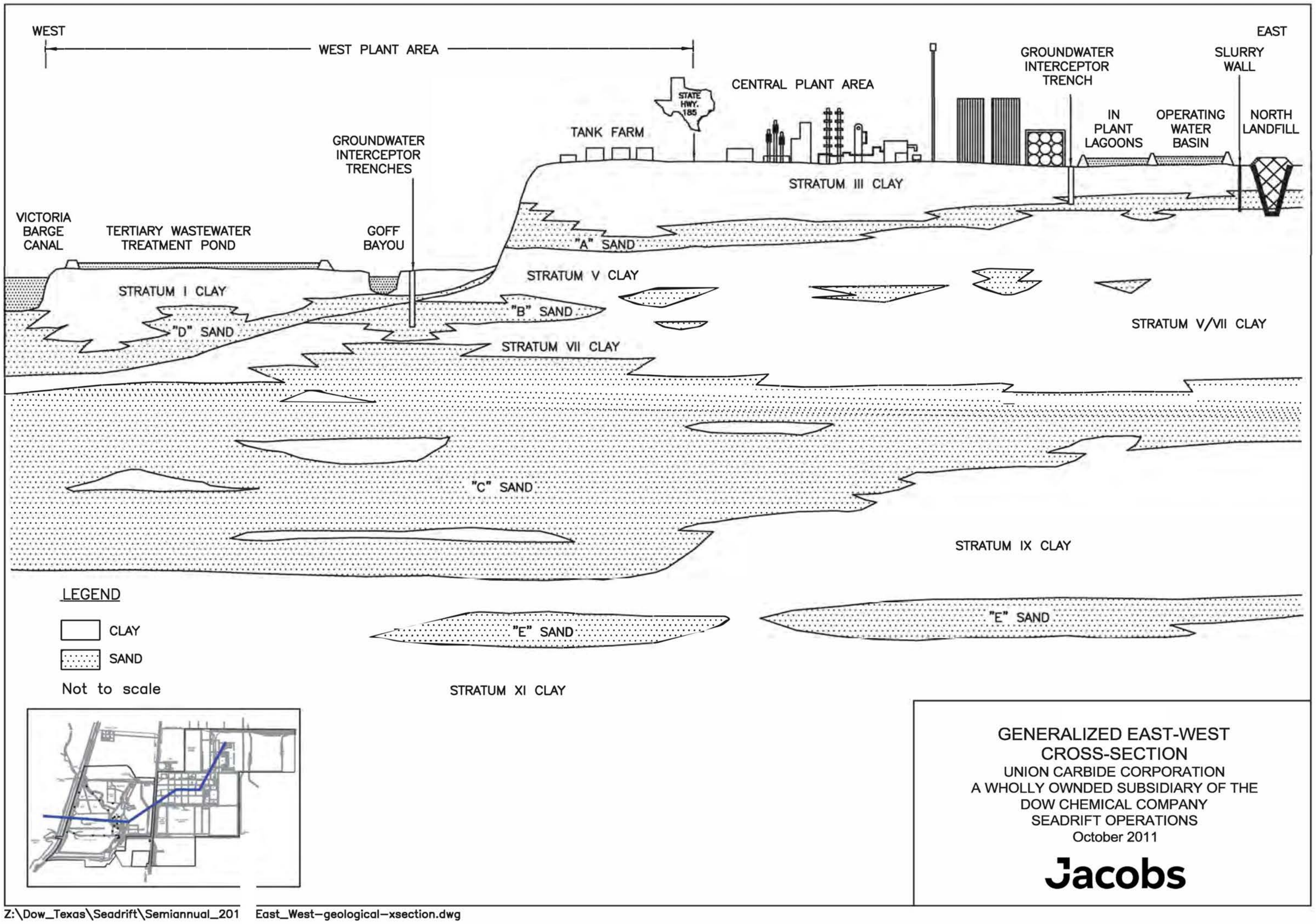
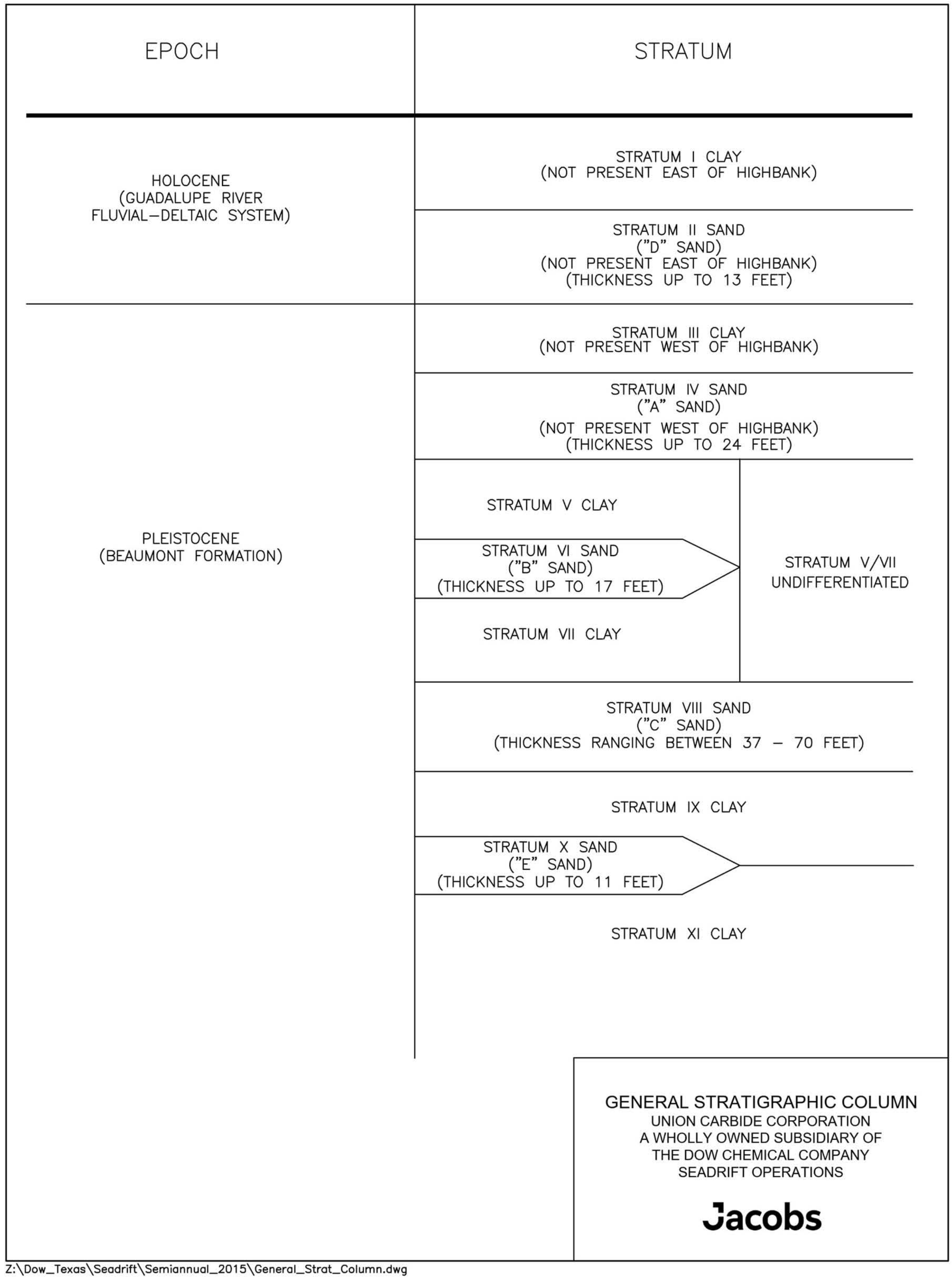


Figure 2.3.2-20: Geologic Units Near the Long Mott Generating Station Site



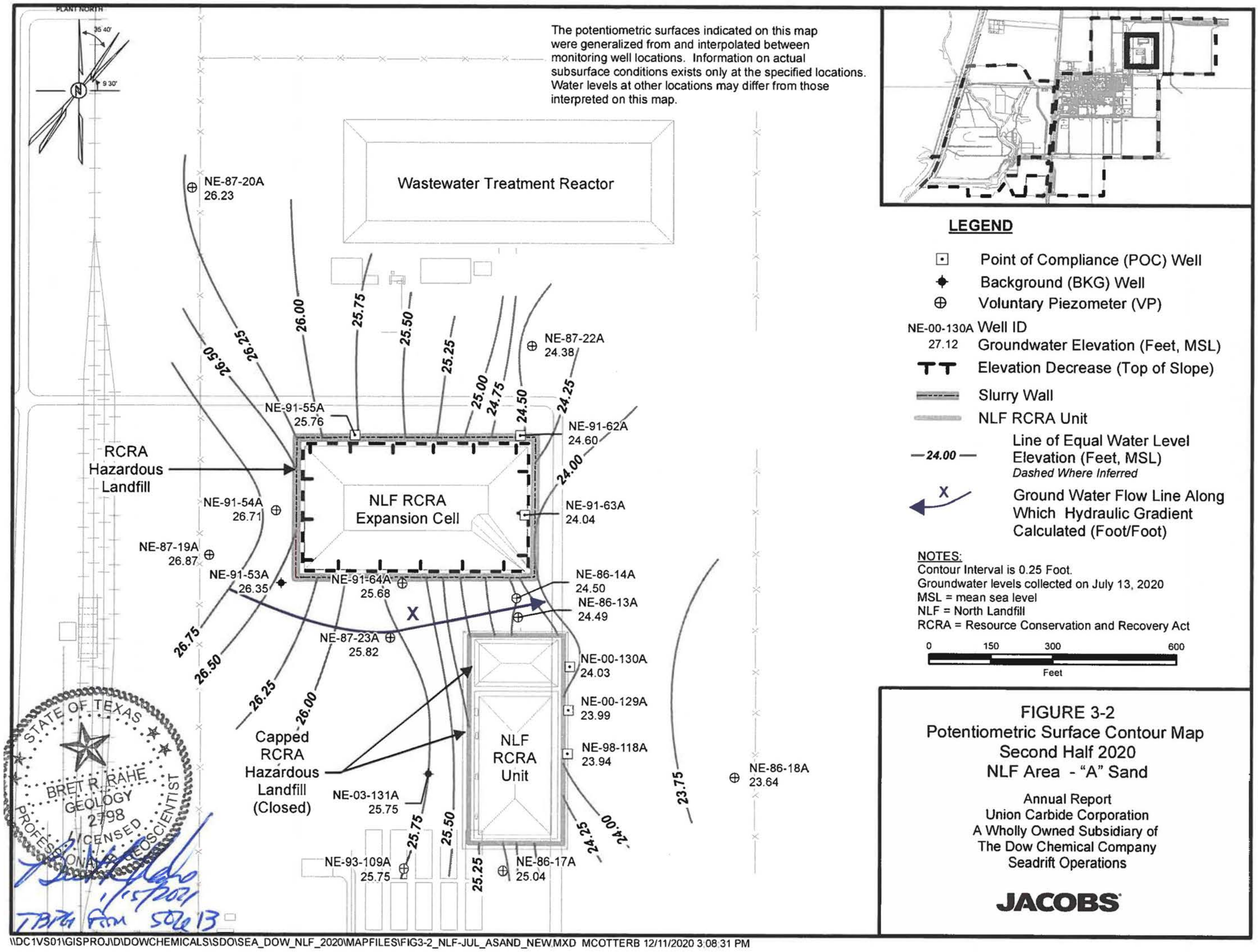
Source: Jacobs, 2022

Figure 2.3.2-21: Generalized Cross Section of the SDO Site



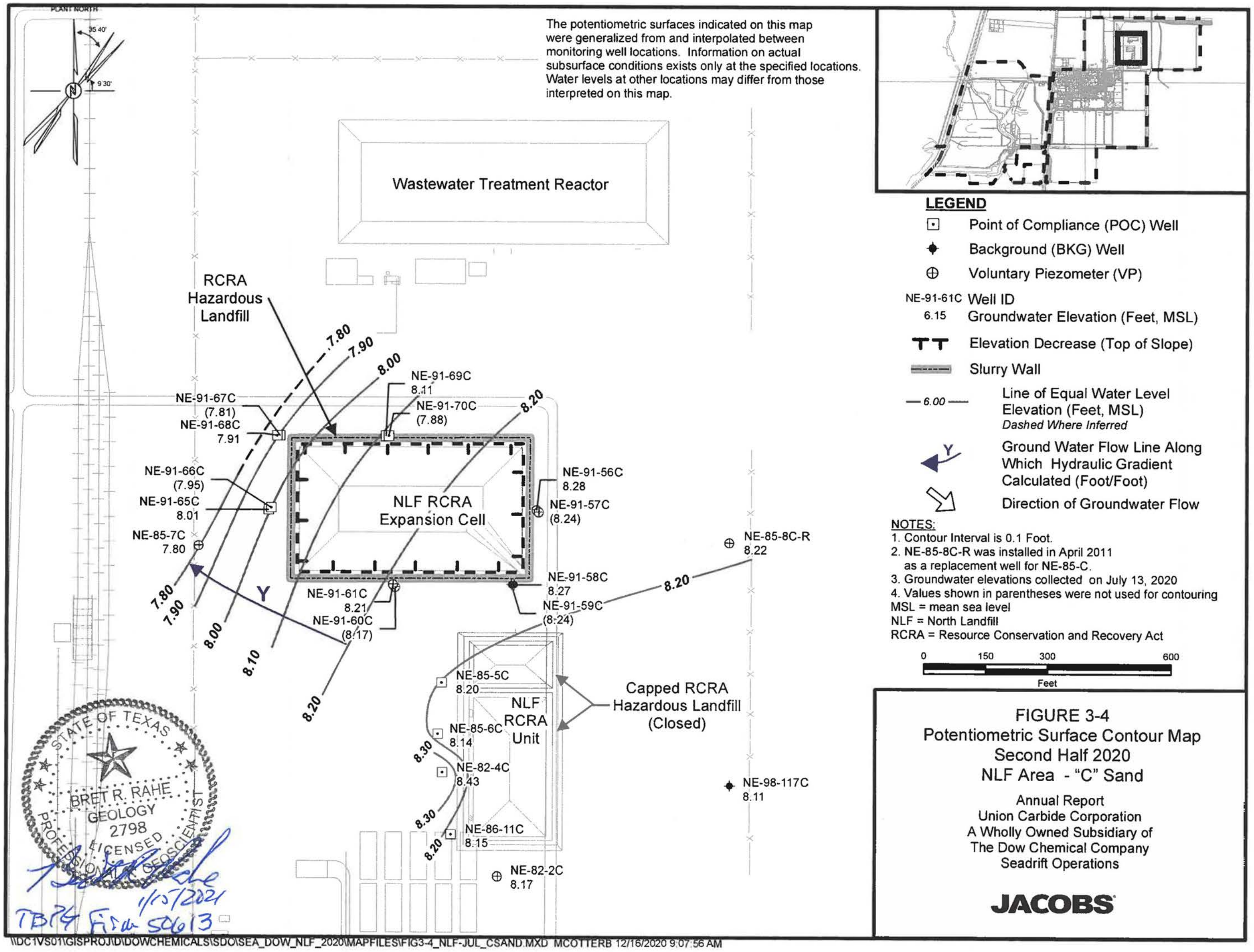
Source: Jacobs, 2022

Figure 2.3.2-22: Generalized Stratigraphic Column of the SDO Site



Source: Jacobs, 2021

Figure 2.3.2-23: NLF "A" Sand Potentiometric Map — 2020



Source: Jacobs, 2021

Figure 2.3.2-24: NLF "C" Sand Potentiometric Map — 2020

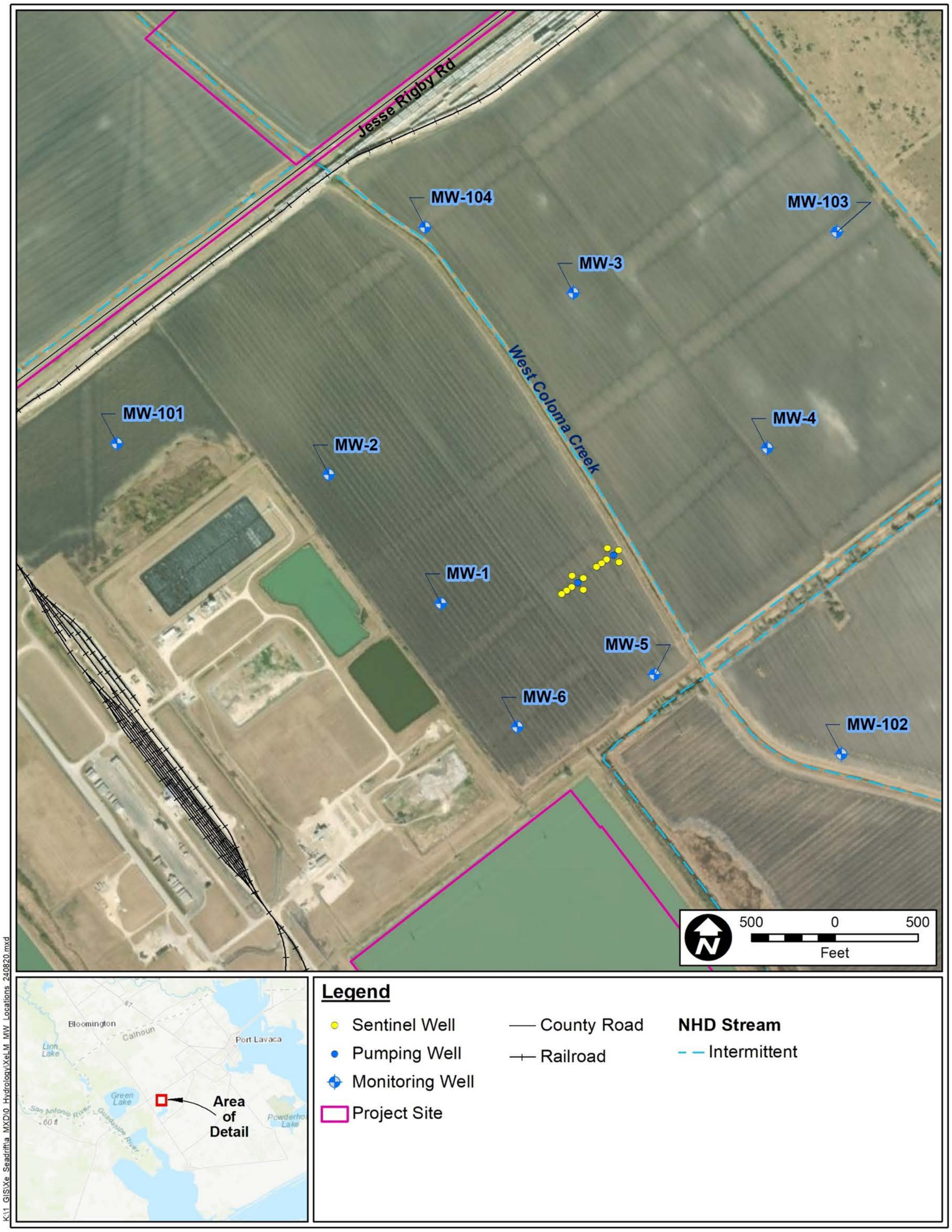


Figure 2.3.2-25: Monitoring Well Locations Developed on the Long Mott Generating Station Site

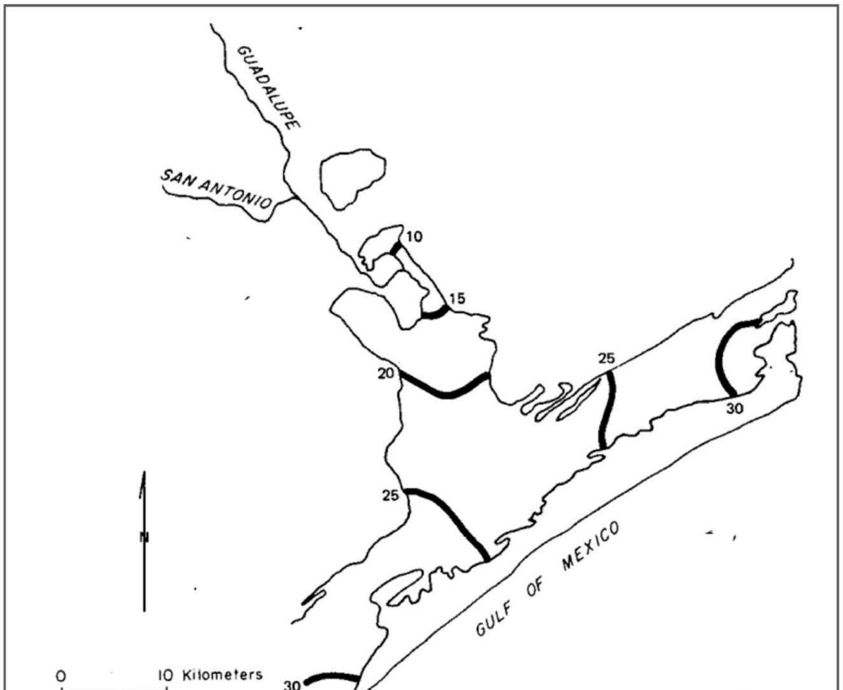


Figure 9-30. Simulated Salinities in The Guadalupe Estuary Under August Freshwater Inflow Needs Alternative I (ppt)

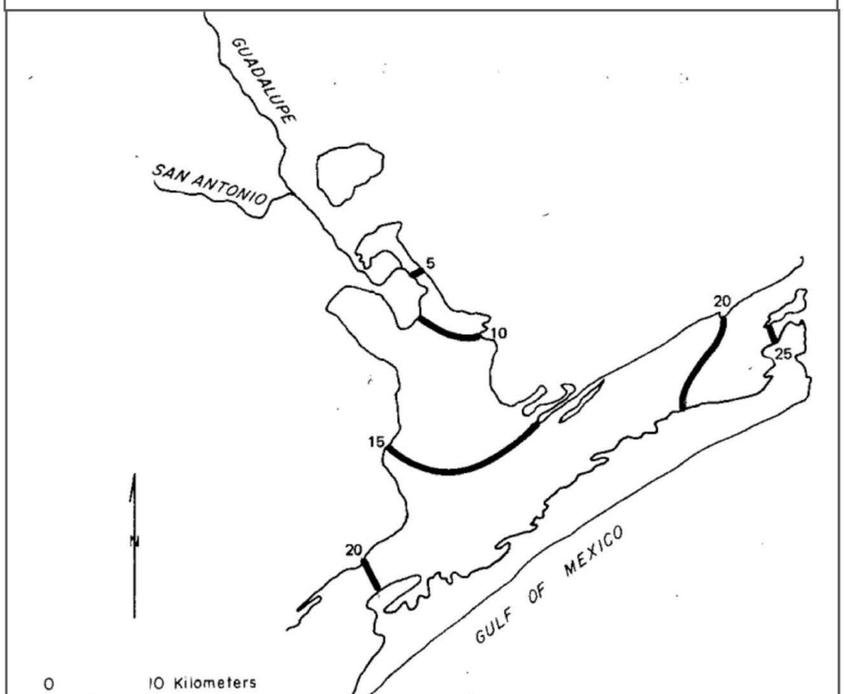


Figure 9-28. Simulated Salinities in The Guadalupe Estuary Under June Freshwater Inflow Needs Alternative I (ppt)

Source: TWDB, 1980

Figure 2.3.2-26: Representative Hydrology Cross Section A-A' on the Long Mott Generating Station Site

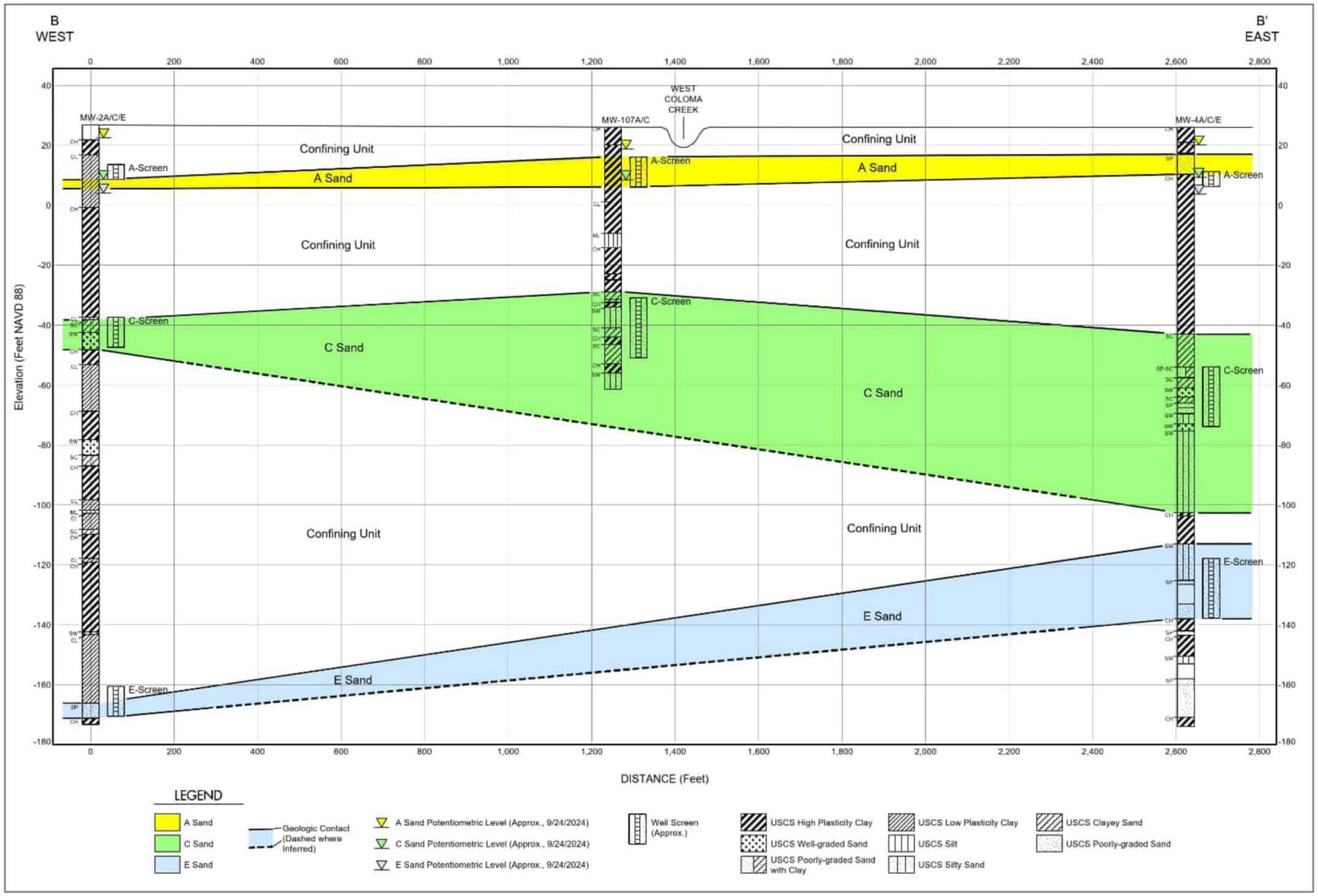


Figure 2.3.2-27: Representative Hydrology Cross Section B-B' on the Long Mott Generating Station Site

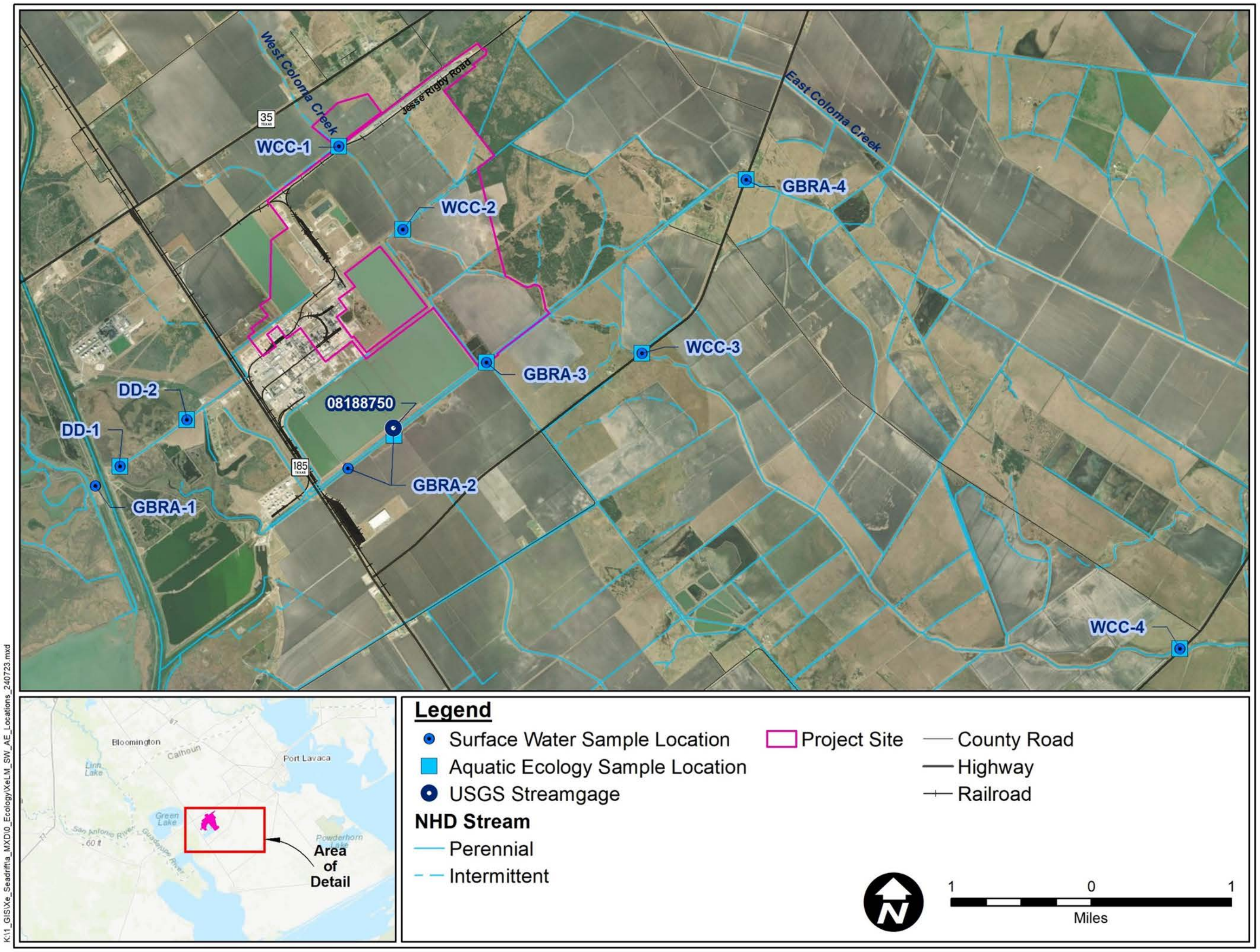


Figure 2.3.2-28: Representative Hydrology Cross Section C-C' on the Long Mott Generating Station Site

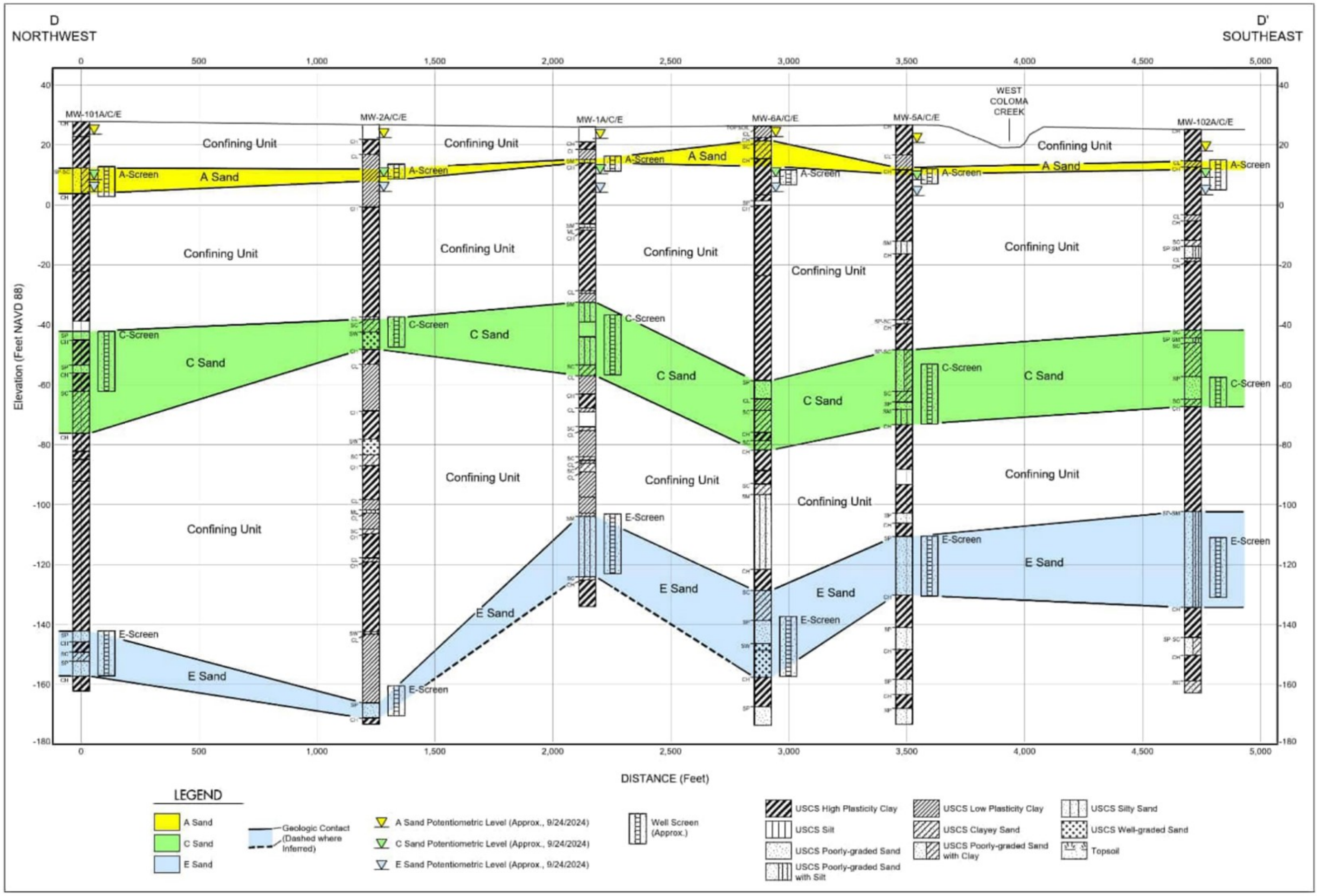
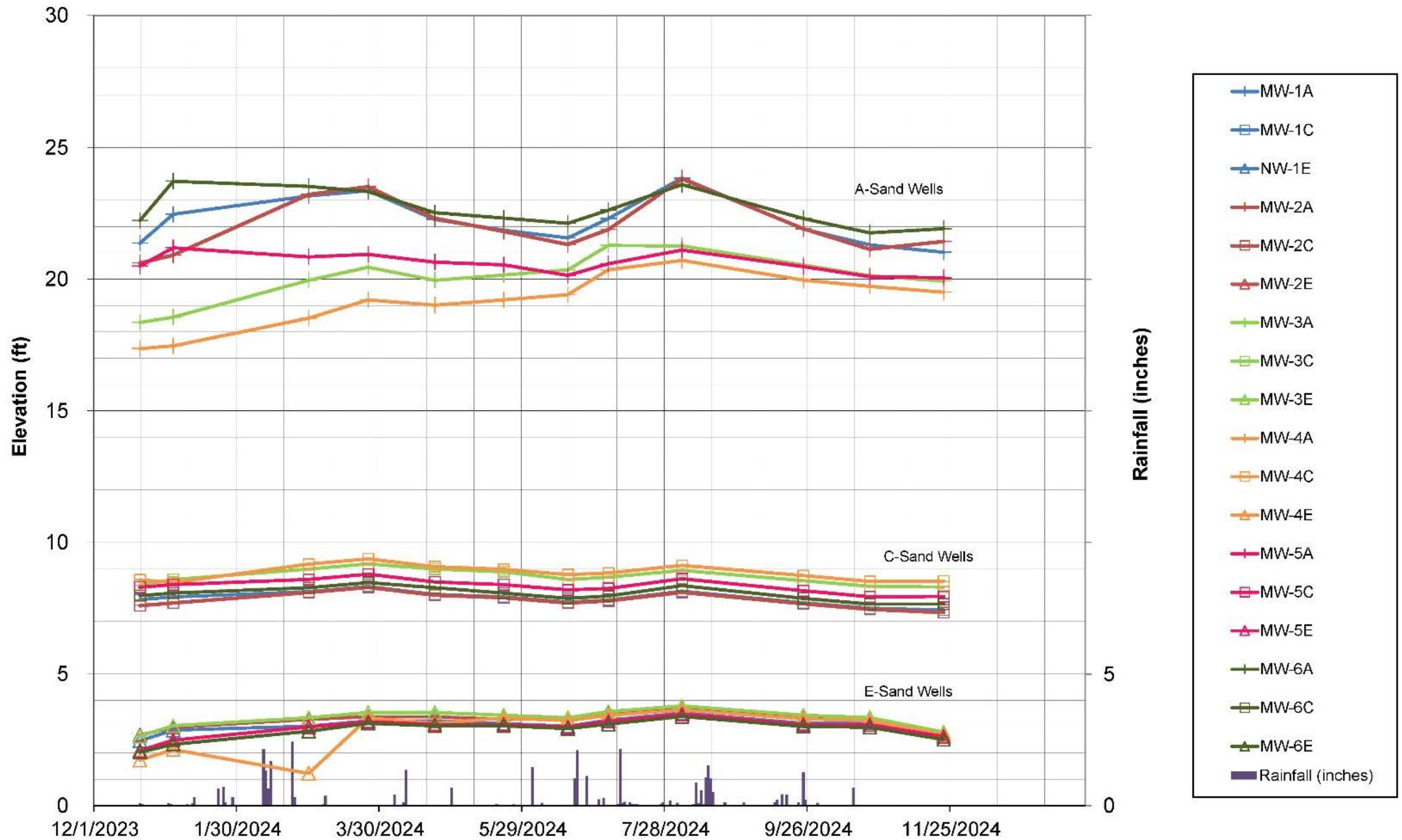
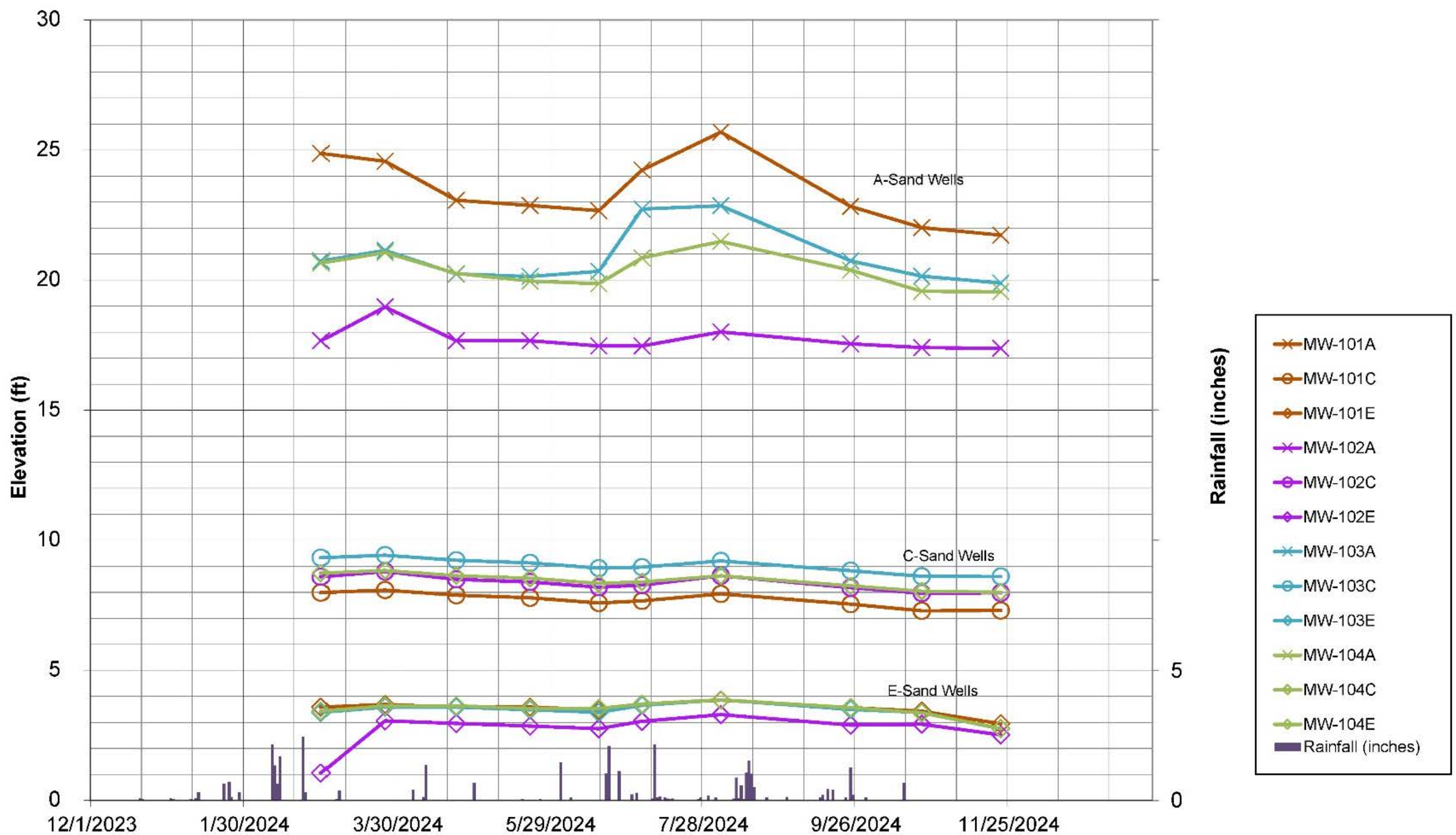


Figure 2.3.2-29: Representative Hydrology Cross Section D-D' on the Long Mott Generating Station Site



Notes:
Elevations based on North American Vertical Datum of 1988 [NAVD88])
ft = feet

Figure 2.3.2-30: Hydrograph of the Long Mott Generating Station Site - MW-1 to MW-6



Notes:
Elevations based on North American Vertical Datum of 1988 [NAVD88])
ft = feet

Figure 2.3.2-31: Hydrographs of the Long Mott Generating Station Site - MW-101 to MW-104

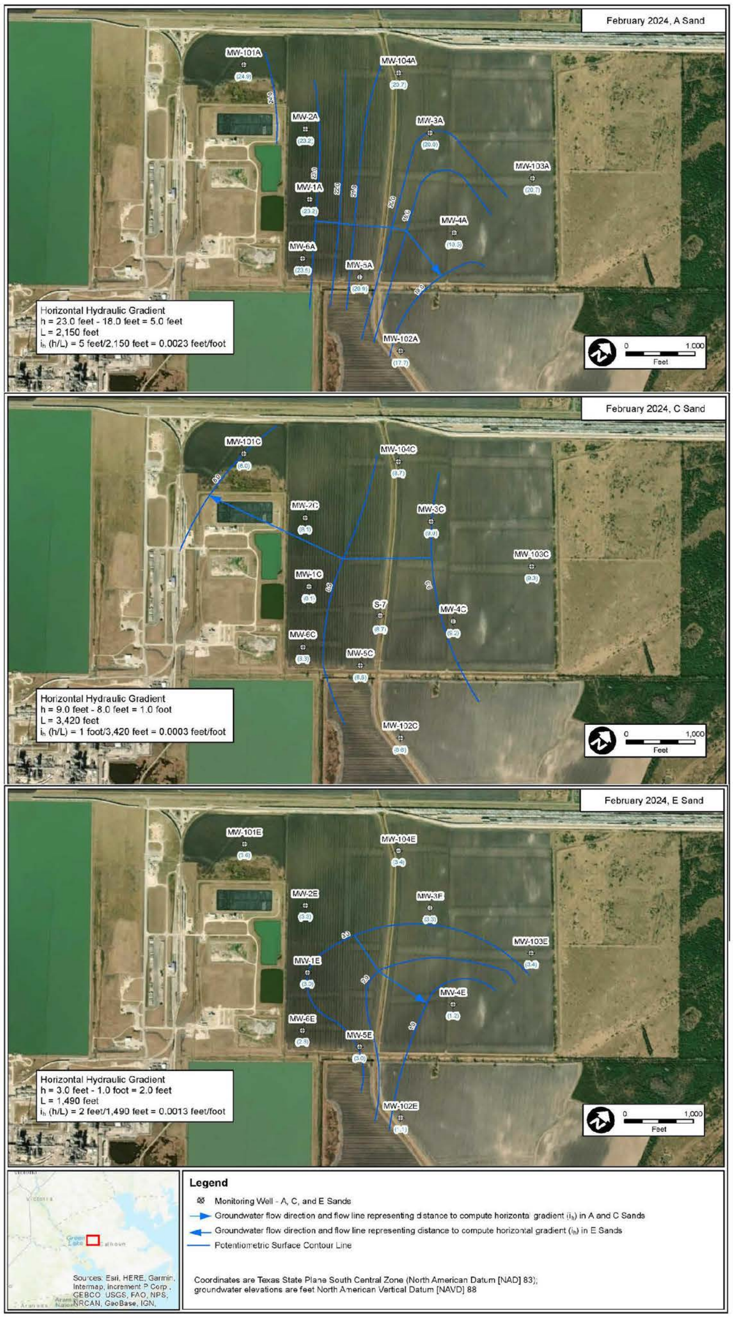


Figure 2.3.2-32: LMGS Site Potentiometric Maps of A, C, and E Sands — Winter 2024

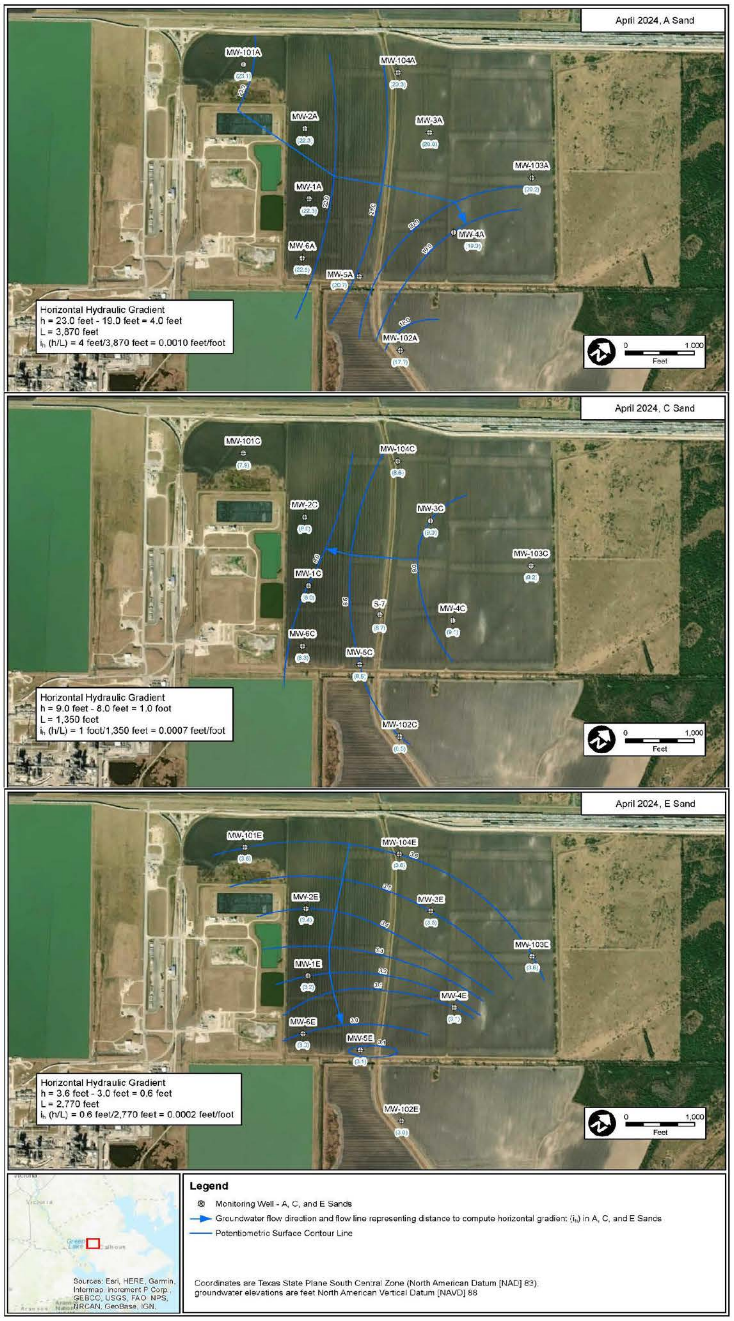


Figure 2.3.2-33: LMGS Site Potentiometric Maps of A, C, and E Sands — Spring 2024

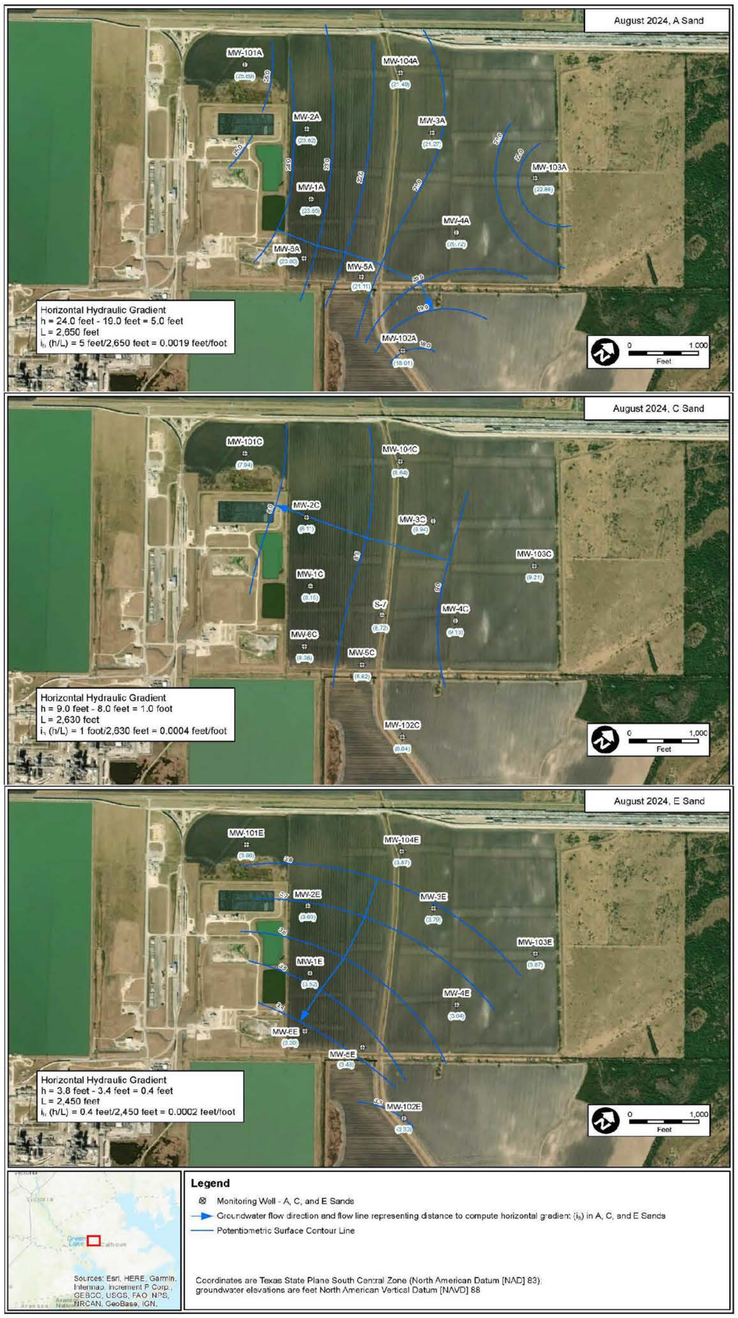


Figure 2.3.2-34: LMGS Site Potentiometric Maps of A, C, and E Sands — Summer 2024

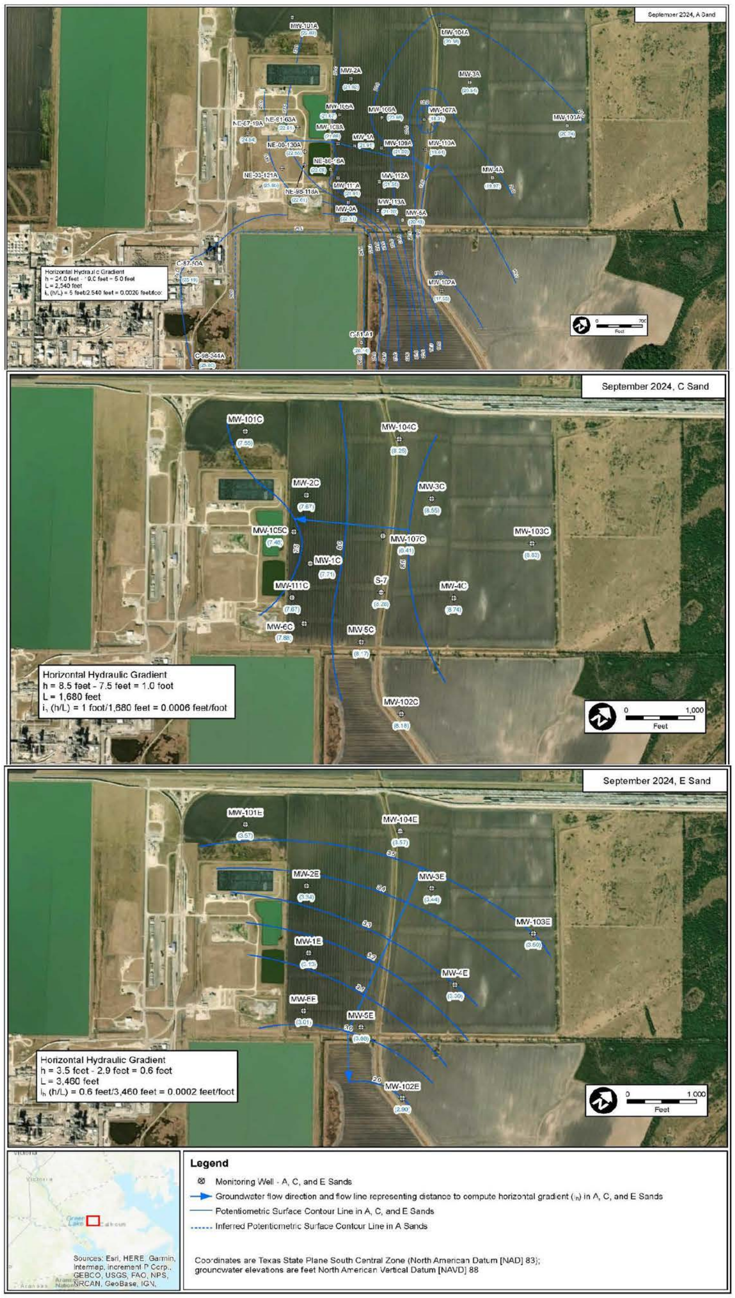


Figure 2.3.2-35: LMGS Site Potentiometric Maps of A, C, and E Sands — Fall 2024

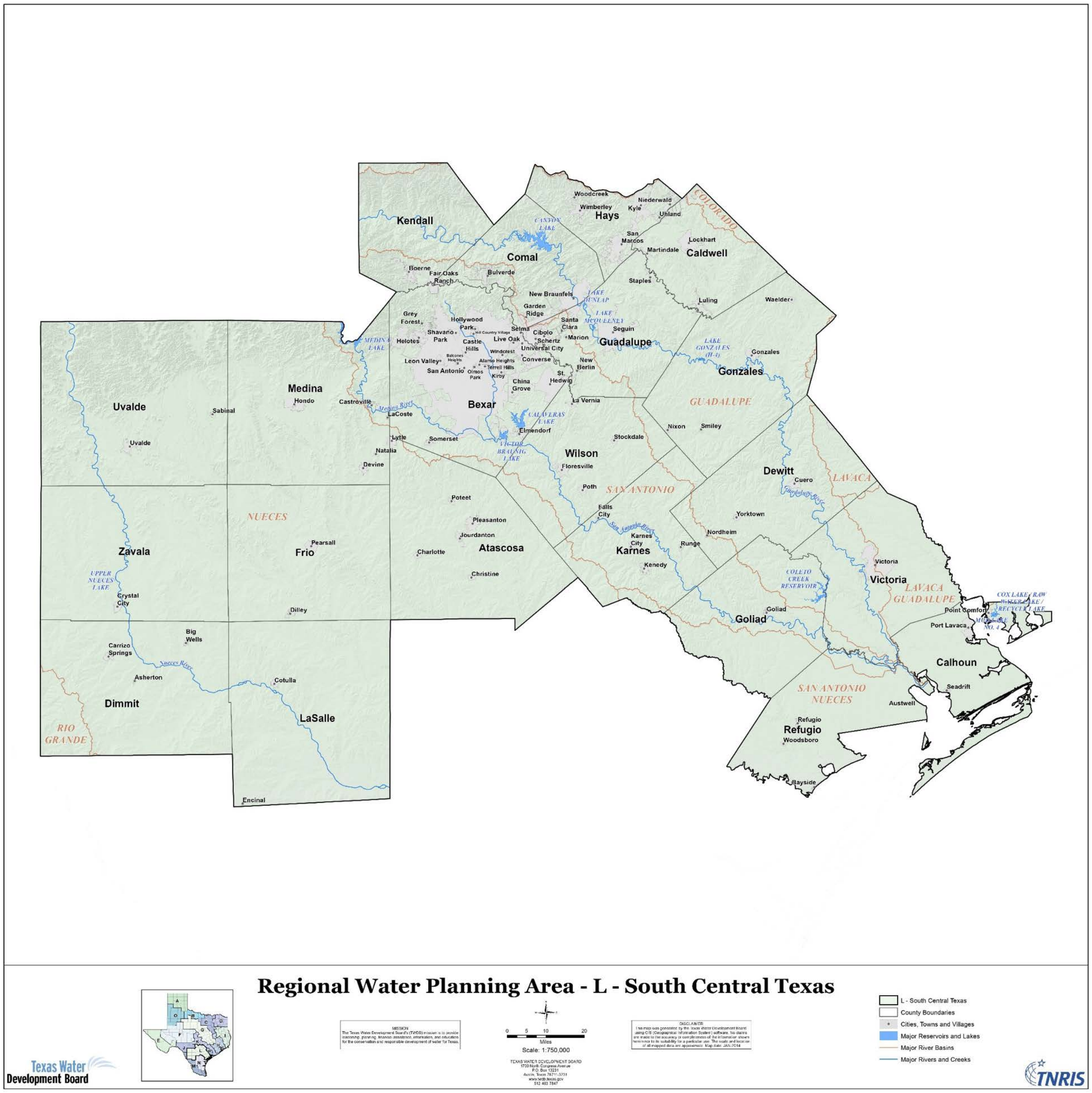


Figure 2.3.2-36: Regional Water Planning Area L

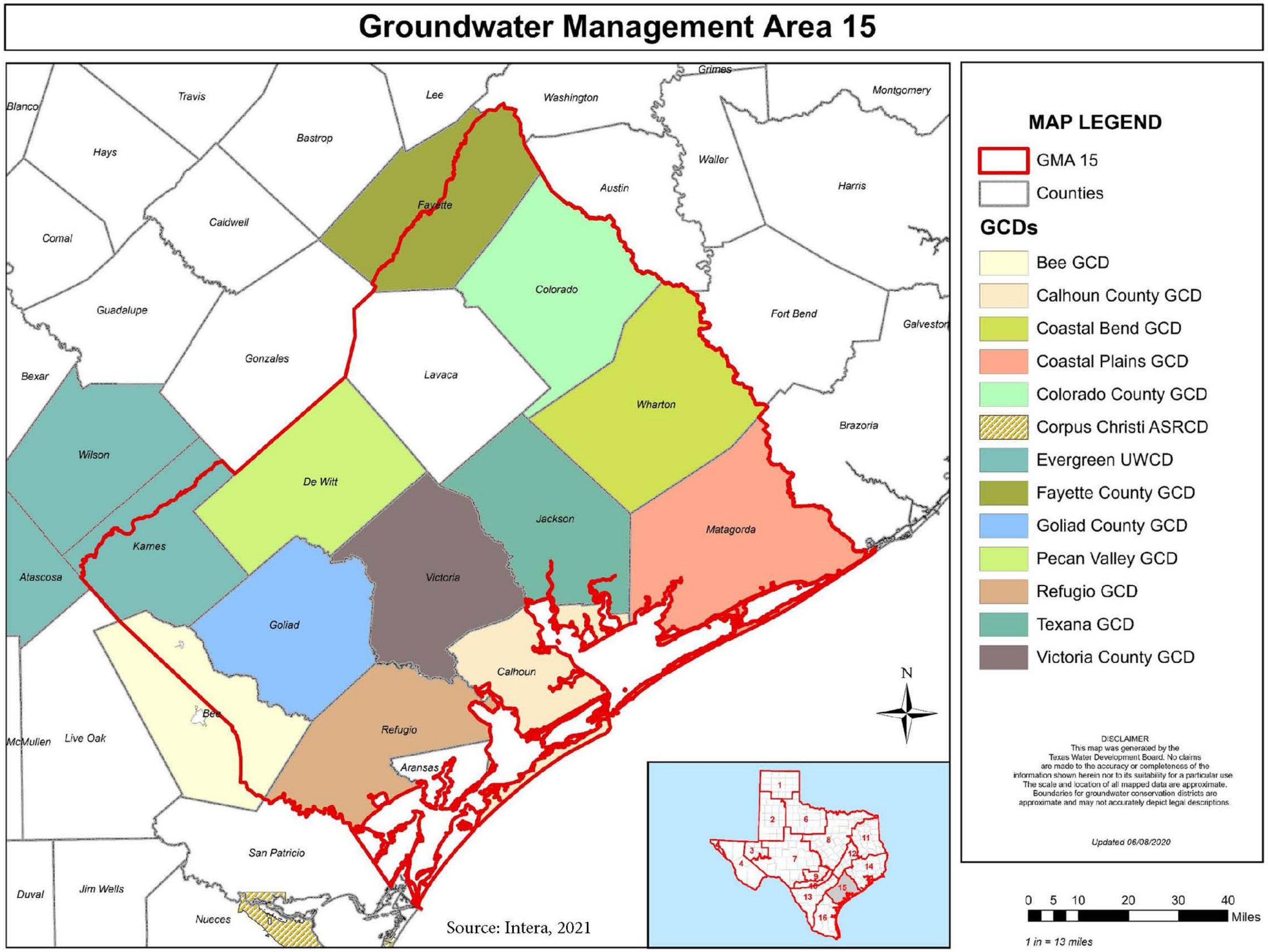


Figure 2.3.2-37: Groundwater Management Area 15

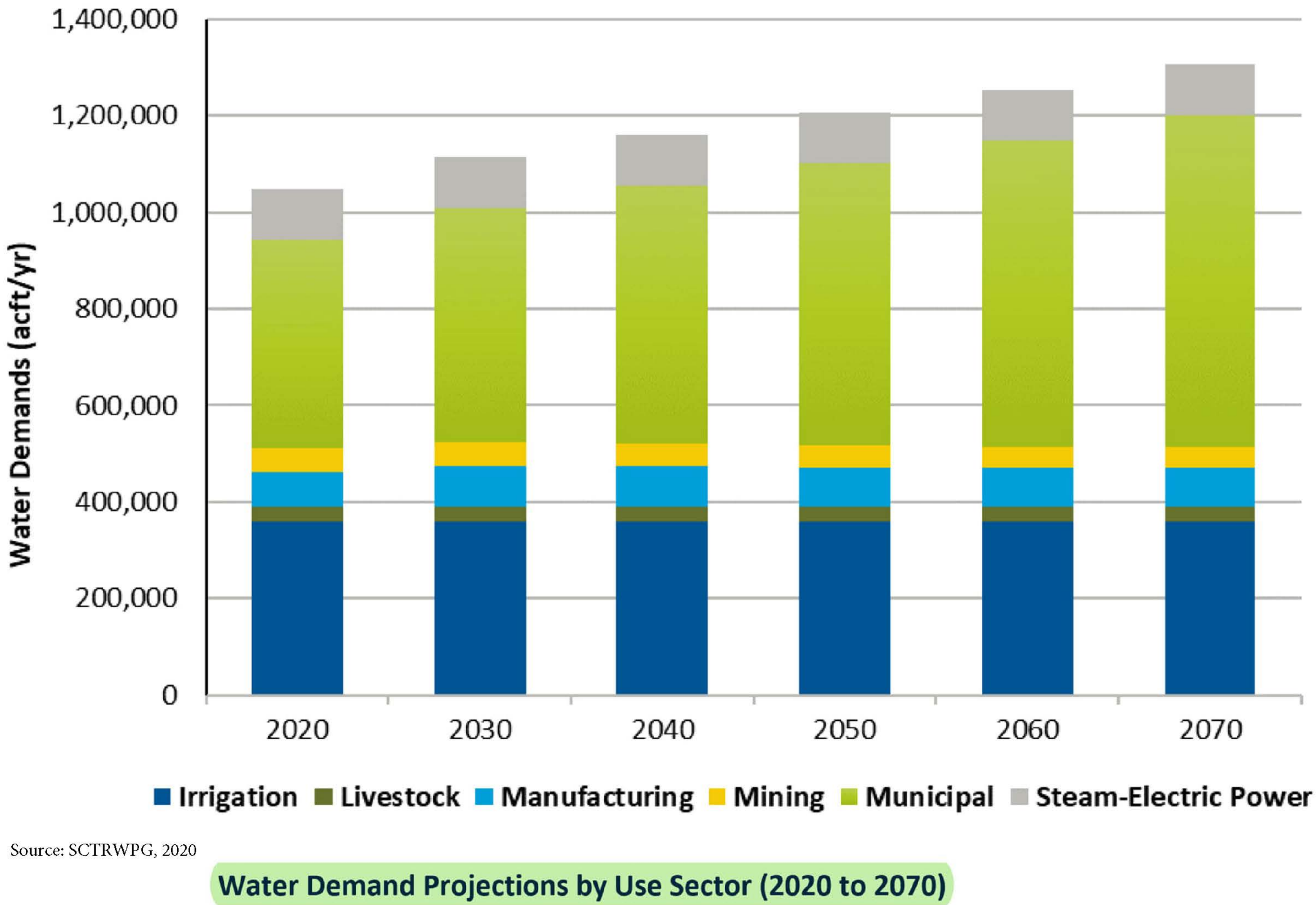


Figure 2.3.2-38: Water Demand Projections from Region L — 2020 to 2070

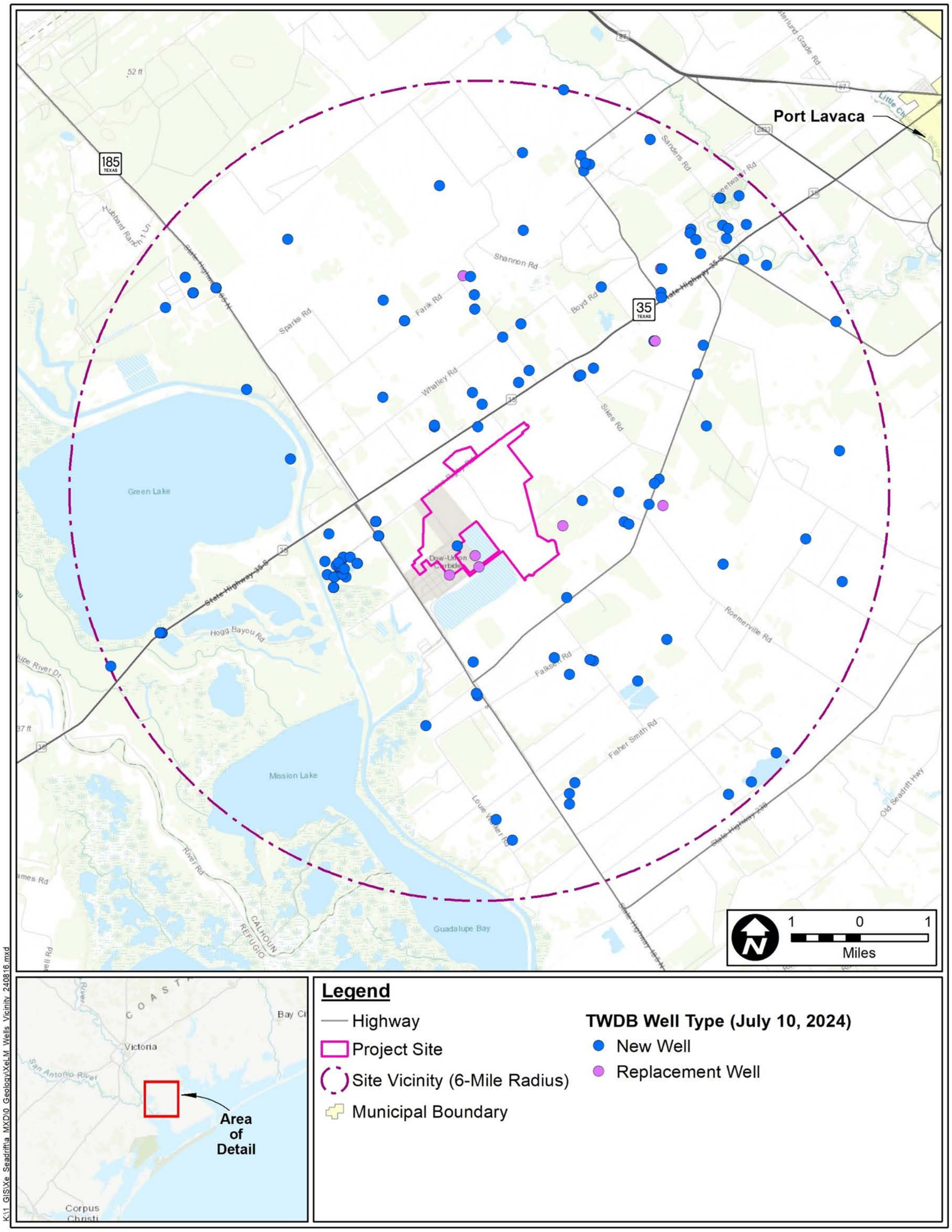


Figure 2.3.2-39: Water Wells Within 6 Mi. (10 Km) Radius of the Long Mott Generating Station

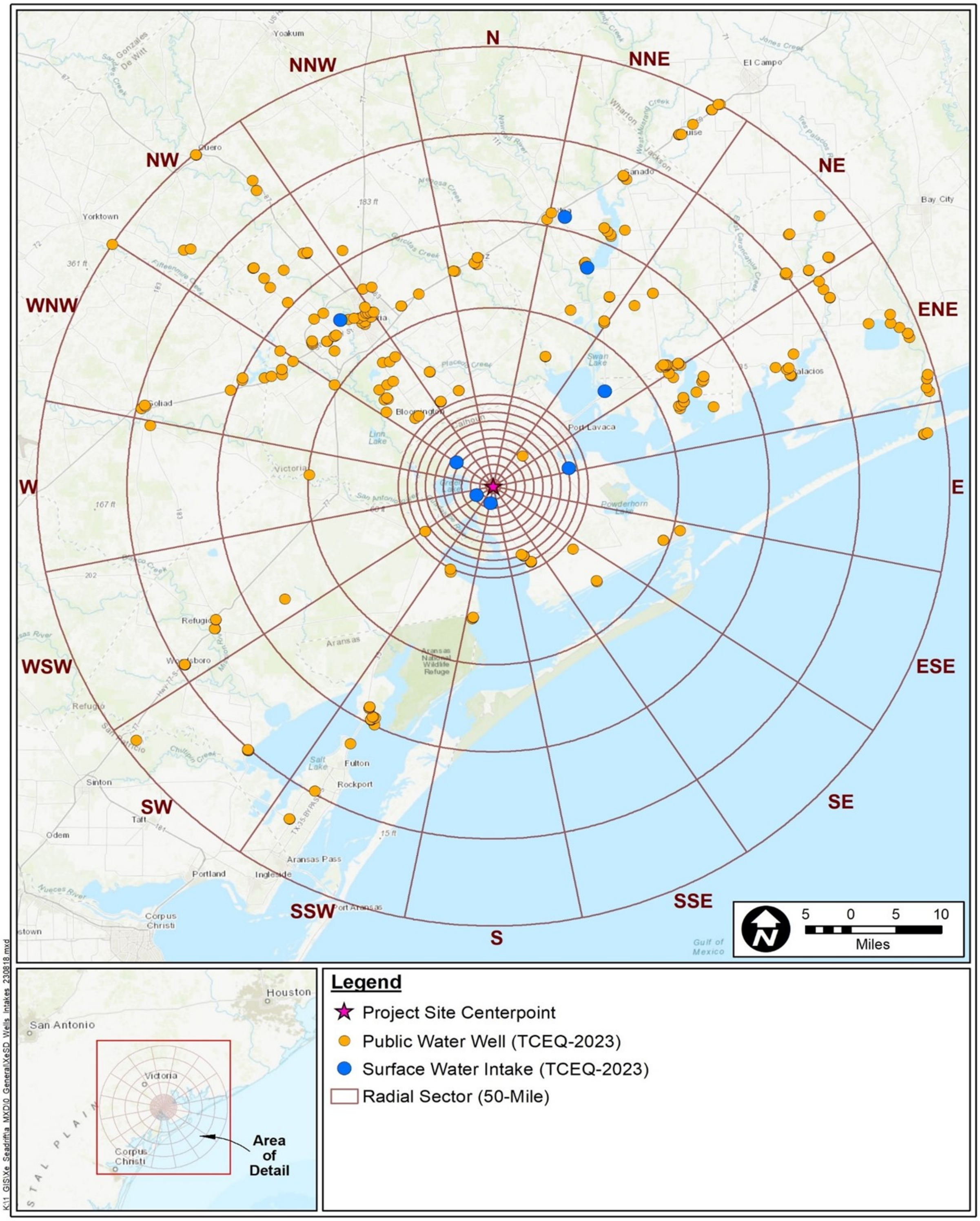


Figure 2.3.2-40: Public Water Supply Wells Near the Long Mott Generating Station

2.4 Ecology

This section describes the terrestrial, wetland, and aquatic ecology of the LMGS site and resources in the LMGS vicinity (6 mi [10 km]) and LMGS region (50 mi [80 km]). Section 2.4.1 describes the potentially affected terrestrial resources, including wetlands, and Section 2.4.2 describes the potentially affected aquatic resources.

2.4.1 Terrestrial Ecology and Wetlands

2.4.1.1 Terrestrial Habitats

Ecoregions are geographic areas that are generally similar in terms of biotic, abiotic, terrestrial, and aquatic ecosystem components. Ecoregions serve as a spatial framework for the monitoring, research, and assessment of ecosystems and their components. The EPA defines ecoregions in hierarchical levels from Level I through Level IV, increasing in detail as the level increases. The EPA maintains the mapping of ecoregions (EPA, 2023a).

Texas is divided into 56 Level IV Ecoregions nested under 12 Level III Ecoregions. The LMGS site and LMGS vicinity are located within the larger Western Gulf Coastal Plain Level III Ecoregion, as depicted in Figure 2.4-1. The Western Gulf Coastal Plain is a relatively flat strip of land adjacent to the Gulf of Mexico and approximately 50 to 90 mi (80 to 145 km) wide. Distinguishing characteristics of this ecoregion include its relatively flat topography and primarily grassland natural vegetation which serve well for croplands. Oil and gas production is common (Griffith et al., 2007).

More specifically, the LMGS site is located within the Northern Humid Gulf Coastal Prairies Level IV Ecoregion (Figure 2.4-1). Northern Humid Gulf Coastal Prairies include gently sloping coastal plain underlaid by quaternary-aged deltaic clays, sands, and silts. Historic vegetation primarily consisted of tallgrass grasslands interspersed with small oak clusters, known as oak mottes or maritime woodlands. Dominant grassland species included little bluestem (*Schizachyrium scoparium*), yellow Indiangrass (*Sorghastrum nutans*), brownseed paspalum (*Paspalum plicatulum*), gulf muhly (*Muhlenbergia capillaris*), and switchgrass (*Panicum virgatum*). However, this ecoregion has a long history of alteration including American Indian occupancy and use of fire, domesticated livestock grazing, agriculture, and conversion to urban areas. Today, most of the coastal prairies have been converted to rangeland, cropland, pasture, or industrial and urban land uses (Griffith et al., 2007).

A topographic map of the LMGS site is provided as Figure 2.2-1. The LMGS site is bisected by West Coloma Creek, and as discussed in Section 2.2, Land, the site is flat, ranging in elevation from approximately 30 ft (9.1 m) in the north to approximately 25 ft (7.6 m) in the south. Lower elevations continue to the Victoria Barge Canal, southwest of the LMGS site. General topography in the LMGS vicinity is characteristic of the Gulf Coastal Plains with gently rolling terrain.

The land cover of the 1537 ac (622 ha) LMGS site is characterized predominantly by cultivated crops (730 ac [295 ha]), followed by herbaceous (442 ac [179 ha]); developed, medium intensity land (196 ac [79 ha]); open water (82 ac [33 ha]); and shrub-scrub (57 ac [23 ha]) (Table 2.4-1 and Figure 2.4-2). As depicted in Figure 2.2-3 and Table 2.4-1, the NLCD indicates that the most prevalent land cover type found within the LMGS vicinity is cultivated crops (34,863 ac [14,109 ha]), followed by hay/pasture (19,496 ac [7890 ha]), open water (11,567 ac [4681 ha]), and emergent herbaceous wetlands (9716 ac [3932 ha]). The NLCD mapped land cover within the LMGS vicinity, as identified in Figure 2.2-3, was ground-verified using drive-by and selected pedestrian surveys.

The dominant land cover type within the LMGS site is cultivated crops, such as corn, which compose the majority of lands within the interior of the site. These areas lack natural vegetation, except for agricultural weeds that are found typically along the field margins, exhibit some resistance to herbicides, and grow well under disturbed conditions. Herbaceous lands, which are the next most prevalent land cover, are composed of a mix of pasture lands, infrequently maintained old fields, and maintained turfgrass found around the developed SDO facility, roadsides, and along canal levees. Nonnative old world bluestem species (*Dichanthium spp.* and *Bothriochloa ischaemum*) and Bermudagrass (*Cynodon dactylon*) dominate herbaceous lands. Developed, medium intensity lands are found within the SDO property and are largely unvegetated, except for small patches of maintained Bermudagrass turf. Shrub-scrub is typically found along fence lines or in heavily grazed livestock pastures and includes species typical of Texas-Louisiana Coastal Prairie systems where natural disturbance regimes have been disrupted and nonnative species have invaded (NatureServe, 2022a).

2.4.1.2 Wetlands

As defined in 33 CFR Section 328.3, wetlands are those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Types of wetlands generally include swamps, marshes, bogs, and similar areas. Wetlands and wetland fringe areas can also be found along the edges of many watercourses and impounded waters (both natural and man-made). Wetland habitat provides valuable public benefits, including flood storage, erosion control, water quality improvement, wildlife habitat, and recreational opportunities (33 CFR Section 320.4[b]).

2.4.1.2.1 Wetlands Within the Long Mott Generating Station Vicinity

Because cultivated crops dominate the land cover within the LMGS vicinity, past agricultural development processes have likely resulted in prior loss of habitats including wetlands. However, wetland complexes within the LMGS vicinity persist and are managed within the low-lying Guadalupe Delta and Mission Lake areas.

According to the USFWS National Wetland Inventory (NWI), approximately 22,188 ac (8979 ha) of wetland, riparian, and deepwater habitats are mapped within the vicinity of LMGS (Figure 2.4-3). Wetland types found in the LMGS vicinity include freshwater emergent wetlands (5961 ac [2412 ha]), estuarine and marine deepwater habitat (3700 ac [1497 ha]), estuarine and marine wetland (1830 ac [741 ha]), freshwater forested/shrub wetland (599 ac [242 ha]), freshwater ponds (553 ac [224 ha]), lakes (7790 ac [3153 ha]), riverine habitat (886 ac [359 ha]), palustrine farmed wetlands (4 ac [1.6 ha]), and freshwater forested/shrub wetland (866 ac [350 ha]) (USFWS, 2023a). Wetland complexes are the predominant cover type southwest of the LMGS site within the lowlands associated with the Guadalupe River, Mission Lake, Goff Bayou, and the Victoria Barge Canal. Within the uplands that surround much of the LMGS site, wetlands are isolated and consist of small herbaceous emergent wetlands.

As previously mentioned in Section 2.2.1 and shown in Figure 2.2-4, special land uses within the LMGS vicinity include the Guadalupe Delta WMA. The Guadalupe Delta area was identified in the 1970s by the USFWS and the TPWD as a wetlands area that should be preserved for protection of wildlife habitat. Important habitat in the Guadalupe Delta WMA includes freshwater marshes subject to flooding from the Guadalupe River and adjacent bayous. Riparian areas along the bayous provide excellent foraging for neotropical songbirds. Wetland-dependent wildlife, especially migratory waterfowl, rely on habitat within the Guadalupe Delta WMA (TPWD, 2023d).

2.4.1.2.2 Long Mott Generating Station Site Wetlands

Wetlands located within the LMGS site are subject to jurisdiction under Section 401 and Section 404 of the CWA (33 United States Code [USC] Section1251). The USACE regulates the discharge of dredged or fill material into waters of the United States (WOTUS), including wetlands, under the CWA Section 404 permit program (33 USC Section 1344). Under Section 401 of the CWA, a Section 401 Water Quality Certification (WQC) is required for any project requiring a federal permit or license for activities that may result in any discharge into navigable waters. In Texas, the Section 401 WQC is issued by the TCEQ, which affirms that the discharge would not violate Texas water quality standards.

Screening of wetland habitats on the LMGS site initially involved a review of the USGS topographic map, NWI map, Natural Resources Conservation Service (NRCS) soil survey map, FEMA Flood Insurance Rate Map, and current and historic aerial photography.

Subsequently, a field survey was performed May 22 to May 25 and August 15, 2023, within the LMGS site. Field identifications of potential WOTUS were performed in accordance with the USACE Wetlands Delineation Manual (USACE, 1987) and Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0) (USACE, 2010). According to the 1987 Manual and Regional Supplement, the presence of sufficient hydrology, hydrophytic vegetation, and hydric soils determines what areas are classified as wetlands on the LMGS site.

Characteristics of each of the 17 areas on-site that were observed to qualify as wetlands in accordance with the Regional Supplement, including classification, acreage, and potential regulation status, are summarized in Table 2.4-2. The locations of each of these wetland features are shown on Figure 2.4-4. One of the 17 wetlands is classified as palustrine scrub-shrub (PSS) and the other 16 are classified as palustrine emergent (PEM) wetlands (Cowardin et al.,1979).

Two wetlands, SD-WET-14 and SD-WET-15, totaling 0.78 ac (0.32 ha), are potentially subject to regulation under the CWA due to their connection to West Coloma Creek. SD-WET-14 is a PEM wetland, totaling 0.61 ac (0.25 ha). The wetland is located within an excavated drainage swale that flows into West Coloma Creek. Longtom (*Paspalum denticulatum*) and swamp smartweed (*Persicaria hydropiperoides*) are the dominant plant species within the wetland. SD-WET-15 is a PEM wetland, totaling 0.17 ac (0.07 ha). The wetland is located within an excavated drainage ditch that flows into West Coloma Creek. Longtom and Bermudagrass are the dominant plant species within this wetland.

The remaining 15 wetlands documented on-site, totaling 26.03 ac (10.53 ha), are considered not regulated. In general, emergent wetlands are associated with ditch features found throughout the LMGS site. Ditches that hold water semipermanently include hydrophytic species like southern cattail (*Typha latifolia*) and water hyssop (*Bacopa monnieri*) along with other hydrophytic terrestrial species, including black willow (*Salix nigra*), sandbar willow (*Salix interior*), common reed (*Phragmites australis*), possumhaw (*Ilex decidua*), halberdleaf rosemallow (*Hibiscus laevis*), winged loosestrife (*Lythrum alatum*), dwarf palmetto (*Sabal minor*), buttonbush (*Cephalanthus occidentalis*), and Chinese tallow (*Triadica sebifera*). Ditches that remain dry for much of the year are typically less diverse and are largely dominated by longtom. One wetland, SD-WET-08, is a PSS wetland totaling 3.29 ac (1.33 ha). The wetland is supported by a depressional area that drains adjacent cropland. Common herbaceous species within the wetland include sand spikerush (*Eleocharis montevidensis*), longtom, and Bermudagrass. Eastern baccharis (*Baccharis halmifolia*) is a common shrub species observed within the wetland.

WOTUS are subject to the regulatory authority of the USACE pursuant to Section 404 of the CWA. These recommendations for potential regulatory features are preliminary and are subject to regulatory jurisdictional determination by the USACE, after permit application submission concurrent with U.S. Nuclear Regulatory Commission (NRC) consultation.

2.4.1.3 Wildlife

To document seasonal wildlife use of the LMGS site and the immediate LMGS vicinity, seasonal pedestrian surveys were conducted during winter (February 13-15, 2023), spring (May 22-25, 2023), summer (August 15-17, 2023), and fall (November 6-9, 2023). Pedestrian surveys were conducted using a semi-quantitative meandering approach along an established walking route to record encountered terrestrial faunal species presence (visual, audible, or other signs such as tracks, scat, nests) within each of the on-site habitats (Figure 2.4-5). A general pedestrian site reconnaissance was also conducted each season for other portions of the LMGS site outside of the established walking routes. The field studies for wildlife included surveys for avifauna, mammals, and herpetofauna.

Additionally, a semi-quantitative roadside survey approach was used to make observations of terrestrial faunal species at prescribed stops along existing roads within the LMGS vicinity

(Figure 2.4-5). At each of the 41 stops, field observers recorded birds observed (visible and audible cues) during a 3-minute period for two mornings per seasonal survey period. Observations were initiated within one hour of sunrise each day.

Prescribed stops were generally spaced 0.5 mi (0.8 km) apart. Some stopping points focused on potential habitat features, such as vegetation changes, stream corridors, and waterbodies, and ranged from 1701 to 4108 ft (518 to 1252 m) apart. Notable wildlife travel corridors (if any) were also documented. Incidental observations of wildlife species and habitats outside the LMGS site were also recorded opportunistically through general reconnaissance within the LMGS vicinity.

As described in Section 2.4.1.1, the terrestrial communities and associated habitats within the LMGS site are composed of a predominance of disturbed and previously disturbed communities consisting of agricultural lands, developed uses, and marginal scrub-shrub habitats. Wildlife habitat value and the associated wildlife communities are therefore limited on the LMGS site with the exception of residual terrestrial wildlife communities along the periphery of the site that may contain more complex plant communities.

Similarly, wetlands and other habitats that are valuable as breeding and nesting areas for wildlife are not prevalent within the LMGS site. As such, the wildlife landscapes and habitats within the LMGS site are of low value for wildlife. More natural landscapes associated with the Guadalupe River and Guadalupe Delta WMA of the LMGS vicinity are well outside of the LMGS site. Additionally, wildlife movement and migratory corridors are more established and valuable within the Guadalupe River, the associated Guadalupe River riparian corridor, and the Guadalupe Delta WMA than they are on the LMGS site.

Further discussion on LMGS site wildlife travel corridors is provided in Section 2.4.1.8. Because of the highly disturbed and impacted nature of the landscapes on the LMGS site, there is no subsistence use or recreational hunting on the site.

2.4.1.3.1 Avifauna

Field studies for avian species included pedestrian meandering and general field reconnaissance and roadside survey methods. Table 2.4-3 documents the avifauna species observed on the LMGS site throughout all survey periods. Table 2.4-4 documents the avifauna species observed in the LMGS vicinity. Man-made basins on the SDO site are constructed water features that are used for operational water supply. Nonetheless, environmental analysis of effects related to biological communities evaluated in Chapter 5 includes consideration of potential effects via impingement/entrainment associated with the LMGS-specific intake structure on Basin #5.

A total of 56 species were observed during the winter 2023 surveys, including 17 species as part of the surveys within the LMGS site, 46 species observed along LMGS vicinity driving routes, and 27 species as part of the LMGS vicinity general reconnaissance. Abundant and common bird species observed during winter 2023 LMGS site field surveys included red-winged blackbird (*Agelaius phoeniceus*) and turkey vulture (*Cathartes aura*).

A total of 72 bird species were observed during the spring 2023 surveys, including 36 species as part of the surveys within the LMGS site, 58 species observed along the LMGS vicinity driving routes, and 30 species as part of the LMGS vicinity general reconnaissance. Abundant and common bird species observed during spring 2023 LMGS site field surveys included red-winged blackbird, Northern cardinal (*Cardinalis cardinalis*), turkey vulture, Northern mockingbird (*Mimus polyglottos*), brown-headed cowbird (*Molothrus ater*), and cave swallow (*Petrochelidon fulva*).

A total of 60 species were observed during the summer 2023 surveys, including 33 species as part of the surveys within the LMGS site, 42 species observed along LMGS vicinity driving routes, and 37 species as part of the LMGS vicinity general reconnaissance. Abundant and common bird species observed during summer 2023 LMGS site field surveys included red-winged blackbird, turkey vulture, great-tailed grackle (*Quiscalus mexicanus*), and mourning dove (*Zenaida macroura*).

A total of 57 bird species were observed during the fall 2023 surveys, including 20 species as part of the surveys within the LMGS site, 46 species observed along LMGS vicinity driving routes, and 43 species as part of the LMGS vicinity general reconnaissance. Abundant and common bird species observed during fall 2023 LMGS site field surveys included red-winged blackbird, Northern cardinal, killdeer (*Charadrius vociferus*), black vulture (*Coragyps atratus*), brown-headed cowbird, savannah sparrow (*Passerculus sandwichensis*), great-tailed grackle, northern rough-winged swallow (*Stelgidopteryx serripennis*), European starling (*Sturnus vulgaris*), and mourning dove.

Regional data concerning occurrence of birds during the breeding season are derived during the annual North American Breeding Bird Survey, which is a long-term international avian monitoring program started in 1966. These surveys are conducted in June each year and are 24.5 mi (39 km) long with 3-minute stops every 0.5 mi (0.8 km) to document avian species present within 0.25 mi (0.40 km) (USGS EESC, 2023a). The closest breeding bird survey route to the LMGS site is Indianola (Number 83013). The Indianola route starts to the southeast of the LMGS site around the Aransas National Wildlife Refuge and proceeds in a northwest direction, ending just east of Green Lake (USGS EESC, 2023b). Fifty-three avian species were observed during the latest (2022) breeding bird survey along this route. The most abundant avian species observed included red-winged blackbirds, laughing gulls (*Leucophaeus atricilla*), great-tailed grackles, cave swallows, and mourning doves (USGS EESC, 2023c).

The Christmas Bird Count (CBC) is a community science initiative started in 1900 to measure avian diversity during the winter period. CBCs occur between December 14 and January 5 each year, and a compiler chooses a single calendar day to count birds within a predetermined 15 mi (24 km) diameter circle. Count volunteers follow specified routes through the circle, counting every bird they see or hear all day (Audubon, 2023a). The nearest CBC to the LMGS site is the Guadalupe River Delta – McFaddin Family Ranches (Code TXGF). This CBC encompasses the LMGS site and is entered on the northwest corner of Green Lake (Audubon, 2023b). The number of avian species observed during the TXGF CBC from 2004 through 2022 ranged from 192 to 225 species. During the latest CBC (2022), 202 species were observed

(Audubon, 2023c). This was the third-highest bird count north of the United States – Mexican border for the CBC (LeBaron, 2023).

Large trees typically used for raptor nesting are limited within the LMGS site, and no raptor nests were observed within the LMGS site during seasonal ecology field surveys. Waterfowl and water-dependent bird species were observed in close association with the LMGS vicinity wetland complexes near Green Lake and Mission Lake.

One state threatened bird, the white-tailed hawk (*Geranoaetus albicaudatus*) was observed on the LMGS site and within the LMGS vicinity, and another state threatened bird, the wood stork (*Mycteria americana*), was observed in the LMGS vicinity during the summer of 2023. Bald eagle (*Haliaeetus leucocephalus*), identified by the USFWS as a migratory bird of conservation concern and protected under the Bald and Golden Eagle Protection Act, was observed within the LMGS vicinity, but no raptor nests were observed. No bird species listed under the Endangered Species Act (ESA) were observed during field surveys in the LMGS site or LMGS vicinity. Information on important species follows in Section 2.4.1.5.

2.4.1.3.2 Mammals

Field studies for mammal species included general field reconnaissance and incidental observations during pedestrian surveys. The list of mammals observed within the LMGS vicinity and on LMGS site is in Table 2.4-5. Information on species of commercial or recreational value follows in Section 2.4.1.5.

Mammal species observed in the LMGS site included coyote (*Canis latrans*), opossum (*Didelphis virginiana*), white-tailed deer (*Odocoileus virginianus*), raccoon (*Procyon lotor*), feral hog (*Sus scrofa*), eastern cottontail (*Sylvilagus floridanus*), groundhog (*Marmota monax*), and striped skunk (*Mephitis mephitis*).

Mammal occurrence in the LMGS site is likely driven by various habitats (developed lands, cultivated crops, herbaceous, scrub/shrub, open water, and fragmented forest) and previous disturbance within and surrounding the LMGS site. Within the LMGS vicinity, additional mammal species, such as beaver (*Castor canadensis*), armadillo (*Dasypus novemcinctus*), and nutria (*Myocastor coypus*), were observed during LMGS site-specific surveys.

At the site previously considered by Exelon Generation for development of a new nuclear power plant (i.e., the Victoria County Station site located approximately 17 mi (27 km) west of the LMGS site), small mammal surveys were conducted during April and May of 2008. Survey methods included Sherman live traps, remote game cameras and scent stations, spotlight surveys, and mist netting. Sixteen total mammal species were observed, with the greatest diversity found in bluestem grasslands followed by depressional wetlands. Abundant mammals included Attwater’s pocket gophers (*Geomys attwaterii*), white-tailed deer, raccoon, fox squirrel (*Sciurus niger*), and cotton rat (*Sigmodon hispidus*) (Exelon Generation, 2012a).

2.4.1.3.3 Herpetofauna

Herpetofauna were recorded based on general field reconnaissance and incidental observations during the ecological surveys. The list of herpetofauna species observed within and near the LMGS site is recorded in Table 2.4-6.

Herpetofauna species encountered on the LMGS site included American alligator (Alligator mississippiensis), Gulf Coast toad (*Incilius nebulifer*), American bullfrog (*Lithobates catesbeianus*), diamondback watersnake (*Nerodia rhombifer*), five-lined skink (*Plestiodon fasciatus*), Gulf Coast ribbon snake (*Thamnophis proximus orarius*), garter snake (*Thamnophis sirtalis*), and red-eared slider (*Trachemys scripta elegans*). Within the LMGS vicinity, additional herpetofaunal species were observed during the LMGS site-specific surveys including cottonmouth (*Agkistrodon piscivorus*), spiny softshell turtle (*Apalone spinifera*), Texas spiny lizard (*Sceloporus olivaceus*), and common snapping turtle (*Chelydra serpentina*).

At the nearby Victoria County Station site, herpetofauna surveys were conducted in May 2008. Survey methods included timed searches of various habitat types, audible call counts, funnel traps, and a nocturnal road cruise. Twenty-two herpetofauna species were observed, with the greatest diversity found in depressional wetlands. Abundant herpetofauna included southern leopard frog (*Rana sphenocephala*) and diamondback watersnake (Exelon Generation, 2012a).

2.4.1.3.4 Insects

Most of the LMGS site has been significantly impacted by either industrial land uses or by current and past agricultural practices that have significantly degraded the potential habitat for plant species richness, and thus insect pollinators. The large areas of single-species cropland, which are subject to pesticide applications as a part of normal agricultural activities, as well as maintenance activities within the existing SDO facility, limit habitat suitability for insect diversity. No insect studies were conducted as a part of site characterization work at the LMGS site.

2.4.1.4 Plant Communities

Vegetation assessment of the LMGS site included pedestrian surveys to record plant species encountered on the LMGS site, characterize plant communities present, and verify land cover. Surveys were conducted in the spring (May 22-25, 2023), summer (August 15-17, 2023), and fall (November 7-8, 2023). No vegetation surveys were conducted during the dormant winter months.

To effectively characterize plant communities on the LMGS site, the relative abundance of each species occurring within each distinctive NLCD land cover type was assessed. Each unique plant community observed within individual land cover types is described. Plant community descriptions are based on dominant and characteristic species observed. Landcover types and parcels assessed as part of the vegetation assessment are illustrated in Figure 2.4-2. Relative abundance of each species recorded through a terrestrial meandering approach within the LMGS site was assessed qualitatively. Plant species abundance was visually scored for each vegetation layer (overstory, midstory, herbaceous, woody vine) based on the professional judgment of the field biology team using the following commonly used relative abundance categories:

- A: abundant (the dominant plants throughout the study area)
- C: common (locally abundant or frequently encountered)
- O: occasional (occasionally encountered, or locally common but absent or infrequent across much of the study area)
- U: uncommon (infrequently encountered)
- R: rare (very few plants encountered)

Qualitative characteristics of habitats near the LMGS site and their associated flora were also recorded opportunistically via windshield surveys where accessible. Particular attention was given to identifying important species and habitats as defined in Standard Review Plans for Environmental Reviews for Nuclear Power Plants: Environmental Standard Review Plan (NUREG-1555), Section 2.4.

The plant communities found throughout the LMGS site are common and well represented throughout the local region. These communities contain substantial populations of nonnative plant species and successional communities, both of which indicate significant past anthropogenic disturbance, nonnative species invasion, and a disruption to natural disturbance patterns (i.e., fire). Vegetation in the LMGS site is contained within the Texas – Louisiana Coastal Prairie (CES203.550) (NatureServe, 2022b) ecological system concept. This system is typical of the Pleistocene aged Beaumont Formation, which underlies the local region, and in its natural state is tall grass prairie. While remnant indicator species of intact coastal prairie structure remain within the LMGS site to a very limited extent, existing vegetation reflects significant human-driven land use change and habitat degradation. The rectangular pasture south of the railyard in the east portion of the LMGS site represents the most intact natural vegetation community on-site even though this portion is significantly disturbed and invaded by nonnative species.

Vegetation descriptions are contextualized within NLCD land cover types of the LMGS site modified based on field observations (Table 2.4-1). Species observed during the pedestrian surveys are summarized in Table 2.4-7. Qualitative descriptions of plant communities are included below, including dominant (abundant or common relative abundance) species occurring in any of the strata (tree, shrub, and herb layers).

The key characteristics of land cover types and the diversity of plant associations found within each type identified within the LMGS site are described in the following subsections.

2.4.1.4.1 Cultivated Crops

Cropland (730.2 ac [295.5 ha]) is the most extensive land cover type found within the LMGS site and is generally positioned within large open upland plains within the interior of the site.

Row crops of corn occur as a monoculture within actively cropped areas of agricultural fields. Other crops on the LMGS site include grain sorghum, cotton, and soybeans. However, along the fringes of cropped fields, a frequently disturbed ruderal herbaceous community can be sporadically found. Within these naturally vegetated areas, weedy species like Brazilian vervain (*Verbena brasiliensis*), broadleaf signalgrass (*Urochloa platyphylla*), browntop signalgrass (*Urochloa fusca*), Johnsongrass (*Sorghum halepense*), creeping woodsorrel (*Oxalis corniculata*), cutleaf evening primrose (*Oenothera laciniata*), and plains coreopsis (*Coreopsis tinctoria*) dominate.

2.4.1.4.2 Evergreen Forest

Evergreen forest (2.2 ac [0.89 ha]) is present within portions of the southeastern corner of the LMGS site where scattered patches of live oak (*Quercus fusiformis*) mottes are found within a scrub-shrub dominated matrix of livestock grazed lands. This vegetation community is positioned along a low swale at the toe of West Coloma Creek's east flanking levee within a naturally vegetated scrub-scrub community. Live oak dominates the overstory and sugarberry (*Celtis laevigata*) can be found to a lesser extent, while yaupon (*Ilex vomitoria*), beautyberry (*Callicarpa americana*), and McCartney rose (*Rosa bracteata*) occupy the shrub layer. The herb layer is sparsely occupied by angleton grass (*Dichanthium aristatum*), blue mistflower (*Chromolaena odorata*), Texas goldentop (*Euthamia gymnospermoides*), and rustyseed paspalum (*Paspalum langei*). Scrambling vines are found growing into the midstory, including saw greenbriar (*Smilax bona-nox*), common greenbriar (*Smilax rotundifolia*), and poison ivy (*Toxicodendron radicans*). This vegetation community is associated with less disturbed, slightly wetter upland conditions underlain by Dacosta – Contee complex soils, as shown by the NRCS web soil survey (NRCS, Soil Survey Staff, 2023).

2.4.1.4.3 Deciduous Forest

A small fringe of deciduous forest totaling 0.2 ac (0.08 ha) is found in the LMGS site along a hedgerow bordering the west levee of West Coloma Creek at the eastern edge of an actively cultivated crop field. The tree canopy is dominated by sugarberry, which grows over shrubs of McCartney rose, yaupon, saw greenbriar, and common greenbriar. The herb layer here is influenced by vegetation found on the nearby levee and includes Kleberg's bluestem (*Dichanthium annulatum*) and angleton grass (*Dichanthium aristatum*).

2.4.1.4.4 Shrub-Scrub and Woody Wetlands

As provided in the NLCD shrub-scrub and woody wetland land covers (61 ac [25 ha]) are found throughout the LMGS site and are represented by several different vegetation types, varying by local disturbance, water availability, and soil conditions. Shrub-scrub (upland) (57.4 ac [23.2 ha]) is the most extensive type found within the LMGS site, although woody wetland (3.3 ac [1.3 ha]) is also represented. Shrubs are evident in the woody wetlands of the LMGS site. WOTUS-delineated wetlands and features are described in Section 2.4.1.2.2.

Within actively or formerly grazed pasture in dry sites located within the hydric soil map series, Dacosta-Contee complex (NRCS, Soil Survey Staff, 2023), scrub-shrub patches form around thickets of McCartney rose, sugarberry, yaupon, or huisache (*Vachellia farnesiana*). The herb layer can be crowded out by thickets of shrub-scrub, as seen north of the rail yard in the northeastern corner of the LMGS site. In areas still heavily grazed, the herb layer is typically dense where it grows between scrub thickets and is dominated by species that include Kleberg's bluestem, angleton grass, Bermudagrass, bitterweed (*Helenium amarum*), fiddle dock (*Rumex pulcher*), Santa Maria feverfew (*Parthenium hysterophorus*), and plains coreopsis. Within heavily grazed pasture in slightly wetter upland areas of the same soil map series, the same shrub species are found; however, huisache falls out and is replaced by live oak. In the herb layer, dominant species found in dry shrub-scrub areas are also found, in addition to dallisgrass (*Paspalum dilatatum*), marsh bristlegrass (*Setaria parviflora*), gaping grass (*Steinchisma hians*), gulf cordgrass (*Spartina spartinae*), and the state-sensitive species (TPWD, 2011), Indianola beaksedge (*Rhynchospora indianolensis*).

Shrub-scrub wetland and wetter upland sites found north of the two artificial wetland basins (SD-WET-03 and SD-WET-04) between the wetland ditch (SD-WET-05) and crop fields along the southwestern edge of the LMGS site represent another community assemblage found on-site. Hydric soils of Laewest clay, 0 to 1 percent slope (NRCS, Soil Survey Staff, 2023), underlie low scrub thickets of eastern baccharis and McCartney rose that are interspersed with herbaceous vegetation dominated by Bermudagrass, winged loosestrife, and eastern baccharis. Wetland basin and ditch features can be found in Figure 2.4-4.

Additionally, a shrub-scrub vegetation association is found within the hydric Edna Loam, 0 to 1 percent slopes soil map series slopes (NRCS, Soil Survey Staff, 2023). This area is bordered by crop field to the south and east, within a naturally vegetated parcel along the eastern edge, in the central part of the LMGS site. A small pocket of honey locust trees (*Gleditsia triacanthos*) is found in the corner of the parcel, while the rest of the area is dominated by impenetrable thickets of shrub-scrub, except for a few paths created by cattle, deer, and brush-hogging that allow ingress. Thickets of McCartney rose, eastern baccharis, yaupon, and huisache grow over an herbaceous layer dominated by prairie agalinis (*Agalinis heterophylla*), western ragweed (*Ambrosia psilostachya*), Kleberg's bluestem, fall panicum (*Panicum dichotomiflorum*), coffeeweed (*Sesbania herbacea*), and Brazilian vervain. This vegetation community is partially influenced by its proximity to agricultural fields, as several weedy species found along crop field margins were also found here.

2.4.1.4.5 Herbaceous

Herbaceous land cover (442 ac [179 ha]) found throughout the LMGS site can be classified as maintained turf, pasture, or ruderal old field.

Herbaceous land cover in the western part of the LMGS site located around SDO consists entirely of maintained turf dominated by Bermudagrass. Elsewhere, along the mowed or grazed canal and irrigation ditch berms, Bermudagrass can be found along the low slopes and longtom in dewatered portions of the channels, while Kleberg's bluestem, angleton grass, and broadleaf signalgrass dominate the upper slopes.

Overgrazed herbaceous pasture lands found in the southeastern portion of the LMGS site have mixed with shrub-scrub and are dominated by mowed grasses including Kleberg's bluestem, angleton grass, Bermudagrass, Texas grama (*Bouteloua rigidiseta*), and hooded windmill grass (*Chloris cucullata*). Forbs are present to a lesser extent; plains coreopsis, prairie tea (*Croton monanthogynus*), Berlandier's yellow flax (*Linum berlandieri*), and Texas star (*Sabatia campestris*) were most commonly observed. A few stems of the state-sensitive Indianola beaksedge was recorded here (TPWD, 2011).

Herbaceous land cover found in the northeastern portion of the LMGS site north of the railyard is no longer grazed or maintained by mowing and has become overgrown, especially by weedy forbs. Within this ruderal, old field community, grasses, including Bermudagrass, Kleberg's bluestem, and hairyseed paspalum (*Paspalum pubiflorum*), are still found but are often over-topped and shaded out by luxuriant growth of forbs and woody species including Santa Maria feverfew, Brazilian vervain, southern dewberry (*Rubus trivialis*), western ragweed, talayote (*Cynanchum racemosum*), balloonvine (*Cardiospermum halicacabum*), and rattlebox (*Sesbania drummondii*). Bermudagrass is dominant within lands underlain by Edna loam, while herbaceous vegetation growing in Contee – Dacosta and Dacosta – Contee soil complexes are more diverse and possess greater affinity here to upland conditions (NRCS, Soil Survey Staff, 2023).

A large rectangular pasture south of the railyard, in the northeast portion of the LMGS site, represents the most diverse herbaceous community found within the LMGS site. Although nonnative species are abundant, partially intact short-grassland structure and native coastal prairie species diversity here is likely maintained by occasional cattle grazing, at an intensity and periodicity that mimics the natural disturbance patterns historically maintained by native ungulate herbivory in the region.

Common grass and forb species include bahia grass (*Paspalum notatum*), Kleberg's bluestem, angleton grass, Bermudagrass, rescuegrass (*Bromus catharticus*), Texas wintergrass (*Nassella leucotricha*), marsh bristlegrass, blackeyed Susan (*Rudbeckia hirta*), Texas star, western ragweed, green antelopehorn (*Asclepias viridis*), winecup (*Callirhoe involucrata*), pine barren flatsedge (*Cyperus retrorsus*), creeping woodsorell, Hooker's eryngo (*Eryngium hookeri*), prairie nymph (*Hebertia lahue*), fragrant spikesedge (*Kyllinga odorata)*, and spotted beebalm (*Monarda punctata*). Scattered shrubs of McCartney rose, huisache, and honey mesquite (*Prosopis glandulosa*) are interspersed throughout.

2.4.1.4.6 Emergent Wetlands

A total of 23.5 ac (9.5 ha) of emergent wetlands was identified during WOTUS delineations in the spring and summer surveys. WOTUS-delineated features can be found in Figure 2.4-4. Information on plant communities in these wetlands is included above in Section 2.4.1.2.2.

2.4.1.4.7 Invasive Species

As previously mentioned, the vegetation throughout the LMGS site contains substantial populations of nonnative plants. The Texas Invasives database lists 17 plant species observed on the LMGS site that are considered invasive (Texas Invasives, 2023a).

Invasive trees observed on the LMGS site include Chinaberry (*Melia azerbach*) and Chinese tallow. Both of these species are in the tree layer, occurring rarely across the LMGS site.

Invasive plants in the shrub layer include Chinaberry, Chinese tallow, paper mulberry (*Broussonetia papyrifera*), white mulberry (*Morus alba*), and McCartney rose. Chinaberry in the shrub layer occur rarely in herbaceous areas. Chinese tallow in the shrub layer occur rarely in herbaceous areas and occasionally in emergent herbaceous wetlands. Paper and white mulberry uncommonly occur in emergent herbaceous wetlands. McCartney rose in the shrub layer occurs in every habitat type except cultivated crops and is considered abundant overall in the LMGS site.

Invasive plants in the herbaceous layer include Bermudagrass, Kleberg's bluestem (*Dichanthium annulatum*), angleton grass (*Dichanthium aristatum*), Johnson grass (*Sorghum halepense*), Brazilian vervain (*Verbena brasiliensis*), McCartney rose, Chinese tallow, rescuegrass, deeprooted sedge (*Cyperus entrerianus*), purple nutsedge (*Cyperus rotundus*), Queensland bluegrass (*Dichanthium sericeum*), dallisgrass, bahia grass, and Vaseygrass (*Paspalum urvillei*).

Bermudagrass is common on the LMGS site and occurs in herbaceous, shrub/scrub, emergent herbaceous wetlands, and woody wetlands land cover types. Kleberg’s bluestem is abundant on the LMGS site overall, occurring in the deciduous forest, herbaceous, and shrub/scrub land cover types. Angleton grass is common across the LMGS site overall with occurrences in the deciduous forest, herbaceous, shrub/scrub, and woody wetland land cover types. Johnson grass is occasionally documented on the LMGS site and is seen in cultivated crops, herbaceous, and emergent herbaceous wetland land cover types. Brazilian vervain is occasionally documented on the LMGS site and occurs in cultivated crops, herbaceous, and shrub/scrub land cover types. McCartney rose in the herbaceous layer occurs occasionally in cultivated crops and commonly in woody wetlands. The other herbaceous invasive species occur rarely, uncommonly, or occasionally in only a few habitats on the LMGS site.

2.4.1.5 Important Species

NRC guidance (NUREG 1555 and Regulatory Guide [RG] 4.2, Preparation of Environmental Reports for Nuclear Power Stations) identifies important species as the following:

- Species that are federally listed as threatened or endangered
- Species that are proposed for, or candidates for, federal listing
- Species with a state listing status or other state status due to rarity

In conjunction with agency coordination regarding listed species, Dow sent letters to the USFWS and TPWD. TPWD provided a number of general construction recommendations in their February 16, 2024, letter to Dow. Correspondence and related discussions with the agencies are located in Appendix 1A.

Prior to ecological field surveys, a desktop analysis was performed to identify important species and habitats that may be present in the LMGS site. As part of the desktop analysis for the ecological surveys, biologists reviewed existing literature, including the Victoria Early Site Permit Environmental Report (ER), and information from the USFWS Information for Planning and Conservation (IPaC) system, TPWD Calhoun County rare species list, USFWS NWI, NOAA, and NLCD. During the pedestrian surveys, any observations of such plant or wildlife species were considered important and the habitat that supports them was noted. A list of protected species potentially occurring within or near the LMGS site was developed and is presented in Table 2.4-8 and summarized in the following sections.

The following sections provide a discussion of federally and state-listed species, as well as species of commercial or recreational value, that may be present on the LMGS site based on desktop analyses and survey observations detailing their occurrence.

2.4.1.5.1 Federally Listed Species

A listing of federally threatened or endangered species currently listed or candidate species proposed for listing that may occur within the LMGS site is available from the USFWS IPaC website as of July 2024. The USFWS IPaC identifies two terrestrial endangered species (Northern aplomado falcon [*Falco femoralis septentrionalis*] and whooping crane [*Grus americana*]); three terrestrial threatened species (red knot [*Calidris canutus rufa*], piping plover [*Charadrius melodus*], and eastern black rail [*Laterallus jamaicensis*]); one terrestrial proposed species (tricolored bat [*Perimyotis subflavus*]); and one terrestrial candidate species (monarch butterfly [*Danaus plexippus*]) as potentially occurring on the LMGS site (USFWS, 2024a).

Northern aplomado falcons are found in the South Texas and Trans-Pecos regions in open grassland or savannah with scattered shrubs or trees. These falcons use stick nests built by other birds and eat mostly insects and birds. Threats to this species include electrocution by improperly designed electrical transmission lines, human disturbance in breeding area, direct loss of habitat from human development, and pesticides (TPWD, 2024a).

Whooping cranes breed in the wetlands of Wood Buffalo National Park in northern Canada and winter on the Texas coast at the Aransas National Wildlife Refuge, which is located within the LMGS region. Fall migration begins from Canada to Texas in mid-September, while spring migration in the reverse direction occurs in late March or early April. Suitable habitat for whooping cranes at the Aransas National Wildlife Refuge consists of salt flats, marshes, coastal prairies, swales, and ponds. Whooping cranes eat blue crabs, clams, frogs, minnows, rodents, small birds, and berries. Threats to whooping cranes include power lines, illegal hunting, habitat loss, and petroleum-related contamination (TPWD, 2024b).

Red knots migrate between the South America and the Arctic region. The western Gulf of Mexico is a wintering area for this species, although they can also occur during migration and breeding season. Coastal habitats used in migration and wintering consists of coastal marine and estuarine habitats with large areas of exposed intertidal sediments such as bays and estuaries, tidal flats, and unimproved tidal inlets. Red knots generally nest near a freshwater wetland in dry, slightly elevated tundra locations. Red knots eat hard-shelled mollusks along with softer invertebrate prey, such as shrimp and crabs, and horseshoe crab eggs (USFWS, 2024b).

Piping plovers are found in Texas along Gulf Coast sandy beaches. These birds begin arriving in late July or early August, remaining in Texas for overwintering for up to nine months. Nests consist of shallow depressions in the sand, and plovers generally return to the same nesting area for many years. Piping plovers eat marine worms, beetles, spiders, crustaceans, mollusks, and other small marine animals. Threats to this species include habitat alteration and destruction, chemical spills, human disturbance during breeding, and increased recreation use (TPWD, 2024c).

Eastern black rails require dense vegetation that permits movement underneath the canopy and can be found in a variety of freshwater, salt, and brackish marsh habitats that are tidally or non-tidally influenced. In some Gulf Coast areas, they can be found in higher elevation wetland zones with shrubby vegetation. Nests are made of herbaceous plants and positioned over moist soil or shallow water. Nesting in Texas begins in March. Eastern black rails eat aquatic beetles, spiders, snails, small crustaceans, grasshoppers, ants, and the seeds of aquatic plants. Threats to this species include habitat fragmentation, altered hydrology, climate change, oil and chemical spills, disease, altered food webs and predation, and human disturbance (USFWS, 2024c).

None of the federally threatened or endangered species identified through IPaC were observed in the LMGS site or have suitable habitat present in the LMGS site (Table 2.4-8).

Tricolored bats are small insectivorous bats that live across the eastern and central United States. In the winter, these bats inhabit caves, abandoned mines, or road-associated culverts if caves are sparse. In the spring, summer, and fall, tricolored bats roost in trees in forests, usually among deciduous hardwood leaves. A notable threat to this species is white-nose syndrome, which impacts cave-dwelling bats across the country (USFWS, 2024d). Tricolored bats are proposed for federal listing, but this species was not observed on the LMGS site and does not have suitable habitat present on the LMGS site.

Monarch butterflies, a federal candidate species, occur across the United States. Monarch butterflies require milkweed and flowering plants: adults feed on the nectar of a variety of flowers during migration and breeding, but they can only lay eggs on milkweed plants. They migrate in the fall to their overwintering sites and then mate at the overwintering sites in early spring. A specific microclimate is required for overwintering monarchs to protect against the elements and prevent freezing (USFWS, 2024e). Monarch butterflies have suitable habitat within the LMGS site due to the observed milkweed host plant species recorded in the large rectangular herbaceous community in the northeast portion of the LMGS site (Figure 2.4-2).

The USFWS IPaC also identified 22 migratory birds of conservation concern that have the potential to occur on the LMGS site: American golden plover (*Pluvialis dominica*), bald eagle, black skimmer (*Rynchops niger*), chimney swift (*Chaetura pelagica*), dickcissel (*Spiza americana*), Forster's tern (*Sterna forsteri*), gull-billed tern (*Gelochelidon nilotica*), king rail (*Rallus elegans*), least tern (*Sternula antillarum antillarum*), lesser yellowlegs (*Tringa flabipes*), long-billed curlew (*Numenius americanus*), marbled godwit (*Limosa fedoa*), painted bunting (*Passerina ciris*), pectoral sandpiper (*Calidris melanotos*), prairie loggerhead shrike (*Lanius ludovicianus excubitorides*), prothonotary warbler (*Protonotaria citrea*), reddish egret (*Egretta rufescens*), sandwich tern (*Thalasseus sandvicensis*), swallow-tailed kite (E*lanoides forficatus*), short-billed dowitcher (Limnodromus griseus), whimbrel (*Numenius phaeopus hudsonicus*),and willet (*Tringa semipalmata*) (USFWS, 2024a). Of these birds, bald eagle, chimney swift, dickcissel, lesser yellowlegs, painted bunting, prothonotary warbler, and short-billed dowitcher have been previously documented in the vicinity as part of the Victoria Early Site Permit ER (Exelon Generation, 2012a) and are likely to inhabit or use nearby habitats of the LMGS site during migration and the breeding season. Three of these migratory birds (bald eagle, black skimmer, and swallow-tailed kite) are state-sensitive species and are listed in Table 2.4-8.

2.4.1.5.2 State-Listed Species

A review of the TPWD Calhoun County list of rare species in July 2024 identified nine state-endangered species, 17 state-threatened species, and 42 state-sensitive species within Calhoun County (TPWD, 2023e).

Based on a review of habitat requirements for each of the wildlife species listed in Table 2.4-8, potentially suitable habitat is present within the LMGS site for three terrestrial state-threatened species: white-tailed hawk, Texas scarlet snake (*Cemophora lineri*), and black-spotted newt (*Notophthalmus meridionalis*).

White-tailed hawks are residents in Texas and breed from late January to July or late August. Nesting occurs in savannahs in short trees and shrubs, and nests are loosely constructed of branches, twigs, grasses, and forbs. White-tailed hawks hunt from perches and feed on mammals, birds, reptiles, amphibians, insects, and other arthropods (Texas A&M Agrilife Research, 2024). White-tailed hawk was observed on-site and within the vicinity during the spring 2023 surveys and within the vicinity during summer and fall 2023. Because a white-tailed hawk was observed perched on a transmission line tower but no raptor nests were observed, white-tailed hawk likely use the site as a flyover to areas in the vicinity to forage but not breed.

Texas scarlet snakes are endemic to Texas and prefer shrubland/chaparral and sandy thicket habitats along the Gulf of Mexico coastline (NatureServe, 2024a). The Texas scarlet snake was not observed on-site but has the potential to occur within the LMGS site based on the presence of preferred scrub habitat in the southern portion of the LMGS site and the herbaceous scrub habitat in the northeast portion of the LMGS site.

Black-spotted newts inhabit ephemeral pools in southern Texas and lay eggs after heavy rains. They eat aquatic insects and crustaceans. Threats to this species include habitat fragmentation, urbanization, chytrid fungus, and ranavirus (TPWD, 2016). The black-spotted newt was not observed on-site but has the potential to occur within the LMGS site based on the presence of preferred scrub-shrub and emergent wetlands in the southwest corner of the LMGS site.

Based on a review of habitat requirements for each of the wildlife and plant species listed in Table 2.4-8, potentially suitable habitat is present within the LMGS site for nine terrestrial state-sensitive species: Sprague's pipit (*Anthus spragueii*), eastern box turtle (*Terrapene carolina*), western box turtle (*Terrapene ornata*), American bumblebee (*Bombus pensylvanicus*), long-tailed weasel (*Mustela frenata*), eastern spotted skunk (*Spilogale putorius*), coastal gay-feather (*Liatris bracteata*), Indianola beakrush, and threeflower broomweed (*Thurovia triflora*).

Sprague's pipit inhabits plains and shortgrass prairies and occurs during the nonbreeding season in Texas. Sprague's pipits mainly eat insects and seeds. A major threat to Sprague's pipit is the conversion of prairie habitat to agricultural fields (Cornell Lab of Ornithology, 2024). Sprague's pipit was not recorded on-site or within the vicinity of the LMGS site but has the potential to occur within the LMGS site based upon the presence of preferred weedy fields and herbaceous cover in the northeast, west, and southwest portions of the LMGS site.

Eastern box turtles inhabit fields, forests, forest-brush, and forest-field ecotones, while western box turtles inhabit prairie grasslands, pastures, fields, sandhills, and open woodland. Eastern box turtles commonly enter water pools in the summer, while western box turtles are mainly terrestrial but sometimes enter creek pools. Egg laying occurs in sandy or loamy soils in open areas from May through July for eastern box turtles and May through August for western box turtles. For shelter, both species burrow under leaf litter, loose soils, debris, or mud, and western box turtles may use burrows made by other species. Adult box turtles eat plants, fungi, snails and other invertebrates, carrion, and small vertebrates. Threats to these species include habitat loss, roads, overcollection for export to other countries for the pet trade, and disease (NatureServe, 2024b; 2024c). Eastern and western box turtles were not recorded on-site or within the vicinity but have the potential to occur within the LMGS site based upon the presence of preferred fields throughout much of the LMGS site.

American bumblebees are found in open farmland and fields and generally nest on the ground among long grass. Adults are generalized pollen and nectar gatherers. Threats to the American bumblebee include pesticide use, habitat conversion, and pathogen spillover from managed colonies (NatureServe, 2024d). The American bumblebee was not recorded on-site or within the vicinity of the LMGS site but has the potential to occur within the LMGS site based upon the presence of preferred farmlands and open fields throughout much of the LMGS site.

Long-tailed weasels are found in a variety of habitats such as brushlands and open woodlands, field edges, riparian grasslands, swamps, and marshes. They are usually found near water. Dens are constructed in rock crevices, brush piles, stump hollows, or are located in abandoned burrows made by other animals, and breeding occurs in July to August. Long-tailed weasels eat small mammals, other small vertebrates, occasionally birds, and insects. Threats include monoculture, drainage of wetlands, and pesticides (NatureServe, 2024e). Long-tailed weasel was not recorded on-site or within the vicinity but has the potential to occur within the LMGS site based on the presence of preferred brushlands and fence rows in the southern and northeast portions of the LMGS site.

Eastern spotted skunks prefer forested areas, habitats with significant cover, open and brushy areas, rocky canyons, and outcrops in prairies and woodlands. Dens are made in burrows abandoned by other mammals, underbrush piles, in a hollow log or tree, in a rock crevice, or under a building. Mating occurs in winter or early spring and young are born in April through July. Eastern spotted skunks eat small mammals, grubs and other insects, corn, grapes, and berries. Threats to this species include road traffic and urbanization (NatureServe, 2024f). Eastern spotted skunk was not recorded on-site or within the vicinity but has the potential to occur within the LMGS site based upon the presence of preferred croplands and fencerows throughout much of the site and brushy scrub-shrub in southern portion of the LMGS site.

Indianola beakrush occurs in cattle pastures, is perennial, and flowers and fruits between April and November (TPWD, 2023b). Less than ten stems of Indianola beakrush were identified in low, wet areas of two heavily to moderately grazed upland livestock pastures in the southeastern portion of the LMGS site.

No other state-sensitive vascular plant species were identified during spring, summer, or fall surveys; however, marginal potential habitat does exist on-site for the coastal gay-feather and threeflower broomweed. Both species are historically found in coastal prairies, and while degradation to this habitat type is recognized as a potential threat to their survival, both species have been observed to possess some resilience to habitat disturbance and have been observed in converted prairie lands along roadsides, railroads, and pastures; therefore, potential habitat likely exists in the open pastures herbaceous lands of the LMGS site, particularly, within the large rectangular herbaceous community in the northeast portion of the LMGS site (Figure 2.4-2).

2.4.1.5.3 Species of Commercial or Recreational Value

Northern bobwhite (*Colinus virginianus*) and mourning dove were species observed within the LMGS site that are recreationally valuable because they are game species (upland game bird and migratory game bird respectively) as listed by TPWD hunting regulations. Species observed in the LMGS vicinity that are recreationally valuable as game species (migratory game birds and upland game birds) include Northern pintail (*Anas acuta*), green-winged teal (*Anas crecca*), sandhill crane (*Antigone canadensis*), Northern bobwhite, black-bellied whistling-duck (*Dendrocygna autumnalis*), American coot (*Fulica americana*), Wilson's snipe (*Gallinago delicata*), common gallinule (*Gallinula galeata)*, gadwall (*Mareca strepera*), wild turkey (*Meleagris gallopavo*), red-breasted merganser (*Mergus serrator*), Northern shoveler (*Spatula clypeata*), blue-winged teal (*Spatula discors*), and mourning dove (TPWD, 2023c).

White-tailed deer are recreationally valuable as game species, while coyotes and eastern cottontails are nongame species in Texas. Opossum, nutria, raccoon, and striped skunk are recreationally valuable as furbearers as listed by TPWD hunting regulations. Feral hogs and coyotes are also hunted in Texas. Alligators, freshwater turtles (snapping turtles), and frogs (bullfrogs) are nongame species hunted and trapped in Texas (TPWD, 2023c).

The Guadalupe Delta WMA, located within the LMGS vicinity, permits public hunting for waterfowl and migratory shore birds, alligators, and other wetland wildlife (TPWD, 2023a).

Based upon the desktop analysis, recorded species during the seasonal ecology surveys, and the predominance of disturbed communities for the LMGS site, no commercially valuable species, species essential to the maintenance and survival of rare or commercially or recreationally valuable species, species critical to the structure and function of local terrestrial ecosystems, or species that could serve as biological indicators of effects on local terrestrial ecosystems were observed in the LMGS site.

2.4.1.6 Important Habitats

NRC guidance (NUREG-1555 and RG 4.2) identifies important habitats as the following:

- Federally designated or proposed critical habitat
- Wildlife sanctuaries, refuges, and preserves
- Habitats identified by federal or state agencies as unique, rare, or a priority for protection
- Other habitats of known or indicated interest

Other than wetlands described in Section 2.4.1.2.2, there are no other important habitats as defined by NRC guidance within the LMGS site. As mentioned in Section 2.4.1.2.1, important wetland habitat within the LMGS vicinity includes the Guadalupe Delta WMA.

Dow manages an existing wastewater treatment pond as constructed wetlands for the purpose of wildlife management. This wildlife management area is owned and managed by Dow in close partnership with state and federal agencies. The wildlife management area is located on the west side of TX-185, just outside of the LMGS site.

As shown in Figure 2.4-6, there are no federally designated or proposed critical habitats within the LMGS site or LMGS vicinity. Within the LMGS region, endangered whooping crane critical habitat is located 12 mi (19 km) south of the LMGS site. Threatened piping plover critical habitat is located 18 mi (29 km) south of the LMGS site. Critical habitat for Guadalupe Orb (*Cyclonaias necki*) and false spike mussel (*Fusconaia mitchelli*) (both proposed endangered) is located 23 mi (37 km) northwest of the LMGS site in the Guadalupe River (USFWS, 2023b).

The 2011, TPWD Rare Plant Communities of Texas (RPCT) report identifies five priority plant communities within Calhoun County: Black Mangrove Shrubland, Colima – Panalero – Chapote Matorral, Seacoast Bluestem – Gulfdune Crowngrass Herbaceous Vegetation, Texas

Coastal Bend Interdune Swale Grassland, and Texas Coastal Bend Live Oak – Redbay Forest, none of which are in the LMGS site. During off-site reconnaissance of natural vegetation communities, a representative example of the Texas Coastal Bend Interdune Swale Grassland was identified approximately 13 mi (21 km) to the southeast of the LMGS site along Lane Road south of Seadrift, just east of the Welder Flats WMA. This community was found in sandy soils in the low swales between dunes and the dominant species observed were sharp clubrush (*Schoenoplectus pungens*) and switchgrass. Additional associates identified include Carolina fimbry (*Fimbristylis caroliniana*), saltmarsh umbrella sedge (*Fuirena breviseta*), Forida bluehearts (*Buchnera floridanum*), rosy palafox (*Palafoxia rosea*), torpedo grass (*Panicum repens*), Gulf Coast swallowwort (*Pattalias palustre*), starrush whitetop (*Rhynchospora colorata*), and southern beaksedge (*Rhynchospora microcarpa*). While the 2011 TPWD RPCT lists this community as state imperiled, according to NatureServe (2022a), from which this community concept is derived, this community is apparently no longer state-ranked but is still considered globally imperiled.

2.4.1.7 Disease Vector and Pest Species

This section is limited to a discussion of pest animal species. For a discussion of pest plant species (invasive species) (Section 2.4.1.4.7).

Ticks and mosquitoes are present on the LMGS site. Tickborne diseases and the mosquito-borne West Nile virus are tracked routinely by the U.S. Centers for Disease Control and Prevention (CDC). However, within the last five years, tickborne diseases or outbreaks of West Nile virus have not been reported in Calhoun County (CDC, 2024a; CDC 2024b). Alligators, coyotes, feral hogs, and brown-headed cowbirds have all been observed on the LMGS site and are considered pest species by the TPWD. Alligators typically avoid humans but are considered nuisances if they establish territories around people. Encounters between humans and alligators have increased as human populations in Texas continue to expand. Alligators are typically found in freshwater but can also tolerate brackish water (TPWD, 2023f).

Coyotes are considered nuisances with the expansion of human development into open range wildlife habitat. Encounters between coyotes and humans have increased over time (TPWD, 2023g).

Feral hogs cause a variety of ecological damage through rooting or direct consumption of plants and animals. Rooting alters chemistry associated with soil nutrient cycling and alters vegetation communities, supporting the spread of invasive plants. Soil disturbance also increases soil erosion rates. Rooting or wallowing in riparian areas increases nutrient concentration and total suspended solids in nearby waters, increases sedimentation and turbidity, and reduces oxygen levels. Feral hogs also negatively impact agriculture by eating crops, trampling crops, and damaging soil through rooting and wallowing. Feral hogs are capable of transmitting at least 30 bacterial, fungal, and viral diseases (Kinsey, 2020).

Brown-headed cowbirds are brood parasites, meaning they lay their eggs in the nests of other birds, leave, and do not care for their own young. They are known to remove or destroy some or all of the eggs or nestlings of the host birds. Cowbirds parasitize more than 225 species of North American birds: landscape changes throughout the country have contributed to cowbird spread and songbird decline (TPWD, 2023h).

Nutria were observed in the LMGS vicinity and are considered an invasive species at the federal level by the USDA. Nutria are generally associated with water, living in fresh water impoundments like rivers, bayous, freshwater and brackish marshes, and swamps. Nutria burrowing can erode banks of lakes, streams, and ditches and decimate native plants holding marsh soils together. This destruction of marshlands increases the vulnerability of adjacent upland habitat to flooding and erosion during storms. Grazing on crops can impact agriculture in the region. Nutria are known to host several pathogens that can infect people, pets, and livestock (USDA APHIS, 2020).

Two other bird species documented on the LMGS site during field surveys, the Eurasian collared dove (*Streptopelia decaocto*) and the European starling, are considered invasive in Texas. Eurasian collared doves are nonnative, extremely successful colonizers and breeders, may be competing with native North American doves, and can carry disease-causing parasites that may spread to native doves or hawks that consume them (Texas Invasives, 2011a). European starlings are nonnative and compete with native cavity nesting birds by taking over the nests and expelling the occupants (Texas Invasives, 2011b).

Regional concerns related to invasive species include imported fire ants (*Solenopsis invicta*), which can affect biodiversity by reducing or eliminating populations of small mammals, amphibians, reptiles, prairie birds, and some insects (Griffith et al., 2007).

2.4.1.8 Wildlife Travel Corridors

Tracks of mammal species, such as white-tailed deer, raccoon, opossum, and coyote, were observed throughout much of the LMGS site habitats during the seasonal field surveys. These common species do not appear to be impacted by the current level of human and industrial activities occurring near the site. Mobile species observed on-site such as white-tailed deer, raccoon, opossum, and coyote, eastern cottontail, groundhog, striped skunk, feral hog and those not observed but likely to occur such as rodents, collectively create and use travel corridors across various biotic communities on the LMGS site and to and from adjacent properties. White-tailed deer typically establish the longest and most complex travel corridors. Other species may use portions of these regularly traveled trails.

The LMGS site is located in the center of the Central Flyway migration route, which results in the occurrence of many avifauna species in the vicinity during fall, winter, and spring. Birds travel through Texas heading north in the spring for breeding and nesting and south in the winter for warmer southern regions. Texas has recorded over 615 species of birds, which is higher than any other state, and these birds are mostly migrants (Shackelford et al., 2005).

2.4.1.9 Existing Ecological Effects and Environmental Stresses

As shown in Figure 2.2-3 and discussed in Section 2.2, Land, much of the land on-site is cultivated crops, hay/pasture, or developed. As discussed in Section 2.4.1.1, the ecoregion has a long history of alteration including fire use, grazing, agriculture, and conversion to urban areas. During the time of the field surveys, much of the LMGS site was in corn production. The western portion of the LMGS site includes areas within the existing SDO site, while the eastern portion of the LMGS site consists of cultivated crops. The LMGS site is within an area of minimal flood hazard and within a low seismic hazard zone, with no mapped seismic faults and no karst potential. However, the LMGS site has the potential to experience water levels higher than the existing grade.

2.4.1.10 Transmission Corridor Habitats and Species

As discussed in Section 2.2.2 and Section 3.7, Power Transmission System, no new transmission line corridors are planned for off-site connections to the LMGS site. Figure 2.2-8 identifies the overhead transmission line easement and proposed transmission lines on the LMGS site. The new transmission corridors on-site are included in the discussion above.

2.4.2 Aquatic Ecology

This section focuses on the characterization of aquatic resources on and in the vicinity of LMGS. Potentially affected aquatic resources include reservoirs, ponds, and streams. Potential effects of LMGS operation also include a consideration of impact to organisms potentially occurring in the artificial basins constructed by Dow for support to SDO. Wetlands and riparian habitats are discussed in conjunction with terrestrial ecology in Section 2.4.1. This section describes the ecological characteristics of the aquatic resources potentially affected by building and operational activities associated with LMGS. Seasonal aquatic ecological surveys were conducted in 2023-2024 to characterize aquatic ecosystems, focusing on the fish and benthic macroinvertebrate communities in waters on-site and in the vicinity of the LMGS site.

2.4.2.1 Aquatic Habitats

Surface water features at the LMGS site and within the LMGS vicinity are described in Section 2.3.1 and shown on Figure 2.3.2-1 and Figure 2.3.2-2. Freshwater resources within the vicinity of the LMGS site include on-site and near-site streams and wetlands, the GBRA Calhoun Canal System, and the Victoria Barge Canal. There is one stream, West Coloma Creek, on the LMGS site. In the vicinity streams, ponds, and lakes include West Coloma Creek, East Coloma Creek, Mission Lake, Green Lake, and the Guadalupe River. Man-made basins on the SDO site are constructed water features that are used for operational water supply. These basins are not jurisdictional and are not subject to regulation under the CWA. Nonetheless, potential effects of LMGS operation include a consideration of impact to organisms potentially occurring in the basins.

Aquatic ecology surveys, including qualitative fisheries and macroinvertebrate surveys, were conducted to characterize the baseline aquatic community in the vicinity of the LMGS site in 2023 and 2024. These surveys focused on West Coloma Creek, the GBRA Calhoun Canal, and the Dow Discharge Canal. As described in Section 2.3.1, the GBRA Canal is an artificial water distribution system that is not subject to regulation by the USACE or TCEQ. However, the use of water from the GBRA Canal is subject to authorization by GBRA. Aquatic biological information was obtained to characterize aquatic ecological communities of this resource. The SDO TPDES permitted outfall 002 is located within the Victoria Barge Canal at the discharge point from the Dow Discharge Canal. The Dow Discharge Canal receives stormwater flow and treated process wastewater from SDO and is an engineered concrete canal. The discharge canal is not considered a jurisdictional water as identified in Section 2.3.1. As such, biological information was obtained to provide anecdotal characterization of the aquatic ecological communities that may be subject to discharge flows from LMGS that are conveyed to the discharge canal.

2.4.2.2 Aquatic Biota

Seasonal aquatic ecology surveys were conducted on the LMGS site and in the LMGS vicinity to characterize the macroinvertebrate and fish communities. Historical data, where available, were also incorporated to provide an overview of aquatic populations. In this section, shellfish, macroinvertebrate, and fish communities in aquatic systems of the LMGS site and vicinity are described. Important aquatic species found in the LMGS vicinity are discussed in Section 2.4.2.3 below.

2.4.2.2.1 Macroinvertebrates

The macroinvertebrate community in the Guadalupe River, which feeds the GBRA Canal, was previously sampled in 2008. This sampling found 27 families and 45 genera of aquatic macroinvertebrates. A list of taxa encountered in this sampling is indicated in Table 2.4-9. During this sampling, 79 percent of specimens encountered were flies and midges (order Diptera). After dipterans, the most abundant taxa were mollusks, freshwater shrimp, and mayflies. In general, benthic macroinvertebrates were scarce and pollution-tolerant taxa were prevalent (Exelon Generation, 2012a).

The benthic macroinvertebrate community was characterized in fall 2023 and spring 2024 by aquatic sampling. Locations sampled included West Coloma Creek, the GBRA Calhoun Canal, and the drainage outfall located to the west of the LMGS site. A total of nine macroinvertebrate sampling locations were identified, as indicated in Figure 2.4-7. Sampling methods included D nets and petite ponar dredging to collected benthic invertebrates, as specific conditions allowed. Fall macroinvertebrate sampling occurred November 7-9, 2023. Sixty-eight distinct taxa were encountered in fall macroinvertebrate sampling (Table 2.4-10). The greatest number of individuals were encountered in West Coloma Creek (n=409) followed by the GBRA Calhoun Canal (n=338). Similarly, diversity was greatest in West Coloma Creek, with 41 distinct taxa encountered. The GBRA Calhoun Canal and Dow Discharge Canal had similar levels of macroinvertebrate diversity, with 25 and 23 distinct taxa, respectively. The most abundant taxa was a Chironomid (*Tanypus* sp., 20.86 percent) followed by a taxon of

Lymnaeid snails (*Pyrgophorous* sp., 14.11 percent) and an annelid worm in the family Naididae (11.45 percent). Spring macroinvertebrate sampling occurred on May 21-23, 2024. A total of 50 distinct taxa were encountered in spring macroinvertebrate sampling, which was fewer taxa than observed in fall sampling. A full list of taxa can be found in Table 2.4-11. The most individuals were encountered in the Dow Discharge Canal (n=546) followed by West Coloma Creek (n=365). Diversity was greatest in the GBRA Calhoun Canal, with 30 distinct taxa encountered. Similarly, West Coloma Creek had relatively high diversity with 28 distinct taxa. In the Dow Drainage Canal, only 8 distinct taxa were observed. The most abundant taxa was in the Corixidae family (*Trichocorixa* sp., 30.79 percent) followed by a taxa of hydrobid snails (*Stygopyrgus* sp., 15.88 percent).

Additionally, opportunistic sampling of shellfish was conducted in fall 2023 and spring 2024 during associated fisheries sampling, as indicated in Table 2.4-12. Shellfish encountered include white shrimp (*Litopenaeus setiferus*), blue crab (*Callinectes sapidus*), red swamp crayfish (*Procambarus clarkia*), and white river crayfish (*Procambarus acutus*). Crayfish were only observed in West Coloma Creek. White shrimp were encountered in all sampled waterbodies, and blue crab were encountered in West Coloma Creek and the Dow Drainage Canal.

2.4.2.2.2 Fish

In 2008, quarterly fish surveys were conducted in the Guadalupe River, Goff Bayou, and the GBRA Main Canal. Species encountered in the 2008 study are listed in Table 2.4-13. Within the GBRA Canal, the most abundant species were longear sunfish (*Lepomis megalotis*, 23.5 percent) and western mosquitofish (*Gambusia affinis*, 14.2 percent). Fish encountered in the GBRA Canal during 2008 sampling are indicated in Table 2.4-13 (Exelon Generation, 2012a).

Seasonal surveys were conducted in 2023–2024 to characterize fish present on the LMGS site and in the LMGS vicinity. Locations sampled included West Coloma Creek, the GBRA Calhoun Canal, and the drainage channel located to the west of the LMGS site. A total of nine aquatic ecology survey locations were identified, as indicated in Figure 2.4-7. Survey techniques utilized included backpack electrofishing, boat electrofishing, and seining. Fish were identified to species, measured, weighed, and returned to the source water body, unless it was necessary to retain a voucher specimen.

Fish species observed during summer 2023, fall 2023, winter 2024, and spring 2024 seasonal fisheries surveys are shown in Table 2.4-14 through Table 2.4-17 by location. In summer 2023, a total of 19 fish species were observed during fish surveys. Abundant species observed included sailfin molly (*Poecilia latipinna*), western mosquitofish (*Gambusia affinis*), and sheepshead minnow (*Cyprinodon variegatus*). A summary of fish species observed in summer surveys by waterbody is shown in Table 2.4-14. A total of 15 fish species were observed within West Coloma Creek during the summer survey, the most abundant of which was sailfin molly. Within the GBRA Calhoun Canal, a total of 10 species were observed, with the most abundant species being western mosquitofish. In the drainage outfall, a total of six species were observed, with the most abundant species being sheepshead minnow.

In fall 2023, a total of 23 fish species were observed during fish surveys. Abundant species observed included sailfin molly, western mosquitofish, and sheepshead minnow. A summary of fish species observed in fall surveys by waterbody is shown in Table 2.4-15. A total of 12 fish species were observed within West Coloma Creek during the fall survey, the most abundant of which was western mosquitofish. Within the GBRA Calhoun Canal, a total of 15 species were observed, with the most abundant species being sailfin molly and gizzard shad (*Dorosoma cepedianum*). In the drainage outfall, a total of 8 species were observed, with the most abundant species being sheepshead minnow.

In winter 2024, a total of 18 fish species were observed during fish surveys. Abundant species observed included sailfin molly, bay anchovy (*Anchoa mitchilli*), inland silverside (*Menidia beryllina*), and western mosquitofish. A summary of fish species observed in winter surveys by waterbody is provided in Table 2.4-16. A total of 11 fish species were observed within West Coloma Creek during the winter survey, the most abundant of which was sailfin molly. Within the GBRA Calhoun Canal, a total of 11 species were observed, with the most abundant species being common carp (*Cyprinus carpio*). In the drainage outfall, a total of three species were observed, with the most abundant species being sailfin molly.

In spring 2024, a total of 17 fish species were observed during fish surveys. Abundant species observed included western mosquitofish, sailfin molly, and gizzard shad. A summary of fish species observed in spring surveys by waterbody is provided in Table 2.4-17. A total of 10 fish species were observed within West Coloma Creek during the spring survey, the most abundant of which was western mosquitofish. Within the GBRA Calhoun Canal, a total of 11 species were observed, with the most abundant species being western mosquitofish. In the drainage outfall, a total of five species were observed, with the most abundant species being sheepshead minnow.

2.4.2.3 Important Aquatic Species

NRC criteria used to identify important species and habitats are provided in Section 2.4.1.5 and Section 2.4.1.6, respectively.

In conjunction with agency coordination regarding listed species, Dow sent letters to the USFWS, NOAA National Marine Fisheries Service (NMFS), and TPWD. TPWD provided a number of general construction recommendations in their February 16, 2024, letter to Dow. Correspondence and related discussions with the agencies are located in Appendix 1A.

2.4.2.3.1 Federally Listed Species

Federally listed threatened and endangered aquatic species that may occur within the vicinity of the LMGS site are listed in Table 2.4-18. There are five listed marine turtles, three of which, hawksbill sea turtle (*Eretmochelys imbricata*), Kemp’s ridley sea turtle (*Lepidochelys kempii*), and leatherback sea turtle (*Dermochelys coriacea*) are categorized as endangered. Two species, loggerhead sea turtle (*Caretta caretta*) and green sea turtle (*Chelonia mydas*), are categorized as threatened. Primary threats to all species include bycatch in fishing gear, climate change, harvest of turtles and eggs, loss of habitat (particularly nesting grounds), vessel strikes, ocean pollution, and predation (NOAA, 2024a, 2024b, 2024c, 2024d, 2024e).

Hawksbill sea turtles inhabit tropical and subtropical marine waters. Hawksbill turtles are omnivores, but preferentially consume sea sponges as well as marine algae, corals, mollusks, tunicates, crustaceans, sea urchins, small fish, and jellyfish. Primary habitat for hawksbill turtles includes nearshore foraging grounds, such as coral reef habitats and mangrove estuaries (NOAA, 2024a).

Kemp's ridley sea turtles are the smallest sea turtles in the world. This species primarily occurs in the Gulf of Mexico. Adults generally occupy nearshore coastal habitats that include muddy or sandy bottoms. The majority of nesting habitat occurs in the beaches of the western Gulf of Mexico (NOAA, 2024b).

The leatherback sea turtle is the largest sea turtle in the world. Leatherback sea turtles are highly migratory and can travel over 10,000 mi (16,094 km) a year between nesting and foraging grounds. They have the widest distribution of any reptile and nest mainly on tropical and subtropical beaches (NOAA, 2024c).

Loggerhead turtles are the most abundant sea turtle that nests in the United States. They reside in U.S. coastal waters and can migrate to other Caribbean beaches, including the Bahamas, Mexico, and Cuba. Loggerheads are primarily carnivorous but can consume plant material. They feed primarily on floating organisms in the open ocean. In coastal regions, they eat primarily benthic invertebrates (NOAA, 2024d).

Green sea turtles are unique in that they are herbivores, consuming primarily seagrasses and algae. Green sea turtles are distributed across the world's oceans, nesting in over 80 countries and living in coastal areas of over 140 countries. Adult sea turtles forage in nearshore coastal habitats (NOAA, 2024e).

Each of the federally listed turtle species that may occur in the vicinity of the LMGS site are marine species. Preferred habitat for these species only potentially exists in the vicinity of the LMGS site within Guadalupe Bay and Mission Lake. No federally listed aquatic species were encountered in seasonal aquatic ecology surveys.

2.4.2.3.2 State-Listed Species

State-listed aquatic species that have been recorded in Calhoun County, Texas, and may potentially occur within the LMGS vicinity are listed in Table 2.4-19 (TPWD, 2023b). Each of the state-listed threatened or endangered aquatic species are primarily marine species, and therefore, habitat for these species within the LMGS vicinity is limited to Guadalupe Bay, Mission Lake, and the Victoria Barge Canal. The only state-listed species for which potential habitat may occur within the LMGS site and immediate environs is alligator gar (*Atractosteus spatula*).

Alligator gar, a state-species of concern, were encountered in seasonal aquatic ecology surveys in West Coloma Creek, downstream of the LMGS site but not within the LMGS site. Alligator gar are the largest species of gar and can grow up to 8 ft (2.4 m) in length. The species are slow to mature and typically do not spawn until they are approximately 10 years old. Spawning habitat consists of shallow areas of flooded vegetation. In Texas, alligator gar are typically found in large rivers, reservoirs, and coastal bays (TPWD, 2023i). Population declines are related to poor spawning habitat and slow growth (TPWD, 2023i). No other state-listed species were encountered in seasonal aquatic surveys.

2.4.2.3.3 Species of Commercial or Recreational Value

Marine aquatic species of commercial value that were observed during the seasonal aquatic ecology surveys included white shrimp (*Litopenaeus setiferus*) and red drum (*Sciaenops ocellatus*). Recreationally important freshwater aquatic species observed in seasonal ecology surveys include largemouth bass, channel catfish, bluegill, warmouth, spotted gar, alligator gar, and shortnose gar (Table 2.4-14, Table 2.4-15, Table 2.4-16, Table 2.4-17). No commercially harvested freshwater aquatic species were observed in the vicinity of the LMGS site.

In the marine and estuarine waters in the vicinity of the LMGS site, there are several aquatic species of commercial and recreational value. Commercially harvested shrimp species are known to occur in the marine waters of Guadalupe Bay and Mission Lake. Gulf of Mexico shrimp species that are commercially harvested that may be present in the vicinity may include brown shrimp (*Penaeus aztecus*), white shrimp, pink shrimp (*Penaeus duorarum*), and royal red shrimp (*Pleoticus robustus*).

Post-larval and juvenile life stages of shrimp are associated with estuarine and brackish waters in coastal regions. Post-larval and early juvenile brown shrimp occur in estuaries, are associated with shallow, vegetated habitat, and may also be associated with silt and nonvegetated mud habitats. This life stage generally occurs in spring and early summer. Juvenile white shrimp occur from late spring to early fall and are typically found in waters with soft, mud substrates, but they can occur in marsh ponds, channels, inner marshes, shallow subtidal areas, and oyster reefs as well (TDOT, 2016).

Commercial and recreational harvest of oysters historically occurred in the LMGS vicinity. Harvest of oysters is prohibited in Guadalupe Bay and Mission Lake as of 2023/2024. Harvest of oysters is conditionally approved in Hynes Bay (TDSHS, 2022a). This conditional approval indicates that the area is closed to harvest, but may be opened upon approval by TPWD, based upon water quality criteria.

Red drum, also known as redfish, is an important recreational and commercial fish species in the Gulf of Mexico. Red drum is common in the Gulf of Mexico and is most prevalent in bays and estuaries. Red drum are also found in tidal streams, wetlands, and beachfront areas. Nursery habitat for larval and juvenile red drum consists of estuaries with soft bottom (TDOT, 2016). Essential Fish Habitat (EFH) exists within the LMGS vicinity for red drum, as discussed in Section 2.4.2.4.1 below. The location in which red drum were encountered during seasonal surveys, West Coloma Creek, is not considered EFH for this species. However, Powderhorn Lake, located to the southeast of the LMGS site, is fed by West Coloma Creek and is considered EFH for this species.

While the above listed commercially or recreationally important species were identified during field surveys of the LMGS site, habitats supporting these species on the site are limited. As such, no commercial or recreational fishery exists for these species on the LMGS site.

2.4.2.4 Important Aquatic Habitats

NRC criteria for determining important aquatic habitats are provided in Section 2.4.1.6. No important aquatic habitats were identified on the LMGS site.

2.4.2.4.1 Essential Fish Habitat

The Magnuson – Stevens Fishery Conservation Management Act (16 USC 1801–1883), as amended by the Sustainable Fisheries Act of 1996, directs NOAA NMFS to protect and conserve the habitat of marine, estuarine, and anadromous finfish, as well as mollusks and crustaceans. This EFH is defined as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” Federal agencies must consult with NMFS (using existing consultation processes for the National Environmental Policy Act, the ESA, or the Fish and Wildlife Coordination Act) on any action that they authorize, fund, or undertake that may adversely affect EFH.

The NMFS has established EFH for aquatic species that may occur in Guadalupe Bay or Mission Lake, including within the Victoria Barge Canal of the LMGS vicinity. Species for which EFH exists within the LMGS vicinity are listed in Table 2.4-20 (NOAA, 2023b). Existing EFH in the vicinity is for marine species that may be found within Guadalupe Bay and Mission Lake areas. All EFH in the LMGS vicinity lies within estuaries and marine systems. No Habitat Areas of Particular Concern or EFH Areas Protected from Fishing were identified within the LMGS vicinity. Powderhorn Lake, located approximately 12 mi (19 km) to the southeast of the LMGS site, is fed by West Coloma Creek, and is included in EFH for all Gulf of Mexico species for which EFH exists. Powderhorn Lake subsequently feeds Matagorda Bay. Red drum, a species for which EFH exists in Powderhorn Lake, were encountered in seasonal aquatic surveys in West Coloma Creek downstream of the LMGS site, but within the LMGS vicinity.

2.4.2.4.2 Other Important Aquatic Habitats

Important aquatic habitats within the LMGS vicinity include protected marine oyster waters. Oyster water use is assigned to coastal bays by TCEQ to protect existing harvest of edible species such as clams, oysters, and mussels. Concentrations of bacteria in oyster waters must not exceed criteria established to maintain seafood safe for human consumption. The median fecal coliform concentration criterion is 14 colonies per 100 mL (TCEQ, 2022a). The oyster water habitats within Guadalupe Bay and Mission Lake (Bay Segment 2462) are listed as impaired by the State of Texas because of the presence of bacteria within the upper bay and shoreline area (TCEQ, 2022b). The area is closed to shellfish harvest for this reason.

2.4.2.5 Key Indicator Organisms

No key indicator organisms were identified in seasonal aquatic ecology surveys within the LMGS site or in the LMGS vicinity.

2.4.2.6 Nuisance Species

In the 2023 and 2024 aquatic ecology surveys conducted on the LMGS site and in the LMGS vicinity, the only nonnative fish species encountered were common carp (*Cyprinus carpio*) and Rio Grande cichlid (*Herichthys cyanoguttatus*). Other nonnative or nuisance species observed in the vicinity during aquatic ecology sampling included apple snail (*Pomacea maculata*), Asiatic clam (*Corbicula fluminea*), aquatic macrophyte species water hyacinth (*Eichoria crassipes*), and Eurasian watermilfoil (*Myriophyllum spicatum*). Water hyacinth was present only in the GBRA Calhoun Canal, while Eurasian watermilfoil was observed in both the GBRA Calhoun Canal and West Coloma Creek on the LMGS site. Other species found in aquatic ecosystems on the LMGS site include Asiatic clams, Rio Grande cichlid, and apple snails. Two nonnative macroinvertebrates were encountered in sampling: the aquatic oligochaete worm (*Branchiura sowerbyi*), and the red-rimmed melania (*Melanoides tuberculata*).

Apple snail is an invasive aquatic snail species whose presence can result in habitat degradation and competition with native snail species. Apple snails primarily feed on aquatic vegetation and can quickly attain high population densities, resulting in decimation of native aquatic vegetation. They are found primarily in slow-moving waters and have high tolerance for salinity, resulting in this species commonly colonizing in estuarine waters. Apple snails can survive periods of extreme drought through burrowing and aestivating (Texas Invasives, 2023b).

Asiatic clams have been documented in low densities within the GBRA Canal. Asiatic clam is considered a nuisance species due to its tolerance of a variety of aquatic conditions and high reproductive rate. This species has been known to clog pipes and industrial intake systems.

Water hyacinth is a free-floating perennial aquatic plant that is considered invasive in the United States. This macrophyte grows rapidly and can spread from both fragmentation and seed production. Water hyacinth is one of the fastest growing invasive species and can double its population in approximately two weeks. The thick layers of growth can block light and result in depletion of dissolved oxygen in waters (Brazos River Authority, 2023). This plant was found in the GBRA Calhoun Canal during seasonal aquatic ecology surveys.

Eurasian watermilfoil is a submersed perennial plant with finely dissected feather-like leaves and thin stems. This macrophyte can form large, floating mats of vegetation on the surface of lakes, rivers, and other waterbodies, preventing light penetration for native plants and depletion of dissolved oxygen. This plant is found in areas subjected to natural and man-made disturbances. Eurasian watermilfoil is an extremely adaptable plant and is able to thrive in a variety of environmental conditions (Texas Invasives, 2024). This macrophyte was observed in West Coloma Creek during seasonal aquatic ecology surveys.

The GBRA actively employs early detection monitoring stations across the Guadalupe River Basin for the presence of zebra mussels (*Dreissena polymorpha*). Zebra mussels are an invasive mollusk that have expanded across the United States. Zebra mussels multiply rapidly and can result in beach hazards, damage to boats and equipment, and clogged water intakes. Zebra mussels were detected in Texas in Lake Texoma in 2009 and have expanded into five Texas river basins. The Guadalupe River Basin is currently the southernmost range of the species. No zebra mussels have been observed in the vicinity of the LMGS site (GBRA Environmental Sciences, 2021).

2.4.2.7 Existing Ecological Effects and Environmental Stresses

As discussed in Section 2.3.1, microplastic pollution, specifically in the form of nurdles, are present in aquatic ecosystems in the LMGS vicinity. Microplastic pollution exposure has been found to cause growth impairment, behavioral impairment, reproductive impairment, feeding impairment, reduced survival, and increased mortality in aquatic organisms (Ha and Yeo, 2018).

As discussed in Section 2.3.1.3, San Antonio Bay, Hynes Bay, Guadalupe Bay, and Mission Lake are included on the CWA 303(d) List as a Category 5 water due to bacteria in oyster water (fecal coliform), which affects the use of Fish and Shellfish Consumption (TCEQ, 2022b). In 2002, data obtained by TCEQ showed that 14 bay segments, including the Lavaca – Guadalupe Coastal Basin, were not safe for harvesting shellfish because of elevated bacteria concentrations. No total maximum daily loads have been established for the Bays of the Middle Texas Coast at this time. The Middle Texas Coast Oyster Waters project has been initiated to determine the extent and severity of the bacteria impairments in the Middle Texas Coast Oyster Waters, including Mission Lake (TCEQ, 2022b). Because of this, recreational oyster harvesting is prohibited in these areas.

2.4.2.8 Transmission Corridor Aquatic Habitats and Species

Transmission corridors associated with LMGS are shown in Figure 2.2-8. No new transmission line corridors are planned for off-site connections from the LMGS site. All habitats within the transmission corridors within the LMGS site are heavily impacted by previous development. No important aquatic habitats or important aquatic species are present within the corridors on the LMGS site.

Tables

Table 2.4-1: Land Cover within the Long Mott Generating Station Site and Vicinity

Land Cover Class	LMGS Site[(a)] (acres)	6 Mi. Vicinity (acres)
Barren Land	-	123
Deciduous Forest	0.2	281.3
Herbaceous	442.4	352.5
Evergreen Forest	2.2	426.6
Developed, High Intensity	-	430.8
Woody Wetlands	3.3	479
Developed, Medium Intensity[(b)]	196.2	572.4
Mixed Forest	-	754.8
Developed, Low Intensity	-	1159.8
Developed, Open Space	-	1832.5
Shrub/Scrub	57.4	2886.2
Emergent Herbaceous Wetlands	23.5	9715.7
Open Water	81.9	11,566.70
Hay/Pasture	-	19,496.20
Cultivated Crops	730.2	34,862.70
Total	**1537.2**	**84,940.20**

Source: Dewitz and USGS, 2021

Notes:

a) NLCD data modified based on field observations

b) Medium intensity developed land cover types occur on the LMGS site but have no associated vegetation

Abbreviations: LMGS = Long Mott Generating Station

Table 2.4-2: Potential Wetlands Identified within the Long Mott Generating Station Site

Feature ID	Size[(a)] (acres)	Classification	Potential Jurisdictional Status[(b)]	Latitude	Longitude
SD WET-01	0.24	PEM	Not Jurisdictional	28.519297	-96.768785
SD WET-02	0.19	PEM	Not Jurisdictional	28.510182	-96.750582
SD WET-03	4.16	PEM	Not Jurisdictional	28.510655	-96.751253
SD WET-04	3.71	PEM	Not Jurisdictional	28.511601	-96.751944
SD-WET-05	4.85	PEM	Not Jurisdictional	28.520017	-96.75989
SD-WET-06	1.35	PEM	Not Jurisdictional	28.51213	-96.752896
SD-WET-07	0.34	PEM	Not Jurisdictional	28.516012	-96.756431
SD-WET-08	3.29	PSS	Not Jurisdictional	28.517535	-96.757502
SD-WET-09	0.89	PEM	Not Jurisdictional	28.51872	-96.758715
SD-WET-10	1.06	PEM	Not Jurisdictional	28.526042	-96.769802
SD-WET-11	3.17	PEM	Not Jurisdictional	28.526812	-96.77022
SD-WET-12	0.7	PEM	Not Jurisdictional	28.52465	-96.75362
SD-WET-13	0.1	PEM	Not Jurisdictional	28.539367	-96.75362
SD-WET-14	0.61	PEM	Jurisdictional	28.530001	-96.757058
SD-WET-15	0.17	PEM	Jurisdictional	28.520517	-96.750734
SD-WET-16	0.15	PEM	Not Jurisdictional	28.520495	-96.770489
SD-WET-17	1.83	PEM	Not Jurisdictional	28.519894	-96.772706

Notes:

a) Area of the feature within the LMGS site only

b) Based on current interpretations of the WOTUS Rule, based on WSP’s professional opinion, and pending USACE confirmation

Abbreviations: LMGS = Long Mott Generating Station; PEM = palustrine emergent; PSS = palustrine scrub-shrub; USACE = U.S. Army Corps of Engineers; WOTUS = waters of the U.S.

Table 2.4-3: Avifauna Species Observed on the Long Mott Generating Station Site (Sheet 1 of 3)

Scientific Name	Common Name	Winter 2023 LMGS Site Abundance(a)	Spring 2023 LMGS Site Abundance(a)	Summer 2023 LMGS Site Abundance(a)	Fall 2023 LMGS Site Abundance(a)
Agelaius phoeniceus	Red-winged blackbird	A	A	A	A
Ammodramus savannarum	Grasshopper sparrow			R	
Ardea alba	Great egret	R	U	R	R
Ardea herodias	Great blue heron	U			
Bubulcus ibis	Cattle egret			O	
Buteo jamaicensis	Red-tailed hawk	U		R	R
Calidris minutilla	Least sandpiper		R		
Caracara cheriway	Crested caracara	U	U	U	
Cardinalis cardinalis	Northern cardinal		C	O	C
Cathartes aura	Turkey vulture	C	C	C	U
Charadrius vociferus	Killdeer		O	U	C
Circus hudsonius	Northern harrier	R		R	
Coccyzus americanus	Yellow-billed cuckoo		U		
Colinus virginianus	Northern bobwhite		U		
Columba livia	Rock pigeon		R	R	
Contopus virens	Eastern wood-pewee		U		
Coragyps atratus	Black vulture		R	O	A
Dumetella carolinensis	Gray catbird			U	
Egretta caerulea	Little blue heron		U		
Egretta thula	Snowy egret		U	R	
Egretta tricolor	Tricolored heron			U	
Eudocimus albus	White ibis			U	
Falco sparverius	American kestrel	R			
Geranoaetus albicaudatus	White-tailed hawk		R		
Haemorhous mexicanus	House finch	R			
Himantopus mexicanus	Black-necked stilt			U	
Icteria virens	Yellow-breasted chat		R		

Table 2.4-3: Avifauna Species Observed on the Long Mott Generating Station Site (Continued) (Sheet 2 of 3)

Scientific Name	Common Name	Winter 2023 LMGS Site Abundance[(a)]	Spring 2023 LMGS Site Abundance[(a)]	Summer 2023 LMGS Site Abundance[(a)]	Fall 2023 LMGS Site Abundance[(a)]
Lanius ludovicianus	Loggerhead shrike		R	R	U
Melanerpes carolinus	Red-bellied woodpecker			R	
Melospiza melodia	Song sparrow	O			U
Mimus polyglottos	Northern mockingbird	O	A	O	U
Molothrus ater	Brown-headed cowbird		A	R	C
Myiarchus crinitus	Great crested flycatcher		U	R	
Nannopterum auritum	Double-crested cormorant		R	R	R
Nyctanassa violacea	Yellow-crowned night-heron		R		
Passer domesticus	House sparrow		U		
Passerina caerulea	Blue grosbeak		R		
Passerculus sandwichensis	Savannah sparrow	O			C
Petrochelidon fulva	Cave swallow		A		
Petrochelidon pyrrhonota	Cliff swallow			U	
Phalaropus tricolor	Wilson's phalarope		R		
Podilymbus podiceps	Pied-billed grebe		R		
Quiscalus mexicanus	Great-tailed grackle	R	U	A	A
Sayornis phoebe	Eastern phoebe	R			U
Setophaga petechia	Yellow warbler			R	
Setophaga coronata	Yellow-rumped warbler	R			
Spinus tristis	American goldfinch			U	
Spiza americana	Dickcissel		U	U	
Spizelloides arborea	American tree sparrow			U	
Stelgidopteryx serripennis	Northern rough-winged swallow			R	A
Sterna forsteri	Forster's tern		R		U
Sterna hirundo	Common tern		R		
Streptopelia decaocto	Eurasian collared-dove	O	O	U	
Sturnella magna	Eastern meadowlark		U		
Sturnus vulgaris	European starling		O	O	C
Troglodytes aedon	House wren				U

Table 2.4-3: Avifauna Species Observed on the Long Mott Generating Station Site (Continued) (Sheet 3 of 3)

Scientific Name	Common Name	Winter 2023 LMGS Site Abundance[a]	Spring 2023 LMGS Site Abundance[a]	Summer 2023 LMGS Site Abundance[a]	Fall 2023 LMGS Site Abundance[a]
Tyrannus forficatus	Scissor-tailed flycatcher		U		
Zenaida macroura	Mourning dove		U	A	C
Zonotrichia albicollis	White-throated sparrow	R			
	Species Richness	**17**	**36**	**33**	**20**

Note:
a) Species identified during on-site pedestrian surveys
Abbreviations: A = abundant; C = common; LMGS = Long Mott Generating Station; O = occasional; U = uncommon; R = rare

Table 2.4-4: Avifauna Species Observed in the Long Mott Generating Station Vicinity (Sheet 1 of 4)

Scientific Name	Common Name	Winter 2023		Spring 2023		Summer 2023		Fall 2023	
		Driving Route Abundance[(a)]	Vicinity General Recon	Driving Route Abundance[(a)]	Vicinity General Recon	Driving Route Abundance[(a)]	Vicinity General Recon	Driving Route Abundance[(a)]	Vicinity General Recon
Agelaius phoeniceus	Red-winged blackbird	A	X	A	X	A	X	A	X
Anas acuta	Northern pintail		X					R	
Anas crecca	Green-winged teal		X						
Anhinga anhinga	Anhinga					R	X	R	X
Antigone canadensis	Sandhill crane	U						O	
Ardea alba	Great egret	O	X	O	X	A	X	O	X
Ardea herodias	Great blue heron	U				C	X	O	
Botaurus lentiginosus	American bittern								X
Bubulcus ibis	Cattle egret			U		A	X	C	
Buteo jamaicensis	Red-tailed hawk	O		R	X	R		C	X
Buteo lineatus	Red-shouldered hawk	R						R	
Butorides virescens	Green heron	R		U		R	X		
Calidris minutilla	Least sandpiper			U					X
Caracara cheriway	Crested caracara	O	X	U		U	X	U	X
Cardinalis cardinalis	Northern cardinal	C	X	C	X	C		U	X
Cathartes aura	Turkey vulture	C	X	C		A	X	A	X
Charadrius vociferus	Killdeer	O		C	X	R	X	C	X
Chlidonias niger	Black tern			U		A	X		
Chordeiles minor	Common nighthawk			R	X	O	X	R	
Circus hudsonius	Northern harrier	U	X			R		R	X
Coccyzus americanus	Yellow-billed cuckoo			O					
Colinus virginianus	Northern bobwhite			O					
Columba livia	Rock pigeon	R		R			X		
Contopus virens	Eastern wood-pewee			R		R			
Coragyps atratus	Black vulture	C	X	C		O	X	A	X
Cyanocitta cristata	Blue jay			U					

Table 2.4-4: Avifauna Species Observed in the Long Mott Generating Station Vicinity (Continued) (Sheet 2 of 4)

Scientific Name	Common Name	Winter 2023		Spring 2023		Summer 2023		Fall 2023	
		Driving Route Abundance[(a)]	Vicinity General Recon	Driving Route Abundance[(a)]	Vicinity General Recon	Driving Route Abundance[(a)]	Vicinity General Recon	Driving Route Abundance[(a)]	Vicinity General Recon
Dendrocygna autumnalis	Black-bellied whistling-duck			C		C	X		
Dumetella carolinensis	Gray catbird	R						R	
Egretta caerulea	Little blue heron			U	X	C	X		X
Egretta thula	Snowy egret	R		A		A	X	C	X
Egretta tricolor	Tricolored heron	R		U	X	U	X	R	X
Eudocimus albus	White ibis	C			X	A	X	R	X
Falco sparverius	American kestrel	C	X					U	X
Fulica americana	American coot	A	X	U		A	X	A	X
Gallinago delicata	Wilson's snipe	R							
Gallinula galeata	Common gallinule	R		U		U	X		
Geothlypis trichas	Common yellowthroat			U					
Geranoaetus albicaudatus	White-tailed hawk			U		R		U	
Haliaeetus leucocephalus	Bald eagle	R							
Himantopus mexicanus	Black-necked stilt		X		X	A	X		
Hirundo rustica	Barn swallow				X			R	
Hydroprogne caspia	Caspian tern	R							
Lanius ludovicianus	Loggerhead shrike	U	X	U	X	O	X	C	X
Leucophaeus atricilla	Laughing gull	R	X	U	X		X		X
Limnodromus griseus	Short-billed dowitcher		X				X		
Mareca strepera	Gadwall		X						
Megaceryle alcyon	Belted kingfisher	R					X	U	X
Melanerpes carolinus	Red-bellied woodpecker			U				R	
Meleagris gallopavo	Wild turkey				X				
Mergus serrator	Red-breasted merganser			C	X				
Melospiza melodia	Song sparrow	O							X
Mimus polyglottos	Northern mockingbird	O	X	A	X	C	X	U	X
Molothrus aeneus	Bronzed cowbird			U					
Molothrus ater	Brown-headed cowbird	R		A		C	X	A	X

Table 2.4-4: Avifauna Species Observed in the Long Mott Generating Station Vicinity (Continued) (Sheet 3 of 4)

Scientific Name	Common Name	Winter 2023		Spring 2023		Summer 2023		Fall 2023	
		Driving Route Abundance[(a)]	Vicinity General Recon	Driving Route Abundance[(a)]	Vicinity General Recon	Driving Route Abundance[(a)]	Vicinity General Recon	Driving Route Abundance[(a)]	Vicinity General Recon
Mycteria americana	Wood stork					U			
Myiarchus crinitus	Great crested flycatcher			U	X				
Myiarchus tyrannulus	Brown-crested flycatcher			R					
Nannopterum auritum	Double-crested cormorant	R		U	X	U	X	U	X
Nyctanassa violacea	Yellow-crowned night-heron			U					
Pandion haliaetus	Osprey							R	X
Passerculus sandwichensis	Savannah sparrow							C	X
Parkesia noveboracensis	Northern waterthrush	R							
Passerina ciris	Painted bunting			U					
Pelecanus occidentalis	Brown pelican	R	X		X		X		X
Petrochelidon fulva	Cave swallow			A	X	A			
Petrochelidon pyrrhonota	Cliff swallow				X	U			
Pipilo erythrophthalmus	Eastern towhee	R							
Piranga rubra	Summer tanager					R			
Platalea ajaja	Roseate spoonbill	R			X	U			
Plegadis falcinellus	Glossy ibis	R	X	U		U			X
Podilymbus podiceps	Pied-billed grebe	R	X				X		X
Poecile carolinensis	Carolina chickadee			U					
Polioptila caerulea	Blue-gray gnatcatcher							R	X
Progne subis	Purple martin			R					
Quiscalus mexicanus	Great-tailed grackle	A	X	A	X	A	X	A	X
Quiscalus quiscula	Common grackle			R					
Sayornis phoebe	Eastern phoebe	R				R		U	X
Setophaga coronata	Yellow-rumped warbler	R		R					
Sialia sialis	Eastern bluebird							R	
Spatula clypeata	Northern shoveler		X						X
Spatula discors	Blue-winged teal		X						
Spinus tristis	American goldfinch			U		O		R	

Table 2.4-4: Avifauna Species Observed in the Long Mott Generating Station Vicinity (Continued) (Sheet 4 of 4)

Scientific Name	Common Name	Winter 2023		Spring 2023		Summer 2023		Fall 2023	
		Driving Route Abundance[(a)]	Vicinity General Recon	Driving Route Abundance[(a)]	Vicinity General Recon	Driving Route Abundance[(a)]	Vicinity General Recon	Driving Route Abundance[(a)]	Vicinity General Recon
Spiza americana	Dickcissel			C					
Stelgidopteryx serripennis	Northern rough-winged swallow						X	A	
Sterna forsteri	Forster's tern			R			X	U	X
Sterna hirundo	Common tern			U	X				
Streptopelia decaocto	Eurasian collared-dove	A	X	U	X	O		C	X
Sturnella magna	Eastern meadowlark	C		O				C	X
Sturnella neglecta	Western meadowlark								X
Sturnus vulgaris	European starling	U	X	U	X			A	X
Thalasseus maximus	Royal tern				X		X		
Thalasseus sandvicensis	Sandwich tern					R	X		
Thryothorus ludovicianus	Carolina wren			U					
Tringa flavipes	Lesser yellowlegs		X		X				
Tringa semipalmata	Willet			R	X		X		X
Troglodytes aedon	House wren							O	X
Tyrannus forficatus	Scissor-tailed flycatcher			U	X			R	X
Vireo griseus	White-eyed vireo	U		U		U		R	
Vireo olivaceus	Red-eyed vireo			U					
Zenaida macroura	Mourning dove	R	X	A		A	X	A	X
Zonotrichia albicollis	White-throated sparrow	U							
	Species Richness	46	27	58	30	42	37	46	43

Note:
a)Species identified along the bird transect routes at designated vicinity stopping points.
Abbreviations: A = abundant; C = common; O = occasional; U = uncommo; R = rare; X = Observed during field reconnaissance

Table 2.4-5: Mammal Species Observed within the Long Mott Generating Station Vicinity and on the LMGS Site

Scientific Name	Common Name	Winter 2023		Spring 2023		Summer 2023		Fall 2023		Spring 2008[(a)]
		On-Site	Vicinity	On-Site	Vicinity	On-Site	Vicinity	On-Site	Vicinity	Vicinity: Representative Based on Similar Habitat Types
Baiomys taylori	Northern pygmy mouse									X
Canis latrans	Coyote	X		X				X		X
Castor canadensis	Beaver				X					
Dasypus novemcinctus	Armadillo				X		X			X
Didelphis virginiana	Opossum	X							X	X
Geomys attwateri	Attwater’s pocket gopher									X
Lynx rufus	Bobcat									X
Marmota monax	Groundhog	X	X	X						
Mephitis mephitis	Striped skunk	X			X					
Myocastor coypus	Nutria						X			
Odocoileus virginianus	White-tailed deer	X	X	X	X	X	X	X	X	X
Oryzomys palustris	Marsh rice rat									X
Peromyscus leucopus	White-footed mouse									X
Procyon lotor	Raccoon	X	X	X	X	X	X	X	X	X
Reithrodontomys fulvescens	Fulvous harvest mouse									X
Sciurus carolinensis	Eastern gray squirrel									X
Sciurus niger	Eastern fox squirrel									X
Sigmodon hispidus	Hispid cotton rat									X
Sus scrofa	Feral hog			X	X					X
Sylvilagus floridanus	Eastern cottontail		X	X	X	X		X		X

Note:
a)Source: Exelon Generation, 2012
Abbreviations: LMGS = Long Mott Generating Station; X = observed during field reconnaissance

Table 2.4-6: Herpetofauna Species Observed within the Long Mott Generating Station Vicinity and on the LMGS Site (Sheet 1 of 2)

Scientific Name	Common Name	Spring 2023		Summer 2023		Fall 2023		Spring 2008[(a)]
		On-Site	Vicinity	On-Site	Vicinity	On-Site	Vicinity	Vicinity: Representative Based on Similar Habitat Types
Acris crepitans blanchardi	Blanchard's cricket frog							X
Agkistrodon piscivorus	Cottonmouth						X	X
Alligator mississippiensis	American alligator	X	X	X	X		X	X
Apalone spinifera	Spiny softshell turtle		X		X		X	X
Chelydra serpentina	Common snapping turtle				X			X
Elaphe obsoleta lindheimeri	Texas rat snake							X
Gastrophryne carolinensis	Eastern narrowmouth toad							X
Hyla cinerea	Green treefrog							X
Hyla squirella	Squirrel treefrog							X
Incilius nebulifer	Gulf coast toad	X			X			X
Lampropeltis calligaster calligaster	Prairie king snake							X
Lampropeltis getula splendida	Speckled king snake							X
Lithobates catesbeianus	American bullfrog	X	X					
Masticophis flagellum flagellum	Eastern coachwhip							X
Nerodia fasciata confluens	Broad-banded water snake							X
Nerodia rhombifer	Diamondback watersnake	X		X			X	X
Plestiodon fasciatus	Five-lined skink	X						X

Table 2.4-6: Herpetofauna Species Observed within the Long Mott Generating Station Vicinity and on the LMGS Site (Sheet 2 of 2)

Scientific Name	Common Name	Spring 2023		Summer 2023		Fall 2023		Spring 2008[(a)]
		On-Site	Vicinity	On-Site	Vicinity	On-Site	Vicinity	Vicinity: Representative Based on Similar Habitat Types
Rana catesbeiana	Bullfrog							X
Rana sphenocephala	Southern leopard frog							X
Sceloporus olivaceus	Texas spiny lizard		X					
Scincella lateralis	Ground skink							X
Siren intermedia nettingi	Western lesser siren							X
Thamnophis proximus orarius	Gulf Coast ribbon snake					X		
Thamnophis sirtalis	Garter snake	X						
Trachemys scripta elegans	Red-eared slider	X	X		X			X
Virginia striatula	Ground snake							X

Note:
a) Source: Exelon Generation, 2012
Abbreviations: LMGS = Long Mott Generating Station; X = observed during field reconnaissance

Table 2.4-7: Vascular Plant Species of the Long Mott Generating Station Site (Sheet 1 of 8)

Scientific Name	Common Name	Relative Abundance[a] within Landcover Types[b]							
		1	2	3	4	5	6	7	LMGS Site Overall
Tree Layer									
Celtis laevigata	sugarberry		C		R	C	U		O
Fraxinus berlandieriana	Mexican ash						R		R
Gleditsia triacanthos	honey locust					U			R
Melia azerbach	Chinaberry					R			R
Prosopis glandulosa	honey mesquite				U	U			U
Quercus fusiformis	live oak			U		U			U
Salix interior	sandbar willow						U		R
Salix nigra	black willow						U		U
Triadica sebifera	Chinese tallow							R	R
Vachellia farnesiana	huisache				O				U
Shrub Layer									
Baccharis halimifolia	groundseltree				U	O	U	C	O
Broussonetia papyrifera	paper mulberry						U		R
Callicarpa americana	beautyberry					R			R
Celtis ehrenbergia	spiny hackberry					R			R
Celtis laevigata	sugarberry		C		R	C	U		O
Cephalanthus occidentalis	buttonbush						R		R
Forestiera angustifolia	Texas swamp privet					U	U		R
Gleditsia triacanthos	honey locust					U			R
Ilex decidua	posssumhaw						R		R
Ilex vomitoria	yaupon		C	C	R	C			C
Melia azerbach	Chinaberry				R				R
Morus alba	white mulberry						U		R
Prosopis glandulosa	honey mesquite				U				U
Quercus fusiformis	live oak			A					O

Table 2.4-7: Vascular Plant Species of the Long Mott Generating Station Site (Continued) (Sheet 2 of 8)

Scientific Name	Common Name	Relative Abundance[a] within Landcover Types[b]							
		1	2	3	4	5	6	7	LMGS Site Overall
Rosa bracteata	McCartney rose		C	O	O	A	U	C	A
Salix interior	sandbar willow						U		R
Salix nigra	black willow						U		U
Sideroxylon lanuginosum	gum bumelia				U				R
Smilax bona-nox	saw greenbriar		U						U
Smilax rotundifolia	common greenbriar		U	O					U
Toxicodendron radicans	poison ivy						U		R
Triadica sebifera	Chinese tallow				R		O		U
Ulmus crassifolia	cedar elm					R			R
Vachellia farnesiana	huisache				O	O	R	U	O
Zanthoxylum clava-herculis	Hercule’s club				R	R			R
Zanthoxylum fagara	lime prickly ash				R	R			R
Herbaceous Layer									
Agalinis heterophylla	prairie false foxglove					U			U
Agalinis strictifolia	stiffleaf false foxglove				R				R
Amaranthus palmeri	Palmer amaranth				R				R
Ambrosia psilostachya	western ragweed	O			O	U		O	O
Ampelopsis arborea	peppervine						A		U
Amphiachyris dracunculoides	priarie broomweed				R				R
Anagallis arvensis	false pimpernell				U				R
Andropogon glomeratus	bushy bluestem					R	U	U	U
Aristida oligantha	prairie three awn				U				R
Asclepias viridis	green antelopehorn				U				R
Baccharis halimifolia	groundseltree	O				O		C	O
Bacopa monnieri	water hyssop						C		O
Borrichia frutescens	sea oxeye						U	U	U
Bothriochloa bladhii	Caucasian bluestem				R				R
Bothriochloa ischaemum	yellow bluestem				O	R			U

Table 2.4-7: Vascular Plant Species of the Long Mott Generating Station Site (Continued) (Sheet 3 of 8)

Scientific Name	Common Name	Relative Abundance[a] within Landcover Types[b]							
		1	2	3	4	5	6	7	LMGS Site Overall
Bothriochloa laguroides	silver bluestem				U				U
Bothriochloa longipaniculata	longspike beardgrass				O	R		U	U
Bouteloua rigidiseta	Texas grama				U				R
Callicarpa americana	beautyberry					R			R
Callirhoe involucrata	winecup				U				U
Calyptocarpus vialis	straggler daisy				U				U
Caperonia palustris	Texasweed				R		U		U
Cardiospermum halicacabum	balloon vine				U		O		U
Carex tetrastachya	Britton's sedge					R			R
Chenopodium album	lambsquaters				R				R
Chloris canterae	Paraguayan windmill grass					U			U
Chloris cucullata	hooded windmill grass	O			U				U
Chromolaena odorata	blue mistflower			U	U				R
Cirsium horridulum	yellow thistle				R				R
Cooperia sp.					R				R
Coreopsis tinctoria	plains coreopsis	C			O				O
Croton lindheimeri	Wooly croton	O		C	U	O			O
Croton monanthogynus	prairie tea				U				U
Cucumis melo	musk melon				R		R		U
Cyclospermum leptophyllum	marsh parsley				R	U			R
Cynanchum racemosum	talayote				R	U			U
Cynodon dactylon	scutch				C	O	C	C	C
Cyperus articulatus	jointed flatsedge				U		O		U
Cyperus entrerianus	deeprooted sedge				O	U	U		O
Cyperus retrorsus	pine barren flatsedge				U	R			U
Cyperus rotundus	purple nutsedge				R				R
Cyperus virens	green flatsedge				U		U		U
Diaperia verna	spring pygmy cudweed					R			R

Table 2.4-7: Vascular Plant Species of the Long Mott Generating Station Site (Continued) (Sheet 4 of 8)

Scientific Name	Common Name	Relative Abundance[(a)] within Landcover Types[(b)]							
		1	2	3	4	5	6	7	LMGS Site Overall
Dichanthium annulatum	Kleberg's bluestem		C		A	A			A
Dichanthium aristatum	angleton grass		U		C	C		O	C
Dichanthium sericeum	Queensland bluegrass				R				R
Dichondra sp.					R				R
Dinebra nealleyi	Nealley's sprangletop						R		R
Dinebra panicea	mucronate sprangletop						R		R
Distichlis spicata	inland saltgrass				U		O	U	U
Dysphania pumilo	clammy goosefoot				R				R
Eleocharis cellulosa	Gulf Coast spikerush						O		U
Eleocharis montevidensis	sand spikerush				U	U	O	A	O
Elymus virginicus	Virginia wildrye				R			R	R
Eriochloa punctata	Louisiana cupgrass				R	R	R		R
Eryngium hookeri	Hooker's eyrngo				U	U			U
Eupatorium serotinum	late thoroughwort	U			U				U
Euthamia gymnospermoides	Texas goldentop			R					R
Evolvulus sericeus	dwarf silver morning glory				R				R
Fimbristylis puberula	hairy fimbry				R	U			U
Fraxinus berlandieriana	Mexican ash						R		R
Galium tinctorium	stiff marsh bedstraw				R				R
Gomphrena nealleyi	Nealley's globe amaranth				U				R
Helenium amarum	bitterweed	U			O	U			O
Helianthus annuus	annual sunflower				U	U			U
Heliotropium curassavicum	salt heliotrope						R		R
Herbertia lahue	prairie nymph				O				U
Hibiscus laevis	halberdleaf rosemallow						U		U
Hordeum pusillum	little barley				R	U			U
Ipomoea heptaphylla	Wright's morning glory						R		R
Iva angustifolia	narrowleaf marshelder					R	U		U

Table 2.4-7: Vascular Plant Species of the Long Mott Generating Station Site (Continued) *(Sheet 5 of 8)*

Scientific Name	Common Name	Relative Abundance[a] within Landcover Types[b]							
		1	2	3	4	5	6	7	LMGS Site Overall
Iva annua	sumpweed				R	U	O	O	O
Juncus interior	inland rush				U				R
Juncus marginatus	grassleaf rush				U	U			U
Kyllinga odorata	fragrant spikesedge				U				R
Lantana x strigocamara	common lantana				R	U	R		U
Leersia monandra	bunch cutgrass					R			R
Lepidium virginicum	Virginia pepperweed				U	U			U
Limnosciadium pumilum	prairie dogshade				U				R
Linum berlandieri	Berlandier's yellow flax				U				U
Ludwigia peploides	floating primrose willow						R		R
Lycium carolinianum	Carolina wolfberry				U		R		R
Lythrum alatum	winged loosestrife						O	C	O
Lythrum californicum	California loosestrife				R				R
Malachra capitata	yellow leafbract						U		U
Malviscus drummondii	Turk's cap						U		R
Marsilea sp.					U				R
Mecardonia procumbens	baby jump-up				R				R
Melochia pyramidata	pyramidflower				U				R
Mimosa strigilosa	powderpuff				R				R
Monarda punctata	spotted beebalm				U				U
Nassella leucotricha	Texas wintergrass				O				U
Neptunia lutea	yellow sensitive flower				U				U
Neptunia pubescens	tropical puff						U		R
Nothoscordum bivalve	crow poison				U				U
Oenothera curtiflora	velvety gaura				R				R
Oenothera laciniata	cutleaf evening primrose	C							U
Oenothera speciosa	pink ladies				U				R
Oxalis corniculata	creeping woodsorell	C			U				U

Table 2.4-7: Vascular Plant Species of the Long Mott Generating Station Site (Continued) (Sheet 6 of 8)

Scientific Name	Common Name	Relative Abundance[a] within Landcover Types[b]							
		1	2	3	4	5	6	7	LMGS Site Overall
Panicum dichotomiflorum	fall witchgrass					U			U
Panicum hallii	Hall's panicgrass				R	U			U
Panicum virgatum	switchgrass				U				U
Parkinsonia aculeata	Jerusalem thorn					R			R
Parthenium hysterophorus	Santa Maria feverfew				U	U			U
Paspalidium geminatum	Egyptian panicgrass						U		U
Paspalum denticulatum	longtom				O		C	O	O
Paspalum dilatatum	dallisgrass					O			U
Paspalum langei	rustyseed paspalum			U					R
Paspalum notatum	bahia grass				U	U			U
Paspalum pubiflorum	hairyseed paspalum				U	R			U
Paspalum setaceum	hairy beadgrass					R			R
Paspalum urvillei	Vaseygrass				R				R
Passiflora foetida	stinking passionflower				U				R
Pediomelum rhombifolium	gulf indian breadroot				U				R
Phalaris caroliniana	Carolina canarygrass				U	U			U
Phoradendron leucocarpum	American mistletoe					R			R
Phragmites australis	common reed						U		U
Phyla nodiflora	Texas frogruit				O		U		O
Phyllanthus evenescens	birdseed leaf						R		R
Phyrhopappus pauciflorus	smallflower desert chicory				O				O
Phytolacca americana	pokeweed				R				R
Plantago aristata	bracted plantain				R				R
Pluchea odorata	marsh fleabane						U	R	R
Polypremum procumbens	juniper leaf				R				R
Polytaenia texana	Texas prairie parsley				R				R
Ratibida columnifera	Mexican hat				R				R
Rhynchosia minima	least snoutbean				U				U

Table 2.4-7: Vascular Plant Species of the Long Mott Generating Station Site (Continued) (Sheet 7 of 8)

Scientific Name	Common Name	Relative Abundance[(a)] within Landcover Types[(b)]							
		1	2	3	4	5	6	7	LMGS Site Overall
Rhynchospora cauduca	anglestem beaksedge					R			R
Rhynchospora indianolensis[(c)]	Indianola beaksedge				R	U			R
Rivina humilis	pigeonberry				U				R
Rosa bracteata	McCartney rose	O						C	O
Rubus trivialis	southern dewberry				C	O	O	U	O
Rudbeckia hirta	black eyed Susan	O			U				U
Ruellia nudiflora	violet ruellia				U				R
Rumex chrysocarpus	amamastla				U				R
Rumex pulcher	fiddle dock	O			R	U			U
Sabal minor	dwarf palmetto	R					R		R
Sabatia campestris	Texas star				O	U			O
Sagittaria longiloba	longbarb arrowhead				R	R			R
Schizachyrium scoparium	little bluestem				R	U			U
Schoenoplectus tabernaemontani	softstem bulrush				R				R
Sesbania drummondii	rattlebox	U			U	U			O
Sesbania herbacea	coffeeweed				U	U	O	O	O
Setaria magna	giant bristlegrass						R		R
Setaria parviflora	marsh bristlegrass				O	O	R		O
Sida ciliaris	bracted fanpetals				R				R
Solanum elaeagnifolium	silverleaf nightshade				U	U			U
Solanum ptycanthum	eastern black nightshade				R				R
Solanum triquetrum	Texas nightshade				R				R
Solidago altissima	tall goldenrod				O	U	R	O	O
Solidago sempervirens	seaside goldenrod						O	U	U
Sorghum halepense	Johnsongrass	O			O		U		O
Spartina spartinae	Gulf cordgrass				R	U			U
Sporobolus indicus	smutgrass				U				U
Stachys crenata	mousesear				R				R

Table 2.4-7: Vascular Plant Species of the Long Mott Generating Station Site (Continued) (Sheet 8 of 8)

Scientific Name	Common Name	Relative Abundance[a] within Landcover Types[b]							
		1	2	3	4	5	6	7	LMGS Site Overall
Steinchisma hians	gaping grass	U			O	O			O
Symphyotrichum divaricatum	southern annual saltmarsh aster				O		C	O	O
Teucrium cubense	small coastal germander					R			R
Torilis nodosa	knotted hedgeparsley				R				R
Toxicodendron radicans	poison ivy					R			R
Triadica sebifera	Chinese tallow							R	R
Tridens strictus	longspike tridens					R			R
Typha domingensis	Southern cattail						C	O	O
Urochloa fusca	browntop signalgrass	O			U				U
Urochloa platyphylla	broadleaf signalgrass	A			U				O
Vachellia farnesiana	huisache				O			U	U
Verbena brasiliensis	Brazilian vervain	U			U	U			O
Verbena halei	Texas vervain	A			O				O
Vigna luteola	hairy cowpea						R		R
Xanthium strumarium	cocklebur				R				R
Zea mays	corn	A							A
Woody Vine Layer									
Ampelopsis arborea	peppervine				U	U	A	U	C
Smilax bona-nox	saw greenbriar			U	O	O			O
Smilax rotundifolia	common greenbriar				U				U
Vitis mustangensis	mustang grape					U	O		U

Source: TPWD, 2011

Notes:

a) Relative abundance (qualitative) for occurrence in the LMGS site

b) Landcover Types: 1 = Cultivated Crops; 2 = Deciduous Forest; 3 = Evergreen Forest; 4 = Herbaceous; 5 = Shrub/Scrub; 6 = Emergent Herbaceous Wetlands; 7 = Woody Wetlands

c) State vulnerable per TPWD, 2011

Abbreviations: A = abundant; C = common; LMGS = Long Mott Generating Station; O = occasional; U = uncommon; R = rare

Table 2.4-8: Protected Terrestrial Species Potentially Occurring within or near the Long Mott Generating Station Site (Sheet 1 of 2)

Common Name	Scientific Name	Status		
		Federal[(a)]	State[(b)]	Suitable Habitat Present on LMGS Site[(c)]
Birds				
Sprague's pipit	*Anthus spragueii*		S	P
Western burrowing owl	*Athene cunicularia hypugaea*		S	N
White-tailed hawk	*Buteo albicaudatus*		T	P
Red knot	*Calidris canutus rufa*	T	T	N
Piping plover	*Charadrius melodus*	T	T	N
Reddish egret	*Egretta rufescens*		T	N
Swallow-tailed kite	*Elanoides forficatus*		T	N
Northern aplomado falcon	*Falco femoralis septentrionalis*	E	E	N
Eastern black rail	*Laterallus jamaicensis*	T	T	N
Franklin's gull	*Leucophaeus pipixcan*		S	N
Whooping crane	*Grus americana*	E	E	N
Bald eagle	*Haliaeetus leucocephalus*		S	N
Wood stork	*Mycteria americana*		T	N
Black skimmer	*Rynchops niger*		S	N
White-faced ibis	*Plegadis chihi*		T	N
Reptiles and Amphibians				
Woodhouse's toad	*Anaxyrus woodhousii*		S	N
Texas scarlet snake	*Cemophora lineri*		T	P
Southern crawfish frog	*Lithobates areolatus areolatus*		S	N
Texas diamondback terrapin	*Malaclemys terrapin littoralis*		S	N
Salt marsh snake	*Nerodia clarkii*		S	N
Black-spotted newt	*Notophthalmus meridionalis*		T	P
Slender glass lizard	*Ophisaurus attenuatus*		S	N
Texas horned lizard	*Phrynosoma cornutum*		T	N
Prairie skink	*Plestiodon septentrionalis*		S	N
Strecker's chorus frog	*Pseudacris streckeri*		S	N
Western massasauga	*Sistrurus tergeminus*		S	N
Eastern box turtle	*Terrapene carolina*		S	P
Western box turtle	*Terrapene ornata*		S	P
Insects				
American bumblebee	*Bombus pensylvanicus*		S	P
Monarch butterfly	*Danaus plexippus*	C		P
Mollusks				
Live oak glass	*Nesovitrea suzannae*		S	N
Mammals				
Western hog-nosed skunk	*Conepatus leuconotus*		S	N

Table 2.4-8: Protected Terrestrial Species Potentially Occurring within or near the Long Mott Generating Station Site (Continued) (Sheet 2 of 2)

Common Name	Scientific Name	Status		
		Federal[(a)]	State[(b)]	Suitable Habitat Present on LMGS Site[(c)]
Padre Island kangaroo rat	*Dipodomys compactus compactus*		S	N
Eastern red bat	*Lasiurus borealis*		S	N
Hoary bat	*Lasiurus cinereus*		S	N
Northern yellow bat	*Lasiurus intermedius*		S	N
Long-tailed weasel	*Mustela frenata*		S	P
White-nosed coati	*Nasua narica*		T	N
Big free-tailed bat	*Nyctinomops macrotis*		S	N
Tricolored bat	*Perimyotis subflavus*	PE	S	N
Mountain lion	*Puma concolor*		S	N
Eastern spotted skunk	*Spilogale putorius*		S	P
Swamp rabbit	*Sylvilagus aquaticus*		S	N
Plants				
Sand brazos mint	*Brazoria arenaria*		S	N
Marsh-elder dodder	*Cuscuta attenuata*		S	N
Velvet spurge	*Euphorbia innocua*		S	N
Coastal gay-feather	*Liatris bracteata*		S	P
Seaside beebalm	*Monarda maritima*		S	N
Texas peachbush	*Prunus texana*		S	N
Indianola beakrush	*Rhynchospora indianolensis*		S	P
Threeflower broomweed	*Thurovia triflora*		S	P
Plants (continued)				
Texas willkommia	*Willkommia texana var. texana*		S	N

Notes:
a)Federal Status Codes: C = Candidate; E = Listed Endangered; PE = Proposed Endangered; T = Listed Threatened
b)State Status Codes: E = Listed Endangered; S = Listed Sensitive; T = Listed Threatened
c)Habitat Codes: N = No records of species within the LMGS site and no suitable habitat is present;

Abbreviations: LMGS = Long Mott Generating Station; P = potentially suitable habitat is present

Table 2.4-9: Benthic Macroinvertebrates Collected in the Guadalupe River, April – December 2008 (Sheet 1 of 3)

Common Name	Family	Genus	Number	Percent of Total
Mayflies	Ephemeridae	*Hexagenia*	262	4.9
	Polymitarcyidae	*Tortopus*	7	0.1
		Campsurus	5	0.1
	Caenidae	*Cercobrachys*	6	0.1
		Caenis	9	0.2
		Brachycercus	9	0.2
	Palingeniidae	*Pentagenia vittegera*	10	0.2
	Baetidae	*Apobaetis*	1	0
Stoneflies	Perlidae		1	0
Caddisflies	Leptoceridae	*Oecetis*	10	0.2
		Nectopsyche	3	0.1
	Polycentropodidae	*Neureclipsis*	1	0
		Cyrnellus	4	0.1
	Hydroptilidae	*Hydroptila*	2	0
		Neotrichia	1	0
Dragonflies/Damselflies	Gomphidae	*Gomphus*	12	0.2
		Dromogomphus	1	0
		Stylurus	6	0.1
	Coenagrionidae		1	0
		Argia	1	0
	Macromiidae	*Macromia*	2	0
Beetles	Scarabaeidae		1	0
	Elmidae	*Stenelmis*	40	0.7
		Dubiraphia	1	0
		Heterelmis	7	0.1
		Hexacylloepus	2	0
	Chrysomelidae		1	0
	Dryopidae	*Helichus*	1	0

Table 2.4-9: Benthic Macroinvertebrates Collected in the Guadalupe River, April – December 2008 (Continued) (Sheet 2 of 3)

Common Name	Family	Genus	Number	Percent of Total
Flies and Midges	Ceratopogonidae	*Probezzia*	6	0.1
		Sphaeromias	45	0.8
		Culicoides	2	0
	Chironomidae	*Procladius*	1	0
		Ablabesmyia	4	0.1
		Microspectra	7	0.1
		Cryptochironomus	66	1.2
		Cryptotendipes	7	0.1
		Dicrotendipes	13	0.2
		Fissimentum	1	0
		Stelenchomyia	1	0
		Paracladopelma	2	0
		Polypedilum	27	0.5
		Chironomus	29	0.5
		Microchironomus	3	0.1
		Axarus	6	0.1
		Eukiefferiella	1	0
		Endochironomus	1	0
		Stictochironomus	18	0.3
Flies and Midges		*Xestochironomus*	3	0.1
		Epoicocladius	2	0
		Rheocricotopus	1	0
		Cardiocladius	1	0
		Larsia	3	0.1
		Ablabesmyia	5	0.1
		Tanypus	10	0.2
		Coelotanypus	17	0.3
		Paramerina	18	0.3
		Tanytarsus	2	0
		Cladotanytarsus	3	0.1
Molluscs	Corbiculidae		82	1.5
	Hydrobiidae		4536	84
	Ancylidae		4	0.1
	Planorbidae	*Menetus*	1	0
	Unionidae		3	0.1
	Physidae		7	0.1
	Sphaeriidae		21	0.4
	Marine Gastropod		1	0
Leeches	*Subclass Hirudinea*		8	0.1
Flatworms	Planariidae		1	0

Table 2.4-9: Benthic Macroinvertebrates Collected in the Guadalupe River, April – December 2008 (Continued) (Sheet 3 of 3)

Common Name	Family	Genus	Number	Percent of Total
Crustaceans	Palaemonidae	*Palaemonetes*	12	0.2
	Gammaridae	*Gammarus*	8	0.1
	Order Podocopida		2	0
	Class Branchiura		1	0
Segmented worms	*Phylum Annelida*		Present	
Source: Exelon Generation, 2012				

Table 2.4-10: Macroinvertebrates Encountered in the Vicinity of the Long Mott Generating Station Site by Water Body, Fall 2023 (Sheet 1 of 4)

Common Name	Family	Genus	West Coloma Creek	GBRA Calhoun Canal	Dow Drainage Canal	Total	Percent of Total
Flies and Midges	Simulidae		1			1	0.1
	Ceratopogonidae		4			4	0.41
		Culicodes sp.			1	1	0.1
		Dasyhelea sp.	17			17	1.73
	Chironomidae		2			2	0.2
		Suborder: Chironaminae	1			1	0.1
		Larsia sp.	38			38	3.88
		Tanypus sp.	203	1	1	205	20.92
		Dicrotendipes sp.	4	1		5	0.51
		Tanytarsus sp.	7			7	0.71
		Microtendipes sp.	3			3	0.31
		Chironomus sp.	3			3	0.31
		Polypedilum sp.	1		1	2	0.2
		Cryptochironomus sp.		3		3	0.31
		Coelotanypus sp.		1	15	16	1.63
	Limoniidae	*Limonia sp.*	17			17	1.73
	Stratiomyidae	*Odontomyia sp.*	2			2	0.2
	Tanyderidae				1	1	0.1
Annelid Worms	Naididae (Tubificidae)	Group II		4	1	5	0.51

Table 2.4-10: Macroinvertebrates Encountered in the Vicinity of the Long Mott Generating Station Site by Water Body, Fall 2023 (Continued) (Sheet 2 of 4)

Common Name	Family	Genus	West Coloma Creek	GBRA Calhoun Canal	Dow Drainage Canal	Total	Percent of Total
Annelid Worms		Group III		2		2	0.2
		Group V	1	7	104	112	11.43
		Nais sp.	2			2	0.2
		Dero sp.	1			1	0.1
		Pristina sp.	8			8	0.82
		Branchiura sowerbyi		2	1	3	0.31
		Limnodrilus sp.		2	71	73	7.45
		Tubifex tubifex		1		1	0.1
		Aulodrilus sp.			11	11	1.12
	Lumbriculidae				1	1	0.1
	Tipulidae	*Ormosia sp.*			1	1	0.1
	Corethrellidae	*Corethrella sp.*	1			1	0.1
Molluscs	Planorbidae	*Drepanotrema sp.*	6	1	2	9	0.92
		Menetus sp.	2	7	1	10	1.02
	Hydrobiidae		1		1	2	0.2
		Pyrgulopsis sp.		1		1	0.1
		Pyrgophorus sp.	1	136	1	138	14.08
	Thiaridae	*Melanoides sp.*		60		60	6.12
		Melanoides tuberculata		16		16	1.63
	Cyrenidae	*Corbicula sp.*		49	4	53	5.41

Table 2.4-10: Macroinvertebrates Encountered in the Vicinity of the Long Mott Generating Station Site by Water Body, Fall 2023 (Continued)
(Sheet 3 of 4)

Common Name	Family	Genus	West Coloma Creek	GBRA Calhoun Canal	Dow Drainage Canal	Total	Percent of Total
Molluscs	Ampullaridae				1	1	0.1
	Ancylidae	*Hebetancylus sp.*		25		25	2.55
	Lymnaeidae	*Stagnicola sp.*	2			2	0.2
		Lymnaea sp.	1			1	0.1
		Pseudosuccinea sp.		1		1	0.1
	Physidae	*Physa sp.*	16	8		24	2.45
	Unionidae			2		2	0.2
	Gastropoda			1		1	0.1
	Bivalvia	*Pteriomorphia*	1		3	4	0.41
		Unidentified Bivalvia			1	1	0.1
	Unidentified mollusca		1		6	7	0.71
Amphipods	Hyalellidae	*Hyallela sp.*	18	5		23	2.35
Mayflies	Caenidae	*Caenis sp.*	1			1	0.1
	Baetidae	*Callibaetis sp.*	5			5	0.51
Dragonflies/damselfies	Gomphidae		1			1	0.1
		Arigomphus sp.		1		1	0.1
	Coenagrionidae	*Acanthagrion sp.*	5			5	0.51
Beetles	Elmidae	*Heterelmis sp.*		1		1	0.1
	Hydrophilidae	*Berosus sp.*	16			16	1.63
		Tropisternus sp.	1			1	0
Beetles		*Paracymus sp.*	1			1	0.1
True bugs	Naucoridae	*Pelocoris sp.*	2			2	0.2
	Notonectidae	*Buenoa sp.*	2			2	0.2
	Corixidae		3			3	0.31
		Trichocorixa sp.	8			8	0.82
	Gerridae		1			1	0.1
Collembola	Isotomidae	*Isotoma sp.*			1	1	0.1

Table 2.4-10: Macroinvertebrates Encountered in the Vicinity of the Long Mott Generating Station Site by Water Body, Fall 2023 (Continued)
(Sheet 4 of 4)

Common Name	Family	Genus	West Coloma Creek	GBRA Calhoun Canal	Dow Drainage Canal	Total	Percent of Total
Copepods	Cyclopidae		1			1	0.1
Leafhoppers	Cicadellidae				1	1	0.1
		Total	**412**	**338**	**231**	**980**	**100**
Abbreviations: GBRA = Guadalupe-Blanco River Authority							

Table 2.4-11: Macroinvertebrates Encountered in the Vicinity of the Long Mott Generating Station Site by Water Body, Spring 2024 (Sheet 1 of 2)

Common Name	Family	Genus	West Coloma Creek	GBRA Calhoun Canal	Dow Drainage Canal	Total	Percent of Total
Flies and Midges	Stratiomyidae	*Nemotelus sp.*	1			1	0.08
		Heriodiscus sp.		1		1	0.08
	Ceratopogonidae	*Forcipomyia sp.*	1			1	0.08
Flies and Midges	Chironomidae				1	1	0.08
		Tanypus sp.	5			5	0.41
		Dicrotendipes sp.		4		4	0.32
		Chironomus sp.	5			5	0.41
		Polypedilum sp.	1	7		8	0.65
Annelid Worms	Naididae (Tubificidae)	Group IV	46	3		49	3.97
		Dero sp.	6	1		7	0.57
		Branchiura sowerbyi		1		1	0.08
		Limnodrilus sp.	9	1		10	0.81
Molluscs	Planorbidae	*Drepanotrema sp.*		1		1	0.08
		Helisoma sp.	1	7		8	0.65
	Hydrobiidae			6		6	0.49
		Pyrgophorus sp.	5	146		151	12.24
		Stygopyrgus sp.		1	195	196	15.88
	Thiaridae	*Melanoides sp.*		44		44	3.57
	Cyrenidae	*Corbicula sp.*		6		6	0.49
	Ancylidae	*Hebetancylus sp.*		6		6	0.49
	Physidae	*Physa sp.*	6	35		41	3.32
	Gastropoda		1			1	0.08
		Budyconidae		1		1	0.08
Molluscs	Bivalvia	*Pteriomorphia*		4		4	0.32

Table 2.4-11: Macroinvertebrates Encountered in the Vicinity of the Long Mott Generating Station Site by Water Body, Spring 2024 (Continued)
(Sheet 2 of 2)

Common Name	Family	Genus	West Coloma Creek	GBRA Calhoun Canal	Dow Drainage Canal	Total	Percent of Total
Amphipods	Amphipoda			1		1	0.08
	Hyalellidae	*Hyallela sp.*	38	19		57	4.62
	Corophiidae	*Apocorophium lacustre*		1		1	0.08
	Gammaridae	*Gammarus sp.*		11		11	0.89
Mayflies	Caenidae	*Caenis sp.*	2	1		3	0.24
	Baetidae	*Callibaetis sp.*	135	41	6	182	14.75
Dragonflies/damselfies				1		1	0.08
	Coenagrionidae	*Acanthagrion sp.*			3	3	0.24
		Ischnura sp.	8	5		13	1.05
Beetles	Curculionidae				1	1	0.08
	Dytiscidae	*Dytiscus sp.*	1			1	0.08
		Hydroporus sp.	1			1	0.08
	Hydrophilidae	*Berosus sp.*	2	1	1	4	0.32
		Cymbiodyta sp.		1		1	0.08
		Hydrophilus sp.			1	1	0.08
	Helophoridae	*Helophorus sp.*	2			2	0.16
	Chrysomelidae		1			1	0.08
	Scirtidae	*Prionocyphon sp.*	1			1	0.08
		Scirtes sp.	2			2	0.16
True bugs	Hemiptera		1			1	0.08
	Belostomatidae	*Abedus sp.*	1	5		6	0.49
	Saldidae		1			1	0.08
	Corixidae	*Trichocorixa sp.*	39	3	338	380	30.79
	Veliidae	*Microvelia sp.*	1			1	0.08
		Total	**323**	**365**	**546**	**1234**	**100**

Abbreviations: GBRA = Guadalupe-Blanco River Authority

Table 2.4-12: Shellfish Species Encountered in Aquatic Ecology Sampling, Fall 2023 and Spring 2024

Water Body	Common Name	Scientific Name	Number, Fall 2023	Number, Spring 2024
West Coloma Creek	Red swamp crayfish	*Procambarus clarkii*	1	2
	White river crayfish	*Procambarus acutus*	1	
	Blue crab	*Callinectes sapidus*	29	1
	White shrimp	*Litopenaeus setiferus*	123	220
GBRA Calhoun Canal	White shrimp	*Litopenaeus setiferus*	68	81
Dow Drainage Canal	White shrimp	*Litopenaeus setiferus*	287	5
	Blue crab	*Callinectes sapidus*	3	
Abbreviations: GBRA = Guadalupe-Blanco River Authority				

Table 2.4-13: Fishes Collected from the Guadalupe River, Goff Bayou, and GBRA Main Canal, January – December 2008 (Sheet 1 of 2)

Family	Common Name	Scientific Name	Present in GBRA Canal	Total	Percent of Total
Lepisosteidae	Alligator gar	*Atractosteus spatula*		3	0
	Spotted gar	*Lepisosteus oculatus*	X	696	5.4
	Longnose gar	*Lepisosteus osseus*		181	1.4
Elopidae	Ladyfish	*Elops saurus*		1	0
Anguillidae	American eel	*Anguilla rostrata*[(a)]		1	0
Clupeidae	Skipjack herring	*Alosa chrysochloris*		1	0
	Gulf menhaden	*Brevoortia patronus*	X	119	0.9
	Gizzard shad	*Dorosoma cepedianum*	X	995	7.7
	Threadfin shad	*Dorosoma petenense*	X	689	5.3
Engraulidae	Bay anchovy	*Anchoa mitchilli*	X	108	0.8
Cyprinidae	Grass carp	*Ctenopharyngodon idella*[(b)]		2	0
	Red shiner	*Cyprinella lutrensis*	X	5057	39.2
	Common carp	*Cyprinus carpio*[(b)]	X	115	0.9
	Ribbon shiner	*Lythrurus fumeus*		1	0
	Burrhead chub	*Macrhybopsis marconis*		1	0
	Pugnose minnow	*Opsopoeodus emiliae*	X	173	1.3
	Bullhead minnow	*Pimephales vigilax*	X	391	3
Catostomidae	Smallmouth buffalo	*Ictiobus bubalus*	X	204	1.6
	Gray redhorse	*Moxostoma congestum*	X	1	0
Characidae	Mexican tetra	*Astyanax mexicanus*[(b)]	X	359	2.8
Ictaluridae	Yellow bullhead	*Ameiurus natalis*	X	1	0
	Blue catfish	*Ictalurus furcatus*		121	0.9
	Channel catfish	*Ictalurus punctatus*	X	66	0.5
	Tadpole madtom	*Noturus gyrinus*	X	6	0
	Flathead catfish	*Pylodictis olivaris*		39	0.3
Loricariidae	Suckermouth armored catfish	*Pterygoplichthys anisitsi*[(b)]	X	22	0.2
Mugilidae	Striped mullet	*Mugil cephalus*		781	6.1

Table 2.4-13: Fishes Collected from the Guadalupe River, Goff Bayou, and GBRA Main Canal, January – December 2008 (Continued) (Sheet 2 of 2)

Family	Common Name	Scientific Name	Present in GBRA Canal	Total	Percent of Total
Atherinopsidae	Inland silverside	*Menidia beryllina*	X	407	3.2
Fundulidae	Golden topminnow	*Fundulus chrysotus*		1	0
	Bluefin killifish	*Lucania goodei*[(b)]	X	5	0
Cyprinodontidae	Sheepshead minnow	*Cyprinodon variegatus*		1	0
Syngnathidae	Gulf pipefish	*Syngnathus scovelli*	X	2	0
Poeciliidae	Western mosquitofish	*Gambusia affinis*	X	506	3.9
	Sailfin molly	*Poecilia latipinna*	X	156	1.2
Moronidae	White bass	*Morone chrysops*		6	0
Centrarchidae	Green sunfish	*Lepomis cyanellus*		3	0
	Warmouth	*Lepomis gulosus*	X	219	1.7
	Orangespotted sunfish	*Lepomis humilis*	X	18	0.1
	Bluegill	*Lepomis macrochirus*	X	397	3.1
	Longear sunfish	*Lepomis megalotis*	X	603	4.7
	Redear sunfish	*Lepomis microlophus*		1	0
	Bantam sunfish	*Lepomis symmetricus*	X	6	0
Centrarchidae	Spotted bass	*Micropterus punctulatus*	X	93	0.7
	Largemouth bass	*Micropterus salmoides*	X	19	0.1
	White crappie	*Pomoxis annularis*	X	46	0.4
	Black crappie	*Pomoxis nigromaculatus*	X	53	0.4
Sparidae	Pinfish	*Lagodon rhomboides*	X	1	0
Sciaenidae	Freshwater drum	*Aplodinotus grunniens*		36	0.3
Cichlidae	Rio Grande cichlid	*Cichlasoma cyanoguttatum*[(b)]	X	188	1.5
Paralichthyidae	Southern flounder	*Paralichthys lethostigma*		1	0
Achiridae	Hogchoker	*Trinectes maculatus*		1	0

Source: Exelon Generation, 2012
Notes:
a) Observed but not collected
b) Exotic or introduced species
Abbreviations: GBRA = Guadalupe-Blanco River Authority

Table 2.4-14: Fish Species Observed in or Near the Long Mott Generating Station Site, Summer 2023

Location	Common Name	*Scientific Name*	Number	Weight (grams)	Collection Method
Dow Drainage Canal	Sheepshead minnow	*Cyprinodon variegatus*	30	20.9	SE
	Striped mullet	*Mugil cephalus*	9	172.4	SE
	Western mosquitofish	*Gambusia affinis*	7	2.3	SE
	Threadfin shad	*Dorosoma petenense*	3	17	SE
	Plains killifish	*Fundulus zebrinus*	2	1.3	SE
	Sailfin molly	*Poecilia latipinna*	1	0.5	SE
		Total	52	214.4	
GBRA Calhoun Canal	Common carp	*Cyprinus carpio*	1	1067	EFB, EFP
	Smallmouth buffalo	*Ictiobus bubalus*	4	2714	EFB, EFP
	Gizzard shad	*Dorosoma cepedianum*	1	9	EFB, EFP
	Sheepshead minnow	*Cyprinodon variegatus*	2	2	EFB, EFP
	Western mosquitofish	*Gambusia affinis*	58	45.2	EFB, EFP
	Largemouth bass	*Micropterus salmoides*	1	1322	EFB, EFP
	Spotted gar	*Lepisosteus oculatus*	4	3813	EFB, EFP
	Channel catfish	*Ictalurus punctatus*	1	2573	EFB, EFP
	Rio Grande cichlid	*Herichthys cyanoguttatus*	2	1.6	EFB, EFP
	Sailfin molly	*Poecilia latipinna*	4	0.6	EFB, EFP
		Total	**78**	**11547.4**	
West Coloma Creek	Rio Grande cichlid	*Herichthys cyanoguttatus*	1	1.9	EFP, SE
	Western mosquitofish	*Gambusia affinis*	17	7.4	EFP, SE
	Warmouth	*Lepomis gulosus*	3	40.7	EFP, SE
	Striped mullet	*Mugil cephalus*	5	63.4	EFP, SE
	Sheepshead minnow	*Cyprinodon variegatus*	1	0.6	EFP, SE
	Weed shiner	*Notropis texanus*	1	0.3	EFP, SE
	Sailfin molly	*Poecilia latipinna*	76	70.4	EFP, SE
	Spotted gar	*Lepisosteus oculatus*	5	1456	EFP, SE
	Mirror shiner	*Notropis spectrunculus*	1	1	EFP, SE
	Smallmouth buffalo	*Ictiobus bubalus*	1	2083	EFP, SE
	Channel catfish	*Ictalurus punctatus*	2	2.5	EFP, SE
	Largemouth bass	*Micropterus salmoides*	1	0.5	EFP, SE
	Bluegill	*Lepomis macrochirus*	1	1.5	EFP, SE
	Ladyfish	*Elops saurus*	1	3.1	EFP, SE
	Bay anchovy	*Anchoa mitchilli*	19	5.3	EFP, SE
		Total	**135**	**3737.6**	
Abbreviations: EFB = electrofishing (boat); EFP = electrofishing (backpack); GBRA = Guadalupe-Blanco River Authority; SE = Seine					

Table 2.4-15: Fish Species Observed in or near the Long Mott Generating Station Site, Fall 2023 (Sheet 1 of 2)

Location	Common Name	Scientific Name	Number	Weight (g)	Collection Method
Dow Drainage Canal	Striped mullet	*Mugil cephalus*	7	163	SE
	Rio Grande cichlid	*Herichthys cyanoguttatus*	10	9	SE
	Sailfin molly	*Poecilia latipinna*	127	82	SE
	Western mosquitofish	*Gambusia affinis*	17	6	SE
	Sheepshead minnow	*Cyprinodon variegatus*	458	183	SE
	Inland silverside	*Menidia beryllina*	2	4	SE
	Slough darter	*Etheostoma gracile*	8	5	SE
	Spotted gar	*Lepisosteus oculatus*	1	383	SE
		Total	**630**	**835**	
GBRA Calhoun Canal	Smallmouth buffalo	*Ictiobus bubalus*	2	2322	EFB, EFP
	Rio Grande cichlid	*Herichthys cyanoguttatus*	2	94	EFB, EFP
	Bullhead minnow	*Pimephales Vigilax*	2	2	EFB, EFP
	Bluegill	*Lepomis macrochirus*	1	68	EFB, EFP
	Largemouth bass	*Micropterus salmoides*	1	135	EFB, EFP
	Channel catfish	*Ictalurus punctatus*	2	2623	EFB, EFP
	Gizzard shad	*Dorosoma cepedianum*	11	40	EFB, EFP
	Longear sunfish	*Lepomis megalotis*	2	25	EFB, EFP
	Green sunfish	*Lepomis cyanellus*	3	22	EFB, EFP
	Sailfin molly	*Poecilia latipinna*	11	20	EFB, EFP
	Bluefin killifish	*Lucania goodei*	2	2	EFB, EFP
	Western mosquitofish	*Gambusia affinis*	5	2	EFB, EFP
	Gulf killifish	*Fundulus grandis*	1	2	EFB, EFP
GBRA Calhoun Canal	Common carp	*Cyprinus carpio*	1	1306	EFB, EFP
	Spotted gar	*Lepisosteus oculatus*	1	422	EFB, EFP
		Total	**47**	**7085**	

Table 2.4-15: Fish Species Observed in or near the Long Mott Generating Station Site, Fall 2023 (Continued) (Sheet 2 of 2)

Location	Common Name	Scientific Name	Number	Weight (g)	Collection Method
West Coloma Creek	Sailfin molly	*Poecilia latipinna*	48	21	EFB, SE
	Western mosquitofish	*Gambusia affinis*	79	19	EFB, SE
	Bluefin killifish	*Lucania goodei*	1	1	EFB, SE
	Bluegill	*Lepomis macrochirus*	3	11	EFB, SE
	Green sunfish	*Lepomis cyanellus*	1	7	EFB, SE
	Longear sunfish	*Lepomis megalotis*	1	2	EFB, SE
	Alligator gar	*Atractosteus spatula*	3	3342	EFB, SE
	Spotted gar	*Lepisosteus oculatus*	1	520	EFB, SE
	Inland silverside	*Menidia beryllina*	1	1	EFB, SE
	Shortnose gar	*Lepisosteus platostomus*	6	0	EFB, SE
	Bay anchovy	*Anchoa mitchilli*	8	0	EFB, SE
	Red drum	*Sciaenops ocellatus*	12	2	EFB, SE
		Total	**164**	**3926**	

Abbreviations: EFB = electrofishing (boat); EFP = electrofishing (backpack); GBRA = Guadalupe-Blanco River Authority; SE = Seine

Table 2.4-16: Fish Species Observed in or near the Long Mott Generating Station Site, Winter 2024

Location	Common Name	Scientific Name	Number	Weight (grams)	Collection Method
Dow Drainage Canal	Sheepshead Minnow	*Cyprinodon variegatus*	13	9.2	EFP
	Sailfin Molly	*Poecilia latipinna*	33	19.3	EFP
	Western Mosquitofish	*Gambusia affinis*	24	6.1	EFP
		Total	**70**	**34.6**	
GBRA Calhoun Canal	Redear Sunfish	*Lepomis microlophus*	2	39	EFP
	Longear Sunfish	*Lepomis megalotis*	3	48	EFP
	Bluegill	*Lepomis macrochirus*	3	29	EFP
	Gizzard Shad	*Dorosoma cepedianum*	1	9	EFP
	Longnose Gar	*Lepisosteus osseus*	3	3299	EFP
	Smallmouth Buffalo	*Ictiobus bubalus*	3	2269	EFP
	Common Carp	*Cyprinus carpio*	5	5329	EFP
	Warmouth	*Lepomis gulosus*	1	81	EFP
	Channel Catfish	*Ictalurus punctatus*	2	1607	EFP
	Western Mosquitofish	*Gambusia affinis*	1	0.5	EFP
	Weed shiner	*Notropis texanus*	1	0.5	EFP
		Total	**25**	**12,711**	
West Coloma Creek	Sailfin Molly	*Poecilia latipinna*	69	46.6	EFP, SE
	Western Mosquitofish	*Gambusia affinis*	9	4.1	EFP, SE
	Bluefin Killifish	*Lucania goodei*	3	1.3	EFP, SE
	Gizzard Shad	*Dorosoma cepedianum*	1	265	EFP, SE
	Warmouth	*Lepomis gulosus*	5	55.9	EFP, SE
	Bluegill	*Lepomis macrochirus*	1	1.5	EFP, SE
	Plains Killifish	*Fundulus zebrinus*	3	5.1	EFP, SE
	Inland Silverside	*Menidia beryllina*	33	22.7	EFP, SE
	Bay Anchovy	*Anchoa mitchilli*	49	11.1	EFP, SE
	Sheepshead Minnow	*Cyprinodon variegatus*	17	11.3	EFP, SE
	Naked Goby	*Gobiosoma bosc*	1	1.1	EFP, SE
		Total	**191**	**425.7**	
Abbreviations: EFB = electrofishing (boat); EFP = electrofishing (backpack); GBRA = Guadalupe-Blanco River Authority; SE = Seine					

Table 2.4-17: Fish Species Observed in or near the Long Mott Generating Station Site, Spring 2024

Location	Common Name	Scientific Name	Number	Weight (grams)	Collection Method
Dow Drainage Canal	Sheepshead minnow	*Cyprinodon variegatus*	13	15.8	EFP
	Sailfin molly	*Poecilia latipinna*	5	1.1	EFP
	Western mosquitofish	*Gambusia affinis*	3	1.8	EFP
	Alligator gar	*Atractosteus spatula*	1	3584	EFP
	Bluefin killifish	*Lucania goodei*	1	0.02	EFP
		Total	**23**	**3586.92**	
GBRA Calhoun Canal	Western mosquitofish	*Gambusia affinis*	46	3.5	EFB, EFP
	Common carp	*Cyprinus carpio*	6	9825	EFB, EFP
	Sailfin molly	*Poecilia latipinna*	6	1.3	EFB, EFP
	Spotted gar	*Lepisosteus oculatus*	5	4880	EFB, EFP
	Smallmouth buffalo	*Ictiobus bubalus*	5	2337	EFB, EFP
	Largemouth bass	*Micropterus salmoides*	4	3086	EFB, EFP
	Bluegill	*Lepomis macrochirus*	3	96	EFB, EFP
	Channel catfish	*Ictalurus punctatus*	3	4645	EFB, EFP
	Bluefin killifish	*Lucania goodei*	2	0.5	EFB, EFP
	Longnose gar	*Lepisosteus osseus*	2	3623	EFB, EFP
	Warmouth	*Lepomis gulosus*	1	93	EFB, EFP
		Total	**83**	**28590.3**	
West Coloma Creek	Western mosquitofish	*Gambusia affinis*	59	3.9	EFP, SE
	Sailfin molly	*Poecilia latipinna*	42	54.2	EFP, SE
	Gizzard shad	*Dorosoma cepedianum*	40	20.4	EFP, SE
	Red drum	*Sciaenops ocellatus*	3	1.7	EFP, SE
	Inland silverside	*Menidia beryllina*	2	2	EFP, SE
	Spotted gar	*Lepisosteus oculatus*	2	1261	EFP, SE
	Striped mullet	*Mugil cephalus*	2	101	EFP, SE
	Sheepshead minnow	*Cyprinodon variegatus*	1	4.1	EFP, SE
	Bluegill	*Lepomis macrochirus*	1	3.7	EFP, SE
	Warmouth	*Lepomis gulosus*	1	8.7	EFP, SE
		Total	**153**	**1460.7**	
Abbreviations: EFB = electrofishing (boat), EFP = electrofishing (backpack); GBRA = Guadalupe-Blanco River Authority; SE = Seine					

Table 2.4-18: Federally Listed Threatened and Endangered Aquatic Species Potentially within the Long Mott Generating Station Vicinty

Common Name	Scientific Name	Status
Green sea turtle	*Chelonia mydas*	Threatened
Hawksbill sea turtle	*Eretmochelys imbricata*	Endangered
Kemp's Ridley sea turtle	*Lepidochelys kempii*	Endangered
Leatherback sea turtle	*Dermochelys coriacea*	Endangered
Loggerhead sea turtle	*Caretta caretta*	Threatened
Source: USFWS, 2024		

Table 2.4-19: State-Listed Threatened and Endangered Species in Calhoun County

Common Name	Scientific Name	Status
Fish		
Alligator gar	*Atractosteus spatula*	Species of Concern
Opossum pipefish	*Microphis brachyurus*	Species of Concern
Saltmarsh topminnow	*Fundulus jenkinsi*	Species of Concern
Southern flounder	*Paralichthys lethostigma*	Species of Concern
Oceanic whitetip shark	*Carcharhinus longimanus*	Threatened
Shortfin mako shark	*Isurus oxyrinchus*	Threatened
Mammals		
Blue whale	*Balaenoptera musculus*	Endangered
Gulf of Mexico Bryde's whale	*Balaenoptera ricei*	Endangered
Humpback whale	*Megaptera novaeangliae*	Species of Concern
North Atlantic right whale	*Eubalaena glacialis*	Endangered
Sei whale	*Balaenoptera borealis*	Endangered
Sperm whale	*Physeter macrocephalus*	Endangered
West Indian manatee	*Trichechus manatus*	Threatened
Reptiles		
Atlantic hawksbill sea turtle	*Eretmochelys imbricata*	Endangered
Green sea turtle	*Chelonia mydas*	Threatened
Kemp's Ridley sea turtle	*Lepidochelys kempii*	Endangered
Loggerhead sea turtle	*Caretta caretta*	Threatened
Source: TPWD, 2023		

Table 2.4-20: Species for which Essential Fish Habitat Exists in Guadalupe Bay within the Vicinity of the Long Mott Generating Station Site

Species/Management Unit	Scientific Name	Life Stage Potentially Found in Guadalupe Bay
Atlantic sharpnose shark (Gulf of Mexico Stock)	*Rhizoprionodon terraenovae*	Juvenile/Adult, Neonate
Blacktip shark (Gulf of Mexico stock)	*Carcharhinus limbatus*	Neonate
Bonnethead shark (Gulf of Mexico stock)	*Sphyrna tiburo*	Adult, Juvenile, Neonate
Bull shark	*Carcharhinus leucas*	Juvenile/Adult, Neonate
Coastal Migratory Pelagic Fishes		All
Lemon Shark	*Negaprion brevirostris*	Juvenile, Neonate
Red Drum	*Sciaenops ocellatus*	All
Reef fish (43 species)		All
Scalloped hammerhead shark	*Sphyrna lewini*	Neonate
Commercially Harvested Shrimp	Brown shrimp (*Penaeus aztecus*); White shrimp (*Litopenaeus setiferus*); Pink shrimp (*Penaeus duorarum*); Royal red shrimp (*Pleoticus robustus*)	All
Spinner Shark	*Carcharhinus brevipinna*	Neonate
Source: NOAA, 2023b		

Figures

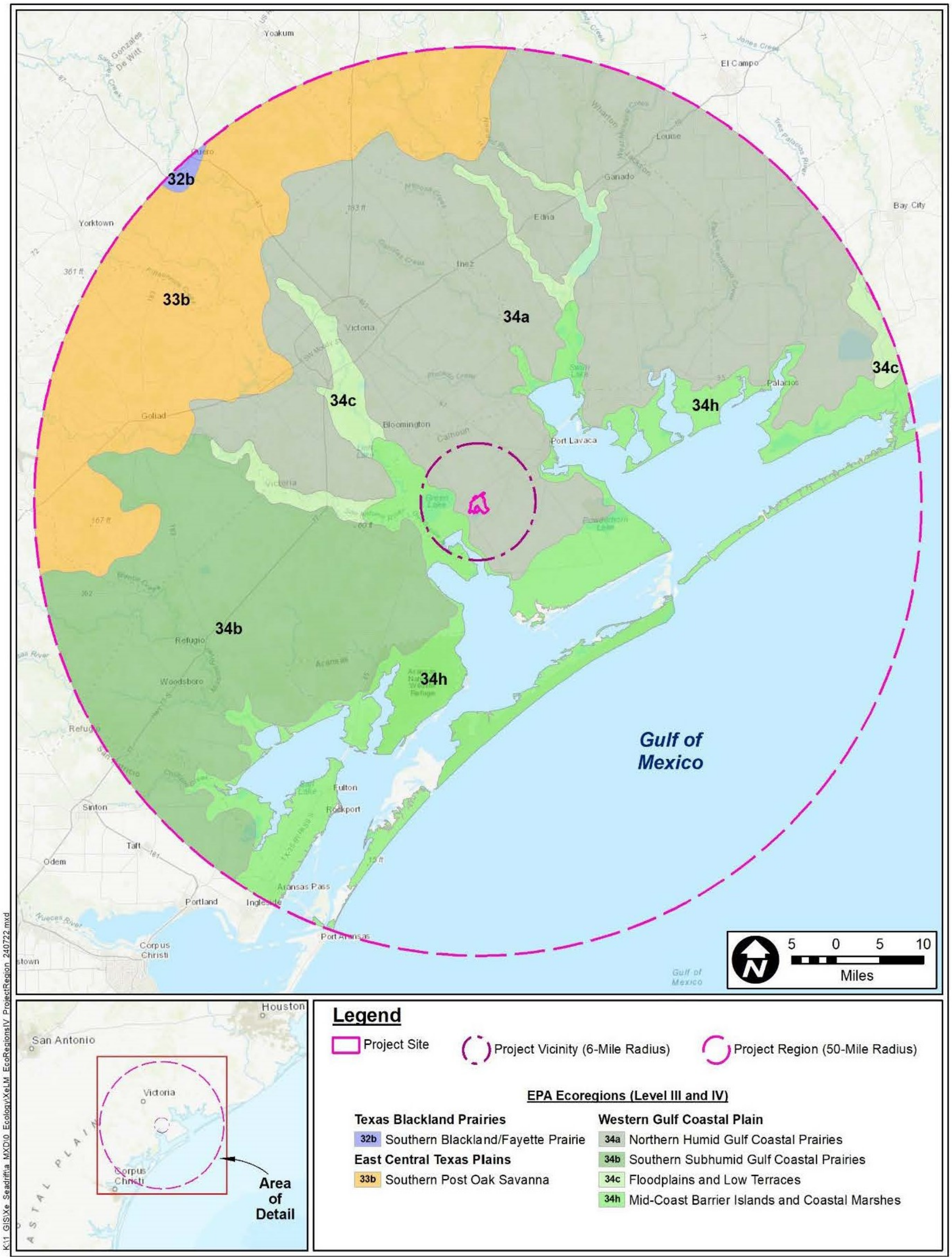


Figure 2.4-1: Ecoregions of the Long Mott Generating Station Region

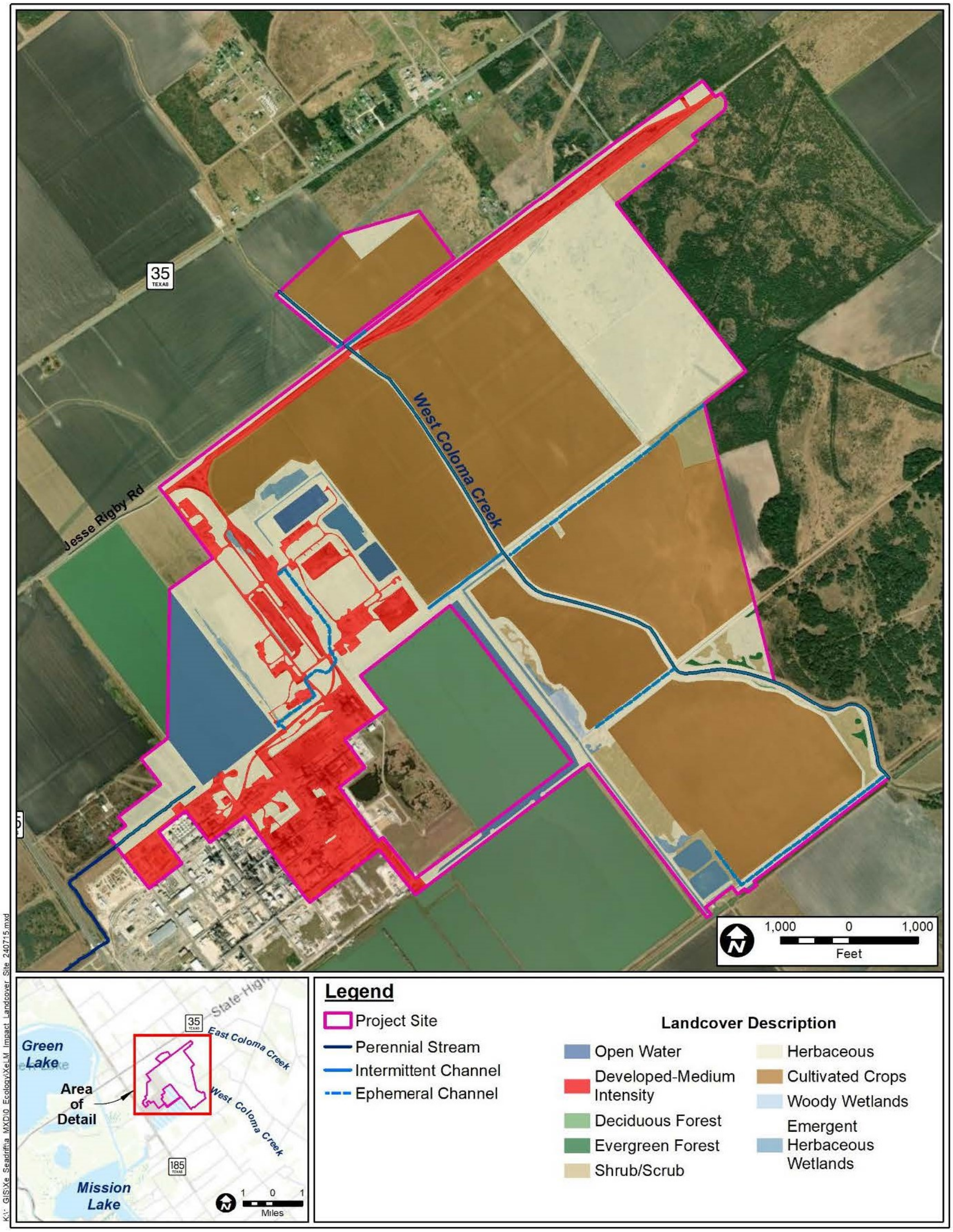


Figure 2.4-2: Land Cover of the Long Mott Generating Station Site

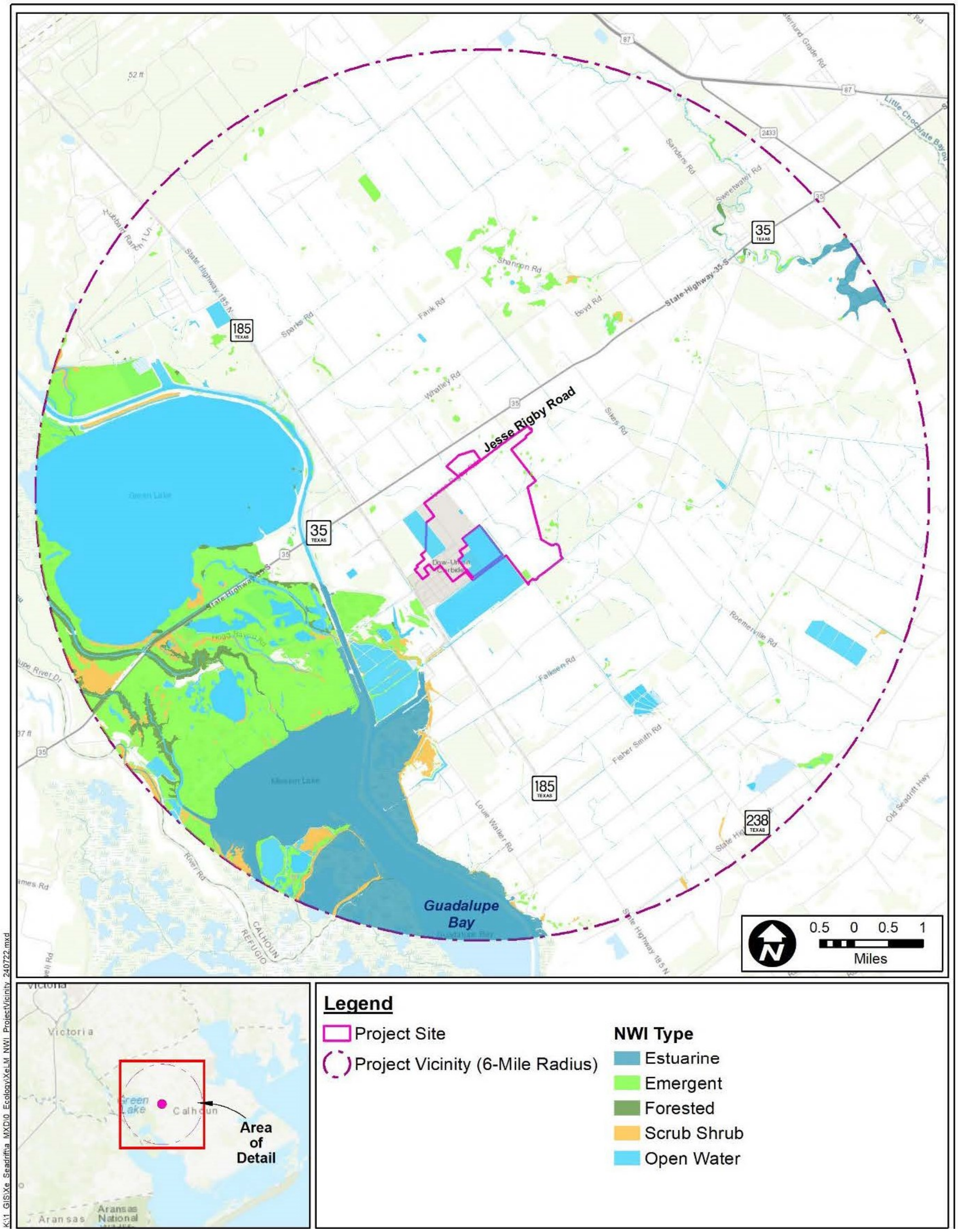


Figure 2.4-3: Wetlands in the Long Mott Generating Station Vicinity

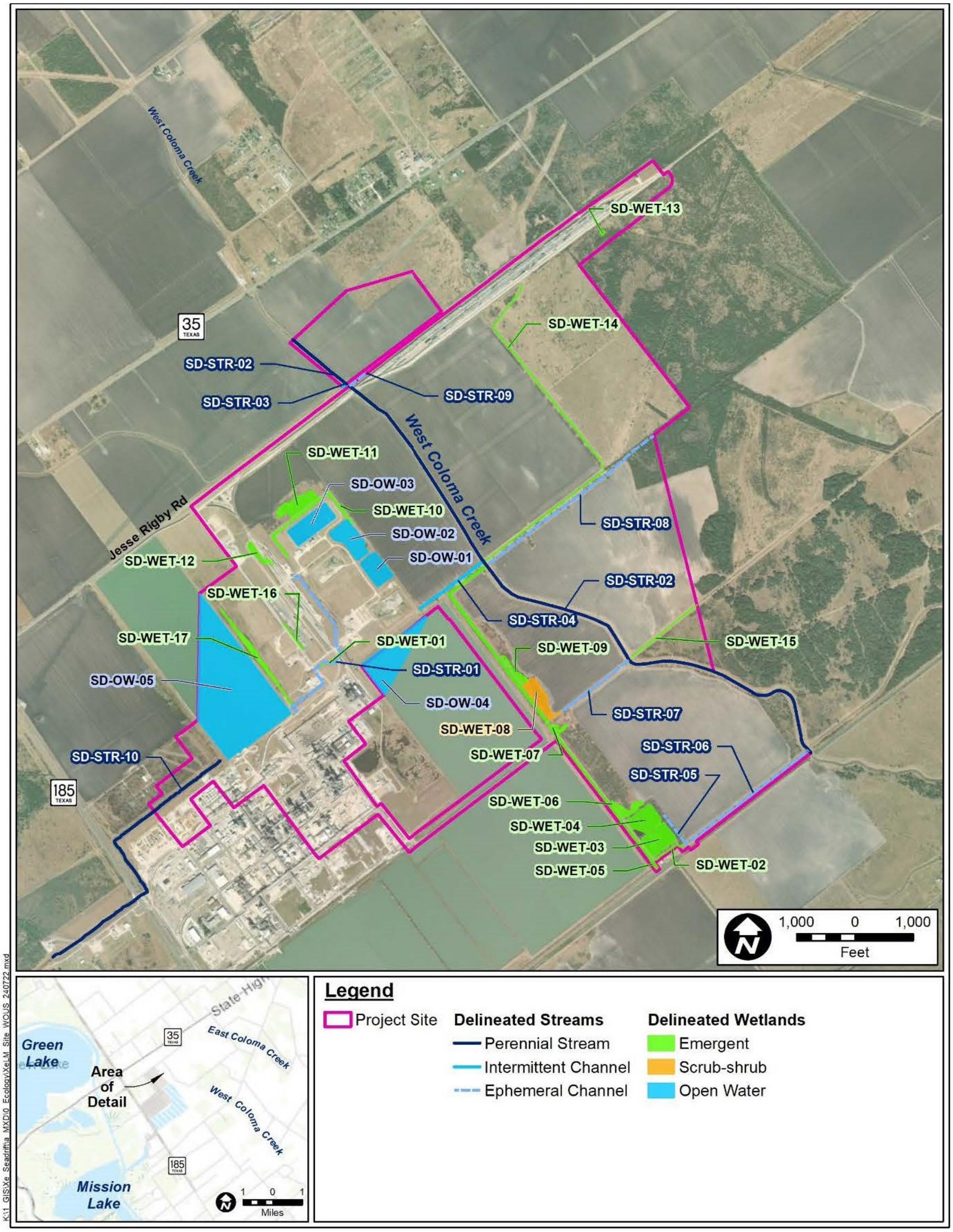


Figure 2.4-4: Potential Waters of the United States on the Long Mott Generating Station Site

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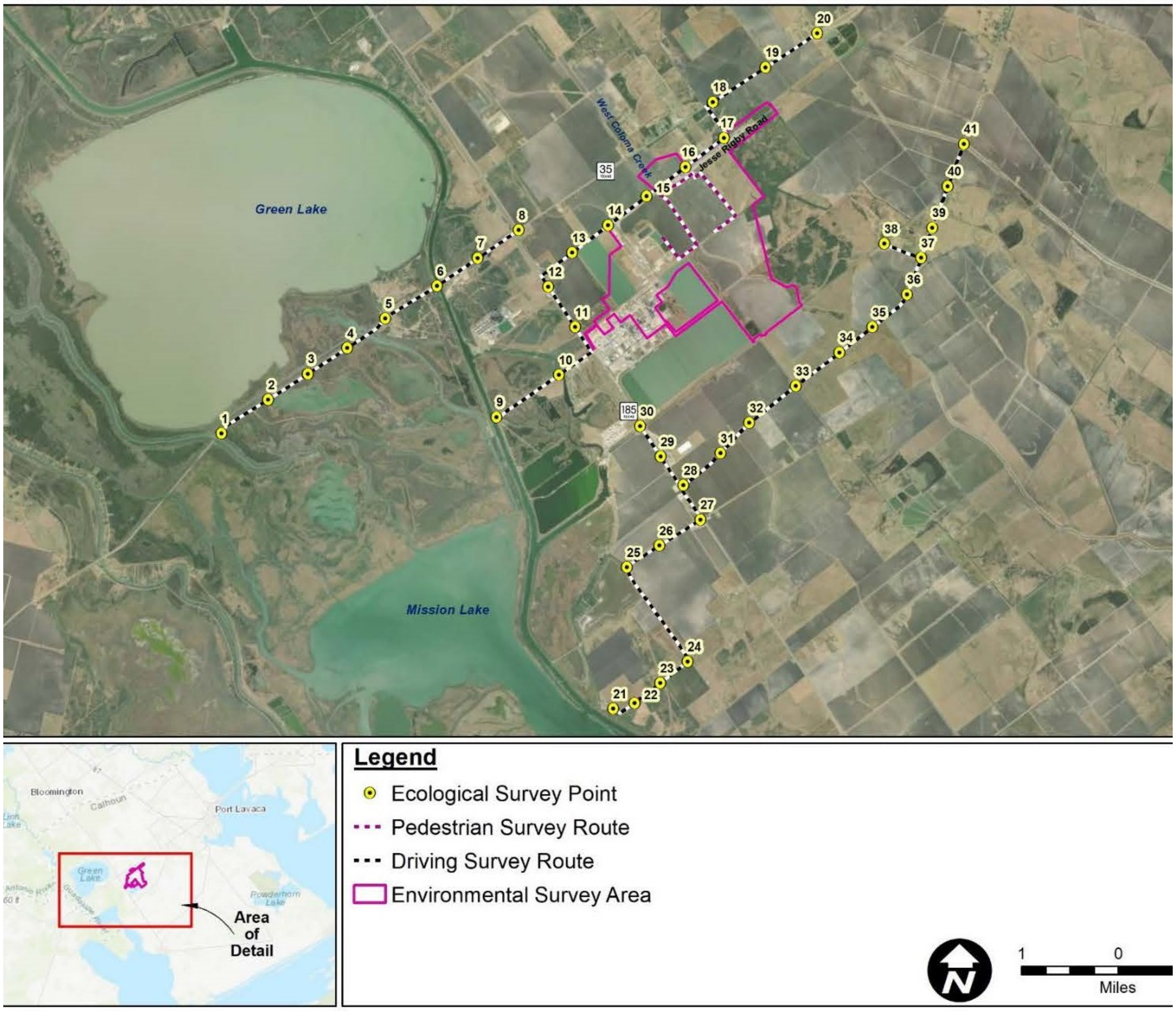


Figure 2.4-5: Ecological Resources Survey Routes

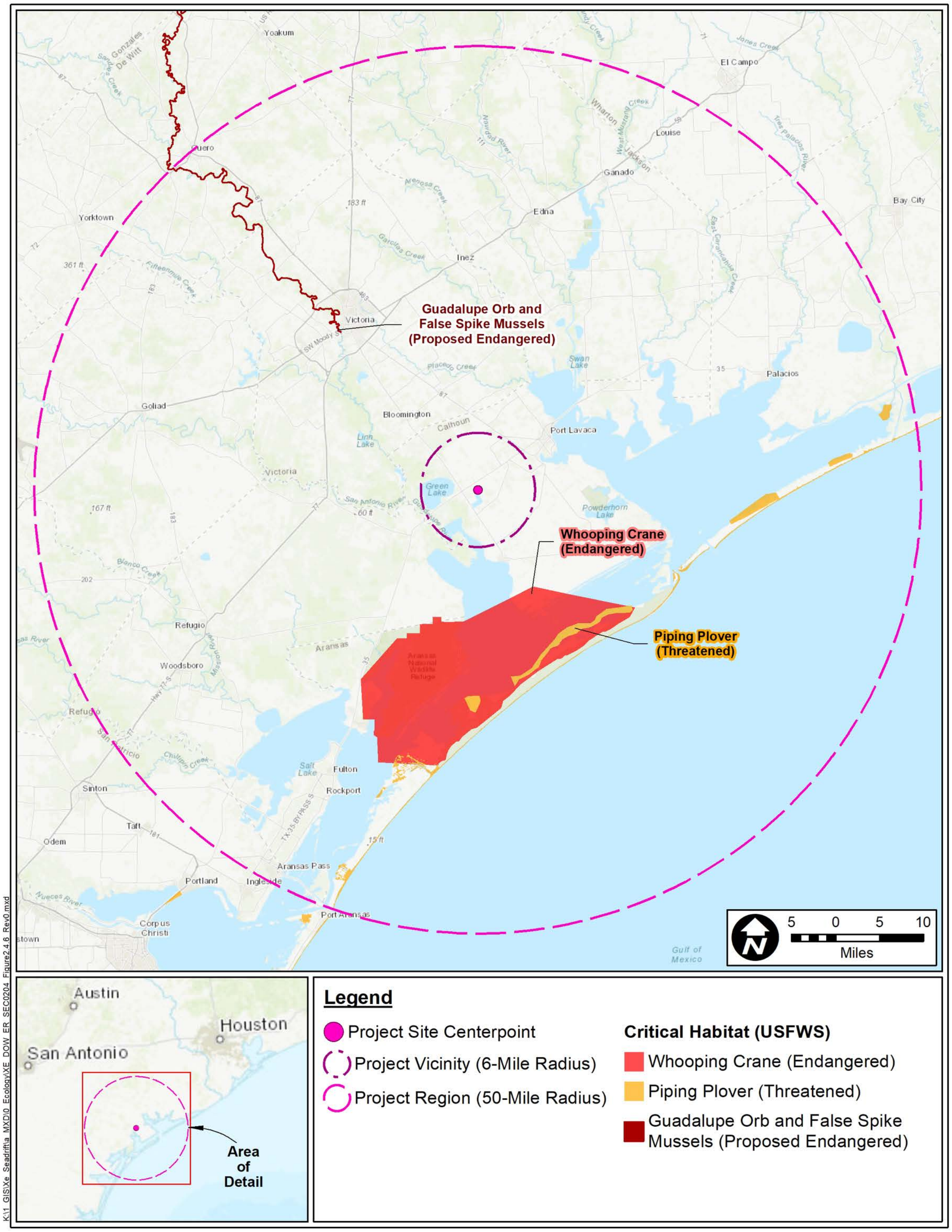


Figure 2.4-6: Critical Habitat within the Long Mott Generating Station Vicinity and Region

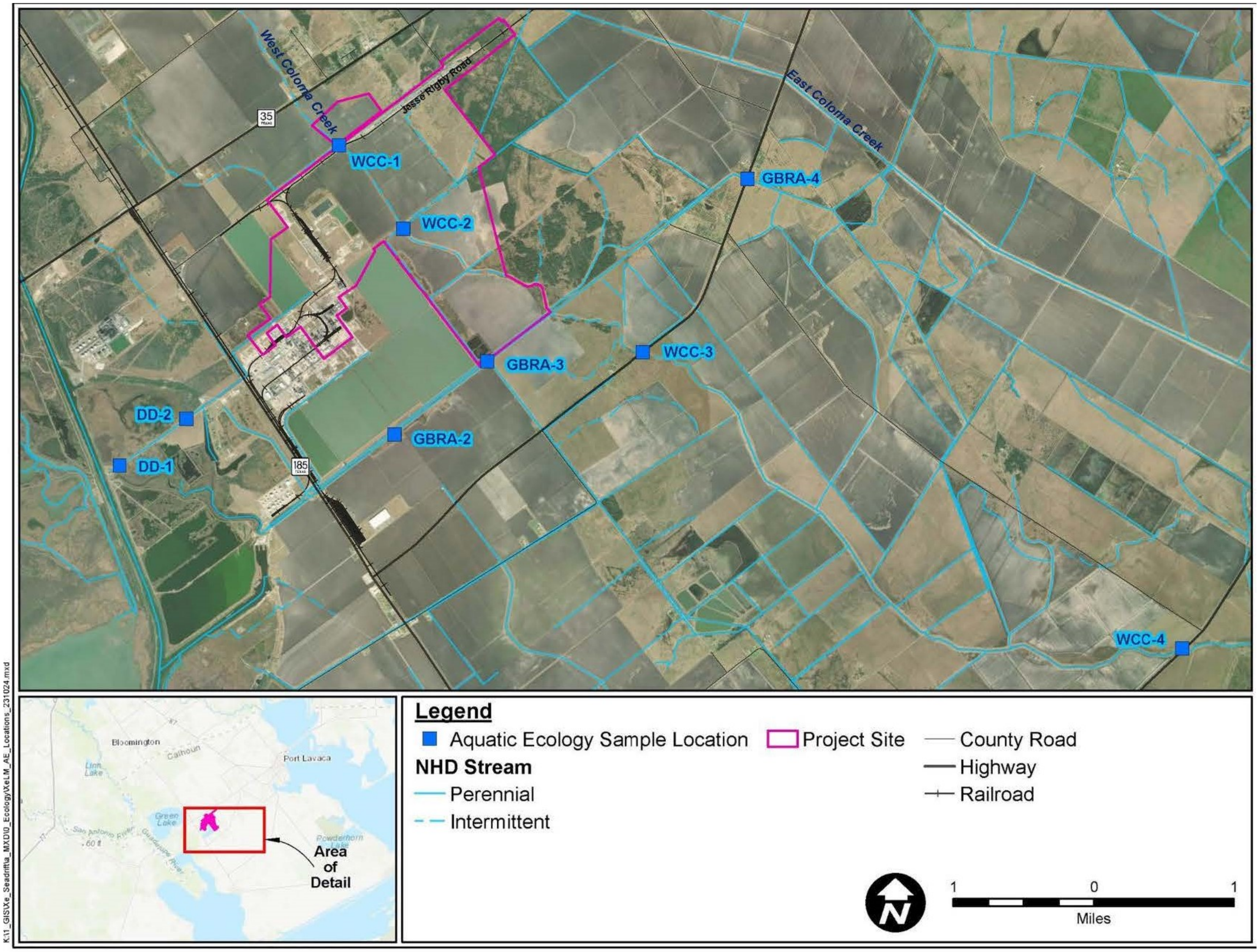


Figure 2.4-7: Long Mott Generating Station Site Aquatic Ecology Sampling Locations

2.5 Socioeconomics

This section describes the socioeconomic characteristics of the areas that could be impacted by building and operation of LMGS. Section 2.5.1 provides demographic information, Section 2.5.2 describes community characteristics, Section 2.5.3 provides information about historic properties, and Section 2.5.4 provides information related to environmental justice.

The demographic region is defined as the LMGS site and the surrounding area within a 50 mi (80 km) radius from the LMGS bounding limit around the site center point. The economic region or ROI for the socioeconomic analyses is defined by the areas where the building and operations workforce and their families would reside, spend their income, and use their benefits, thereby affecting the economic conditions of the region.

To determine the ROI for the socioeconomic analyses, it is assumed that the residential distribution of the new plant building and operational workforce is the same as the residential distribution of the current workforce for SDO.

The SDO workforce is made up of approximately 753 employees distributed among six states and 33 counties. The largest percentage of workers employed by SDO reside in Victoria County, Texas (64.3 percent). The neighboring counties of Calhoun (where the LMGS site is located) and Jackson provide 16.5 percent and 3.2 percent of the total workers employed by SDO, respectively.

Employees from these ROI counties, together with Victoria County residents, account for approximately 84 percent of the total employment at SDO. The remaining 16 percent of the workforce commute from counties outside the three-county region. No other county accounts for more than three percent of the total workforce. Because most of the operational workforce of SDO resides in Victoria, Calhoun, and Jackson Counties, and the building and operational workforce of the LMGS is assumed to have the same distribution, these three counties represent the ROI and serve as the basis for evaluating impacts.

2.5.1 Demography

This subsection describes the current and projected resident population distribution within the demographic region, demographic characteristics of the population residing within the ROI, and a discussion of transient populations. Population data presented are based on the 2020 census data from the U.S. Census Bureau (USCB) and, where applicable, more recent data from the USCB 2017 – 2021 American Community Survey (ACS) five-year estimates.

2.5.1.1 Population Data by Sector

The resident population data, obtained from the USCB by census block group (CBG) for the year 2020, are divided into distance bands and directional sectors. These are established from the LMGS site center point bounding limit at the following 15 concentric bands: 0-0.3 mi (0-0.5 km), 0.3-1 mi (0.5-2 km), 1-2 mi (2-3 km), 2-3 mi (3-5 km), 3-4 mi (5-6 km), 4-5 mi

(6-8 km), 5-6 mi (8-10 km), 6-7 mi. (10-11 km), 7-8 mi (11-13 km), 8-9 mi (12.9-14.5 km), 9-10 mi (15-16 km), 10-20 mi (16-32 km), 20-30 mi (32-48 km), 30-40 mi (48-64 km), and 40-50 mi (64-80 km). For each sector, the percentage of each CBG's land area that falls either partially or entirely within that sector is calculated. The equivalent percentage of each CBG's population is then assigned to that sector. If two or more CBGs fall within the same sector, the proportional population estimates for the CBGs are summed to obtain the total population estimate for that sector.

Demographic calculations for LMGS assumed construction permit issuance in 2026, first year of plant operation in 2029, and an operating license period ending in 2070. It is not anticipated that the demographic calculations would differ significantly with the current project timeline. Projected population levels for these time frames are based on state planning agency projections and studies or other appropriate federal agency sources. Where these planning agency projections do not cover the required period, population projections are extrapolated based on calculated growth rates. It is also assumed that population growth rates calculated by state or federal agencies remain constant throughout the projection period.

Current and projected resident population data by sector within 50 mi (80 km) of the LMGS site center point limit are summarized in Table 2.5-1. Current (2020) population data by sector within 20 mi (32 km) of the LMGS site center point are shown on Figure 2.5-1 and current population data within 20-50 mi (32-80 km) are shown on Figure 2.5-2.

2.5.1.2 Demographic Characteristics of the Region of Influence

The following demographic characterization, which includes current, historic, and projected population data, age and sex distribution, income distribution, and racial and ethnic distribution, is focused on the three-county ROI, where most of socioeconomic impacts are experienced.

Table 2.5-2 shows the 2020 population of each county and of each municipality within those counties. The 2020 resident population of the three counties that compose the ROI was 126,413. The closest municipalities from the LMGS site center point bounding limit are the City of Seadrift (population 995), approximately 7.7 mi (12.4 km) to the south southeast, and the City of Port Lavaca (population 11,557), approximately 8.2 mi (13.2 km) to the northeast, both located in Calhoun County (Figure 2.5-1). Victoria County, to the northwest, is the most populated county in the ROI and also contains the City of Victoria (population 65,534), the only large population center (with a population greater than 25,000) within the ROI.

Historic and projected population within the ROI is shown in Table 2.5-3. Population values include historic data for the three most recent decennial censuses (2000, 2010, and 2020) and are projected forward through 2070, the expected end of the license period. Calhoun County, where the LMGS site is located, experienced population growth of approximately 0.4 percent annually between 2000 and 2010, but then declined by 0.6 percent annually between 2010 and 2020 despite growth in Jackson and Victoria Counties over the same period. The population in Calhoun County is projected to continue to decline at a rate of approximately 0.1 percent annually. Despite the slight decline in the projected population of Calhoun County, the population in the ROI as a whole is projected to continue to grow at a rate of approximately 0.3 percent annually, led by growth in Victoria County.

Age and sex distribution within the ROI and the state of Texas are shown on Table 2.5-4. The residents of the ROI trend older than those of the state, with a higher median age and larger percentage of the population age 65 and over, particularly in Calhoun and Jackson Counties. Similar to the state of Texas, women in the ROI account for slightly more than half of the population. Sex distribution does, however, vary by county; while women outnumber men in Jackson and Victoria Counties, men make up approximately 52 percent of the population in Calhoun County.

Table 2.5-5 presents the current income distribution, including household income ranges, median household income level, and the percentage of the population below the federal poverty level, for each county in the ROI and for the state of Texas. The median household income in the ROI is lower than that of Texas, and percentages of households in the highest income ranges ($150,000 or more) are also lower than the state. The percentage of the population below the poverty level in the ROI is slightly higher than that of the state. Within the ROI, the percentage of the population below the poverty level is highest in Victoria County. In the absence of additional information regarding income level projections, it is assumed that income levels remain relatively stable.

Racial and ethnic minority distribution within the ROI is shown in Table 2.5-6. Consistent with the state as a whole, racial and ethnic minorities make up more than half of the population of the ROI. Hispanic or Latino residents make up the largest racial or ethnic minority group by a wide margin in all three ROI counties. In the absence of additional information regarding racial and ethnic minority population projections, it is assumed that racial and ethnic minority population levels within the regional population remain relatively stable.

2.5.1.3 Transient Population

As described in NRC RG 4.7, Revision 3, *General Site Suitability for Nuclear Power Stations*, transient populations are defined as “people (other than those just passing through the area) who work, reside part-time, or engage in recreational activities, and are not permanent residents of the area.”

Significant sources of transient populations include airports, major employers, schools, medical facilities, lodging facilities, and recreation areas. Transient populations associated with the specific facilities identified within approximately 20 mi (32 km) of the LMGS bounding limit around the site center point are provided in Table 2.5-7. Estimates of the transient populations associated with the facilities identified in Table 2.5-7 were obtained primarily by reviewing government agency websites and other public sources of information on employers, schools, recreation areas, medical facilities (hospitals and nursing homes), and lodging facilities (hotels, motels, recreational vehicle [RV] parks, and vacation rentals).

Employee counts for industrial employers were sourced, if possible, from company websites. If unavailable, estimates were obtained from job resource websites and news sources. In one instance, the number of parking spaces available at the facility was used to estimate maximum worker population, assuming one worker per car. County and city employee data were sourced from a public database.

Eighteen school facilities (16 public and 2 private) were identified within the 20 mi (32 km) radius. School district employment was sourced from staff directories on the school district websites. All schools in Calhoun Independent School District (ISD), Austwell –Tivoli ISD, and Bloomington ISD are located within the 20 mi (32 km) radius, as is all but one of the schools in Industrial ISD. It was assumed that all school district employees in these districts work within the 20 mi (32 km) radius. School enrollment data for public schools were retrieved from the Texas Education Agency. Private school data were sourced from private school data aggregator websites.

Twelve daycare facilities, one hospital, four nursing homes, and an outpatient program were identified within the 20 mi (32 km) radius. Daycare information, with a single exception, was collected from Texas Department of Family and Protective Services records of licensed providers. The exception was sourced from a website aggregating information on care facilities. The maximum number of children for which the facility is licensed was used as the transient population estimate. Hospital information was collected from the website of Memorial Medical Center. Nursing home information was collected from the federal Medicare website, when available. For facilities not officially licensed by Medicare, data were collected using websites that aggregate information about care facilities. The population was assumed equal to the number of beds at the facility.

The Gulf Coast region surrounding the LMGS site is a major recreational area, and many hotels, motels, RV parks, campgrounds, and vacation rentals were identified within the 20 mi (32 km) radius. Information about lodging facilities was collected from several sources. Where available, data on room or bed number and number of RV hookups were drawn from specific business or facility websites. Tourism websites were also used to source information about site capacity. For facilities where no data could be acquired using the above sources, realty websites, Facebook and imagery from Google Maps or Google image search were used to roughly estimate number of rooms or number of RV sites. Rooms were assumed to be occupied by three people and RV and campsites by six people. All rooms were assumed to be occupied as a conservative assumption. Vacation rentals in homes, apartments, and trailers are listed on many different websites. To avoid overestimating the transient population in vacation rentals by double counting properties listed on multiple websites, a list of rentals in the 20 mi (32 km) radius was generated from a single website (Vrbo.com) in May, when upcoming seasonal demand is high. Each property was assumed to be occupied at maximum capacity using the number of beds cited in the listing.

The Gulf Coast region also features many areas dedicated to public recreation, including multiple parks, beaches, and nature areas. Visitor data for public recreation areas within 20 mi (32 km) were estimated using publicly available imagery. Where parking spaces or marina slips could be counted using aerial imagery, population was estimated assuming that the facility was at capacity and that each car or boat contained three people. Where parking data were not available, images of the facilities themselves and of events at the facilities were assessed to estimate usage when at capacity. In general, small city parks and playgrounds were assumed to have a capacity of 10 people, larger city parks with pavilions and sports fields were assumed to have a capacity of 50, and waterfront parks and city beaches were assumed to have a capacity of 300. It was not possible to estimate populations for facilities like wildlife refuges and bird watching areas that do not have parking or are accessible only by boat. However, it is likely that most users of these types of facilities are residents or tourists staying in the area and thus are captured in census data or estimates of transient populations using lodging facilities.

In addition to the transient populations identified in association with the facilities listed above and in Table 2.5-7, nonpermanent residents of the area also include migrant laborers whose employment requires travel that prevents the worker from returning to their permanent place of residence the same day. The USDA conducts a census of agriculture that collects information on migrant workers. Results of the 2017 census indicate that there are 15 farms within the ROI that employ migrant workers and 22 migrant workers employed on those farms (USDA, NASS 2017).

2.5.2 Community Characteristics

2.5.2.1 Economy

Total employment levels by industry sector for the three counties in the ROI are presented in Table 2.5-8. The largest sector of employment in the ROI is government and government enterprises followed by retail trade and construction. The industry with the largest growth within the ROI as a whole from 2010 to 2021 is transportation and warehousing (83.7 percent). The industry with the largest decline from 2010 to 2021 is arts, entertainment, and recreation (87.4 percent).

In Calhoun County, the industry sectors with the highest employment are manufacturing, construction, and government and government enterprises. The industry with the largest growth from 2010 to 2021 is accommodation and food services (47.6 percent increase) followed closely by construction (47.1 percent increase). The industry with the largest decline from 2010 to 2021 is mining, quarrying, and oil and gas extraction (66.1 percent decline). During that same period, total employment increased by 27.1 percent.

In Jackson County, the industry sectors with the highest employment are government and government enterprises, construction, and retail trade. The industry with the largest growth from 2010 to 2021 is administrative and support and waste management and remediation services (95.2 percent increase). The industry with the largest decline is from 2010 to 2021 is information (38.5 percent decline). During that same period total employment increased by 16.6 percent.

In Victoria County, the sectors with the highest employment are government and government enterprises, retail trade, and construction. The industry with the largest growth from 2010 to 2021 is transportation and warehousing (83.7 percent increase). The industry with the largest decline is from 2010 to 2021 is arts, entertainment, and recreation (87.4 percent decline). During that same period total employment increased by 8.7 percent.

Table 2.5-9 details employment trends for the three counties in the ROI. A total of 57,825 individuals are employed in the ROI from a labor force of 60,547 people. Between 2011 and 2021 employment within the ROI increased by 5.1 percent. Calhoun County saw the largest increase in employment (9.3 percent); while Jackson County saw a minor decrease in employment rate (-0.8 percent). During the same period, employment in Texas increased by 20.6 percent.

Additionally, 2722 individuals in the ROI are unemployed, resulting in an unemployment rate of 4.5 percent. All three of the counties in the ROI have similar unemployment rates, ranging from 4.1 percent in Calhoun County to 4.6 percent in Victoria County. However, from 2011 to 2021 unemployment in the ROI decreased by 40.7 percent, a rate much higher than the state of Texas, which saw a 13.3 decrease in unemployment over the same period (Table 2.5-9).

The largest employers in the ROI are detailed in Table 2.5-10. Major employers with over 250 employees are concentrated in Victoria and Calhoun Counties. Jackson County has several employers with 100 to 249 employees. The largest employers within the ROI are Formosa Plastics Corporation, Invista, and SDO.

Income distribution by household for the ROI is detailed in Table 2.5-5. The median household income for the three counties within the ROI is relatively similar, ranging from $60,598 (Victoria County) to $61,887 (Calhoun County), and lower than the median household income for the state of Texas, which is $67,321. Per capita income is the mean income for every individual living in a particular group and is derived by dividing the aggregate income of a particular group by the total population in that group. Table 2.5-11 details the per capita income for the ROI counties, which ranges from $27,278 (Jackson County) to $30,879 (Calhoun County). Between 2011 and 2021, Calhoun County saw the greatest increase in per capita income (42.0 percent) and Jackson County saw the lowest increase (11.4 percent). Both Jackson and Victoria Counties had lower increases in per capita income than the state during the same period (34.1 percent).

From 2011 to 2022 the number of individuals employed in heavy and civil engineering construction in Texas which would be applicable to LMGS increased from 115,700 to 166,900. This type of construction workforce is reflective of the labor required for large-scale projects like LMGS. Heavy and civil engineering construction workforce data are only available at the state level because it is expected that individuals in this construction industry would be drawn from a larger geographic area than general construction (BLS FRED, 2023).

2.5.2.2 Transportation

This section describes the transportation network serving the LMGS site in the LMGS vicinity (6 mi [10 km]) and in the LMGS region (50 mi [80 km]). Available transportation resources in the LMGS site vicinity and LMGS region include a diverse road network, rail lines, airports, waterways, and public transportation, all of which are illustrated in Figure 2.2-7.

2.5.2.2.1 Roads

The road and highway transportation system is shown in Figure 2.5-3 with location number details noted in Table 2.5-12. Three U.S. highways provide regional access to the LMGS site. U.S. 59 runs northeast-southwest connecting Jackson, Victoria, and Goliad Counties, approximately 20.9 mi (33.6 km) northwest of the LMGS bounding limit around the site center point; U.S. 77 runs north-south-southwest connecting Lavaca, Victoria, and Refugio Counties, approximately 17 mi (27.3 km) west of the LMGS site center point bounding limit; and U.S. 87 runs northwest-southeast connecting DeWitt, Victoria, and Calhoun Counties approximately 6.8 mi (10.9 km), northeast of the LMGS site center point bounding limit. State highways and county Farm-to-Market (FM) roads in the LMGS region include SH 35, SH 185, SH 202, SH 238, SH 239, SH 316, FM 616, FM 774, and FM 2441.

Primary roadways in the LMGS site vicinity are shown on Figure 2.5-4. Jesse Rigby Road, which provides direct access to the LMGS site, can be accessed by commuting workers from all directions via primary roadways SH 35 and SH 185 in the LMGS site vicinity. The intersections of Jesse Rigby Road at SH 35 and SH 185 are two-way stop-controlled intersections. Commuting workers coming from the surrounding region to the north are likely to take U.S. 77 and U.S. 87 to SH 185. Commuting workers traveling from east and west are likely to take U.S. 59 to SH 185. Other commuting workers traveling within Calhoun, Victoria, and Jackson Counties are likely to use county and county FM roads and connect to SH 35 and SH 185.

2.5.2.2.2 Traffic Conditions

As shown on Table 2.5-12, the principal arterial highways in the LMGS region, U.S. 59, U.S. 77, and U.S. 87, are four-lane divided roadways, with two segments on U.S. 59 and U.S. 77 that are two-lane undivided roadways. SH 185 is a four-lane divided highway from U.S. 59 to the Victoria and Calhoun County line. From the Calhoun County line to the south, SH 185 is a two-lane undivided roadway. The rest of the SH and FM highways in the LMGS region are two-lane undivided roadways. Table 2.5-12 identifies the number of lanes per roadway segments, functional roadway classification, level of service (LOS), and the average annual daily traffic (AADT) of the roadways in the LMGS region.

AADT is the total volume of motorized vehicle traffic on a highway or roadway segment for one year divided by 365 days in the year (TxDOT, 2013). LOS is a quantitative stratification of a performance measure or measures representing quality of service (Transportation Research Board, 2016). The Highway Capacity Manual (HCM) defines six levels of service, ranging from A to F, for each service measure or combination of service measures. LOS A represents the best operating conditions from the traveler's perspective and LOS F represents the worst.

The LOS A through F are described as follows:

- LOS A: Free-flow operations on freeway or multilane highways and high operating speeds and little difficulty in passing on two-way highways
- LOS B: Reasonably free-flow operations, and the ability to maneuver within the traffic stream is slightly restricted on freeway or multilane highways; on two-way highways, passing demand and passing capacity are balanced with some speed reductions present
- LOS C: Freedom to maneuver within the traffic stream is noticeably restricted, and lane changes require more care and vigilance on the part of the driver on freeway or multilane highways; speeds are noticeably reduced on two-way highways
- LOS D: Freedom to maneuver within the traffic stream is seriously limited, and drivers experience reduced physical and psychological comfort levels on freeway or multilane highways; platooning increases significantly on two-way highways
- LOS E: Operation is at or near capacity, and there are virtually no usable gaps within the traffic stream on freeway or multilane highways; passing is virtually impossible on two-way highways
- LOS F: Describes unstable flow with queues forming behind bottlenecks on multilane highways; operating conditions are unstable, and heavy congestion exists on two-way highways

The LOS values shown in Table 2.5-12 are based on the Florida Department of Transportation 2023 Multimodal Quality/Level of Service Handbook (FDOT, 2023), which incorporates new analytical techniques from the *Transportation Research Boards's HCM, Sixth Edition: A Guide for Multimodal Mobility Analysis* (Transportation Research Board, 2016). Overall, LOS results show that the roadway network in the LMGS region operates at a LOS B except for two segments on U.S. 59 and one segment on State Highway 35, all of which experience LOS C.

2.5.2.2.2.1 Roadway Freight Network

Rural principal and minor arterials make up most of the Texas Highway Freight Network (THFN) mileage. Approximately two-thirds of the THFN mileage is located in rural areas (TxDOT, 2021a). The rural principal and minor arterials in the LMGS region identified on Table 2.5-12 allow a direct connection to the THFN for any heavy-haul needs from the LMGS site.

2.5.2.2.2.2 Road Conditions and Improvements

Calhoun, Victoria, DeWitt, and Jackson Counties are part of the Texas Department of Transportation (TxDOT) Yoakum district, which plans, designs, builds, and maintains the state transportation system in its counties (TxDOT, 2023b). TxDOT also evaluates roadway pavement conditions using the Pavement Management Information System (PMIS), in which a pavement section with a condition score of 70 or above is considered to be in “good” or better condition. The PMIS report describes Texas pavement condition based on analysis of PMIS distress ratings and ride quality measurements and includes trends for the major highway systems (U.S., SH, and FM) and pavement types for all districts. For the fiscal year 2022, the Yoakum district roadway pavement has a score of 92.71, which is considered “good or better condition” (TxDOT, 2022a). This applies to the conditions for portions of the U.S., SH, and FM highway system within the LMGS region.

Currently, there is one major roadway project underway in Victoria County. This project consists of upgrading U.S. 59 to a freeway and adding an overpass. There is also one planned improvement on U.S. 77 in Victoria County, which consists of adding two lanes to create a four-lane divided highway (TxDOT, 2022b). Per the current Rural Transportation Improvement Program for Victoria and Calhoun Counties, maintenance and rehabilitation for highways within the LMGS region, such as pavement seal coat and resurfacing, are currently underway with additional projects scheduled to start within the next four to ten years (TxDOT, 2022b).

2.5.2.2.3 Railroads

Union Pacific (UP) is the primary operator of the rail lines within the LMGS region. Burlington Northern Santa Fe and Kansas City Southern (KCS) have track rights to operate on the UP lines (VEDC, 2023).

The UP railroad system runs east-west across Matagorda, Jackson, Victoria, and Refugio Counties, and north-south across DeWitt, Victoria, and Calhoun Counties. The KCS railroad in the LMGS region runs east-west across Wharton, Jackson, and Victoria Counties (TxDOT, 2021a). The UP railroad segment running north-south in the vicinity of the LMGS site crosses at-grade SH 35 before it ends at LMGS next to the SDO facility. The internal SDO industrial railroad system is owned and operated by Watco (Dow, 2020).

2.5.2.2.4 Waterways

As described in Section 2.2, Land, the GIWW is a major waterway transportation system located within the LMGS region. Several canals provide transportation from the GIWW to various ports. The Victoria Barge Canal is a 35 mi (56 km) waterway channel located within the LMGS site vicinity that connects the Port of Victoria to the GIWW.

The Port of Victoria is a shallow-draft barge port with more than 2000 ac (809 ha) available and is served by barge, rail, and four-lane divided highways. The GIWW links Victoria to the entire Gulf Coast from Brownsville, Texas, to Apalachee Bay, Florida. In addition, it opens up commerce via the Mississippi River, Ohio River, and their connecting canals and river basins with 14,000 miles of inland waterways (VEDC, 2023).

The locations of the rest of the ports within the LMGS region are shown on Figure 2.2-7 and are listed below:

- Deep-draft ports: the Ports of Calhoun, Harbor Island, and Point Comfort
- Shallow-draft ports: Ports of Aransas Pass, Bay City, Chocolate Bayou, Matagorda, Palacios, Port Lavaca, Port O'Connor, Port of Rockport, Port of West Calhoun, and Seadrift

2.5.2.2.5 Airports

As shown on Figure 2.2-7, there are eight airports within the LMGS region. The Victoria Regional Airport is the only regional airport that offers commercial services. The remaining airports are categorized as general aviation airports (TxDOT, 2023c).

Commercial flights from Victoria Regional Airport to Houston Bush Intercontinental Airport are available with connections to state, national, and international airports. The Victoria Jet Center offers several business services, including pilot supplies, 24-hour aircraft rescue and firefighting, and hangar space (VEDC, 2023).

Section 2.2, Land identifies the Calhoun County Airport as the closest airport to the LMGS site center point limit. The Calhoun County Airport is a public-use, general aviation facility that serves the region's air transportation needs. The most frequent general aviation operations at Calhoun County Airport include corporate flights, recreational flying, military training, and flights bringing visitors to the area (TxDOT, 2018).

2.5.2.2.6 Public Transportation

Texas public transit services are provided primarily by three types of entities: rural transit districts, urban transit districts, and metropolitan transit authorities (TCPA, 2021). The Golden Crescent Regional Planning Commission's (GCRPC) RTRANSIT is a rural transit district that provides an origin to destination demand response curb-to-curb within the LMGS region, serving Calhoun, DeWitt, Goliad, Gonzales, Jackson, Lavaca, Matagorda, and Victoria Counties (GCRPC, 2022).

2.5.2.3 Taxes

Table 2.5-13 presents annual tax revenues from property taxes, sales and use taxes, maintenance and operations taxes, and other taxes for the three counties in the ROI for fiscal year 2019 through fiscal year 2022. Property taxes are levied by local governmental entities, school districts, and special purpose districts. The 2022 tax rates and levies for each county in the ROI are shown on Table 2.5-14. Values shown are per $100 of assessed valuation. Appraisal districts are responsible for appraising all property subject to property taxes in Texas at the property's market value as of January 1 each year. The Texas Comptroller of Public Accounts provides technical assistance to local governments and taxpayers. Additionally, the Comptroller's office conducts the School District Property Value Study (SDPVS) to determine the total taxable value of all property in each school district. The results of the SDPVS can affect a school district's state funding. Generally, school districts with less taxable property value per student receive more state dollars for each pupil than school districts with more value per student (TCPA, 2022). Table 2.5-15 details the assessed value of all property for each school district that falls wholly within the ROI.

While the United States imposes a federal income tax based on income brackets, Texas does not tax personal income at the state or local level (TCPA, 2023a). Texas imposes a franchise tax on taxable entities formed or organized in Texas or doing business in Texas. These entities include corporations, limited liability companies, banks, state-limited banking associations, savings and loan associations, S corporations, professional corporations, partnerships, trusts, professional associations, business associations, joint ventures, and other legal entities. The franchise tax, depending on the entity classification, ranges from 0.375 percent to 0.75 percent (TCPA, 2023b).

The State of Texas also imposes a miscellaneous gross receipts tax on utility companies, including retail electric providers that deliver service to an ultimate consumer in an incorporated city or town that has a population of 1000 or more. The tax is based on the population of the incorporated area where the service is provided and ranges from 0.581 percent to 1.997 percent (TCPA, 2023c).

Texas imposes a state sales and use tax of 6.25 percent on all retail sales, leases, and rentals of most goods, as well as taxable services. Local taxing jurisdictions (cities, counties, special purpose districts, and transit authorities) may impose up to 2 percent sales and use tax for a maximum combined rate of 8.25 percent (TCPA, 2023d).

The LMGS site is developed on 13 individual parcels in Calhoun County, with a combined assessed property value of $406,620. This results in a revenue of $5728 tax dollars (with applicable exemptions) for the county and various other entities. The taxing entities that comprise the LMGS site include Calhoun County, Calhoun County Groundwater Conservation District, Calhoun County ISD, Water Control and Improvement District 1, and Drainage District 10. SDO has a tax abatement agreement with Calhoun County for the land improvements in conjunction with the development of LMGS. Further discussion of the tax abatement agreement is included in Section 4.4, Socioeconomic Impacts.

2.5.2.4 Land Use

The three counties within the ROI are members of the GCRPC. The GCRPC is a regional voluntary association of local governments, special districts, and other agencies within a seven-county region that also includes DeWitt, Goliad, Gonzales, and Lavaca Counties. The GCRPC is involved in development of the region and assists local governments with implementing regional plans. Programs include comprehensive planning and delivery of services in several program areas including aging, economic development, emergency 911, solid waste management, and rural transportation (GCRPC, 2023).

As noted in Section 2.2, Land, the ability of counties in Texas to control land use is largely limited to reviews related to the subdivision of land. Because of this limited ability, the three counties within the ROI have not adopted formal land use plans but implement subdivision regulations to guide property development.

Calhoun County has adopted subdivision regulations that protect the health, safety, and welfare of the county citizens and provide minimum standards by which commercial and residential land may be subdivided and developed (Calhoun County, 2007b).

Jackson County has adopted subdivision regulations that provide for the safety, health, and well-being of the general public by requiring that adequate streets, storm drainage, water and sewage facilities are installed in all residential subdivisions (Jackson County, 2021).

Victoria County adopted the Victoria County Development Standards Manual, which is intended to protect the public health and welfare of citizens and facilitate the administration of regulations (Victoria County, 2018).

Municipalities within Texas may adopt long-range comprehensive plans; however, the LMGS site is not located within an incorporated municipality and therefore is not addressed in a municipal comprehensive plan.

2.5.2.5 Aesthetics and Recreation

2.5.2.5.1 Aesthetics

As detailed in Section 2.2, Land, Calhoun County is in the Texas Coastal Plain Province of southeast Texas. The topography of the LMGS site is flat with surface elevations ranging from approximately 30 ft (9.1 m) NAVD 88 in the north to approximately 25 ft (7.6 m) NAVD 88 in the south.

SDO is located adjacent to the LMGS site to the west and spans 4700 ac (1902 ha) (Dow, 2023). The SDO property and associated structures represent a developed viewshed that includes manufacturing facilities and associated infrastructure within the immediate visual environment of the LMGS site.

Sensitive visual receptors, which may be potentially affected by visual intrusions of LMGS, include residences to the north of the LMGS site along SH 35. Additional sensitive visual receptors include visitors to the Guadalupe Delta WMA – Mission Lake Unit (approximately 2.7 mi [4.3 km] west of the LMGS site [Section 2.1, Station Location]) and recreators within the Victoria Barge Canal which bounds the eastern edge of the Guadalupe WMA – Mission Lake Unit (Figure 2.1-2).

Primary roadways in the LMGS vicinity are shown on Figure 2.5-4. Jesse Rigby Road and SHs 35 and 185 provide the best opportunity for the public to view the site. Due to the relatively flat terrain and sparse tree cover surrounding the site, there is minimal natural screening of the LMGS site from nearby roadways.

2.5.2.5.2 Recreation

Recreational areas that could be affected by the building and operation of the LMGS are those located within the 6 mi (10 km) LMGS vicinity. These include:

- Victoria Barge Canal
- Mission Lake Unit of the Guadalupe Delta WMA
- Hatchbend Country Club
- Polebenders
- Open Waters and Lakes (Green Lake, Mission Lake, and Guadalupe Bay) (Figure 2.1-2)

The Victoria Barge Canal is a 35 mi (56 km) long waterway maintained by the USACE and was developed to connect the City of Victoria to the GIWW (Port of Victoria, 2011). The Victoria Barge Canal is available for general aquatic recreation and fishing (GBRA, 2008).

As stated in Section 2.1, Station Location, the Mission Lake Unit of the Guadalupe Delta WMA is located within the LMGS vicinity (Figure 2.1-1). The WMA is open during hunting season with valid permits and fees, and portions are open daily for fishing and can be accessed for group tours. Hunters can enter the Mission Lake Unit through multiple access points. (TPWD, 2023j).

Additional recreation in the vicinity as indicated above include private recreation areas, Hatchbend Country Club and Polebenders, and undeveloped recreation areas such as open waters and lakes.

2.5.2.6 Housing

Table 2.5-16 shows the total number of housing units (56,330) in the ROI in 2021, most of which are located in Victoria County. Approximately 69 percent of the housing units in the ROI are owner-occupied and the remainder are renter-occupied. The median mortgage in the ROI is $1365 and the median rent in the ROI is $872. As shown on Table 2.5-17, in the ROI there are 9208 vacant housing units, accounting for approximately 16 percent of total housing units within the ROI. Of the vacant units in the ROI, 2043 (approximately 27 percent), are for rent and 458 are for sale.

As shown in Table 2.5-18, most of the housing units in the ROI were built between 1970 and 1989. However, since 1970, the number of new houses built has decreased slightly every 10 years, with only 227 or 0.4 percent of houses built in 2020 or later. Because most of the houses in the ROI were built between 1970 and 1989, most of the housing stock within the ROI was built within the last 50 years.

2.5.2.7 Public Services and Community Infrastructure

Public services and community infrastructure consist of the political structure, public water and wastewater treatment systems, police and fire departments, medical facilities, and schools. Schools are described in Section 2.5.2.8. The other infrastructure and service elements are described in the following subsections.

2.5.2.7.1 Political Structure

Within the three-county ROI, there are two state senate districts; District 18, which includes Calhoun and Victoria Counties, and District 17, which includes Jackson County (Texas Legislative Council, 2023). All three counties are located in congressional district 27 (TxDOT, 2023b).

The Texas Constitution established the Commissioners Court as the governing body of each of the 254 Texas counties. The court consists of five members: four county commissioners and one county judge.

The LMGS site is in unincorporated Calhoun County. The Calhoun County seat is Port Lavaca, which is located approximately 8.2 mi (13.2 km) northeast of the LMGS site (Section 2.1, Station Location). Incorporated cities within Calhoun County include Point Comfort, Port Lavaca, and Seadrift. The City of Victoria, the only incorporated city within Victoria County, is the Victoria County seat. Incorporated cities within Jackson County include Edna, Ganado, and La Ward. Edna is the Jackson County seat.

2.5.2.7.2 Public Water Supply and Wastewater Treatment Systems

2.5.2.7.2.1 Public Water Supply

The TWDB works to ensure Texans have access to sufficient, clean, and affordable water supplies. In 1997, the legislature established a water planning process that considered the state’s population growth trends when addressing water supply issues (TWDB, 2023). The TWDB divides Texas into 16 planning groups, one for each regional water planning area, which includes Region A through Region P (Figure 2.5-5). The planning groups each consist of about 20 members and represent a variety of interests, including agriculture, industry, environment, public, municipalities, business, water districts, river authorities, water utilities, counties, groundwater management areas, and power generation. The planning process includes quantifying current and projected population and water demand over a 50-year planning horizon; evaluating and quantifying water availability and current water supply; identifying water surpluses and needs; identifying, evaluating, and recommending water management strategies and projects to meet the identified water needs; developing drought response information and recommendations; and recommending regulatory, administrative, and legislative changes (TWDB, 2022a).The three counties comprising the ROI are located in Region L (Calhoun and Victoria Counties) and Region P (Jackson County) (Figure 2.5-5).

2.5.2.7.2.1.1 Region L

Region L of the SCTRWPG consists of several counties (Kendall, Comal, Hays, Caldwell, Guadalupe, Gonzales, DeWitt, Victoria, Calhoun, Refugio, Goliad, Karnes, Wilson, Bexar, Atascosa, Medina, Frio, La Salle, Dimmit, Zavala, and Uvalde) and nine major water providers. For Calhoun and Victoria Counties, the major water provider is the Guadalupe-Blanco River Authority and Victoria. Major water sources in Region L include the Gulf Coast Aquifer and the Guadalupe River (TWDB, 2020a).

2.5.2.7.2.1.2 Region P

Region P consists of the Lavaca Regional Water Planning Area (LRWPA), which comprises Lavaca County, Jackson County, and portions of Wharton County. The major water provider in the LRWPA is the Lavaca-Navidad River Authority. Major water sources in the Gulf Coast Aquifer System and Texana Lake (TWDB, 2020b).

The Texas State Water Plan for 2022 addresses the needs of all water users (irrigation, municipal, manufacturing, steam electric power, livestock, and mining) within the state during a drought of the same magnitude of the record drought that occurred in the 1950s (TWDB, 2022b). Table 2.5-19 shows existing supply, demand, excess supply, needs (potential shortages), excess existing supply, and strategy supplies (water management strategies recommended to address potential shortages) for municipal water for each county in the ROI from 2020 to 2070. The Texas State Water Plan (2022) concluded that without strategy supplies, Victoria County will not have enough water to meet demand for all users in 2030 through 2070. However, supply, which incorporates strategy supplies, for municipal users is forecasted to exceed demand by 2050. Calhoun and Jackson County may have excess supply without needing strategy supplies.

Table 2.5-20 summarizes the public water supply systems in the ROI by water source type (surface water or groundwater), population served, production capacity, average daily usage, utilized capacity, and excess capacity. Within the ROI, there are 15 public water systems providing potable water. Every water system in the ROI is operating below maximum capacity, except for Jackson County Water Control and Improvement District 2, which is exceeding its daily capacity by 4.7 percent.

Wastewater treatment in the ROI is provided by 13 different wastewater systems. Table 2.5-21 details the public wastewater treatment facilities, their capacities, and average daily utilization for Calhoun, Jackson, and Victoria Counties. All of the wastewater treatment facilities are operating below capacity.

2.5.2.7.3 Police, Fire, and Medical Services

2.5.2.7.3.1 Police

Information regarding law enforcement services is based on the Federal Bureau of Investigation data for full time sworn officers, current as of 2019 (FBI, 2019). Within the ROI the number of law enforcement officers (sworn officers) ranges from 52 to 260. Within the ROI there are 337 law enforcement officers. Information on law enforcement officers by county is shown on Table 2.5-22.

Within Texas, the ratio of law officers to residents is 1 to 339. The officer-to-resident ratio of counties within the ROI ranges from 351 to 600 residents per officer. In 2019, the nationwide ratio of law enforcement officers to citizens was approximately 2.4 per 1,000 citizens. All of the counties within the ROI are above this ratio, except for Jackson County, where the ratio is 1.7 officers per 1,000 residents. Table 2.5-22 details the ratio of law enforcement officers to resident by county.

2.5.2.7.3.2 Fire Services

Table 2.5-23 details fire protection personnel data for the fire departments within the ROI. With the exception of the Victoria and Port Lavaca fire departments, most firefighters within the ROI are volunteers. In 2020, the National Fire Protection Association estimated that there were 1,041,200 career and volunteer firefighters in the United States (NFPA, 2022). According to USCB data, the population of the United States in 2020 was 331,449,281 citizens (USCB, 2020), resulting in a firefighter-to-citizen ratio of 1 to 318.3. Within the counties in the ROI, the ratio of firefighters to residents ranges from 1 to 170.3 to 1 to 356.7. The ratio of firefighters to residents in the ROI is 1 to 279.1. Victoria County is the only county with a firefighter-to-resident ratio that exceeds the national average (Table 2.5-23).

2.5.2.7.3.3 Emergency Management

The Texas Division of Emergency Management (TDEM) coordinates the state's emergency management program, which helps the state and its local governments respond to and recover from emergencies and disasters and implement plans and programs to prevent or lessen the impact of emergencies and disasters. TDEM implements programs to increase public awareness about threats and hazards, coordinates emergency planning, and provides an array of specialized training. TDEM carries out comprehensive all-hazard emergency management programs for the state and assists cities, counties, and state agencies in planning and implementing their emergency management programs. Chapter 418 of the Texas Government Code lays out an extensive set of specific responsibilities assigned to TDEM (TDEM, 2023). Texas is divided into Emergency Management Regions and further into Disaster Districts. All of the counties within the ROI are located in Region 6, and further divided in Disaster District 17 Victoria (TDEM, 2023). All the counties within the ROI have a designated emergency management coordinator who is responsible for emergency preparedness and response within the local jurisdictions (Calhoun County, 2023; Jackson County, 2023; Victoria County, 2023).

2.5.2.7.3.4 Medical Services

Table 2.5-24 identifies the hospitals and the number of beds within the ROI. There are 787 hospital beds in the ROI with most of the hospital beds located within the five hospitals in Victoria County. Calhoun and Jackson County each have one hospital with 25 beds. The number of physicians and dentists within each ROI county is detailed in Table 2.5-25. There are 113 physicians and 49 dentists within the three-county ROI. The resident-to-physician ratio ranges from 1061.8 to 1 to 1665.3 to 1. The resident-to-dentist ratio ranges from 2227.3 to 1 to 4996.0 to 1.

2.5.2.8 Education

A total of 52 public and 11 private schools are located in the ROI, most of which are located in Victoria County. The number of schools, student enrollment, number of teachers, and student-to-teacher ratios for the 2019-2020 private school year and the 2021-2022 and 2022-2023 public school years are provided in Table 2.5-26. None of the schools within the ROI are located within the vicinity of the LMGS site.

The State of Texas imposes limitations on class sizes. Prekindergarten classrooms must have 22 students or fewer, and kindergarten to fourth grade classrooms must have 22 students or fewer in one classroom within the final 12 weeks of a school year, with exceptions in districts with significant migrant populations, where class size can exceed 22 students in a 12-week period chosen by the district. Fifth to twelfth grade teachers must average at or under 20 students per class across the district, but there is no defined cap for a single secondary classroom (Texas AFT, 2023). As shown on Table 2.5-26, student-to-teacher ratios for the school districts within the ROI are 15.4 to 1 or lower, with the average across public schools being 14.3 to 1. This ratio is similar to that of the state of Texas, where the average student-to-teacher ratio in public schools is 14.7 to 1. Additionally, within the ROI, there are 11 private schools (10 are located within Victoria County) with an average student-to-teacher ratio of 12.4 to 1.

In addition to primary and secondary schools there are two college campuses located within the ROI, University of Houston – Victoria and Victoria College, both of which are located in Victoria (NCES, 2023a). The approximate number of individuals within the ROI enrolled in school, by grade level and post-secondary school, is shown in Table 2.5-27. As shown in this table, in 2021, schools in the ROI served more than 30,441 students.

As shown on Table 2.5-28, in 2021, approximately 39 percent of individuals 25 years and older living in Texas received an associated degree or higher, whereas, within the ROI, approximately 28 percent of individuals received similar degrees.

2.5.3 Historic Properties

As defined by the National Historic Preservation Act (NHPA) (16 USC Section 470 et seq.) and its implementing regulations 36 CFR 800.16(I)(1), historic properties are those properties deemed eligible for listing or that are already listed in the National Register of Historic Places (NRHP). This section focuses on a description of the existing archaeological resources and historic properties on and immediately adjacent to the LMGS site.

The State of Texas' Government Code, Title 4, Chapter 442, Texas Historical Commission (THC), Subsection 442.006(f) protects recorded Texas historic landmarks. Texas Natural Resources Code Title 9, Chapter 191, Antiquities Code State, protects recorded archaeological landmarks. Historic cemeteries (dated post-1700) located on state, municipal, or private lands are protected by the Texas Health and Safety Code, Title 8, Chapters 694 – 715. Prehistoric burials located on state, municipal, or private lands do not have any additional protection, other than as an archaeological site, as addressed through the Antiquities Code.

The history of human activity in Calhoun County and the surrounding region spans thousands of years. The earliest groups to leave a definitive material record of their presence were early Paleoindians, who entered the area during the Late Pleistocene glacial epoch, more than 11,000 years ago. Their descendants and the descendants of other Native American groups who migrated to the region lived in the area until the arrival of the first European explorers. The Apache tribe of Oklahoma, Comanche Nation Oklahoma, Tonkawa Tribe of Indians of Oklahoma, and Wichita and Affiliated Tribes (Wichita, Keechi, Waco, and Tawakonie) Oklahoma have interest in Calhoun County, Texas (HUD, 2023).

2.5.3.1 Cultural Resources Investigations

The archeological survey area consisted of 1548 ac (626 ha), which included the LMGS site and some surrounding areas. The Area of Potential Effect (APE) for the archaeological survey and historic viewshed survey area were determined in consultation with Long Mott Energy, LLC, the THC, and the State Historic Preservation Office. There are two APEs for cultural resources that could potentially be affected by the LMGS site. The APE for archaeological resources is 1537 ac (622 ha) and represents the location and extent of areas required for all LMGS-related building activities. The APE for visual effects to architectural resources includes the 1537 ac (622 ha) LMGS site and includes a 0.5 mi (0.8 km) buffer radiating from the periphery of the LMGS site to account for potential visual impacts to aboveground historic architectural resources that are adjacent to the LMGS site.

Prior to conducting a Phase I archaeological survey, archaeological background research was compiled by reviewing the Texas Archaeological Sites Atlas, THC Atlas, and the NRHP. The archaeological background research included the archaeological survey area and a 0.6 mi (1 km) buffer surrounding the LMGS site. The purpose of the research was to identify previous archaeological surveys and recorded archaeological sites within or near the LMGS site. According to the review, no archaeological sites are located within the LMGS site or the buffer surrounding the LMGS site. No previously conducted surveys are located within the LMGS site; however, two previously conducted archaeological surveys (8400009819 and 8400009824) are located within the buffer surrounding the LMGS site. Little information regarding surveys 8400009819 and 8400009824 was available, except that they were conducted in May 2001. No archaeological sites were associated with these surveys within the buffer surrounding the LMGS site.

A Phase I intensive archaeological survey of the LMGS site was conducted from July 10 to July 19, 2023. Per the provisions of the Texas Cultural Resources Code, Title 9, Chapter 191, WSP USA Inc. initiated a review of the scope of work (SOW) with the THC on May 12, 2023, with the concurrence of the SOW from the THC on June 7, 2023 (THC Tracking No. 202308205). Mr. John A. Hunter served as the principal investigator for the overall cultural survey and the field director for the archaeological survey. Mr. Hunter is a registered professional archaeologist with a master's degree in anthropology and more than 20 years of experience.

The archaeological survey was conducted in two sections: a 930.6 ac (376.6 ha) section and a 617.4 ac (249.8 ha) section. The archaeological survey area consists of portions of agricultural fields containing unharvested and harvested corn, disturbances from extant infrastructure (plant facilities, paved areas, and holding ponds), as well as portions of open scrub growth, railroad tracks, and railyard. The ground surface visibility varies across the survey area, and the Phase I intensive survey was completed over the entire survey area using a combination of systematic shovel test pits coupled with a pedestrian survey.

A total of 382 shovel test pits were excavated across the archaeological survey area. None of the excavated shovel test pits contained cultural material. Additionally, no evidence of deeply buried cultural deposits suggesting buried A-horizons or cultural artifacts were identified in any of the excavations. As a result of the intensive archaeological survey, no archaeological sites nor cultural materials were identified on the LMGS site (Appendix 1A and Part VI Supplemental Information).

2.5.3.2 Architectural Viewshed Survey

As described above, the architectural viewshed survey area, also referred to as the architectural APE, includes the LMGS site and a 0.5 mi (0.8 km) buffer radiating from the periphery of the LMGS site to account for potential visual impacts to aboveground historic architectural resources that are adjacent to the LMGS site. Per THC protocols, along with structures located within the architectural survey area, the survey documented all historic structures located on a parcel intersected by the architectural survey area, even if the structure is located outside of the 0.5 mi (0.8 km) architectural survey area buffer.

To support the architectural survey and provide historic context, a literature review was conducted to identify what architectural resources were previously surveyed and recorded within the survey area and within a 1 mi (1.6 km) buffer around the architectural APE. Site file and database checks for architectural resources were performed via the THC Atlas on July 24, 2023. Based on the site file and database check, there are seven previously surveyed resources within the architectural APE and 20 previously surveyed resources located within the additional 1 mi (1.6 km) buffer around the architectural APE. Of these 27 previously surveyed resources, 26 were recommended not eligible for listing in the NRHP, and one resource, the historic Victoria Barge Canal (Site #3300074805), was recommended eligible for listing in the NRHP under Criterion A for association with transportation industry and maritime history. The THC Atlas was also used to gather contextual data regarding NRHP listed properties within 10 mi (16.1 km) of the LMGS site center point. This resource revealed that within 10 mi (16.1 km) of the LMGS site center point, no properties are listed in the NRHP.

The architectural survey was conducted from July 11 to 13, 2023. Ms. Carolyn Andrews, registered architect, American Institute of Architects, served as the field director for the architectural survey. Ms. Andrews is an architectural historian with a master's degree in architecture and historic preservation and 16 years of experience.

A total of 10 resources over 50 years of age were identified within the architectural APE and recorded during the survey: four residential buildings, two outbuildings, one utility site, two operating industrial or agricultural facilities, and one defunct agricultural facility (Table 2.5-29). Of these resources, seven were previously recorded. None of the 10 resources over 50 years of age surveyed were determined eligible for listing on the NRHP. Based on these findings, no historic properties are present on the LMGS site (Appendix 1A and Part VI Supplemental Information).

2.5.3.2.1 Consultation with State Historic Preservation Office and Native American Tribes

As a federal project requesting a permit from a federal agency, LMGS is subject to review and consultation under Section 106 of the NHPA (16 USC Section 470 et seq.) and its implementing regulations (36 CFR 800). Additionally, the LMGS site is subject to the Native American Graves Protection and Repatriation Act (25 USC Section 3001 et seq.), the Archaeological Resources Protection Act (16 USC Section 470 aa—mm), the American Indian Religious Freedom Act (42 USC Section1996), and the Archaeological and Historic Preservation Act (16 USC Section 469).

The U.S. Department of Energy (DOE) completed a review of ground disturbing site characterization and environmental monitoring activities at the LMGS site to evaluate potential impacts on ecological, historical, and cultural resources. Given the potential presence of historical/cultural resources on the portion of the LMGS site where these activities were proposed, a cultural resource survey (Section 2.5.3.1) was conducted. DOE consulted with Tribes having ancestral ties to the project area including the Apache Tribe of Oklahoma, Cheyenne & Arapaho Tribes, Comanche Nation, Kiowa Indian Tribe of Oklahoma, Mescalero Apache Tribe, Shawnee Tribe, Tonkawa Tribe of Oklahoma, and the Tunica Biloxi Tribe of Louisiana. DOE received concurrence from TX SHPO on the finding of no historic properties or cultural resources present in the project area and received one comment from the Shawnee Tribe that the project is located outside of the Tribe's area of interest. The DOE issued a categorical exclusion on September 5, 2023 (Appendix 1A).

Initial coordination with the THC was submitted on May 12, 2023. The purpose of this coordination was to review the SOW prior to conducting fieldwork. THC provided concurrence with the SOW on June 7, 2023 (Appendix 1A). The THC concurred with the archaeological findings and the architectural viewshed findings that no historic properties are present or affected by LMGS on February 16, 2024 (Appendix 1A). This coordination initiates regulatory review pursuant to Section 106 of the NHPA. However, NRC will conduct the Section 106 consultation process through direct coordination with THC.

2.5.4 Environmental Justice

2.5.4.1 Identification of Potentially Affected Environmental Justice Populations

2.5.4.1.1 Methodology

The following analysis considers information requirements for environmental justice determinations in NUREG-1555, as well as the NRC's guidance on environmental justice analysis contained in Nuclear Reactor Regulation Office Instruction, LIC–203, Revision 4, *Procedural Guidance for Preparing Environmental Assessments and Considering Environmental Issues*, Appendix D. This guidance document contains a methodology to identify the locations of minority and low-income populations of interest, suggesting that a 50 mi (80 km) radius centered on the nuclear facility could reasonably be expected to contain the area affected and that the state could be considered an appropriate geographic area for comparative analysis.

NRC guidance recommends use of USCB demographic data at the CBG level. CBGs represent the smallest geographic subdivision for which the USCB tabulates detailed demographic data. Race and ethnicity data from the 2020 decennial census (USCB, 2020) were selected for use in this analysis, as the data have been recently released and are based on a count of all United States residents. However, the decennial census data does not provide the necessary poverty data at the CBG level. Thus, the USCB 2017-2021 ACS five-year estimates (USCB, 2021) were used for the low-income population analysis. USCB ACS five-year estimates are based on estimated projections from smaller sample sizes.

The demographic data are used in conjunction with geographic information system software to determine the minority and income characteristics of resident populations by CBG. If any part of a CBG is included within the 50 mi (80 km) radius, the entire CBG is included in the analysis. A total of 189 CBGs are located within the 50 mi (80 km) region, measured from the LMGS bounding limit around the site center point. Consistent with NRC guidance, the geographic area for comparative analysis is defined as the state of Texas.

2.5.4.1.2 Minority Populations

The NRC's *Procedural Guidance for Preparing Environmental Assessments and Considering Environmental Issues* defines minority categories as Black or African American, American Indian or Alaska Native, Asian, Native Hawaiian and Other Pacific Islander, some other race (not mentioned above), two or more races (also referred to as multiracial), or a race whose ethnicity is Hispanic or Latino.

Identification of minority populations requires analysis of individual race and ethnicity classifications as well as comparisons of total minority populations in the region. Thus, each minority category was evaluated separately while the total of all minority categories combined was also evaluated as the aggregate minority population. The aggregate minority population is calculated as the total population minus people who identified themselves as *White, Not Hispanic or Latino*. Minority populations exist if either of the following conditions is met:

- The minority population of the impacted area exceeds 50 percent of the total population
- The ratio of minority population in the impacted area is meaningfully greater (i.e., greater than or equal to 20 percentage points) than the minority population percentage in the general population or other appropriate unit of geographic analysis

For each of the CBGs within a 50 mi (80 km) radius of the LMGS site center point, the percentage of the CBG's population represented by each minority category was calculated. If either the percentage of an individual minority category or the percentage of the aggregate minority population in a CBG exceeded 50 percent, then the CBG was identified as containing a minority population. Texas served as the geographic area of comparison for all CBGs, as the region does not extend into any other states. Percentages for each minority category within Texas are shown in Table 2.5-6. The CBG minority percentage for each racial or ethnic category, and in aggregate, was compared to the appropriate state percentage. If any CBG percentage exceeded the corresponding state percentage by 20 percentage points or more, then a minority population was determined to exist within that CBG.

Table 2.5-30 and Figure 2.5-6 identify the CBGs with minority populations, as defined above, within the 50 mi (80 km) region. There are 189 CBGs in the region, of which approximately 48 percent (90 CBGs) have a racial or ethnic minority population or an aggregate minority population that exceed one of the above criteria. The majority of the CBGs that exceed the threshold criteria for minority populations do so because of the number of Hispanic or Latino residents. Within the ROI, Victoria County has 46 CBGs with minority populations, primarily located near the cities of Victoria and Bloomington. There are 10 CBGs with minority populations in Calhoun County, all in or adjacent to Port Lavaca. Jackson County has four CBGs with minority populations, located centrally around Edna and Granado. The closest minority CBG to the LMGS site is located in Refugio County to the southwest (Figure 2.5-6).

2.5.4.1.3 Low-Income Populations

The nationwide poverty level is determined annually by the USCB and varies by the size of the family and the number of related children under 18 years of age. For the purposes of this assessment, and consistent with NRC guidance, the low-income population is defined as individuals or families whose annual household income is below the USCB poverty thresholds. A low-income environmental justice population exists if either of the following two conditions is met:

- The low-income population of the impacted area exceeds 50 percent of the total population
- The ratio of low-income population in the impacted area is meaningfully greater (i.e., greater than or equal to 20 percentage points) than that of the general population or other appropriate unit of geographic analysis

The same 50 mi (80 km) region as described above was used for this analysis. The number of low-income individuals in each CBG was divided by the total number of individuals within that block group to obtain the percentage of low-income persons per CBG. These percentages were compared to the low-income percentage in Texas (14 percent; Table 2.5-5) to determine the block groups with low-income populations that meet either of the criteria listed above.

Table 2.5-30 and Figure 2.5-7 illustrate the number and distribution of low-income block groups within the 50 mi (80 km) region. Among the 189 CBGs within the 50 mi (80 km) region, approximately 13 percent (24 CBGs) meet the low-income criteria. The largest numbers of low-income CBGs in the region are located in Victoria County, to the northwest of the LMGS site, and Aransas County, to the southwest. Within the ROI, there is also one low-income CBG in Jackson County, near Edna, and two low-income CBGs in Calhoun County, in Port Lavaca. The closest low-income population to the LMGS site is located to the northeast in Port Lavaca (Figure 2.5-7).

2.5.4.2 Identification of Potential Pathways and Communities with Unique Characteristics

Environmental justice analysis also considers any unique economic, social, or human health circumstances and lifestyle practices of minority and low-income populations that could result in disproportionately high and adverse impacts to these populations from a project's actions. Such circumstances and practices may include, for example, dependence on subsistence resources such as fish and wildlife, unusual concentrations of minority or low-income populations within a compact area, or preexisting health conditions within a community that make it more susceptible to potential environmental impacts.

Dow regularly contacts stakeholders and community organizations that provide services to, or represent, minority and low-income communities located near SDO. Table 2.5-31 provides the names and descriptions of the organizations with whom Dow regularly engages. In addition, Dow has hosted or participated in multiple community outreach events for nearby residents, community organizations, and local officials, providing information and answering questions related to the LMGS. Recent events include a community education event at SDO in May 2023, a Texas Municipal League Region 11 meeting in February 2024, and a near-neighbor dinner at SDO in March 2024, designed to provide a safe and open forum for local residents. The NRC also held a public meeting in Port Lavaca in February 2024 related to this project where the NRC provided context on how the public engagement process functions and responded to questions from attendees. No stakeholders, community organizations, or members of the public have reported concerns regarding impacts to environmental justice populations or knowledge of dependencies or practices, such as subsistence agriculture, hunting, or fishing, or preexisting health conditions, through which the populations could be disproportionately adversely affected by the LMGS.

As shown in Figure 2.5-6, there is one CBG in Port Lavaca that exceeds the threshold criteria as an Asian minority population. Higher than typical percentages of Asian residents also contribute to the aggregate minority population of other CBGs around Port Lavaca, as well as Palacios (in Matagorda County, to the east), as the area is home to a large community of Vietnamese immigrants and their families. Tens of thousands of Vietnamese settled along the

Gulf and Atlantic coasts in the late 1970s to shrimp, crab, fish, and work in seafood processing and wholesaling (Tang, 2003). While many in the Vietnamese community make their living by catching seafood, the seafood is generally sold commercially rather than for personal sustenance. No unique preexisting health conditions were identified for this particular community.

Migrant workers, who are often members of minority or low-income populations, may also warrant additional consideration. Because they travel and can spend a significant amount of time in an area without being actual residents, migrant workers may be unavailable for counting by census takers and thus underrepresented in USCB minority and low-income population counts. However, based on migrant worker data collected for the census of agriculture (Section 2.5.1.3) and Dow's engagement in the local community, migrant labor occurring in the ROI is minimal. No migrant labor populations were identified that would require further consideration.

Table 2.5-1: Projected Resident Population for Each Sector within 50 Mi. of the Long Mott Generating Station Site (Sheet 1 of 6)

Directional Sector/Year	0-0.3 (mi.)	0.3-1 (mi.)	1-2 (mi.)	2-3 (mi.)	3-4 (mi.)	4-5 (mi.)	5-6 (mi.)	6-7 (mi.)	7-8 (mi.)	8-9 (mi.)	9-10 (mi.)	10-20 (mi.)	20-30 (mi.)	30-40 (mi.)	40-50 (mi.)	Total 0-50 (mi.)
NORTH																
2020	1	4	11	21	30	37	45	52	60	56	43	807	2659	3094	1117	
2026	1	4	11	21	30	37	44	52	59	56	44	827	2707	3134	1134	
2029	1	4	11	21	29	37	44	52	59	56	45	837	2732	3154	1143	
2030	1	4	11	21	29	37	44	51	59	56	45	840	2740	3161	1146	
2040	1	4	11	21	29	36	44	51	58	57	47	875	2823	3229	1175	
2050	1	4	11	20	29	36	43	50	57	57	48	911	2908	3299	1204	
2060	1	4	11	20	28	35	42	49	57	57	50	949	2996	3371	1235	
2070	1	4	10	20	28	35	42	49	56	57	52	989	3087	3444	1266	
NNE																
2020	1	4	13	22	30	37	44	72	76	163	116	740	2127	4438	2145	
2026	1	4	13	22	30	37	44	71	76	161	116	747	2153	4493	2161	
2029	1	4	13	22	29	37	44	71	75	161	115	751	2166	4520	2169	
2030	1	4	13	22	29	37	44	71	75	160	115	752	2170	4529	2172	
2040	1	4	13	22	29	36	43	70	74	158	114	764	2215	4622	2199	
2050	1	4	13	21	29	36	43	69	73	156	112	777	2260	4717	2226	
2060	1	4	13	21	28	35	42	68	72	154	111	789	2307	4814	2253	
2070	1	4	12	21	28	35	42	67	71	152	110	802	2354	4913	2281	
NE																
2020	1	4	12	22	30	36	42	191	333	1901	3359	4693	868	1696	2173	
2026	1	4	12	22	29	35	41	190	330	1886	3332	4659	879	1696	2162	
2029	1	4	12	22	29	35	41	189	329	1878	3319	4642	884	1696	2157	
2030	1	4	12	22	29	35	41	189	329	1876	3314	4637	886	1696	2155	
2040	1	4	12	22	29	35	40	186	324	1851	3271	4581	904	1695	2137	
2050	1	4	12	21	29	34	40	184	320	1826	3228	4526	922	1695	2120	
2060	1	4	12	21	28	34	39	181	316	1802	3185	4472	941	1694	2102	
2070	1	4	11	21	28	33	39	179	312	1779	3143	4418	960	1694	2085	

Table 2.5-1: Projected Resident Population for Each Sector within 50 Mi. of the Long Mott Generating Station Site (Continued)

Directional Sector/Year	0-0.3 (mi.)	0.3-1 (mi.)	1-2 (mi.)	2-3 (mi.)	3-4 (mi.)	4-5 (mi.)	5-6 (mi.)	6-7 (mi.)	7-8 (mi.)	8-9 (mi.)	9-10 (mi.)	10-20 (mi.)	20-30 (mi.)	30-40 (mi.)	40-50 (mi.)	Total 0-50 (mi.)
ENE																
2020	1	4	12	22	27	34	41	51	183	778	543	1713	531	4999	1209	
2026	1	4	12	22	27	34	41	51	181	772	539	1700	531	4931	1193	
2029	1	4	12	21	27	34	40	51	180	769	537	1693	530	4897	1185	
2030	1	4	12	21	27	34	40	51	180	768	536	1691	530	4886	1182	
2040	1	4	11	21	27	33	40	50	178	758	529	1668	529	4776	1155	
2050	1	4	11	21	26	33	39	49	176	748	522	1646	528	4668	1129	
2060	1	4	11	21	26	32	39	49	173	738	515	1625	526	4562	1103	
2070	1	4	11	20	26	32	38	48	171	728	508	1603	525	4459	1078	
EAST																
2020	1	4	11	20	27	34	41	48	55	62	99	685	691	385	238	
2026	1	4	11	20	27	34	41	47	54	62	99	680	684	380	234	
2029	1	4	11	20	27	34	40	47	54	62	98	677	681	377	233	
2030	1	4	11	20	27	34	40	47	54	62	98	676	680	376	232	
2040	1	4	11	20	27	33	40	46	53	61	97	667	668	368	227	
2050	1	4	10	19	26	33	39	46	52	60	96	658	657	359	222	
2060	1	4	10	19	26	32	39	45	52	59	94	650	646	351	217	
2070	1	4	10	19	26	32	38	45	51	58	93	641	635	343	212	
ESE																
2020	1	4	11	18	25	32	39	39	30	42	48	350	446	0	0	
2026	1	4	11	17	25	32	39	39	30	42	48	347	442	0	0	
2029	1	4	11	17	25	32	38	39	30	41	47	346	440	0	0	
2030	1	4	11	17	25	32	38	39	30	41	47	346	439	0	0	
2040	1	4	11	17	25	31	38	38	29	41	47	341	433	0	0	
2050	1	4	10	17	24	31	37	38	29	40	46	337	427	0	0	
2060	1	4	10	17	24	30	37	37	29	40	45	332	421	0	0	
2070	1	4	10	16	24	30	36	37	28	39	45	328	415	0	0	

Table 2.5-1: Projected Resident Population for Each Sector within 50 Mi. of the Long Mott Generating Station Site (Continued)

Directional Sector/Year	0-0.3 (mi.)	0.3-1 (mi.)	1-2 (mi.)	2-3 (mi.)	3-4 (mi.)	4-5 (mi.)	5-6 (mi.)	6-7 (mi.)	7-8 (mi.)	8-9 (mi.)	9-10 (mi.)	10-20 (mi.)	20-30 (mi.)	30-40 (mi.)	40-50 (mi.)	Total 0-50 (mi.)
SE																
2020	1	4	11	16	22	27	33	38	34	27	20	132	46	0	0	
2026	1	4	11	16	22	27	32	38	34	27	20	131	46	0	0	
2029	1	4	11	16	22	27	32	38	34	27	20	130	46	0	0	
2030	1	4	11	16	22	27	32	38	34	27	20	130	46	0	0	
2040	1	4	11	16	21	27	32	37	33	26	20	128	45	0	0	
2050	1	4	10	16	21	26	31	37	33	26	19	127	45	0	0	
2060	1	4	10	15	21	26	31	36	32	26	19	125	44	0	0	
2070	1	4	10	15	20	25	31	36	32	25	19	123	43	0	0	
SSE																
2020	1	4	11	16	22	24	24	25	217	459	8	120	41	0	0	
2026	1	4	11	16	21	24	24	25	215	456	8	119	41	0	0	
2029	1	4	11	16	21	23	24	25	215	454	8	119	41	0	0	
2030	1	4	11	16	21	23	24	25	214	453	8	119	41	0	0	
2040	1	4	11	16	21	23	24	24	212	447	8	117	40	0	0	
2050	1	4	10	16	21	23	23	24	209	441	7	116	40	0	0	
2060	1	4	10	15	21	22	23	24	206	436	7	114	39	0	0	
2070	1	4	10	15	20	22	23	24	203	430	7	113	39	0	0	
SOUTH																
2020	1	4	11	9	5	4	5	5	6	7	8	128	160	22	0	
2026	1	4	11	9	5	4	5	5	6	7	8	127	160	22	0	
2029	1	4	11	9	4	4	5	5	6	7	7	127	160	22	0	
2030	1	4	11	9	4	4	5	5	6	7	7	127	160	22	0	
2040	1	4	10	9	4	4	4	5	6	7	7	126	160	23	0	
2050	1	4	10	9	4	4	4	5	5	6	7	125	161	23	0	
2060	1	4	10	8	4	4	4	5	5	6	7	124	161	24	0	
2070	1	4	10	8	4	4	4	4	5	6	7	123	161	24	0	

Table 2.5-1: Projected Resident Population for Each Sector within 50 Mi. of the Long Mott Generating Station Site (Continued)

Directional Sector/Year	0-0.3 (mi.)	0.3-1 (mi.)	1-2 (mi.)	2-3 (mi.)	3-4 (mi.)	4-5 (mi.)	5-6 (mi.)	6-7 (mi.)	7-8 (mi.)	8-9 (mi.)	9-10 (mi.)	10-20 (mi.)	20-30 (mi.)	30-40 (mi.)	40-50 (mi.)	Total 0-50 (mi.)
SSW																
2020	1	4	5	2	3	4	5	5	6	6	7	139	533	15,205	14,950	
2026	1	4	5	2	3	4	5	5	5	6	7	137	542	15,470	15,124	
2029	1	4	5	2	3	4	4	5	5	6	7	137	547	15,604	15,212	
2030	1	4	5	2	3	4	4	5	5	6	7	136	548	15,649	15,241	
2040	1	4	5	2	3	4	4	5	5	6	6	134	564	16,106	15,538	
2050	1	4	5	2	3	4	4	4	5	5	6	132	581	16,576	15,840	
2060	1	4	5	2	3	4	4	4	4	5	5	130	598	17,061	16,148	
2070	1	4	5	2	3	4	4	4	4	4	5	127	615	17,559	16,463	
SW																
2020	1	4	3	2	3	4	5	5	6	6	7	111	223	1356	1529	
2026	1	4	3	2	3	4	5	5	5	6	7	106	220	1353	1531	
2029	1	4	3	2	3	4	5	5	5	6	7	104	219	1352	1532	
2030	1	4	3	2	3	4	5	5	5	6	7	103	218	1351	1532	
2040	1	4	3	2	3	4	5	4	5	6	6	96	214	1347	1535	
2050	1	4	3	2	3	4	4	4	5	5	6	89	209	1343	1538	
2060	1	4	3	2	3	4	4	4	4	5	5	83	205	1339	1541	
2070	1	4	3	2	3	4	4	4	4	4	5	77	200	1334	1544	
WSW																
2020	1	4	3	2	3	4	5	5	6	7	14	111	264	4537	1108	
2026	1	4	3	2	3	4	5	5	6	7	14	106	252	4340	1080	
2029	1	4	3	2	3	4	5	5	5	7	14	104	247	4245	1067	
2030	1	4	3	2	3	4	5	5	5	7	14	103	245	4214	1062	
2040	1	4	3	2	3	4	5	5	5	6	14	96	227	3913	1018	
2050	1	4	3	2	3	4	4	5	5	6	14	89	211	3633	975	
2060	1	4	3	2	3	4	4	5	4	6	14	83	196	3374	934	
2070	1	4	3	2	3	4	4	4	4	5	14	77	182	3133	895	

Table 2.5-1: Projected Resident Population for Each Sector within 50 Mi. of the Long Mott Generating Station Site (Continued)

Directional Sector/Year	0-0.3 (mi.)	0.3-1 (mi.)	1-2 (mi.)	2-3 (mi.)	3-4 (mi.)	4-5 (mi.)	5-6 (mi.)	6-7 (mi.)	7-8 (mi.)	8-9 (mi.)	9-10 (mi.)	10-20 (mi.)	20-30 (mi.)	30-40 (mi.)	40-50 (mi.)	Total 0-50 (mi.)
WEST																
2020	1	4	5	2	3	4	5	5	10	29	34	447	494	357	772	
2026	1	4	5	2	3	4	5	5	10	30	35	454	491	358	771	
2029	1	4	5	2	3	4	5	5	10	31	35	457	489	358	770	
2030	1	4	5	2	3	4	5	5	10	31	35	458	489	358	769	
2040	1	4	5	2	3	4	5	5	10	32	37	470	483	359	767	
2050	1	4	5	2	3	4	4	5	10	33	38	481	478	360	764	
2060	1	4	5	2	3	4	4	5	10	35	40	493	473	361	761	
2070	1	4	4	2	3	4	4	5	10	36	42	505	468	363	759	
WNW																
2020	1	4	10	9	4	4	5	5	6	11	26	621	1725	2955	1819	
2026	1	4	10	9	4	4	5	5	6	11	26	637	1757	2966	1825	
2029	1	4	10	9	4	4	5	5	6	11	27	644	1773	2971	1827	
2030	1	4	10	9	4	4	5	5	6	11	27	647	1778	2973	1828	
2040	1	4	10	9	4	4	5	5	6	11	28	674	1833	2992	1838	
2050	1	4	10	8	4	4	4	5	6	12	28	703	1890	3011	1848	
2060	1	4	10	8	4	4	4	5	6	12	29	732	1949	3030	1857	
2070	1	4	10	8	4	4	4	5	6	12	30	763	2009	3049	1867	
NW																
2020	1	4	11	22	29	31	33	36	40	94	777	2661	41,964	5363	4675	
2026	1	4	11	21	29	30	33	36	40	95	796	2728	43,015	5485	4662	
2029	1	4	11	21	29	30	33	36	39	96	806	2762	43,550	5547	4655	
2030	1	4	11	21	29	30	33	36	39	96	809	2773	43,730	5568	4653	
2040	1	4	11	21	28	30	32	36	39	98	843	2890	45,571	5780	4631	
2050	1	4	10	21	28	30	32	35	38	100	879	3012	47,490	6000	4609	
2060	1	4	10	20	28	29	31	35	38	103	916	3138	49,489	6229	4588	
2070	1	4	10	20	27	29	31	34	37	105	954	3271	51,573	6466	4566	

Table 2.5-1: Projected Resident Population for Each Sector within 50 Mi. of the Long Mott Generating Station Site (Continued)

Directional Sector/Year	0-0.3 (mi.)	0.3-1 (mi.)	1-2 (mi.)	2-3 (mi.)	3-4 (mi.)	4-5 (mi.)	5-6 (mi.)	6-7 (mi.)	7-8 (mi.)	8-9 (mi.)	9-10 (mi.)	10-20 (mi.)	20-30 (mi.)	30-40 (mi.)	40-50 (mi.)	Total 0-50 (mi.)
NNW																
2020	1	4	11	21	30	37	45	52	60	51	51	1278	32,196	2656	2917	
2026	1	4	11	21	30	37	44	52	59	52	52	1310	33,003	2719	2922	
2029	1	4	11	21	29	37	44	52	59	52	53	1327	33,414	2751	2925	
2030	1	4	11	21	29	37	44	51	59	52	53	1332	33,552	2762	2926	
2040	1	4	11	21	29	36	44	51	58	54	55	1388	34,965	2871	2935	
2050	1	4	10	20	29	36	43	50	57	55	57	1447	36,437	2986	2944	
2060	1	4	10	20	28	35	42	49	57	56	60	1508	37,971	3105	2953	
2070	1	4	10	20	28	35	42	49	56	58	62	1571	39,570	3228	2962	
TOTAL																
2020	17	70	150	228	293	353	414	637	1126	3701	5159	14,736	84,969	47,063	34,653	193,568
2026	17	70	149	226	291	350	411	632	1116	3675	5149	14,815	86,923	47,345	34,799	195,967
2029	17	69	149	225	289	348	409	629	1112	3663	5143	14,856	87,918	47,494	34,873	197,195
2030	17	69	148	225	289	348	409	628	1110	3659	5142	14,870	88,253	47,545	34,898	197,609
2040	17	68	147	222	285	343	403	619	1095	3618	5127	15,016	91,676	48,081	35,154	201,870
2050	16	67	145	219	282	339	398	610	1079	3578	5114	15,175	95,243	48,671	35,419	206,355
2060	16	67	143	216	278	334	392	602	1064	3538	5104	15,347	98,961	49,314	35,694	211,070
2070	16	66	141	213	274	330	387	593	1050	3500	5096	15,532	102,836	50,010	35,979	216,021
Note: Population estimates are rounded to the nearest whole number, accounting for potential discrepancies between the total value and the sum of individual distance bands																

Table 2.5-2: 2020 Population for Counties and Municipalities within the Region of Influence

County/Municipality	2020 Population
Calhoun County	**20,106**
Alamo Beach CDP	254
Magnolia Beach CDP	217
City of Point Comfort	603
City of Port Lavaca	11,557
Port O’Connor CDP	954
City of Seadrift	995
Jackson County	**14,988**
City of Edna	5987
City of Ganado	1975
City of La Ward	176
Lolita CDP	519
Vanderbilt CDP	409
Victoria County	**91,319**
Bloomington CDP	2082
Inez CDP	2641
Placedo CDP	625
Quail Creek CDP	1800
City of Victoria	65,534
ROI	**126,413**

Source: USCB, 2020
Abbreviations: CDP = Census Designated Place; ROI = region of influence

Table 2.5-3: Historic and Projected Population within the Region of Influence

Year	Calhoun County		Jackson County		Victoria County		ROI	
	Population	Annual% Growth	Population	Annual % Growth	Population	Annual % Growth	Population	Annual% Growth
Historic Population Data[(a)]								
2000	20,647	-	14,391	-	84,088	-	119,126	-
2010	21,381	0.36%	14,075	-0.22%	86,793	0.32%	122,249	0.26%
2020	20,106	-0.60%	14,988	0.65%	91,319	0.52%	126,413	0.34%
Projected Population Data								
2030	19,841	-0.13%	15,296	0.21%	95,164	0.42%	130,301	0.31%
2040	19,579	-0.13%	15,610	0.21%	99,172	0.42%	134,361	0.31%
2050	19,321	-0.13%	15,930	0.20%	103,348	0.42%	138,599	0.32%
2060	19,066	-0.13%	16,257	0.21%	107,700	0.42%	143,023	0.32%
2070	18,815	-0.13%	16,591	0.21%	112,235	0.42%	147,641	0.32%

Sources:
a) USCB, 2000; USCB, 2010; USCB, 2020
Abbreviation: ROI = region of influence

Table 2.5-4: Age and Sex Distribution in the Region of Influence and State

	Calhoun County		Jackson County		Victoria County		ROI		Texas	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Age Groups										
Under 5 years	1344	6.60%	1024	6.80%	6236	6.80%	8604	6.80%	1,959,223	6.80%
5 to 14 years	2673	13.10%	2212	14.80%	13,071	14.30%	17,956	14.20%	4,218,529	14.60%
15 to 24 years	2717	13.30%	1784	11.90%	12,291	13.50%	16,792	13.30%	4,065,360	14.10%
25 to 44 years	4944	24.30%	3512	23.50%	23,877	26.20%	32,333	25.50%	8,159,336	28.30%
45 to 64 years	5078	24.90%	3743	25.00%	21,206	23.20%	30,027	23.70%	6,839,335	23.70%
65 years and over	3611	17.70%	2696	18.00%	14,599	16.00%	20,906	16.50%	3,620,798	12.50%
Total	**20,367**	**100.00%**	**14,971**	**100.00%**	**91,280**	**100.00%**	**126,618**	**100.00%**	**28,862,581**	**100.00%**
Median Age (years)	37.9		39.8		36		36.8		35	
Sex										
Male	10,486	51.50%	7252	48.40%	45,062	49.40%	62,800	49.60%	14,398,171	49.90%
Female	9881	48.50%	7719	51.60%	46,218	50.60%	63,818	50.40%	14,464,410	50.10%

Source: USCB, 2021
Abbreviation: ROI = region of influence

Table 2.5-5: Household Income Distribution within the Region of Influence

Income Range	Calhoun County	Jackson County	Victoria County	ROI	State of Texas
Total Households	7748	5155	34,219	47,122	10,239,341
Less than $10,000	3.60%	4.80%	5.20%	4.90%	5.70%
$10,000 to $14,999	3.80%	4.50%	4.80%	4.60%	3.70%
$15,000 to $24,999	6.40%	9.00%	10.50%	9.70%	7.70%
$25,000 to $34,999	12.20%	6.80%	9.00%	9.30%	8.50%
$35,000 to $49,000	16.40%	11.50%	11.90%	12.60%	11.70%
$50,000 to $74,999	17.30%	23.50%	18.40%	18.80%	17.30%
$75,000 to $99,999	14.10%	11.90%	13.20%	13.20%	12.70%
$100,000 to $149,999	15.70%	19.00%	15.70%	16.10%	16.20%
$150,000 to $199,999	5.70%	6.70%	6.20%	6.20%	7.70%
$200,000 or more	4.70%	2.30%	5.00%	4.70%	8.70%
Median Household Income ($)	61,887	60,807	60,598	60,833	67,321
Mean Income ($)	77,888	74,270	78,310	77,799	94,115
Percentage of Population Below Poverty Level	9.70%	12.50%	16.20%	14.70%	14.00%

Source: USCB, 2021
Abbreviation: ROI = region of influence

Table 2.5-6: Racial and Ethnic Percentage Distribution within the Region of Influence

Racial or Ethnic Category	Calhoun County	Jackson County	Victoria County	ROI	Texas
Total population (persons)	20,106	14,988	91,319	126,413	29,145,505
White alone (Not Hispanic or Latino)	41.60%	56.80%	43.10%	44.50%	39.70%
Racial and ethnic minorities	58.40%	43.20%	56.90%	55.50%	60.30%
Hispanic or Latino	49.00%	32.20%	47.00%	45.60%	39.30%
Black or African American	1.80%	6.30%	5.70%	5.20%	11.80%
American Indian and Alaska Native	0.20%	0.20%	0.20%	0.20%	0.30%
Asian	5.50%	1.10%	1.50%	2.10%	5.40%
Native Hawaiian and Other Pacific Islander	0.00%	0.00%	0.00%	0.00%	0.10%
Some other race	0.30%	0.70%	0.30%	0.30%	0.40%
Multiracial	1.50%	2.70%	2.10%	2.10%	3.00%

Source: USCB, 2020
Abbreviation: ROI = region of influence

Table 2.5-7: Transient Population within 20 Mi. of the Long Mott Generating Station Site (Sheet 1 of 8)

Facility Type	Facility Name	City	Distance Band	Directional Sector	Transient Population (Unweighted)
Airport Facilities	Calhoun County Port Lavaca Airport (employees)	Port Lavaca	8-9 mi	NNE	33
Airport Facilities	Calhoun County Port Lavaca Airport (crew and passengers)	Port Lavaca	8-9 mi	NNE	88
Daycare Facilities	Babies and Beyond Daycare	Port Lavaca	9-10 mi	NE	75
Daycare Facilities	BCFS Education Services Port Lavaca Head Start	Port Lavaca	9-10 mi	NE	83
Daycare Facilities	Calhoun County YMCA HJM Afterschool Care	Port Lavaca	9-10 mi	NE	129
Daycare Facilities	Calhoun County YMCA — Summer Camp	Port Lavaca	9-10 mi	NE	27
Daycare Facilities	Ladybug Preschool	Port Lavaca	9-10 mi	NE	27
Daycare Facilities	Tots and Tikes Learning Center	Port Lavaca	9-10 mi	NE	137
Daycare Facilities	Tots and Tikes Learning Center II	Port Lavaca	9-10 mi	NE	94
Daycare Facilities	Bright Day Preschool and Daycare	Port Lavaca	10-20 mi	NE	12
Daycare Facilities	Coastal Kids Daycare	Port Lavaca	10-20 mi	NE	47
Daycare Facilities	Shirley Harper (Home Care)	Port O'Connor	10-20 mi	ESE	11
Daycare Facilities	Calhoun County YMCA JR Afterschool Care	Port Lavaca	8-9 mi	ENE	45
Daycare Facilities	Gingerbread School and Daycare	Port Lavaca	8-9 mi	NE	150
Lodging	L&W Frazier RV Park	Port Lavaca	0.3-1 mi	NNW	84
Lodging	Bay Flats Lodge Resort	Seadrift	9-10 mi	SSE	55
Lodging	Indian Point Motel	Port Lavaca	10-20 mi	E	24
Lodging	Indianola Beach Park Dispersed Camping	Port Lavaca	10-20 mi	E	72
Lodging	Lola & Ethel's RV Park	Port Lavaca	10-20 mi	E	54
Lodging	Magnolia Beach Dispersed Camping	Port Lavaca	10-20 mi	E	210
Lodging	Magnolia Beach RV Park	Port Lavaca	10-20 mi	E	66
Lodging	Ocean Drive RV Park (Oceanside in some places)	Port Lavaca	10-20 mi	E	108
Lodging	Powderhorn RV Park Boat Ramp and Marina	Port Lavaca	10-20 mi	E	192
Lodging	Sunrise on Mag RV Park	Port Lavaca	10-20 mi	E	36
Lodging	Vacation Rentals (VRBO)	Various	10-20 mi	E	1062
Lodging	Camp Alamo Beach	Port Lavaca	10-20 mi	ENE	18

Table 2.5-7: Transient Population within 20 Mi. of the Long Mott Generating Station Site (Continued) (Sheet 2 of 8)

Facility Type	Facility Name	City	Distance Band	Directional Sector	Transient Population (Unweighted)
Lodging	Keller Bay RV Park	Port Lavaca	10-20 mi	ENE	102
Lodging	Chaparral Motel	Port Lavaca	10-20 mi	NE	159
Lodging	Holiday Inn Express & Suites Port Lavaca	Port Lavaca	10-20 mi	NE	237
Lodging	La Quinta Inn & Suites by Wyndham Port Lavaca	Port Lavaca	10-20 mi	NE	171
Lodging	Lavaca Bay RV Park	Port Lavaca	10-20 mi	NE	306
Lodging	Lighthouse Beach Park	Port Lavaca	10-20 mi	NE	246
Lodging	Lonestar RV Park	Port Lavaca	10-20 mi	NE	216
Lodging	Motel 6 Port Lavaca, TX	Port Lavaca	10-20 mi	NE	159
Lodging	Sanddollar RV Park	Port Lavaca	10-20 mi	NE	348
Lodging	Call of Country RV Park	Victoria	10-20 mi	NNW	60
Lodging	DaCosta RV Park	Victoria	10-20 mi	NNW	78
Lodging	Ripple Road RV	Victoria	10-20 mi	NNW	78
Lodging	Standing Rock RV Park	Victoria	10-20 mi	NNW	90
Lodging	A & A RV Park	Victoria	10-20 mi	NW	222
Lodging	Bgs Cabin #31	Bloomington	10-20 mi	NW	66
Lodging	Cabin Rentals/Tinks Cabins/Black Bayou RV and Cabins	Bloomington	10-20 mi	NW	294
Lodging	Grandpas RV	Victoria	10-20 mi	NW	72
Lodging	Hilltop Acres RV Park — Victoria, Texas	Victoria	10-20 mi	NW	84
Lodging	Jk RV Park	Victoria	10-20 mi	NW	66
Lodging	Outskirts Lodging	Victoria	10-20 mi	NW	30
Lodging	Outskirts RV Park	Victoria	10-20 mi	NW	36
Lodging	RV And Cabins	Victoria	10-20 mi	NW	687
Lodging	Tropical RV Park	Victoria	10-20 mi	NW	60
Lodging	Falcon Point Ranch	Seadrift	10-20 mi	SSE	39
Lodging	Waterfront RV	Port Lavaca	10-20 mi	SSE	72
Lodging	Austwell City Park Campground	Austwell	10-20 mi	SSW	48
Lodging	McFaddin Ranch Camp	McFaddin	10-20 mi	W	8
Lodging	Machacek's Rockin M RV Park and Campgrounds	Port Lavaca	10-20 mi	ENE	150

Table 2.5-7: Transient Population within 20 Mi. of the Long Mott Generating Station Site (Continued) (Sheet 3 of 8)

Facility Type	Facility Name	City	Distance Band	Directional Sector	Transient Population (Unweighted)
Lodging	Simple Stay	Port Lavaca	10-20 mi	ENE	30
Lodging	10th Street Lodge	Port O'Connor	10-20 mi	ESE	26
Lodging	American Inn & Suites	Port O'Connor	10-20 mi	ESE	99
Lodging	Beacon 44 RV Park	Port O'Connor	10-20 mi	ESE	258
Lodging	Captain's Quarters	Port O'Connor	10-20 mi	ESE	177
Lodging	Dolphins of the Bay RV Park	Port O'Connor	10-20 mi	ESE	198
Lodging	Inn at Clarks	Port O'Connor	10-20 mi	ESE	63
Lodging	Poco Loco Lodge	Port O'Connor	10-20 mi	ESE	24
Lodging	Port O'Connor RV Park	Port O'Connor	10-20 mi	ESE	276
Lodging	R & R RV Resort & Casitas	Port O'Connor	10-20 mi	ESE	504
Lodging	Texas Coast RV Resorts	Port O'Connor	10-20 mi	ESE	426
Lodging	Texas Gulf Coast RV Park	Port O'Connor	10-20 mi	ESE	162
Lodging	The Two RV Park	Port O'Connor	10-20 mi	ESE	246
Lodging	Americas Best Value Inn Port Lavaca	Port Lavaca	10-20 mi	NE	297
Lodging	Best Western Port Lavaca Inn	Port Lavaca	10-20 mi	NE	150
Lodging	Executive Inn Port Lavaca	Port Lavaca	10-20 mi	NE	150
Lodging	Hampton Inn & Suites Port Lavaca	Port Lavaca	10-20 mi	NE	255
Lodging	Royal Inn (Port Lavaca)	Port Lavaca	10-20 mi	NE	198
Lodging	Chaparral Motel	Victoria	10-20 mi	NW	162
Lodging	La Quinta Inn & Suites by Wyndham Victoria - South	Victoria	10-20 mi	NW	198
Lodging	Lone Star Inn & Suites Victoria	Victoria	10-20 mi	NW	204
Lodging	Super 8 by Wyndham Victoria South Highway 59	Victoria	10-20 mi	NW	162
Lodging	Country Club RV Park	Port Lavaca	4-5 mi	NE	240
Lodging	Sweetwater RV Campgrounds	Port Lavaca	4-5 mi	NE	252
Lodging	Gator RV Park	Tivoli	6-7 mi	WSW	87
Lodging	Papa & Maga’s Calhoun's Riverside RV Retreat	Tivoli	6-7 mi	WSW	72
Lodging	Bay Motel	Seadrift	7-8 mi	SSE	24
Lodging	Beacon 7 RV Park	Seadrift	7-8 mi	SSE	48

Table 2.5-7: Transient Population within 20 Mi. of the Long Mott Generating Station Site (Continued) (Sheet 4 of 8)

Facility Type	Facility Name	City	Distance Band	Directional Sector	Transient Population (Unweighted)
Lodging	Castaway Lodge	Seadrift	7-8 mi	SSE	40
Lodging	Coastal Bend at Seadrift, Motel & RV Park	Seadrift	7-8 mi	SSE	138
Lodging	Kelly's Reef RV Park	Seadrift	7-8 mi	SSE	30
Lodging	Reel Time Lodging and Guide Service	Seadrift	7-8 mi	SSE	15
Lodging	Seadrift Pelican House	Seadrift	7-8 mi	SSE	6
Lodging	Bay View RV Park, LLC	Port Lavaca	8-9 mi	ENE	366
Lodging	Texas Lakeside RV Resort	Port Lavaca	8-9 mi	ENE	582
Lodging	Holiday Motel	Port Lavaca	8-9 mi	NE	60
Lodging	Port Lavaca RV Park	Port Lavaca	8-9 mi	NE	219
Lodging	Bunkhouse Lodge	Seadrift	8-9 mi	SE	NA
Lodging	Almost Paradise RV Park	Seadrift	8-9 mi	SSE	66
Lodging	Breezy Palms Cottages & RV Park	Seadrift	8-9 mi	SSE	63
Lodging	Driftwood RV Resort	Seadrift	8-9 mi	SSE	228
Lodging	Seadrifter Inn	Seadrift	8-9 mi	SSE	60
Lodging	Tivoli Motel	Tivoli	8-9 mi	WSW	30
Major Employers	Calhoun County	NA	9-10 mi	NE	388
Major Employers	Calhoun Independent School District	NA	9-10 mi	NE	553
Major Employers	Austwell — Tivoli Independent School District	NA	8-9 mi	WSW	40
Major Employers	Bloomington Independent School District	NA	10-20 mi	NNW	72
Major Employers	Industrial Independent School District	NA	10-20 mi	NNE	205
Major Employers	DOW-Seadrift Operation	Seadrift	1-2 mi	SSW	1424
Major Employers	Orion Marine Construction	Port Lavaca	10-20 mi	NE	NA
Major Employers	Memorial Medical	Port Lavaca	9-10 mi	NE	200
Major Employers	Seadrift Coke	Port Lavaca	1-2 mi	WSW	117
Major Employers	INEOS Nitriles	Port Lavaca	4-5 mi	NW	208
Major Employers	Braskem — Seadrift Unit	Port Lavaca	10-20 mi	ESE	200
Major Employers	Calhoun Chemical	Port Lavaca	3-4 mi	WNW	24
Major Employers	Hatchbend Country Club	Port Lavaca	4-5 mi	NE	14

Table 2.5-7: Transient Population within 20 Mi. of the Long Mott Generating Station Site (Continued) (Sheet 5 of 8)

Facility Type	Facility Name	City	Distance Band	Directional Sector	Transient Population (Unweighted)
Major Employers	Formosa Plastics Point Comfort	Point Comfort	10-20 mi	NE	2250
Major Employers	Point Comfort Power Plant	Point Comfort	10-20 mi	ENE	NA
Major Employers	Invista	Victoria	10-20 mi	NW	1792
Major Employers	Port of Port Lavaca	Point Comfort	10-20 mi	NE	NA
Major Employers	Max Midstream Seahawk Terminal	Point Comfort	10-20 mi	NE	NA
Major Employers	City of Point Comfort	Point Comfort	10-20 mi	NE	32
Major Employers	City of Port Lavaca	Port Lavaca	9-10 mi	NE	119
Major Employers	City of Seadrift	Seadrift	8-9 mi	SSE	28
Medical and Assisted Living Facilities	Bethany Senior Living	Port Lavaca	9-10 mi	NE	130
Medical and Assisted Living Facilities	Calhoun Group Home	Port Lavaca	9-10 mi	NE	6
Medical and Assisted Living Facilities	Memorial Medical Center	Port Lavaca	9-10 mi	NE	25
Medical and Assisted Living Facilities	Program Hope	Port Lavaca	9-10 mi	NE	30
Medical and Assisted Living Facilities	Trinity Shores of Port Lavaca	Port Lavaca	9-10 mi	NE	100
Medical and Assisted Living Facilities	Port Lavaca Nursing and Rehabilitation Center	Port Lavaca	10-20 mi	NE	148
Parks and Recreation Areas	Port Lavaca Shooting Range	Port Lavaca	9-10 mi	ENE	20
Parks and Recreation Areas	Welder Flats Wildlife Management Area	NA	9-10 mi	ENE	NA
Parks and Recreation Areas	6 Mile Beach	Port Lavaca	9-10 mi	NE	10
Parks and Recreation Areas	Calhoun County Museum	Port Lavaca	9-10 mi	NE	90
Parks and Recreation Areas	Faye Sterling Park	Port Lavaca	9-10 mi	NE	10
Parks and Recreation Areas	George Adams Park	Port Lavaca	9-10 mi	NE	50
Parks and Recreation Areas	Nautical Landing	Port Lavaca	9-10 mi	NE	234
Parks and Recreation Areas	Tilley Park	Port Lavaca	9-10 mi	NE	50

Table 2.5-7: Transient Population within 20 Mi. of the Long Mott Generating Station Site (Continued) (Sheet 6 of 8)

Facility Type	Facility Name	City	Distance Band	Directional Sector	Transient Population (Unweighted)
Parks and Recreation Areas	Bill Sanders Memorial Park	Seadrift	9-10 mi	SSE	186
Parks and Recreation Areas	Swan Point Landing Marina	Seadrift	9-10 mi	SSE	12
Parks and Recreation Areas	Indianola Beach Park	Port Lavaca	10-20 mi	E	300
Parks and Recreation Areas	Indianola Fishing Marina	Port Lavaca	10-20 mi	E	30
Parks and Recreation Areas	Indianola Ghost Town	Port Lavaca	10-20 mi	E	NA
Parks and Recreation Areas	Magic Bird Sanctuary	Port Lavaca	10-20 mi	E	NA
Parks and Recreation Areas	Magnolia Beach Park	Port Lavaca	10-20 mi	E	300
Parks and Recreation Areas	Haterious Park	Olivia	10-20 mi	ENE	10
Parks and Recreation Areas	Powderhorn Wildlife Management Area	Port O'Connor	10-20 mi	ESE	NA
Parks and Recreation Areas	Brookhollow Estates Park	Port Lavaca	10-20 mi	NE	10
Parks and Recreation Areas	Lighthouse Beach & Fishing Pier Park	Port Lavaca	10-20 mi	NE	300
Parks and Recreation Areas	Bayfront Peninsula Park	Port Lavaca	10-20 mi	NNW	300
Parks and Recreation Areas	Aransas National Wildlife Refuge	NA	10-20 mi	SSW	150
Parks and Recreation Areas	Austwell City Park	Austwell	10-20 mi	SSW	50
Parks and Recreation Areas	Hopper's Landing	Austwell	10-20 mi	SSW	25
Parks and Recreation Areas	Guadalupe Delta Wildlife Management Area	NA	2-3 mi	WSW	NA
Parks and Recreation Areas	King Fisher Beach Park	Port O'Connor	10-20 mi	ESE	300
Parks and Recreation Areas	Las Palmas Marina	Port O'Connor	10-20 mi	ESE	18
Parks and Recreation Areas	St Christopher's Marina	Port O'Connor	10-20 mi	ESE	51

Table 2.5-7: Transient Population within 20 Mi. of the Long Mott Generating Station Site (Continued) (Sheet 7 of 8)

Facility Type	Facility Name	City	Distance Band	Directional Sector	Transient Population (Unweighted)
Parks and Recreation Areas	Sunday Beach Pass	NA	10-20 mi	ESE	NA
Parks and Recreation Areas	Bauer Community Center	Port Lavaca	10-20 mi	NE	1110
Parks and Recreation Areas	INVISTA Wetland	Victoria	10-20 mi	NW	70
Parks and Recreation Areas	Cavasso Creek (Aransas Pathways)	Rockport	10-20 mi	SSW	NA
Parks and Recreation Areas	Hatchbend Country Club	Port Lavaca	4-5 mi	NE	75
Parks and Recreation Areas	Polebenders	Port Lavaca	5-6 mi	S	36
Parks and Recreation Areas	Chocolate Bayou Park	Calhoun	7-8 mi	ENE	200
Parks and Recreation Areas	Park @ Stringham & Henry Barber Way	County of Calhoun	7-8 mi	NE	200
Parks and Recreation Areas	Art Center Seadrift	Seadrift	7-8 mi	SSE	30
Parks and Recreation Areas	Bay Front Park & Pavilion (AD Powers Park)	Seadrift	8-9 mi	SSE	50
Parks and Recreation Areas	Seadrift Train Depot	Seadrift	8-9 mi	SSE	12
Parks and Recreation Areas	Wilson Park	Port Lavaca	8-9 mi	SSE	90
Parks and Recreation Areas	WSSCND Harbor	Seadrift	8-9 mi	SSE	150
School Facilities	Calhoun High School	Port Lavaca	9-10 mi	NE	987
School Facilities	Harrison/Jefferson/Madison Elementary	Port Lavaca	9-10 mi	NE	664
School Facilities	Hope High School	Port Lavaca	9-10 mi	NE	25
School Facilities	Our Lady of the Gulf Catholic School	Port Lavaca	9-10 mi	NE	130
School Facilities	Travis Middle	Port Lavaca	9-10 mi	NE	702
School Facilities	Bloomington High School	Bloomington	10-20 mi	NNW	239
School Facilities	Bloomington Junior High	Bloomington	10-20 mi	NNW	195
School Facilities	Placedo Elementary	Placedo	10-20 mi	NNW	191
School Facilities	Bloomington Elementary	Bloomington	10-20 mi	NW	265
School Facilities	Port O'Connor School	Port O'Connor	10-20 mi	ESE	63

Table 2.5-7: Transient Population within 20 Mi. of the Long Mott Generating Station Site (Continued) (Sheet 8 of 8)

Facility Type	Facility Name	City	Distance Band	Directional Sector	Transient Population (Unweighted)
School Facilities	Industrial ElementaryEast	Vanderbilt	10-20 mi	NNE	269
School Facilities	Industrial High School	Vanderbilt	10-20 mi	NNE	386
School Facilities	Industrial Junior High	Vanderbilt	10-20 mi	NNE	262
School Facilities	Seadrift School	Seadrift	7-8 mi	SSE	237
School Facilities	Jackson/Roosevelt Elementary	Port Lavaca	8-9 mi	ENE	852
School Facilities	Cornerstone Christian Academy	Port Lavaca	8-9 mi	NE	30
School Facilities	Austwell — Tivoli Elementary	Tivoli	8-9 mi	WSW	78
School Facilities	Austwell — Tivoli High School	Tivoli	8-9 mi	WSW	66
				Total	**32,289**

Abbreviations: LLC = limited liability corporation; NA = not applicable; RV = recreational vehicle; NNE = north-northeast; NE = northeast; ESE = east-southeast; ENE = east-northeast; NNW = north-northwest; SSE = south-southeast; E = east; NW = northwest; SSW = south-southwest; W = west; WSW = west-southwest; SE = southeast; WNW = west-northwest; S = south

Table 2.5-8: Employment by Industry
(Sheet 1 of 2)

Industry Type	Calhoun County, TX			Jackson County, TX			Victoria County, TX			ROI		
	2010	2021	Percent Change	2010	2021	Percent Change	2010	2021	Percent Change	2010	2021	Percent Change
Total employment	12,503	15,893	27.10%	7221	8423	16.60%	50,418	51,917	3.00%	70,142	76,233	8.70%
Farm employment	307	303	-1.30%	873	895	2.50%	1487	1528	2.80%	2667	2726	2.20%
Non-farm employment	12,196	15,590	27.80%	6348	7528	18.60%	48,931	50,389	3.00%	67,475	73,507	8.90%
Private non-farm employment	10,582	14,126	33.50%	5245	6344	21.00%	41,935	43,859	4.60%	57,762	64,329	11.40%
Forestry, fishing, and related activities	336	446	32.70%	143	(D)	-	(D)	(D)	-	479	446	-6.90%
Mining, quarrying, and oil and gas extraction	310	105	-66.10%	(D)	318	-	3327	2393	-28.10%	3637	2816	-22.60%
Utilities	(D)	18	-	(D)	(D)	-	387	459	18.60%	387	477	23.30%
Construction	2095	3082	47.10%	692	1121	62.00%	3204	3591	12.10%	5991	7794	30.10%
Manufacturing	2882	3643	26.40%	(D)	(D)	-	2824	1941	-31.30%	5706	5584	-2.10%
Wholesale trade	(D)	154	-	216	194	-10.20%	1807	2219	22.80%	2023	2567	26.90%
Retail trade	1118	1274	14.00%	567	647	14.10%	6390	6790	6.30%	8075	8711	7.90%
Transportation and warehousing	178	239	34.30%	(D)	(D)		1032	1984	92.20%	1210	2223	83.70%
Information	54	52	-3.70%	122	75	-38.50%	535	338	-36.80%	711	465	-34.60%
Finance and insurance	340	455	33.80%	246	324	31.70%	2297	2359	2.70%	2883	3138	8.80%
Real estate and rental and leasing	254	349	37.40%	135	238	76.30%	1827	1984	8.60%	2216	2571	16.00%
Professional, scientific, and technical services	(D)	984	-	307	(D)	-	1778	1735	-2.40%	2085	2719	30.40%
Management of companies and enterprises	(D)	(D)	-	0	(D)	-	(D)	223	-	(D)	223	-

Table 2.5-8: Employment by Industry (Continued) (Sheet 2 of 2)

Industry Type	Calhoun County, TX			Jackson County, TX			Victoria County, TX			ROI		
	2010	2021	Percent Change	2010	2021	Percent Change	2010	2021	Percent Change	2010	2021	Percent Change
Administrative and support and waste management and remediation services	594	(D)	-	125	244	95.20%	2139	2401	12.20%	2858	2645	-7.50%
Educational services	71	96	35.20%	16	(D)	-	503	764	51.90%	590	860	45.80%
Health care and social assistance	508	420	-17.30%	323	(D)	-	7000	6492	-7.30%	7831	6912	-11.70%
Arts, entertainment, and recreation	67	86	28.40%	(D)	(D)	-	615	(D)	-	682	86	-87.40%
Accommodation and food services	725	1070	47.60%	(D)	(D)	-	3215	4168	29.60%	3940	5238	32.90%
Other services (except government and government enterprises)	532	606	13.90%	343	421	22.70%	2705	3130	15.70%	3580	4157	16.10%
Government and government enterprises	1614	1464	-9.30%	1,03	1,184	7.30%	6996	6530	-6.70%	9713	9178	-5.50%
Federal civilian	38	33	-13.20%	32	33	3.10%	416	200	-51.90%	486	266	-45.30%
Military	107	81	-24.30%	32	29	-9.40%	205	187	-8.80%	344	297	-13.70%
State and local	1469	1350	-8.10%	1039	1122	8.00%	6375	6143	-3.60%	8883	8615	-3.00%

Source: USBEA, 2021

Abbreviations: (D) = Not shown to avoid disclosure of confidential information; estimates are included in higher-level totals; ROI = region of influence; TX = Texas

Table 2.5-9: Employment Trends in the Region of Influence (2011 – 2021)

	2011	2021	Percent Change
Calhoun County			
Labor Force	9926	10,085	1.60%
Employed	8847	9671	9.30%
Unemployed	1079	414	-61.60%
Unemployment Rate	10.90%	4.10%	
Jackson County			
Labor Force	6638	6501	-2.10%
Employed	6273	6222	-0.80%
Unemployed	365	279	-23.60%
Unemployment Rate	5.50%	4.30%	
Victoria County			
Labor Force	43,041	43,961	2.10%
Employed	39,897	41,932	5.10%
Unemployed	3144	2029	-35.50%
Unemployment Rate	7.30%	4.60%	
ROI			
Labor Force	59,605	60,547	1.60%
Employed	55,017	57,825	5.10%
Unemployed	4588	2722	-40.70%
Unemployment Rate	7.70%	4.50%	
Texas			
Labor Force	12,179,035	14,390,216	18.20%
Employed	11,288,597	13,618,630	20.60%
Unemployed	890,438	771,586	-13.30%
Unemployment Rate	7.30%	5.40%	

Sources: USCB, 2011; USCB 2021

Abbreviation: ROI = region of influence

Table 2.5-10: Top Employers Located in the Region of Influence

Company	Total Employees	Description
Calhoun County		
Alcoa Corp	>1000	Metal Service Centers and Other Metal Merchant Wholesalers
DOW Seadrift Operations	1424	–
Formosa Plastics Corporation	2250	Plastics Material and Resin Manufacturing
Orion Marine Group	250 – 499	Site Preparation Contractors
Jackson County		
Inteplast Group Ltd	100 – 249	Plastics Materials and Basic forms and shapes merchant wholesaler
Jackson County Hospital District	100 – 249	General Diagnostic and Medical Treatment Hospitals
Magnum Services Inc	100 – 249	Drilling Oil and Gas Wells
Regency Nursing	100 – 249	Offices of all Other Miscellaneous Health Practitioners
Southbrooke Manor Nursing & Rehabilitation Center	100 – 249	Senior Homes (without Nursing Care)
Victoria County		
Berry Global	250 – 499	Miscellaneous Stores
Caterpillar Inc	>1000	Construction and Mining (Except Oil Well) Machinery and Equipment Merchant Wholesalers
Citizens Medical Center	500 – 999	General Diagnostic and Medical Treatment Hospitals
Detar Hospital Navarro	500 – 999	General Diagnostic and Medical Treatment Hospitals
Detar Hospital North	>1000	General Diagnostic and Medical Treatment Hospitals
Victoria County (continued)		
Devereaux Texas Treatment Network – Victoria	250 – 499	Rehabilitation Hospital
H-E-B	250 – 499	Grocery Stores and Supermarkets
Invista	1792	–
TLC Healthcare Staffing	250 – 499	Offices of all other Miscellaneous Health Practitioners
Victoria College	250 – 499	Schools Offering Baccalaureate or Graduate Degrees

Source: VEDC, 2023

Note: Major Employers classified as businesses with 250 or more employees, except for Jackson County, for which Major Employer is classified as businesses with 100 or more employees as there are no businesses with over 250 employees.

Table 2.5-11: Per Capita Income Trends in the Region of Influence

Geographic Area	2011	2021	Percentage Change	Annual Average Growth (Percent)
Calhoun County	21,751	30,879	42.00%	4%
Jackson County	24,476	27,278	11.40%	1%
Victoria County	24,571	29,801	21.30%	2%
Texas	25,548	34,255	34.10%	3%

Source: USCB, 2021

Note: All dollar estimates are in thousands of current dollars (not adjusted for inflation)

Table 2.5-12: Summary of Roadway Characteristics in the Long Mott Generating Station Region

Location Number[(a)]	Route Segment	Number of Lanes	Type[(b)]	TxDOT Functional Road Classification	2022 AADT[(c)]	LOS[(d)]
1	U.S. 59 (From Berclair to Goliad)	2	Undivided	Rural Principal Arterial – Other	6353	C
2	U.S. 59 (From Goliad to U.S. 77)	4	Divided	Rural Principal Arterial – Other	10,848	B
3	U.S. 59 to U.S. 77(via US 59 loop south of Victoria)	4	Divided	Rural Principal Arterial – Other	9338	B
4	U.S. 59 to U.S. 87 (From Telferner to south from Victoria)	4	Divided	Rural Principal Arterial – Other	34,815	C
5	U.S. 77 BUS to U.S. 77 (To intersection of U.S. 59 and U.S. 77)	2	Undivided	Rural Major Collector	2073	B
6	U.S. 59 loop to U.S. 87	4	Divided	Rural Principal Arterial – Other	25,000	B
7	U.S. 87 (south from Victoria to Placedo)	4	Divided	Rural Principal Arterial – Other	12,683	B
8	U.S. 87 (south from Placedo to SH 35)	4	Divided	Rural Principal Arterial – Other	11,500	B
9	SH 185 (south from Victoria to Bloomington)	4	Divided	Rural Minor Arterial	10,374	B
10	SH 185 (Bloomington to SH 35)	2	Undivided	Rural Major Collector	3437	B
11	SH 185 (Seadrift to SH 35)	2	Undivided	Rural Major Collector	4128	B
12	SH 185 (Port O'Connor to Seadrift)	2	Undivided	Rural Major Collector	2553	B
13	SH 238 (From SH 316 to SH 185)	2	Undivided	Rural Major Collector	3056	B
14	FM 616 (LaSalle to Placedo)	2	Undivided	Rural Major Collector	900	B
15	FM 616 (Placedo to Bloomington)	2	Undivided	Rural Major Collector	1751	B
16	SH 35 (From Port Lavaca to Green Lake-SH 185)	2	Undivided	Rural Minor Arterial	6381	C
17	SH 35 (SH 185 to Refugio County Line)	2	Undivided	Rural Minor Arterial	3771	B
18	SH 35 (from Refugio County line to FM 774)	2	Undivided	Rural Minor Arterial	4415	B
19	SH 239 (Tivoli to U.S. 77)	2	Undivided	Rural Major Collector	2902	B
20	SH 239 (U.S. 77 to Goliad)	2	Undivided	Rural Major Collector	400	B
21	U.S. 77 (U.S. 59 loop south to Refugio County Line)	4	Divided	Rural Principal Arterial – Other	18,939	B
22	U.S. 77 (Refugio County line south to Refugio)	4	Divided	Rural Principal Arterial – Other	16,764	B
23	SH 202 (Refugio to FM 2441)	2	Undivided	Rural Major Collector	1023	B

Source:
b) TxDOT, 2022b
c) TxDOT, 2022a
d) FDOT, 2023
Notes:
a) Location numbers in column one are shown on Figure 2.5-3.
Abbreviations: AADT = annual average daily traffic; FM = Farm-to-Market Road; LOS = level of service; SH = state highway; TxDOT = Texas Department of Transportation; U.S. = United States

Table 2.5-13: Total Tax Revenues for Calhoun, Jackson, and Victoria Counties

Fiscal Year	Calhoun County	Jackson County	Victoria County
2018 – 2019	$20,122,387	$11,079,483	$36,389,390
2019 – 2020	$23,243,854	$11,211,464	$39,210,757
2020 – 2021	$24,838,620	$11,812,236	$39,845,731
2021 – 2022	$26,057,164	$12,393,725	$43,418,424

Sources: Calhoun County, 2022; Jackson County, 2022; Victoria County, 2022

Note: Total tax revenues include property tax, sales and use tax, maintenance and operations tax, and other taxes.

Table 2.5-14: Tax Rates by County (2022)
(Sheet 1 of 2)

Taxing Unit	Tax Rates[a]			
	County	City	School District	Other Entity
Calhoun County[b]	0.597			
Point Comfort		0.8119		
Port Lavaca		0.7944		
Port O'Connor		0.509		
Seadrift		0.5682		
Calhoun County Drainage District #6				0.0427
Calhoun Port Authority				0.0008
Calhoun County WCID #1[b]				0.0367
Calhoun County GCD[b]				0.0072
Port O'Connor ID Defined Area #1				0.491
Calhoun County Drainage District #10[b]				0.1802
Calhoun County Drainage District #11				0.171
Calhoun County Drainage District #8				0.2353
Calhoun County ISD[b]			0.9567	
Jackson County	0.4158			
Edna		0.2299		
Ganado		0.4998		
LaWard				
Texana Groundwater Conservation District				0.0077
Jackson County WCID #1				0.2004
Jackson County ESD #1				0.0509
Jackson County Hospital District				0.2109
Jackson County WCID #2				0.3397
Jackson County ESD #2				0.0335
Jackson County ESD #3				0.1
Edna ISD			1.0459	
Ganado ISD			1.200444	
Industrial ISD			1.0899	
Victoria County	0.3934			
Victoria		0.5582		
Quail Creek MUD				0.1572

Table 2.5-14: Tax Rates by County (2022) (Continued) (Sheet 2 of 2)

Taxing Unit	Tax Rates[a]			
	County	City	School District	Other Entity
Victoria County WCID #1				0.5119
Victoria County Drainage District #2				0.0831
Victoria Junior College District			0.1959	
Victoria County Navigation District				0.0288
Victoria County WCID #2				0.2763
Victoria County Drainage District #3				0.0279
Victoria County Groundwater Conservation District				0.008
Bloomington ISD			1.1163	
Victoria ISD			1.0542	
Nursery ISD			1.0431	

Source TCPA, 2022b

Notes:

a) Tax rates are per $100.00 assessed valuation

b) Denotes taxing entities applicable to the LMGS site

Abbreviations: ESD = Emergency Services District; GCD = Groundwater Conservation District; ISD = Independent School District; LMGS = Long Mott Generating Station; MUD = Municipal Utility District; WCID = Water Control and Improvement District

Table 2.5-15: Property Assessed Value by Independent School District in the Region of Influence

Taxing Unit[a]	2022	2021	2020	2019	2018
Calhoun County					
Calhoun County ISD	4,353,330,703	3,849,270,967	3,740,929,218	3,670,983,969	3,444,003,106
Jackson County					
Edna ISD	753,709,697	688,839,735	605,274,420	557,411,386	518,143,415
Ganado ISD	299,071,721	283,957,701	264,785,464	247,780,058	220,962,859
Industrial ISD[b]	1,084,201,643	876,895,579	935,506,639	916,480,637	808,102,781
Victoria County					
Bloomington ISD	291,782,098	235,248,226	228,731,700	229,867,723	179,206,624
Nursery ISD	237,565,591	262,550,170	278,534,187	261,617,373	234,704,048
Victoria ISD	7,300,200,384	6,738,415,316	6,136,416,874	6,037,468,226	5,566,716,851

Source: TCPA, 2023e
Notes:
a) Split districts not included in table
b) District is split between Victoria and Jackson County
Abbreviation: ISD = Independent School District

Table 2.5-16: Housing in the Region of Influence (2021)

County	Total Housing Units	Number Occupied	Percent Total Occupied	Number Owner-Occupied	Percent Owner-Occupied	Number Renter-Occupied	Percent Renter-Occupied
Calhoun	10,703	7748	72.40%	5813	75	1935	25
Jackson	6942	5155	74.30%	3719	72.1	1436	27.9
Victoria	38,685	34,219	88.50%	22,794	66.6	11,425	33.4
ROI	56,330	47,122	83.70%	32,326	68.6	14,796	31.4

Source USCB, 2021
Abbreviation: ROI = region of influence

Table 2.5-17: Vacant Housing in the Region of Influence (2021)

County	Total Vacant Units	Percent	For Rent	Percent	For Sale	Percent	For Seasonal, Recreational, or Occasional Use	Percent	Other Vacant	Percent	All Other Classifications of Vacant[a]	Percent
Calhoun	2955	27.60%	265	9.00%	78	2.60%	1950	66.00%	606	20.50%	56	1.90%
Jackson	1787	25.70%	309	17.30%	52	2.90%	424	23.70%	789	44.20%	213	11.90%
Victoria	4466	11.50%	1469	32.90%	328	7.30%	503	11.30%	2100	47.00%	66	1.50%
ROI	9208	16.30%	2043	22.20%	458	5.00%	2877	31.20%	3495	38.00%	335	3.60%

Source: USCB, 2021
Note:
a) Includes rented, not occupied; sold, not occupied; and for migrant workers
Abbreviation: ROI = region of influence

Table 2.5-18: Number of Structures Built by Decade in the Region of Influence

	Calhoun County	Jackson County	Victoria County	ROI	Percent of Total Housing Units
Built 2020 or later	0	0	227	227	0.40%
Built 2010 to 2019	933	494	4453	5880	10.40%
Built 2000 to 2009	1353	691	4112	6156	10.90%
Built 1990 to 1999	1133	693	5042	6868	12.20%
Built 1980 to 1989	1605	1233	5693	8531	15.10%
Built 1970 to 1979	1321	910	6284	8515	15.10%
Built 1960 to 1969	1718	738	4781	7237	12.80%
Built 1950 to 1959	2185	1087	4624	7896	14.00%
Built 1940 to 1949	304	745	1899	2948	5.20%
Built 1939 or earlier	151	351	1570	2072	3.70%
Total housing units	**10,703**	**6942**	**38,685**	**56,330**	

Source: USCB, 2021

Abbreviation: ROI = region of influence

Table 2.5-19: Texas State Water Plan for Municipal Water for Counties in the Region of Influence

County	2020	2030	2040	2050	2060	2070
Existing Supply by Usage Type (Total)(ac-ft/yr)						
Calhoun County	6882	6923	6966	7016	7074	7131
Jackson County	2625	2625	2625	2625	2625	2625
Victoria County	11,533	11,533	11,533	11,533	11,533	11,533
Demand by Usage Type (total) (ac-ft/yr)						
Calhoun County	3040	3271	3520	3791	4090	4384
Jackson County	1825	1819	1788	1782	1789	1797
Victoria County	20,139	21,065	21,782	22,528	23,253	23,877
Excess Existing Supply (ac-ft/yr)						
Calhoun County	3842	3652	3446	3225	2984	2747
Jackson County	800	806	837	843	836	828
Victoria County	-8606	-9532	-10,249	-10,995	-11,720	-12,344
Needs (potential Shortages) (ac-ft/yr)						
Calhoun County	0	0	0	0	88	119
Jackson County	0	0	0	0	0	0
Victoria County	9766	10,681	11,390	12,124	12,835	13,446
Strategy Supplies (ac-ft/yr)						
Calhoun County	43,164	58,499	60,103	59,139	55,578	50,898
Jackson County	80	80	80	80	80	80
Victoria County	18,589	19,549	21,037	22,617	24,244	25,126
Excess Existing Supply (Shortages and Strategy Supplies) (ac-ft/yr)						
Calhoun County	47,006	62,151	63,549	62,364	58,474	53,526
Jackson County	880	886	917	923	916	908
Victoria County	217	-664	-602	-502	-311	-664

Source: Texas State Water Plan, 2022
Note: ac-ft/yr = acre-feet per year

Table 2.5-20: Public Water Supply Systems and Capacities for Counties in the Region of Influence

Water System[(a)]	Water Source Type[(b)]	Population Served[(c)]	Production Capacity (MGD)[(b)]	Average Daily Usage (MGD)[(b)]	Utilized Capacity Percent	Excess Capacity Percent
Calhoun County						
City of Port Lavaca	Surface Water Purchase	11,854	3.2	1.673	52.3	47.7
City of Seadrift	Groundwater	1577	1.426	0.187	13.1	86.9
City of Point Comfort	Surface Water	759	4.896	0.177	3.6	96.4
GBRA Calhoun County Rural Water System	Surface Water Purchase	4482	0.648	0.201	31	69
Port O'Connor Improvement District	Surface Water Purchase	1064	1.044	0.312	29.9	70.1
Jackson County						
Cape Carancahua WSC	Groundwater	1305	2.203	0.039	1.8	98.2
City of Edna	Groundwater	5999	3.096	0.522	16.9	83.1
City of Ganado	Groundwater	1994	2.713	0.233	8.6	91.4
Jackson County WCID 1	Groundwater	660	0.419	NA	NA	NA
Jackson County WCID 2	Groundwater	525	0.317	0.332	104.7	-4.7
Tri County Point Water System 3	Groundwater	600	0.196	NA	NA	NA
Victoria County						
City of Victoria	Surface Water	66,932	27.2	8.056	29.6	70.4
Victoria County (continued)						
Coleto Water	Groundwater	510	0.122	0.043	35.2	64.8
Quail Creek MUD	Groundwater	1641	1.728	0.205	11.9	88.1
Victoria County WCID 1	Groundwater	2459	0.706	0.206	29.20%	70.80%
Victoria County WCID 2	Groundwater	741	0.331	0.047	14.20%	85.80%

Sources:

b)Texas Drinking Water Watch, 2023

c)EPA, 2023

Note:

a)Water systems serving 500 individuals or more included

Abbreviations: GBRA = Guadalupe-Blanco River Authority; MGD = Millions of Gallons per Day; MUD = Municipal Utilities District; NA = Not Available; WCID = Water Control and Improvement District; WSC = Water Supply Corporation

Table 2.5-21: Public Wastewater Treatment Facilities in the Region of Influence

Water System	Population Served	Total Design Flow (MGD)	Existing Total Flow (MGD)	Existing Flow as Percent of Design	Excess Capacity (MGD)
Calhoun County					
Lynn's Bayou WWTP[a]	13,000	2	1.27	63.5	0.73
City of Point Comfort WWTP[b]	–	0.2	0.042	21	0.158
City of Port Lavaca WWTP[b]	–	2	1.11	55.5	0.89
City of Seadrift WWTP[b]	–	0.3	0.05	16.67	0.25
Port O'Connor MUD WWTP[b]	–	0.6	0.15	25	0.45
Jackson County					
Edna WWTP[a]	6711	1	0.82	82	0.18
Lolita WWTP[a]	530	0.06	0.05	83.33	0.01
Vanderbilt WWTP[a]	320	0.57	0.5	87.72	0.07
Victoria County					
Bloomington WWTP[a]	2650	0.333	0.147	44.14	0.186
Willow Street WWTP[a]	10,000	2.5	1.34	53.6	1.16
Victoria Odem Street WWTP[c]	–	4.4	–	–	–
Victoria Regional WWTP[a]	50,000	9.6	6.9	71.88	2.7
La Ward WWTP[a]	140	0.013	0.005	38.46	0.008

Sources:
a) EPA, 2012
b) GBRA, 2021
c) City of Victoria, 2023

Abbreviations: MGD = millions of gallons per day; MUD = Municipal Utility District; WWTP = Wastewater Treatment Plant

Table 2.5-22: Law Enforcement in the Region of Influence

Geographic Area	Number of Law Enforcement Officers[a]	Officer to Resident Ratio[a][b]	Officers per 1000 Residents
Calhoun County	52	1:387	2.6
Jackson County	25	1:600	1.7
Victoria County	260	1:351	2.8
ROI	337	1:375	2.7
Texas	85,958	1:339	3.0

Sources:
a) FBI, 2019
b) USCB, 2020
Abbreviation: ROI = region of influence

Table 2.5-23: Fire Protection Services in the Region of Influence

Geographic Area	Number of Firefighters[a]	Ratio
Calhoun County		
Magnolia Beach Volunteer Fire Department	19	
Olivia-Port Alto Volunteer Fire Department, Inc.	20	
Port Lavaca Fire Department	27	
Thomaston Volunteer Fire Department	8	
Port O'Connor Volunteer Fire Department	20	
Seadrift Volunteer Fire Department	15	
Total	**109**	**1:184.5**
Jackson County		
Carancahua Community Volunteer Fire Department	12	
Jackson County Emergency Services District No. 3	35	
Ganado Volunteer Fire Department	26	
La Ward Volunteer Fire Department	15	
Total	**88**	**1:170.3**
Victoria County		
Victoria Fire Department	130	
DaCosta Volunteer Fire Department	18	
Lone Tree Volunteer Fire Department	10	
Quail Creek Volunteer Fire Department	12	
Raisin Volunteer Fire Department	25	
Bloomington Volunteer Fire Department	22	
Nursery Volunteer Fire Department, Inc.	14	
Placedo Volunteer Fire Department	6	
Fordtran Volunteer Fire Department, Inc.	19	
Total	**256**	**1:356.7**
ROI Total	**453**	**1:279.1**

Source: U.S. Fire Administration, 2023
Note:
a) Includes career, volunteer, and paid per call firefighters
Abbreviation: ROI = region of influence

Table 2.5-24: Hospitals in the Region of Influence

Facility	Number of Beds[a]	Ratio of Beds to Residents[a][b]
Calhoun County		1:804.2
Memorial Medical Center	25	
Jackson County		1:599.5
Jackson County Hospital	25	
Victoria County		1:124.4
Citizens Medical Center	338	
DeTar Hospital Navarro	304	
PAM Specialty Hospital of Victoria South	23	
PAM Specialty Hospital of Victoria North	46	
PAM Rehabilitation Hospital of Victoria	26	
ROI Total	**787**	**1:160.6**

Sources:
a) Texas Department of State Health Services, 2022b
b) USCB, 2020
Abbreviation: ROI = region of influence

Table 2.5-25: Physicians and Dentists in the Region of Influence

	Number of Physicians[a]	Ratio of Residents to Physicians[a][b]	Number of Dentists[b]	Ratio of Residents to Dentists[a][b]
Calhoun County	18	1117	5	4021.2
Jackson County	9	1665.3	3	4996
Victoria County	86	1061.8	41	2227.3
ROI	113	1118.7	49	2579.9

Sources:
a) Texas Health Data, 2022
b) USCB, 2020
Abbreviation: ROI = region of influence

Table 2.5-26: Schools and Student Enrollment in the Region of Influence

	Total # of Schools[a]	Student Enrollment[a]	Teachers (FTEs)[a][b]	Student to Teacher Ratio
Calhoun				
Calhoun County ISD	7	3576	272.7	13.1
Private Schools	-	-	-	-
Jackson				
Edna ISD	6	1559	116.6	13.4
Ganado ISD	3	738	61.3	12
Industrial ISD	3	906	77	11.8
Private Schools	1	20	3.4	5.9
Victoria				
Bloomington ISD	4	806	65.5	12.3
Industrial ISD	1	252	21	12
Nursery ISD	1	136	13	10.5
Victoria ISD	27	13,119	851.5	15.4
Private Schools	10	1894	151	12.5
ROI				
Public School	52	21,092	1478.6	14.3
Private School	11	1914	154.4	12.4
Texas				
Public	9284	5,407,200	367472	14.7
Private Schools	1241	184,531	20,910.60	8.8

Source: NCES, 2023b

Notes:

a) Information from the 2019-2020 and 2021-2020 Private School Years and 2022-2023 Public School Years

b) Part-time workers are reported as a fraction of one full-time worker

Abbreviation: FTE = Full-Time Equivalent Employee; ISD = Independent School District; ROI = region of influence

Table 2.5-27: Population Enrolled in Schools in the Region of Influence

	Calhoun County	Jackson County	Victoria County	ROI	Texas
	Number of Individuals	**Number of Individuals**	**Number of Individuals**	**Number of Individuals**	**Number of Individuals**
Nursery School, Preschool	175	376	1074	1625	435,637
Kindergarten	338	229	1245	1812	413,772
Grade 1 to grade 4	1066	715	5033	6814	1,635,589
Grade 5 to grade 8	975	981	6100	8056	1,713,746
Grade 9 to grade 12	1223	873	4672	6768	1,692,163
College, undergraduate years	623	394	3531	4548	1,506,511
Graduate or professional school	64	65	689	818	355,225
Total	**4464**	**3633**	**22,344**	**30,441**	**7,752,643**
Source: USCB, 2021 Abbreviation: ROI = region of influence					

Table 2.5-28: Educational Attainment within the Region of Influence

	Calhoun County		Jackson County		Victoria County		ROI		Texas	
	Number of Individuals	% of Total	Number of Individuals	% of Total	Number of Individuals	% of Total	Number of Individuals	% of Total	Number of Individuals	% of Total
Level of Schooling										
High school graduate (includes equivalency)	4401	32.30%	3289	33.10%	18,268	30.60%	25,958	31.20%	4,563,619	24.50%
Some college, no degree	3249	23.80%	2460	24.70%	14,070	23.60%	19,779	23.80%	3,956,030	21.20%
Associate's degree	1290	9.50%	728	7.30%	6027	10.10%	8045	9.70%	1,402,444	7.50%
Bachelor's degree	1695	12.40%	1185	11.90%	8114	13.60%	10,994	13.20%	3,791,665	20.40%
Graduate or professional degree	681	5.00%	356	3.60%	3437	5.80%	4474	5.40%	2,079,530	11.20%
Population 25 years or older	13,633		9951		59,682				18,619,469	

Source: USCB, 2021
Abbreviation: ROI = region of influence

Table 2.5-29: Aboveground Historic Resources in the Architectural Survey Area and National Register of Historic Places Determinations

Resource Number	Address	Style/Form	NRHP Status	Determination of Effect
AR 1	7501 TX-185, Calhoun County, TX	Mid-20th Century Industrial Complex	Not eligible due to a loss of integrity.	No Historic Property Affected
AR 2	NE of TX-185, Port Lavaca, TX	Industrial Ruins	Not eligible due to a lack of historic and architectural significance.	No Historic Property Affected
AR 3	NE of TX-185, Port Lavaca, TX	20th Century Utility Structures	Not eligible due to a lack of historic and architectural significance.	No Historic Property Affected
AR 4	Jesse Rigby Rd, Port Lavaca, TX	20th Century Agricultural Outbuildings	Not eligible due to a lack of historic and architectural significance.	No Historic Property Affected
AR 5	11525 TX-35, Port Lavaca, TX	Ranch	Not eligible due to a lack of historic and architectural significance.	No Historic Property Affected
AR 6	10622 TX-35, Port Lavaca, TX	Transitional Ranch	Not eligible due to a lack of historic and architectural significance.	No Historic Property Affected
AR 7	10548 TX-35, Port Lavaca, TX	20th Century Residential Outbuilding	Not eligible due to a lack of historic and architectural significance.	No Historic Property Affected
AR 8	10237 TX-35, Port Lavaca, TX	Ranch	Not eligible due to a lack of historic and architectural significance.	No Historic Property Affected
AR 9	10211 TX-35, Port Lavaca, TX	20th Century Vernacular	Not eligible due to a lack of historic and architectural significance.	No Historic Property Affected
AR 10	10254 TX-35, Port Lavaca, TX	Mid-20th Century Cotton Gin Facility	Not eligible due to a lack of integrity.	No Historic Property Affected

Abbreviation: NRHP = National Register of Historic Places; TX = Texas

Table 2.5-30: Census Block Groups by Environmental Justice Status within the Long Mott Generating Station Region

County	Total Number of CBGs	Number of CBGs with Potentially Affected Minority Populations								Number of CBGs with Potentially Affected Low-Income Population
		Black or African American	American Indian or Native Alaskan	Asian	Native Hawaiian or Other Pacific Islander	Some Other Race	Hispanic or Latino	Multiracial	Aggregate	
Aransas	25	0	0	0	0	0	1	0	4	7
Bee	3	0	0	0	0	0	3	0	3	0
Calhoun	***19***	***0***	***0***	***1***	***0***	***0***	***8***	***0***	***10***	***2***
Colorado	1	0	0	0	0	0	0	0	0	0
DeWitt	10	0	0	0	0	0	1	0	3	0
Goliad	7	0	0	0	0	0	1	0	3	1
Jackson	***11***	***1***	***0***	***0***	***0***	***0***	***0***	***0***	***4***	***1***
Lavaca	3	0	0	0	0	0	0	0	0	0
Matagorda	11	0	0	0	0	0	5	0	6	1
Nueces	3	0	0	0	0	0	0	0	0	0
Refugio	8	0	0	0	0	0	5	0	6	1
San Patricio	13	0	0	0	0	0	3	0	5	1
Victoria	***71***	***0***	***0***	***0***	***0***	***0***	***33***	***0***	***46***	***10***
Wharton	4	0	0	0	0	0	0	0	0	0
50-mile Region Total	**189**	**1**	**0**	**1**	**0**	**0**	**60**	**0**	**90**	**24**

Sources: USCB, 2020; USCB, 2021
Note: Shaded and italicized rows indicate counties within the ROI
Abbreviations: CBG = Census Block Group; ROI = region of influence

Table 2.5-31: Stakeholders and Community Organizations Regularly Engaging with Dow

Organization Name	Geography Served	Description of Organization
Business-Related Organizations		
Seadrift Chamber of Commerce	City of Seadrift	A member-driven, nonprofit organization supporting the City of Seadrift; a local business advocate that is focused on developing services to enhance the business climate in our community and establish Seadrift and Calhoun County as an economic leader on the Gulf Coast.
Victoria Chamber of Commerce	City of Victoria	A nonprofit business membership organization comprised of over 1000 businesses and professionals in the Victoria area dedicated to supporting a favorable business climate and enhancing the quality of life in the area.
Victoria Economic Development Corporation	Calhoun and Victoria Counties	A nonprofit business centric organization who seeks investment and job creation/retention; also serves as a governmental partner in efforts to upskill the minority workforce of the region.
Education-Related Organizations		
Calhoun County ISD Education Foundation	Calhoun County	Supports the educational programs for both students and staff in Calhoun County Independent School District by providing funds for activities that could otherwise not be funded by the school district’s regular operating budget. These funds are used to encourage student achievement and skill development, to recognize and encourage staff excellence and to expand the involvement of the surrounding communities.
Crossroads Business and Education Connection	Golden Crescent Region[a]	A nonprofit organization with a mission to bring business and community members together to help students prepare for the workforce, higher education, or training.
Victoria College	Golden Crescent Region[a]	Community college located in Victoria that serves as the catalyst for educational attainment, economic growth, and cultural enrichment in partnership with business, industry, community groups, and all levels of education.
Environmental Organizations		
San Antonio Bay Partnership	San Antonio Bay Watershed (Aransas, Calhoun, Refugio, and Victoria Counties)	A regional nonprofit environmental organization that creates and sustains a working partnership of committed stakeholders in order to protect, restore and enhance the natural resources of the San Antonio Bay System for the benefit of the ecosystem and its human uses.
Social Justice Organizations		
Christ’s Kitchen	City of Victoria	A nonprofit community service that provides meals to low-income populations in the Victoria region.
Habitat of Golden Crescent	Golden Crescent Region[a]	A nonprofit social justice organization whose new home construction program builds safe, affordable homes in partnership with low-income families and the local community.
United Way of Calhoun County	Calhoun County	A nonprofit social justice organization that fights for the health, education, and financial stability of every person in the Calhoun County community. Together with partner agencies, they provide funding for programs and initiatives throughout the Crossroads area to provide essential services for Calhoun County residents.
United Way of the Crossroads	DeWitt, Goliad, Lavaca and Victoria Counties and the City of Gonzales	A nonprofit social justice organization whose primary goal is to work for the betterment of the community, focusing on education, financial stability, and health.
Senior Services Organizations		
Hospice of South Texas	Golden Crescent Region[a]	A nonprofit hospice organization that enables people to regain who they are beyond their illness by helping control symptoms, providing practical support, and empowering control.

Note:

a) The Golden Crescent Region represents a seven-county area in the Mid-Texas Coast consisting of Calhoun, DeWitt, Goliad, Gonzales, Jackson, Lavaca, and Victoria Counties

Figures

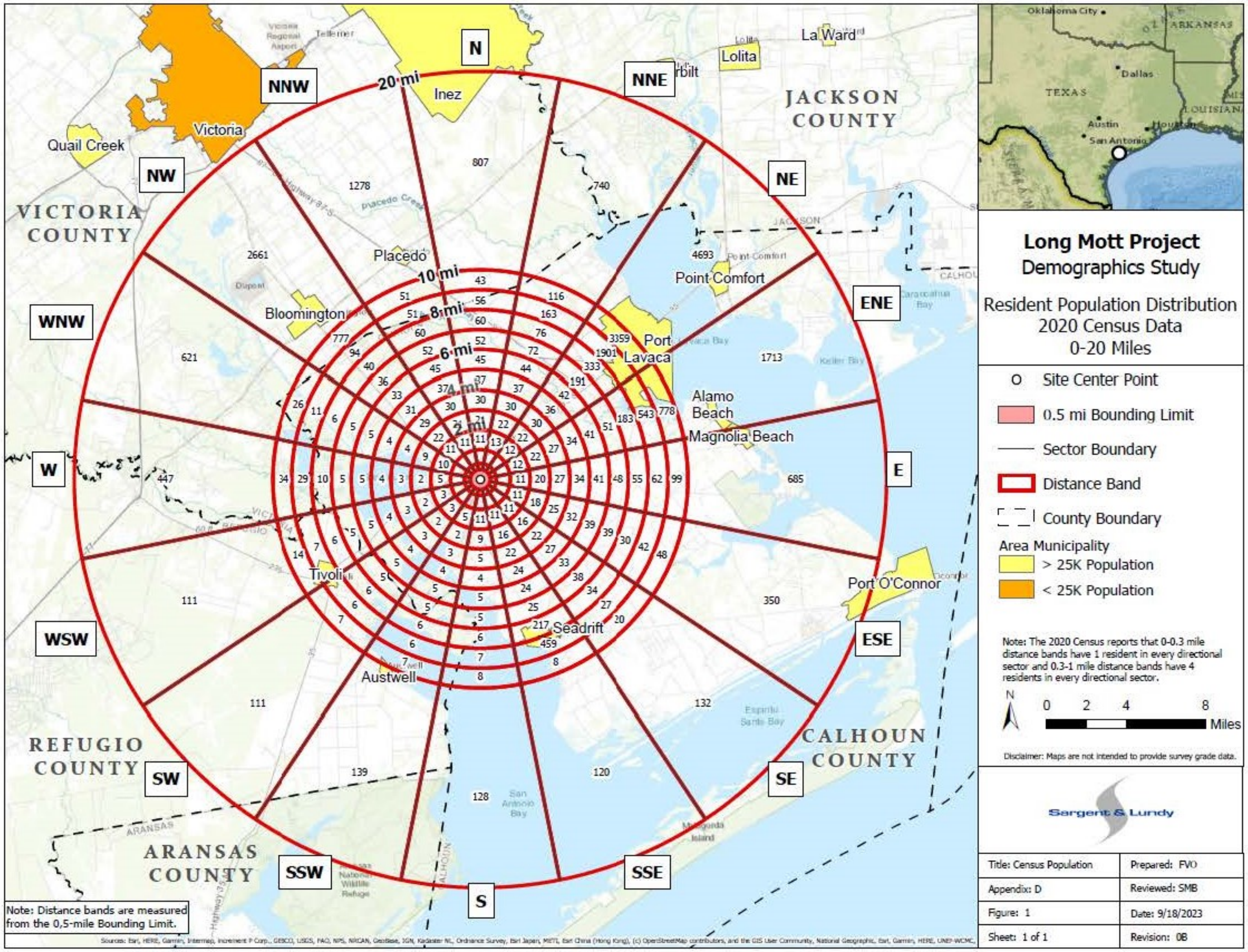


Figure 2.5-1: Population by Sector (0-20 Mi.)

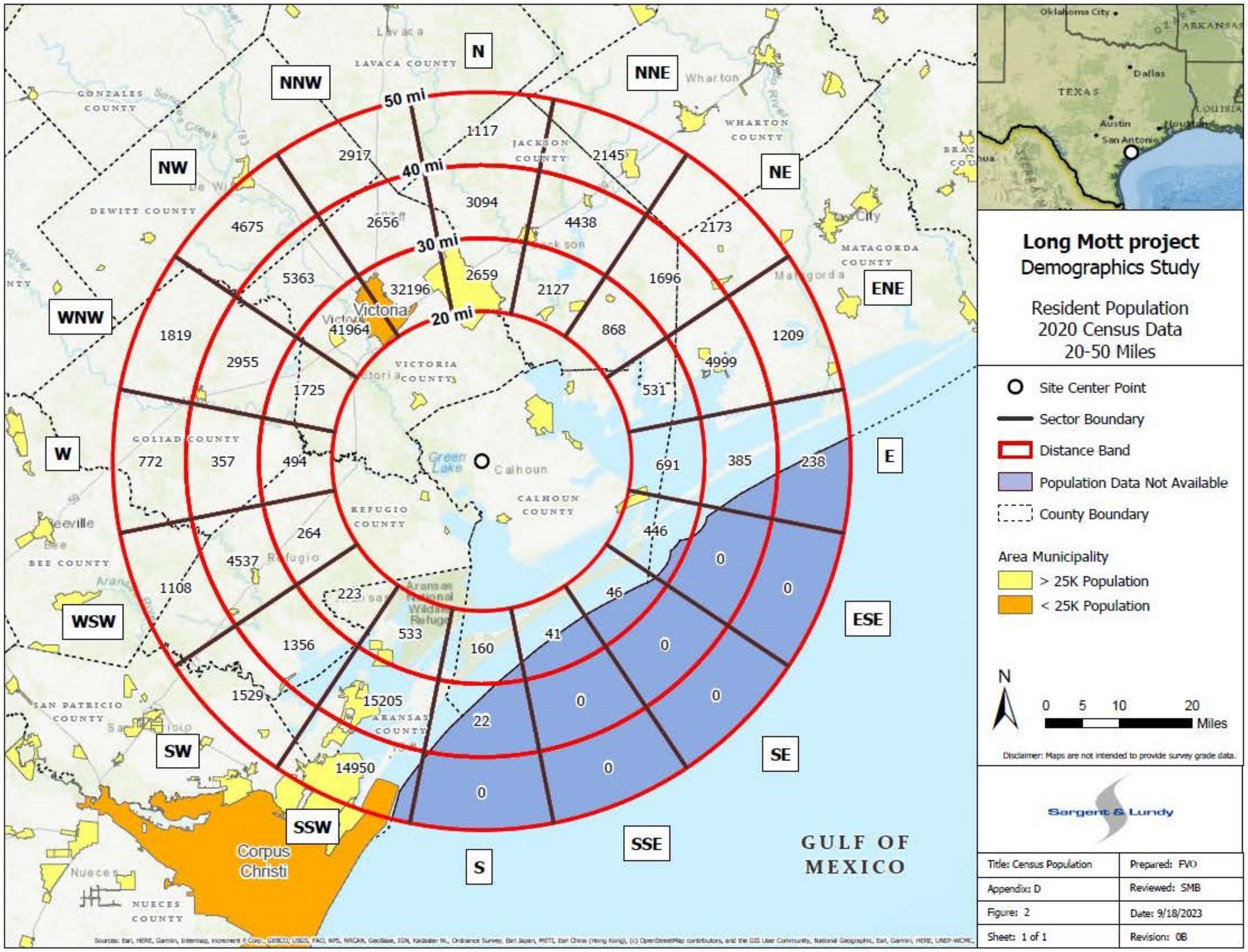


Figure 2.5-2: Population by Sector (20-50 Mi.)

Figure 2.5-3: Roadway Network in the Long Mott Generating Station Region

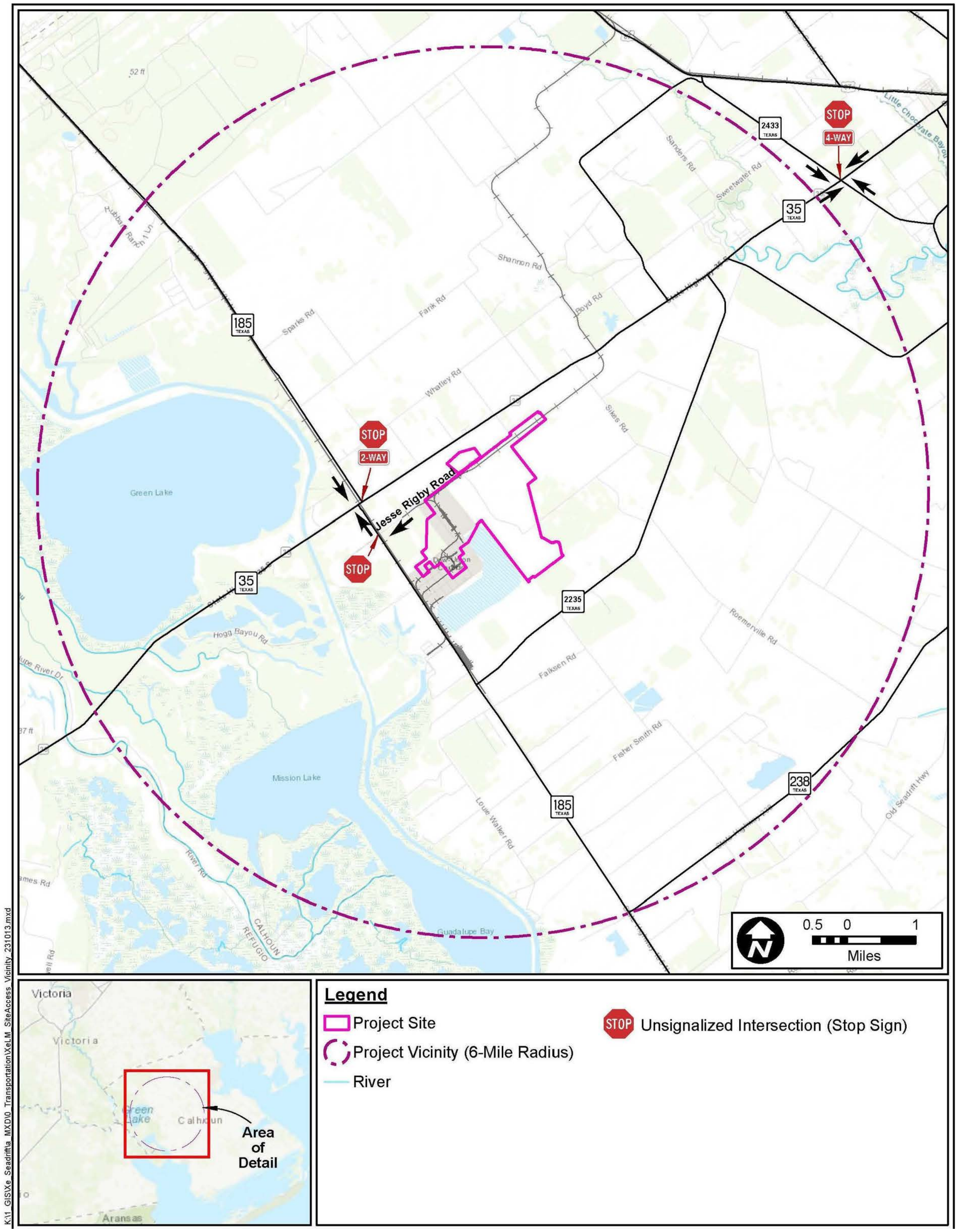


Figure 2.5-4: Primary Roadways in the Long Mott Generating Station Vicinity

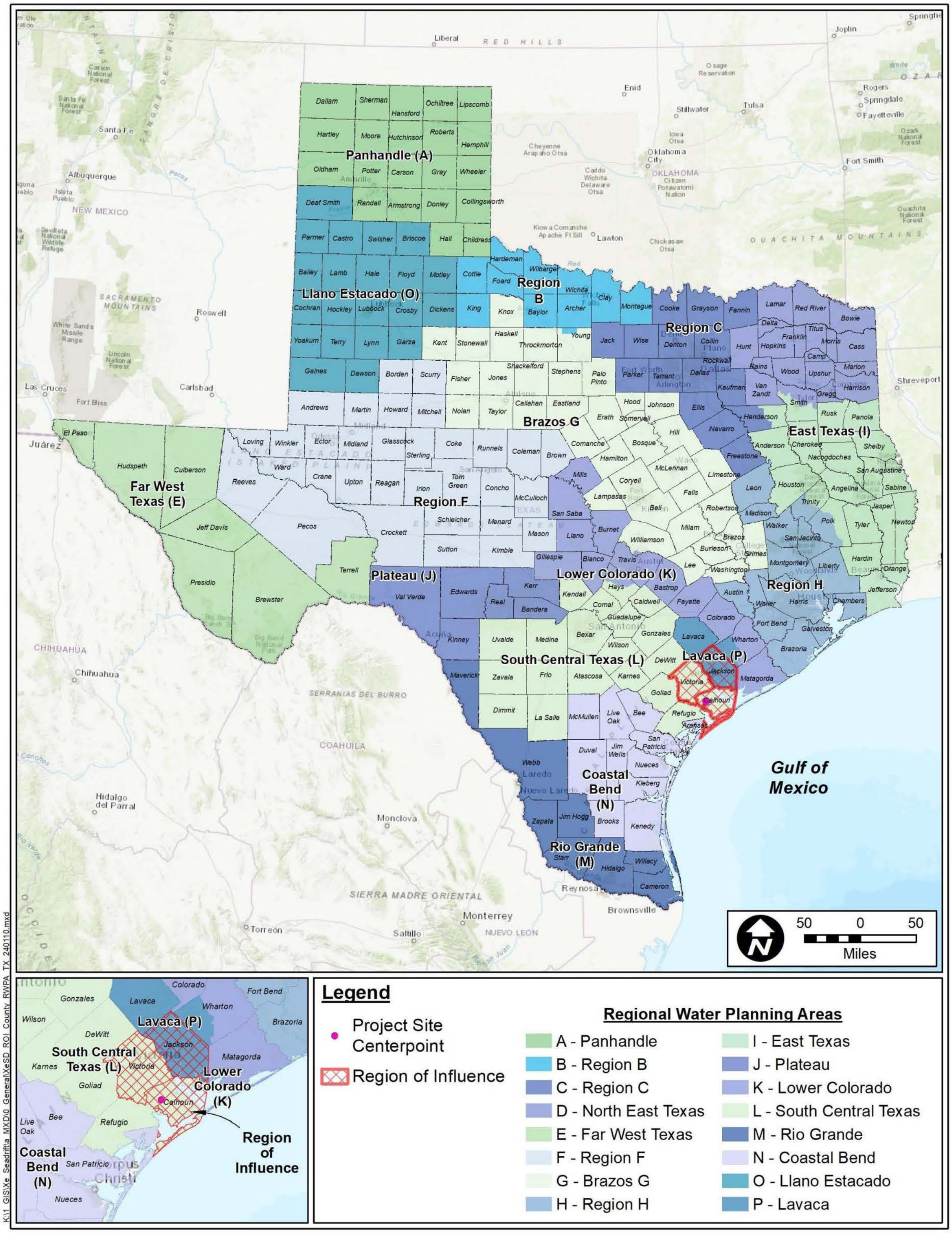


Figure 2.5-5: Texas Water Development Board Planning Districts

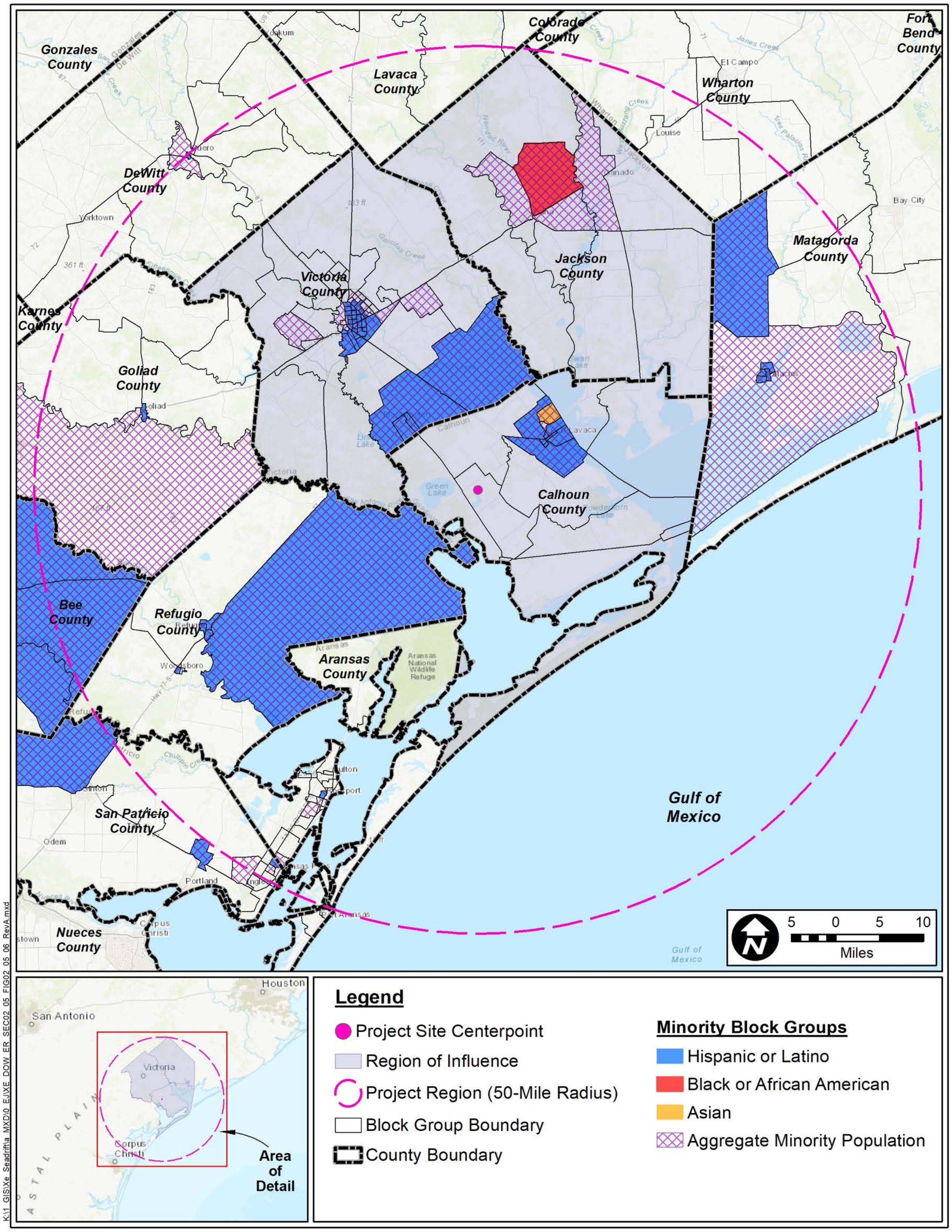


Figure 2.5-6: Minority Populations within the Long Mott Generating Station Region

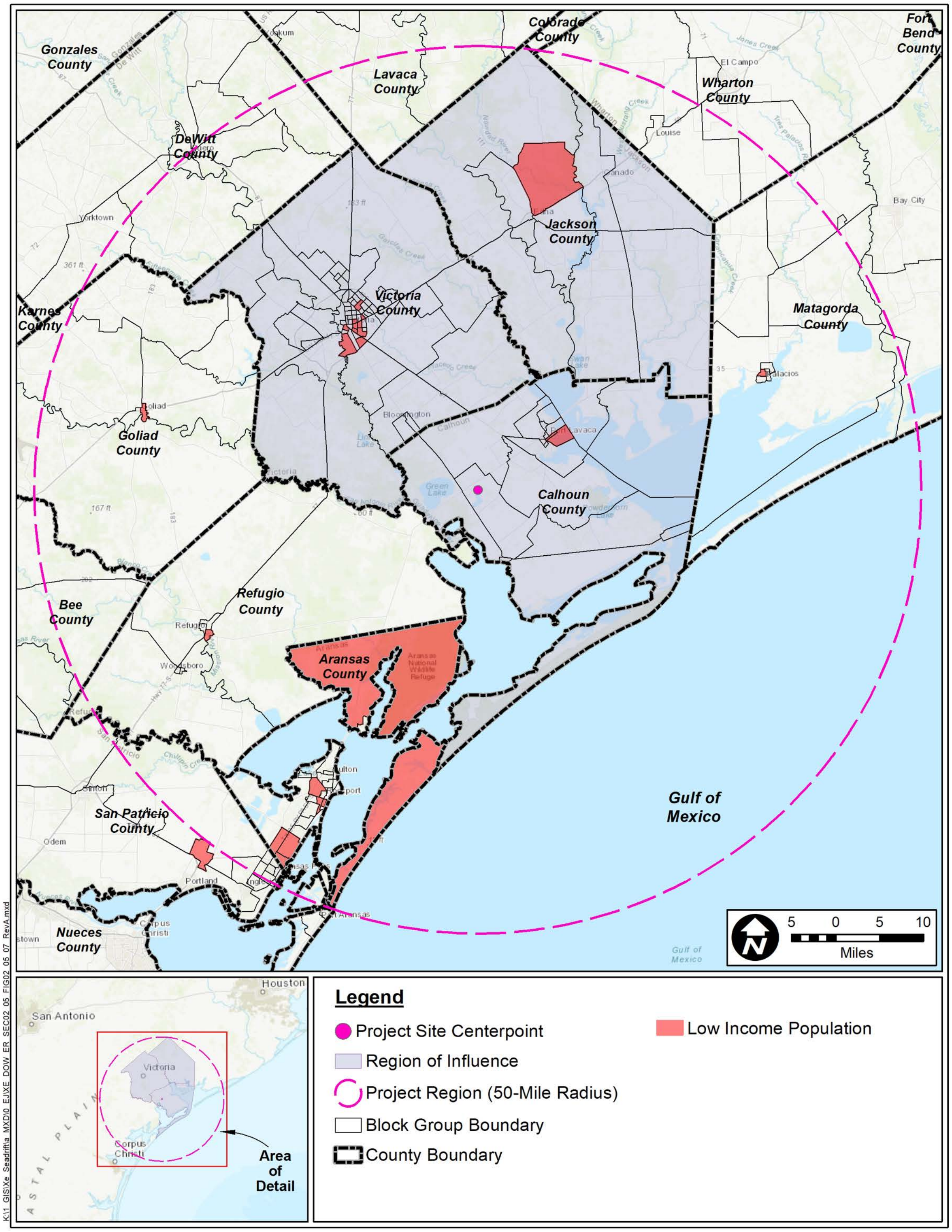


Figure 2.5-7: Low-Income Populations in the Long Mott Generating Station Region

2.6 Geology

The geological conditions at the LMGS site are summarized in this section. Section 2.6.1 provides information about physiography, Section 2.6.2 provides information about stratigraphy and hydrogeology, and Section 2.6.3 provides information about structural geology. Section 2.5 of the PSAR presents detailed geological and geotechnical site evaluations.

2.6.1 Physiography

The LMGS site lies within the Coastal Prairies subprovince of the Gulf Coastal Plains physiographic province, as shown in Figure 2.6-1. The subprovince is composed of geologically young formations generally consisting of unconsolidated deltaic sands, silts, and clays sloping to the southeast that are incised by meandering streams discharging into the Gulf of Mexico (TBEG, 1996). The geologic and tectonic setting of the region is the product of historic continental collisions and rifting followed by the deposition of sediments in the Gulf of Mexico basin during the Mesozoic era (Chowdhury and Turco, 2006). Topography in the subprovince is characteristic of the Gulf Coastal Plains with gently rolling terrain. The LMGS site is relatively flat with the mean ground elevation at approximately 28 ft NAVD 88.

The natural drainage flow paths of the site and surrounding areas have been modified through the ongoing agricultural field improvements, existing levees, roadways, railroads, and industrial developments. The LMGS site is drained by several channelized streams that flow intermittently and form a dendritic drainage pattern. In addition, several man-made drainage ditches from neighboring agricultural and industrial activities are also present at the LMGS site. The longest stream at the LMGS site is West Coloma Creek. This stream enters the LMGS site near the northwestern edge and extends southeast through the center of the LMGS site. West Coloma Creek meets East Coloma Creek to form Coloma Creek approximately 8 mi (12.9 km) south of the LMGS site. Coloma Creek discharges into Powderhorn Lake approximately 11 mi (17.7 km) downstream towards the southeast. Powderhorn Lake discharges into Matagorda Bay via Powderhorn Bayou (Figure 2.6-2).

2.6.2 Stratigraphy And Hydrogeology

2.6.2.1 Regional Stratigraphy and Hydrogeology

Regional stratigraphy consists of Paleozoic basement rock overlain by Mesozoic age sedimentary rock units, which are in turn overlain by Cenozoic age well to poorly lithified sediments (Hentz, 1952). These sediments were deposited under fluvial-deltaic to shallow-marine environments during the Miocene to the Pleistocene periods. Repeated sea-level changes and natural basin subsidence produced cyclic sedimentary deposits composed of discontinuous beds of sand, silt, clay, and gravel (Chowdhury and Turco, 2006). Subsidence of the basin and rising of the land surface in the west caused the stratigraphic units to thicken to the east. This massive thickness of sediments forms a homocline that slopes gently towards the Gulf of Mexico; therefore, progressively younger sediments outcrop towards the Gulf Coast. A limited stratigraphic column of the Gulf Coastal Plain of Texas is provided as Figure 2.6-3.

Aquifers of the Gulf Coast Region are represented in large lenses of sand interbedded within clay deposits forming the Gulf Coast Sedimentary Basin. On a regional scale, the aquifers are hydraulically connected and act as a single aquifer called the Gulf Coast Aquifer. On a localized scale (county-wide) differences in lithology and hydraulic characteristics, such as transmissivity, separate the Gulf Coast Aquifer into distinct aquifers, from shallowest to deepest: the Chicot, Evangeline, and Jasper. Groundwater flow in these aquifers is further complicated by numerous clay lenses (some less than 6 ft thick [1.8 m]) contained within the water-bearing units of the sand beds that retard vertical movement locally and may provide different hydraulic heads to each sand bed (Chowdhury and Turco, 2006).

2.6.2.2 Vicinity Stratigraphy and Hydrogeology

Within the LMGS site and vicinity, some of the major Pleistocene age sedimentary deposits are the Beaumont and Lissie formations. Both formations consist of thick sequences of fluvial-deltaic sediments deposited as a wide belt generally trending northeast parallel to and dipping gently toward the Gulf Coast. The fluvial-deltaic sediments consist of alternating sequences of unconsolidated to partially consolidated silt, clay, and sand (Chowdhury and Turco, 2006). A major source of groundwater in the vicinity is the Chicot Aquifer. The Chicot Aquifer consists of multiple formations present in the vicinity, including, from shallowest to deepest: Holocene and Pleistocene alluvium, the Beaumont Formation, the Lissie Formation, and the Willis Sand (Figure 2.6-3 and Figure 2.6-4). Near the coastline, the bottom of the Chicot Aquifer lies at an elevation of -1200 ft (365.8 m) (Chowdhury and Turco, 2006).

The Holocene deposits fill, in part, the Pleistocene Guadalupe River Valley incised into the Beaumont Formation during the last period of sea level regression. Groundwater flow in the Holocene sand deposits is strongly influenced by surface water bodies and tides in lowland areas (Jacobs, 2022). Holocene deposits locally outcrop at the Guadalupe River Valley south of the LMGS site (Barnes, 1987).

Below the Holocene and Pleistocene alluvium, the Beaumont Formation is recognized as a series of multiple, cross-cutting and/or superimposed incised stream channel fills and over-bank deposits formed during repeated sea-level changes (Chowdhury and Turco, 2006). The Beaumont Formation is composed of poorly bedded, marly, reddish-brown clay interbedded with lenses of sand, gypsum, and occasionally caliche. The thickness of the Beaumont Formation varies from 0 to 1500 ft (0 to 457.2 m) (Wood, Gabrysch, and Marvin, 1963). The Beaumont formation is locally water-bearing and outcrops at the LMGS site (Baker, 1979). As discussed in Section 2.6.2.1, groundwater flow in the Chicot Aquifer is further complicated by numerous clay lenses (some less than 6 ft thick [1.8 m]) contained within the water-bearing units of the sand beds that retard vertical movement locally and may provide different hydraulic heads to each sand bed. Previous investigations have identified 11 localized stratigraphic units within the upper approximately 70 ft (21.3 m) of the Beaumont Formation underlying the LMGS vicinity. A generalized cross section and stratigraphic column depicting the area to the west and adjacent to the LMGS site are provided as Figure 2.6-5 and Figure 2.6-6, respectively. The strata in Figure 2.6-6 are sequentially numbered from youngest to oldest (I through XI), and sand units are referred to by their letter designations assigned in previous reports: the “D”, “A”, “B”, “C”, and “E” Sands, respectively. The “A,” “B,” “C,” and “E” Sands belong to the Beaumont Formation, while the “D” Sand is part of the Holocene deposits that outcrop at the Guadalupe River Valley south of the LMGS site (Jacobs, 2022). Due to the cross-cutting and discontinuity of the beds in the Beaumont formation, the thickness of these stratigraphic units is variable and are not always laterally extensive (Chowdhury and Turco, 2006).

The Lissie Formation is uncomformably contained between the underlying Willis Sand and the overlying Beaumont Formation. It can be further broken down to the Bentley and Montgomery formations, although heterogeneity of the sediments and discontinuity of the beds in the subsurface often make correlation difficult. Lissie Formation sediments consist of reddish, orange, and gray fine- to coarse-grained, cross bedded sands interbedded with sandy clay, clay, and gravel. Caliche deposits several feet thick are common in the outcrop area and often mark the base of the formation (Chowdhury and Turco, 2006). The Lissie Formation ranges in thickness from 0 to 1600 ft (0 to 487.7 m) and some sand beds are more than 80 ft thick (24.4 m) (Wood, Gabrysch, and Marvin, 1963).

The Willis Sand Formation underlies the Lissie Formation. It is locally extensive in the region but outcrops over a small geographic area. The Willis Sand Formation is a sequence of unfossiliferous sand and reddish, gravelly sand beds with subordinate clays (Chowdhury and Turco, 2006). The Willis Sand Formation ranges in thickness from 0 to 400 ft (0 to 121.9 m) (Wood, Gabrysch, and Marvin, 1963).

2.6.2.3 Site Stratigraphy and Hydrogeology

The stratigraphy and hydrogeology at the LMGS site are similar to those described for the vicinity in Section 2.6.2.2. Subsurface investigations of the LMGS site consisted of geotechnical borings in support of facility design and installation of groundwater wells as part of the hydrogeologic investigation. As described in Section 2.3.2, six well clusters with up to three wells per cluster were installed along the perimeter of the LMGS site. Detailed information regarding the stratigraphy of the LMGS site is provided in PSAR Sectioin 2.5.1.

2.6.3 Structural Geology

The oldest rocks exposed above ground in Texas are found at the Llano Uplift in central Texas, in the Franklin Mountains, and the West Texas Uplifts in western part of the state. However, the Precambrian rocks and their geological deformation in these regions are not well understood due to limited exposure. The boundary between oceanic and continental crust is thought to be beneath the current Texas continental shelf or slope, though its precise location remains uncertain (Hentz, 1952).

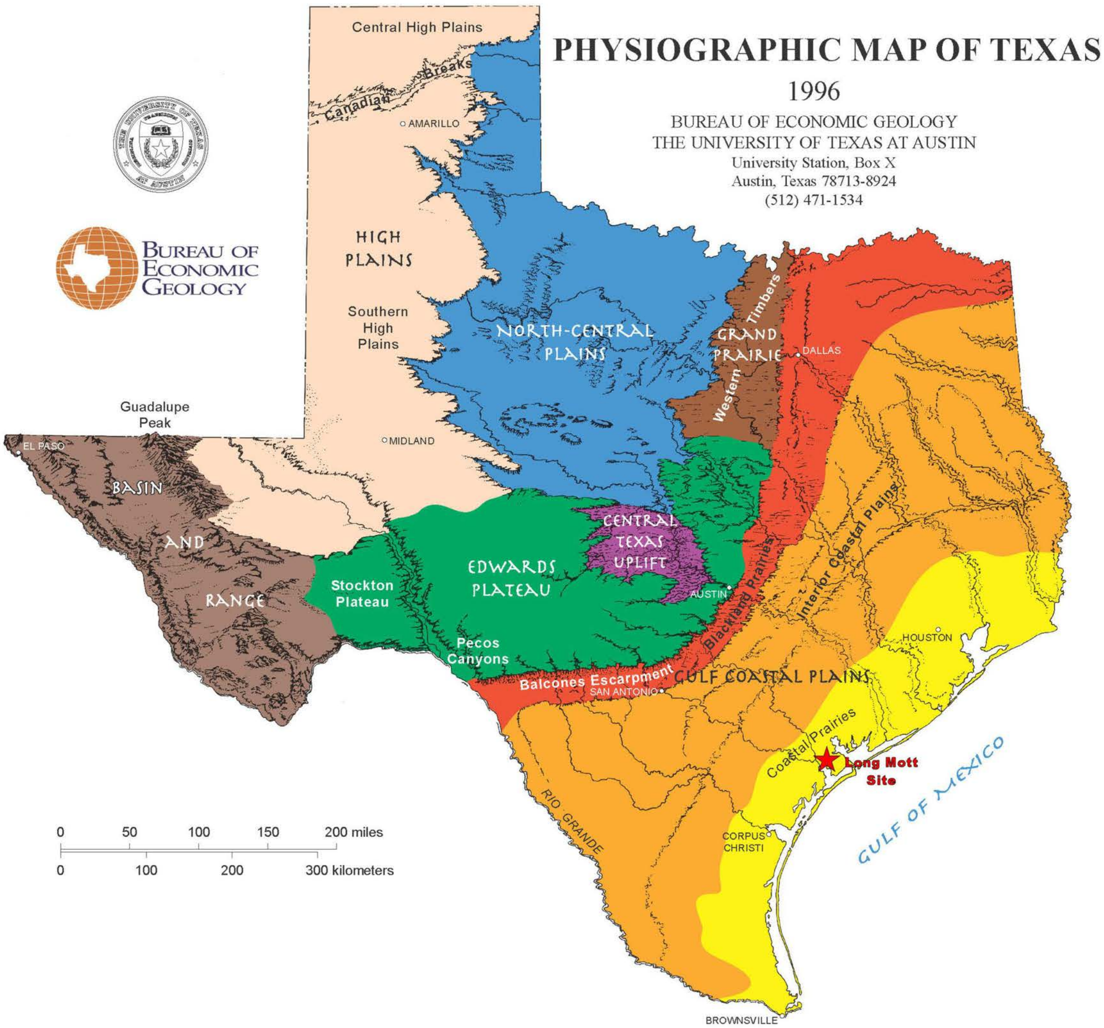
Local structures that rim the Gulf Coast Basin are primarily formed by gravity acting on thick sedimentary sections deposited on abnormally pressured shale or salt that sole out above the basement to produce salt-flow structures and growth faults (large, curved faults that form during sediment accumulation and continue to grow with increasing depth of burial) (Chowdhury and Turco, 2006 and Hentz, 1952). Growth faults in the Gulf Coast Aquifer are northeast-southwest trending, occurring parallel to the coastline (Figure 2.6-7). They have an extensional component and are often referred to as listric-normal faults. Growth faults in the Gulf Coast Aquifer are rooted in the deeper subsurface at depths of 3200 to 13,000 ft (975.4 m to 3962.4 m). They may be caused by a number of processes, including a buoyant rise of salt or shale, differential sediment loading and compaction, and free gravity gliding (Chowdhury and Turco, 2006).

Previous investigations have identified the presence of growth faults in the subsurface underlying the LMGS region and vicinity as shown in Figure 2.6-8 (Exelon Generation, 2012b). Further discussion regarding the geologic conditions within the LMGS site and vicinity can be found in Section 2.5 of the PSAR.

Tables

None

Figures



Source: TBEG, 1996. Physiographic Map of Texas, Texas Bureau of Economic Geology, University of Texas, 1996.

PROVINCE	MAX. ELEV. (ft)	MIN. ELEV. (ft)	TOPOGRAPHY	GEOLOGIC STRUCTURE	BEDROCK TYPES
Gulf Coastal Plains					
Coastal Prairies	300	0	Nearly flat prairie, <1 ft/mi to Gulf	Nearly flat strata	Deltaic sands and muds
Interior Coastal Plains	800	300	Parallel ridges (questas) and valleys	Beds tilted toward Gulf	Unconsolidated sands and muds
Blackland Prairies	1000	450	Low rolling terrain	Beds tilted south and east	Chalks and marls
Grand Prairie	1250	450	Low stairstep hills west; plains east	Strata dip east	Calcareous east; sandy west
Edwards Plateau					
Principal	3000	450	Flat upper surface with box canyons	Beds dip south; normal faulted	Limestones and dolomites
Pecos Canyons	2000	1200	Steep-walled canyons		Limestones and dolomites
Stockton Plateau	4200	1700	Mesa-formed terrain; highs to west	Unfaulted, near-horizontal beds	Carbonates and alluvial sediments
Central Texas Uplift	2000	800	Knobby plain; surrounded by questas	Centripetal dips, strongly faulted	Granites; metamorphics; sediments
North-Central Plains	3000	900	Low north-south ridges (questas)	West dip; minor faults	Limestones; sandstones; shales
High Plains					
Central	4750	2900	Flat prairies slope east and south	Slight dips east and south	Eolian silts and fine sands
Canadian Breaks	3800	2350	Highly dissected; local solution valleys		
Southern	3800	2200	Flat; many playas; local dune fields		
Basin and Range	8750	1700	North-south mountains and basins	Some complex folding and faulting	Igneous; metamorphics; sediments

Figure 2.6-1: Physiographic Map of Texas

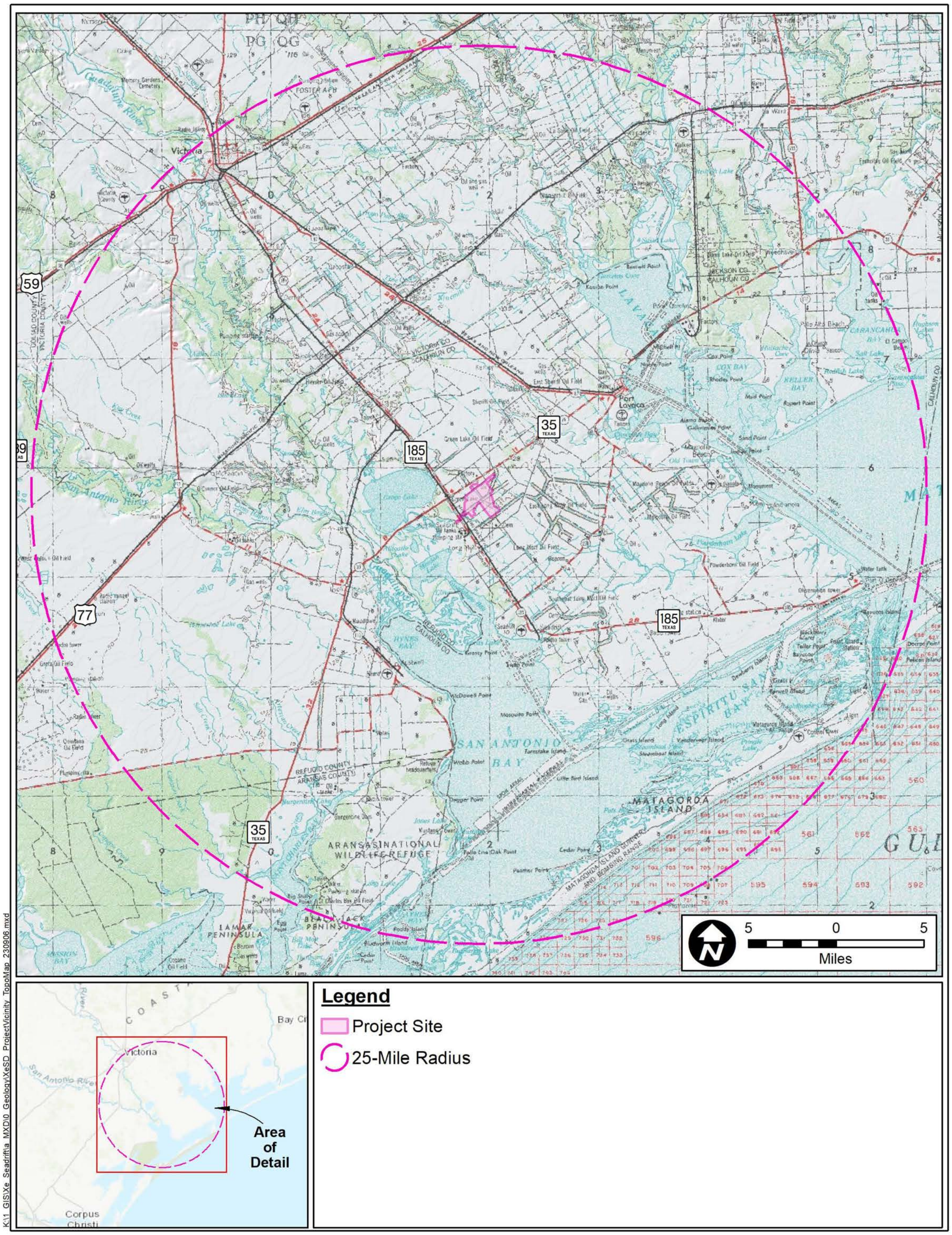
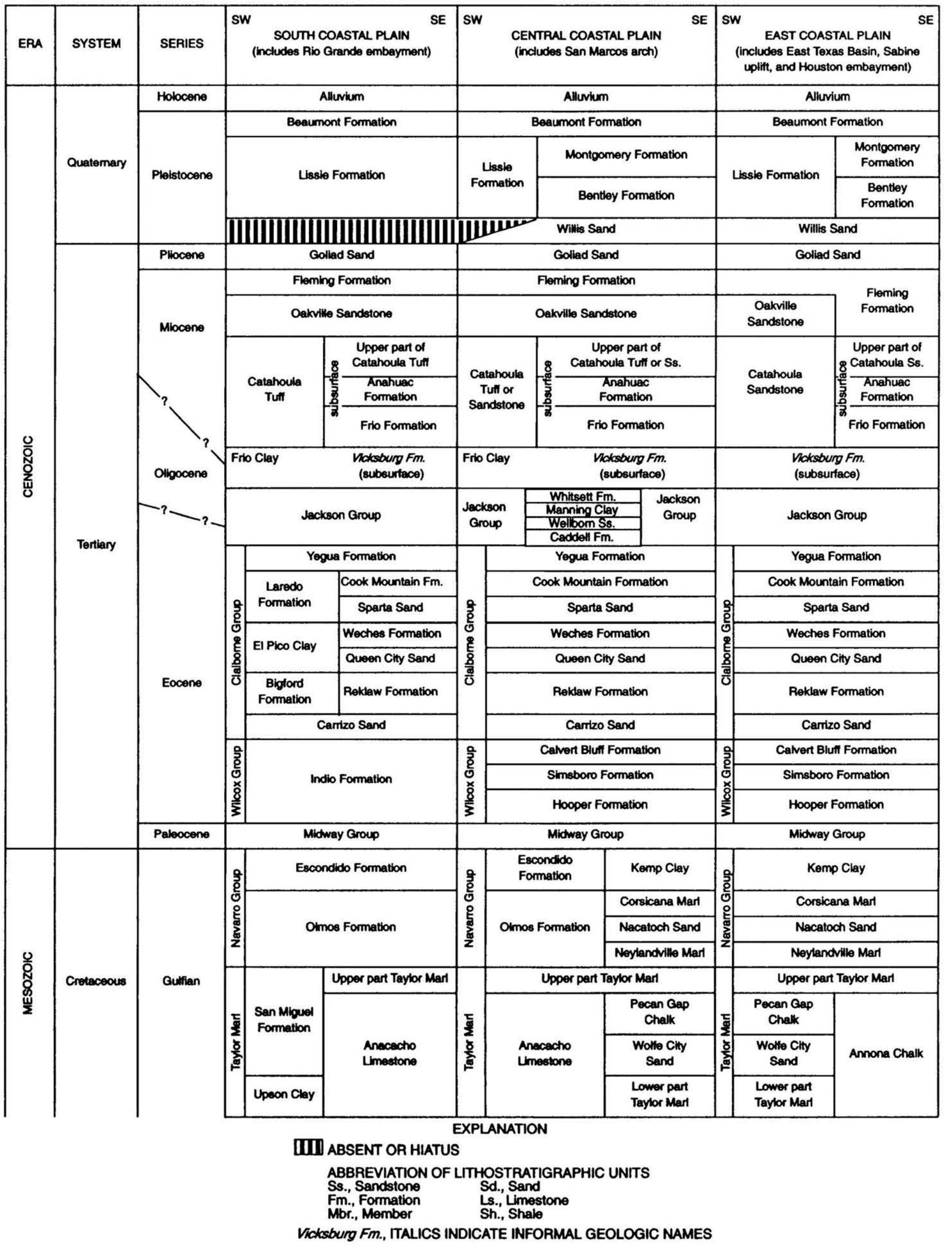
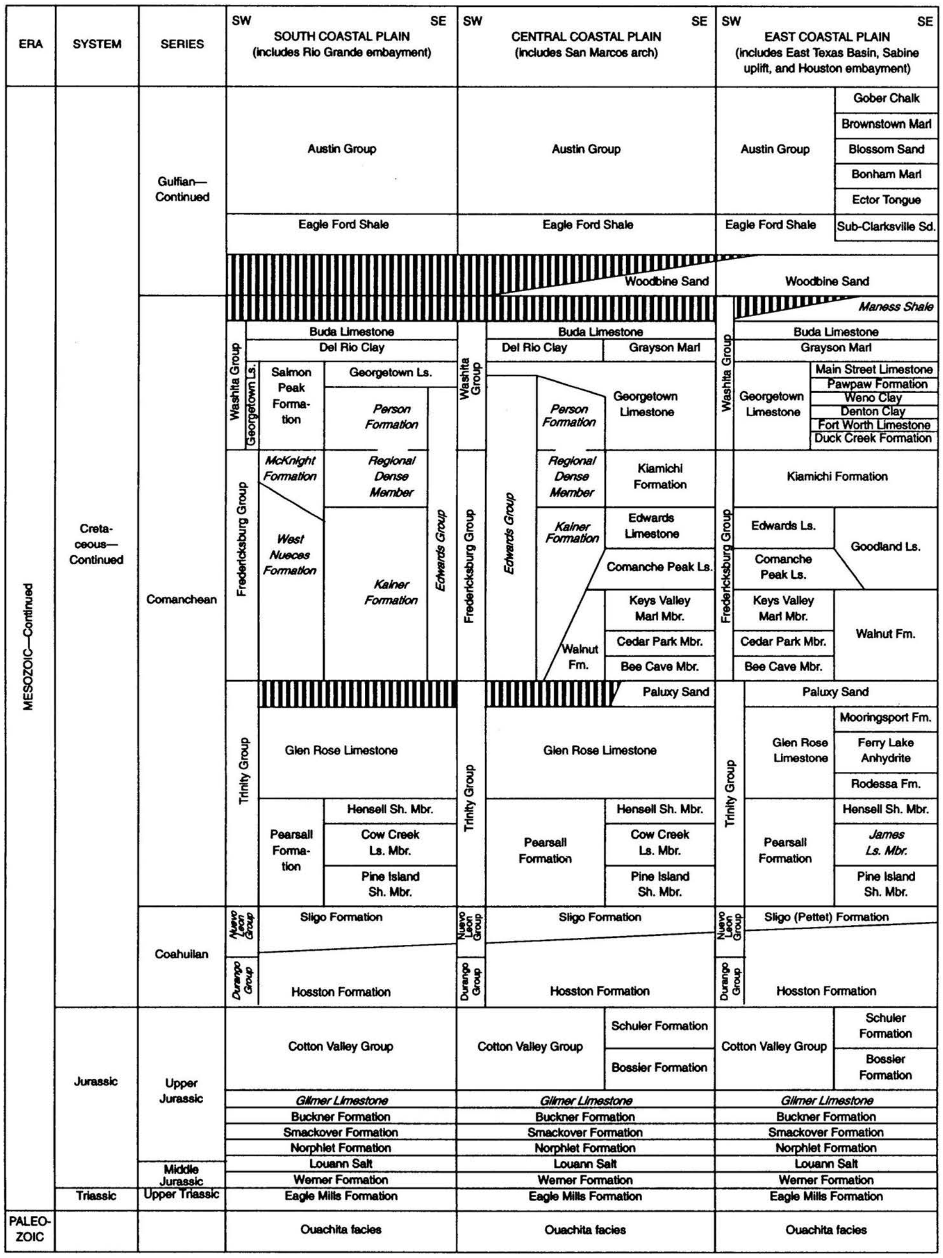


Figure 2.6-2: Topographic Map (25 Mi. Radius)



Source: Baker, E.T. Jr., 1995, Stratigraphic Nomenclature and Geologic Sections of the Gulf Coastal Plain of Texas, U.S. Geological Survey Open-File Report 94-461, 1995.



Stratigraphic Nomenclature and Geologic Sections of the Gulf Coastal Plain of Texas

Source: Baker, E.T. Jr., 1995, Stratigraphic Nomenclature and Geologic Sections of the Gulf Coastal Plain of Texas, U.S. Geological Survey Open-File Report 94-461, 1995.

Figure 2.6-3: Generalized Stratigraphic Column of the Gulf Coastal Plain of Texas

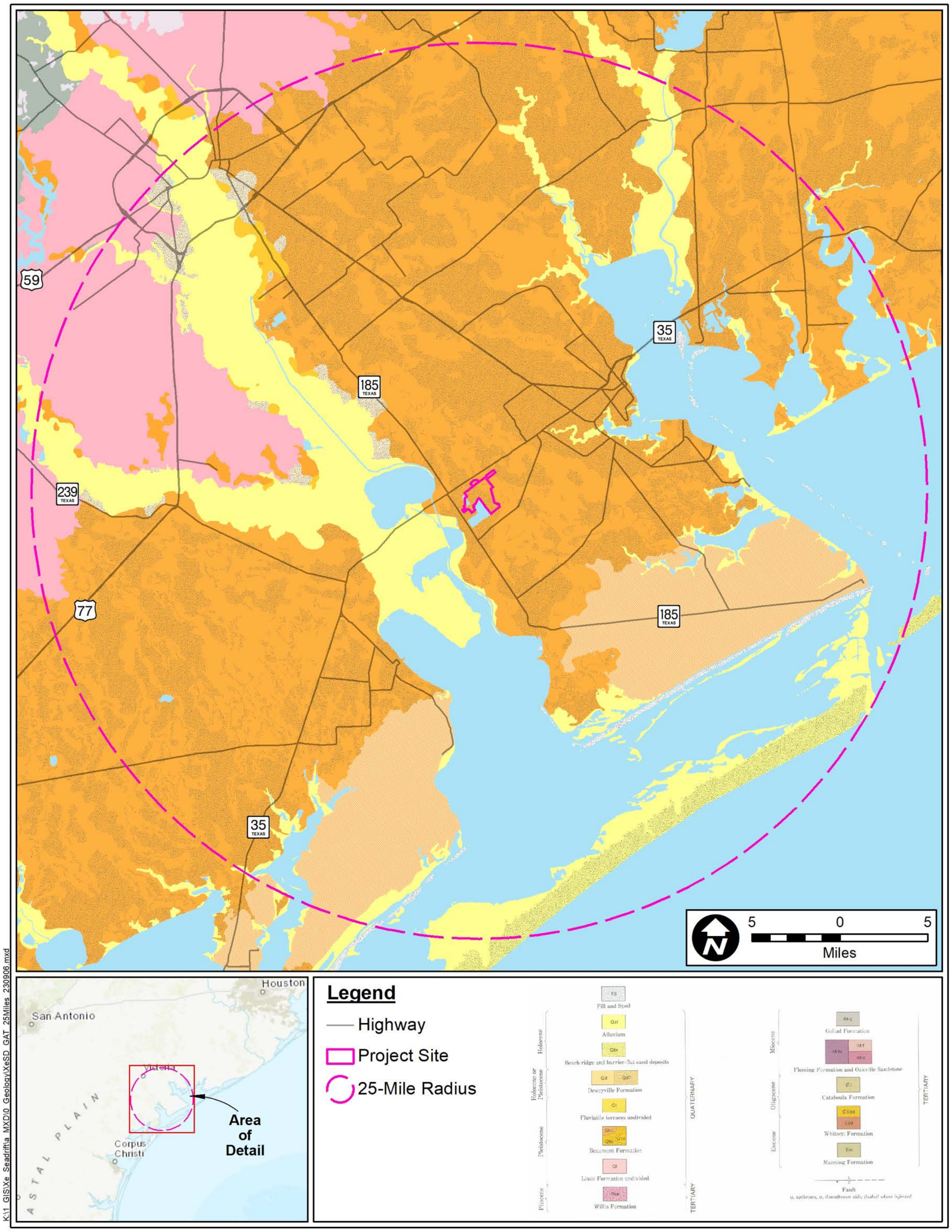


Figure 2.6-4: Geologic Map (25 Mi. Radius)

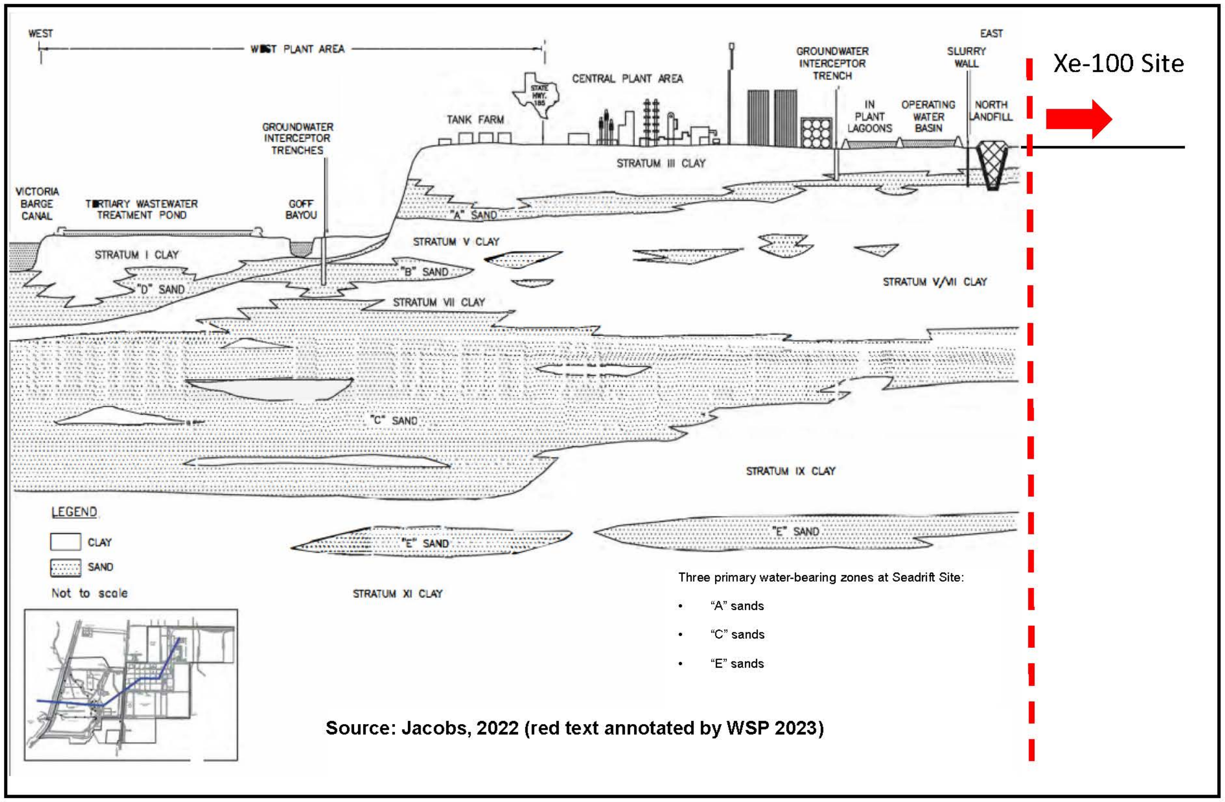


Figure 2.6-5: Generalized Cross Section in the Long Mott Generating Station Vicinity

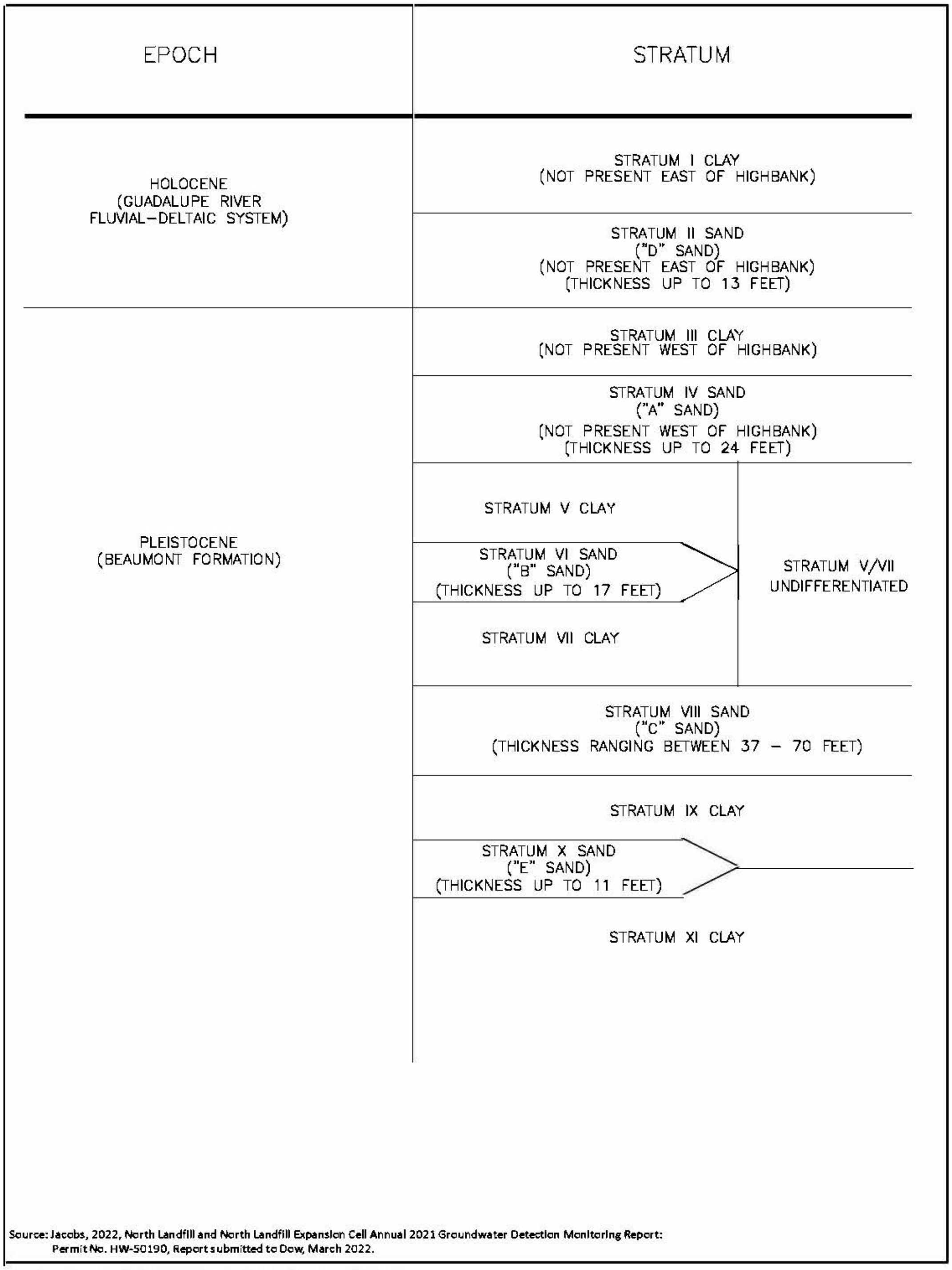
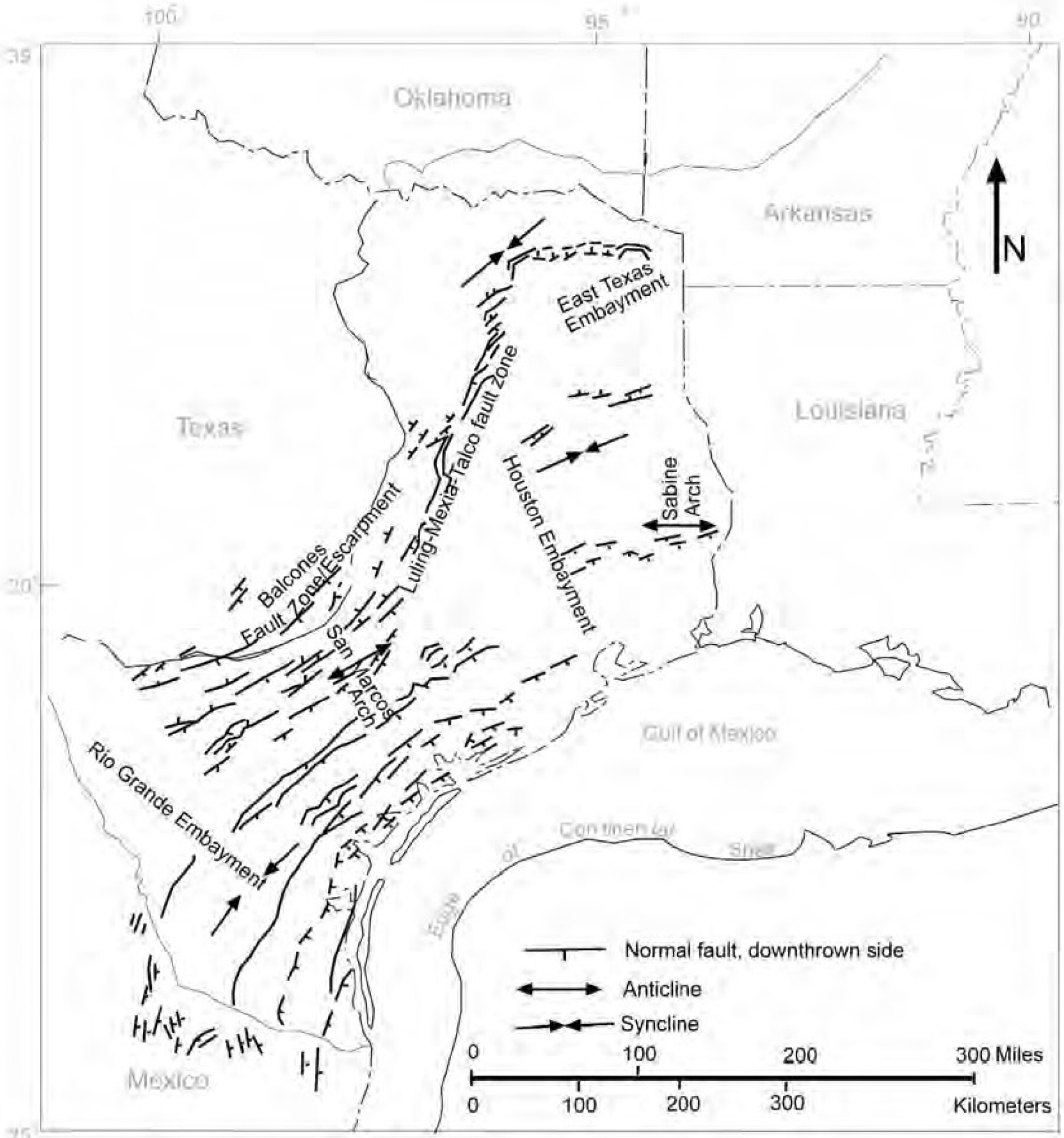
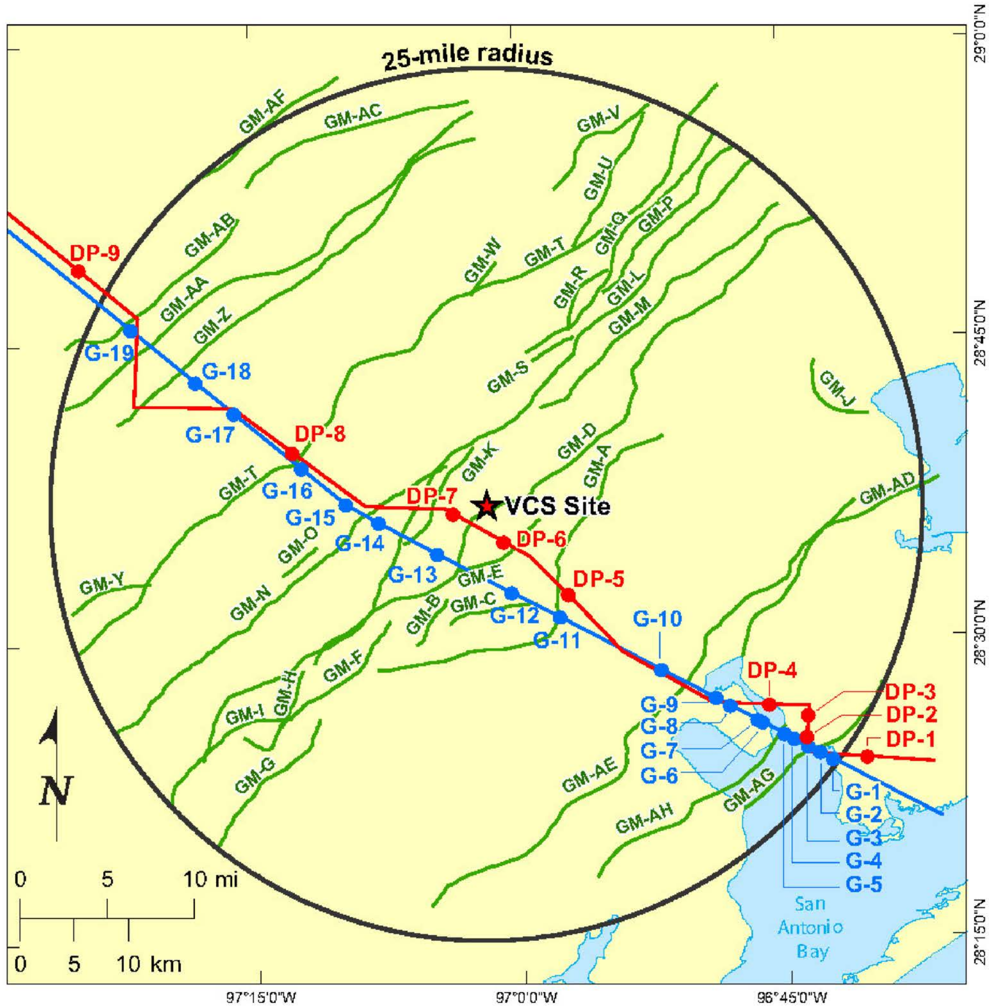


Figure 2.6-6: General Stratigraphic Column in the Long Mott Generating Station Vicinity



Source: Chowdhury, A. H., and Turco, M. J., 2006, Geology of the Gulf Coast Aquifer, Texas, in Mace et all, eds, Aquifers of the Gulf Coast of Texas, Texas Water Development Board Report 365, Ch. 2, p. 23-50, 2006.

Figure 2.6-7: Map of Growth Faults in the Gulf Coast Aquifer in Texas



Explanation

Approximate surface projections of growth faults. Dot indicates single projection from a cross section. Line indicates projection of an extensive growth fault observed in subsurface.

G-1 Galloway et al.[2]

DP-1 Dodge and Posey[3]

GM-AH Geomap (2008)(GM)

Location of original cross section used in growth fault projections

Section B-B' of Galloway et al.[4]

Section 14-14' of Dodge and Posey[5]

Source: Exelon Generation, 2012. Victoria County Station, ESP Application Part 02, Site Safety Analysis Report. May, 2012.

Figure 2.6-8: Surface Projections of Growth Faults

2.7 Meteorology and Air Quality

This section describes climatology, meteorology, and air quality in the region surrounding the LMGS site. Section 2.7.1 describes characteristics of the local and regional climate, Section 2.7.2 discusses air quality, and Section 2.7.3 provides information about pre-operational meteorological monitoring at the LMGS site.

2.7.1 Climate

2.7.1.1 General Climate

LMGS is located in Calhoun County, a coastal county bordered from the southwest to the southeast by inland bays and the Gulf of Mexico in the southeastern portion of Texas. There are 10 climatic divisions of Texas, with Calhoun County falling into the Gulf Coastal Plain, primarily a combination of prairies and marshes. The climate of this region is classified as maritime subtropical, which is marked by relatively short, mild winters; long, hot summers; and mild springs and falls. The Azores high-pressure system is the source of maritime tropical air masses much of the year. During the winter months, occasional cold continental air masses displace the maritime air. The LMGS site is flat with no topographic features that would cause the local climate to deviate significantly from the regional climate. While tornadoes and floods are the primary weather hazards in the rest of the State, the Gulf Coastal Plain is most vulnerable to hurricanes.

The LMGS site is located in a region classified as humid subtropical. Summers are hot, with approximately 100 days with air temperatures of 90 °F (32.2 °C) or higher per year. Sea breezes from the nearby Gulf of Mexico moderate the afternoon high temperatures. Spring is characterized by mild days and occasional showers and thunderstorms. Thunderstorm activity generally peaks in May. Sea breeze activity diminishes during the summer while occasional thunderstorms continue (NOAA, 2022). The Gulf of Mexico can modify outbreaks of polar air masses such that temperatures below 32 °F (0 °C) may occur, on average, less than four times per year.

Wind at the LMGS site is consistent with the dominant influence of the Azores high-pressure system and the coastal location of the site. Seasonal variation of the prevailing directions shows a predominance of southeasterly winds except in January, July, and August, when south winds prevail, and November and December, when northerly winds prevail. The coastal location of the site leads to typical onshore (southeast) winds during the day and offshore winds at night. The first cold front (“norther”) of the cooler season arrives near the beginning of autumn. Autumn is characterized by long periods of clear days with mild temperatures. During winter, weather conditions alternate between cold, dry periods and cloudy periods with mild temperatures and drizzle (NOAA, 2022).

Thunderstorms occur approximately 50 days per year. Destructive thunderstorms with tornadoes are rare in the region. However, the region is subject to occasional tropical storms and hurricanes which bring destructive winds and torrential rain (NOAA, 2022).

2.7.1.2 Climatological and Air Quality Related Data Sources

The following sources were used to evaluate climatological and air quality data:

- Digital records from cooperative weather monitoring stations (COOP): Cooperative weather observing stations record parameters of particular interest to agricultural, industrial, and engineering applications. Depending upon the station, those parameters include daily and monthly high and low dry bulb temperatures (DBT), liquid precipitation, and snowfall. COOP stations do not generally record humidity-related parameters, such as relative humidity, dew point or wet bulb temperatures (WBT); therefore, WBT that are coincident with extreme DBT, which are of interest in regional climate analysis, are generally not available from COOP stations.
- Digital records and other reports from Automated Surface Observing Stations (ASOS): An ASOS may be operated by NOAA, the Federal Aviation Administration or another agency. Hourly meteorological data files are available in TD-3505 format (NCEI, 2021a).
- Annual and monthly local climatological data (LCD) summaries from the National Centers for Environmental Information (NCEI): LCD annual summaries are typically available for meteorological stations located at major airports. Summaries from those stations include climatic normal values, averages, and extremes. Thirty-year monthly histories are generally provided for the following parameters: mean temperature, total precipitation, total snowfall, and heating/cooling degree days. The summaries also include a narrative description of the local climate. Monthly LCDs contain much of the same type of information as annual LCDs but are focused on a particular month of a specific year.
- In the region surrounding the LMGS site, a current LCD is available for the Victoria Regional Airport (KVCT). The LCD provides supplemental information on the climate unavailable from COOP stations (ASCE, 2016).
- Statistical summaries of climatological data from the American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. (ASHRAE) (ASHRAE, 2017): ASHRAE provides climatic information for worldwide locations including many U.S. airports and other locations with hourly surface weather observing stations. Parameters include DBT, WBT, and dew point temperatures. Also included are statistical design values of DBT with mean coincident WBT; design WBT with mean coincident DBT; and design dew point with mean coincident DBT. ASHRAE also provides a methodology and key inputs for estimating extreme DBT and WBT for various return intervals.
- American Society of Civil Engineers/Structural Engineering Institute (ASCE/SEI) structural design standards (ASCE, 2016): The ASCE/SEI standards provide minimum load requirements for the design of buildings and other structures that are subject to building code requirements. Particularly useful are maps of 100-year, mean return-interval 3-second wind gusts. ASCE also provides maps and charts of 50-year return interval snowpack and a methodology for converting 50-year values extracted from those maps to other return intervals.

- 100-year return-interval, two-day duration precipitation: The U.S. Department of Commerce (DOC) provides 100-year return interval, two-day duration liquid equivalent precipitation values for the state of Texas. Two-day duration snowfall at 100-year recurrence intervals are available from the DOC (DOC, 1964).
- Tornado and other weather event statistics from NCEI's online storm events database and “Storm Data” publications: The storm events database contains a chronological listing, by state and county, of climate statistics of interest for climate analysis. Those statistics describe tornadoes, thunderstorms, hail, lightning, high winds, snow, temperature extremes, and other weather phenomena. Also included are statistics on personal injuries and estimated property damage. The “Storm Data” publications are monthly summaries of severe weather events published by NCEI. These publications provide additional details about specific severe weather events listed in the storm events database.
- The LMGS utilizes these meteorological sources to support the environmental monitoring program:
    - Meteorological tower at the Victoria Regional Airport (KVCT), Calhoun County-Port Lavaca Airport (KPKV)
    - Palacios-R. B. Trull Municipal Airport (KPSX), Aransas County Airport Rockport (KRKP)
    - South Texas Project Electric Generating Station (STP)
    - Data from Seadrift, Texas (SDRT2)
- Air Quality Summaries and Air Quality Monitor Data: The EPA provides summaries of current compliance status for U.S. counties with the National Ambient Air Quality Standards (NAAQS), as well as digital summaries of measured concentrations from air quality monitors. State environmental agencies track concentrations from monitors to assess compliance with specific NAAQS. LMGS is in Calhoun County, Texas, which is in attainment for all criteria pollutants (EPA, 2023b).

To meet the intent of 10 CFR 100.20(c)(2) and the guidance contained in Regulatory Guide (RG) 1.23, an applicant must show that meteorological data used in analyses that support a 10 CFR Part 50 Construction Permit Application is representative of site conditions.

Airport data supports construction projects in Texas requiring air quality modeling and TCEQ specifies the required input airport data set by county (TCEQ, 2024a-c). A list of airports meeting TCEQ requirements for meteorological data sets are:

- Rockport, TX (Calhoun, Refugio and Aransas counties) (LMGS site in Calhoun County)
- Victoria Regional airport, TX (Victoria and Jackson Counties)
- Palacios, TX (Matagorda County) (STP in Matagorda County)

These regional airports and STP are in the same climate zone along the western Gulf Coast with relatively flat terrain; they should experience similar meteorological conditions (Figure 2.7-1). Wind roses from all four regional airports surrounding the LMGS site and STP are similar. Correlation analysis was performed using meteorological data from Rockport, Victoria, and Palacios and showed correlations with air temperature, wind speeds, and wind directions. Moderate and high correlations among the data sets support use of airport data to prepare the PSAR/ER until data are available from an on-site meteorological tower. Because both the LMGS site and the STP fall within the geographic area among these three airports, STP data is representative of the LMGS site.

2.7.1.3 Regional Meteorological Data

Climatological parameters from the sources described in Section 2.7.1.2 are presented in the following subsections. For purposes of identifying a climate region containing meteorological stations relatively close to the LMGS site and subject to the same general climatic influences, this analysis concentrates on the counties surrounding the LMGS site: Victoria, Refugio, Aransas, Calhoun, Bee, Colorado, DeWitt, Lavaca, Matagorda, Wharton, and Jackson counties. Additional climatological and meteorological parameters, including humidity, mixing heights, and inversion conditions, can be found in PSAR Section 2.3.

Table 2.7-1 presents a list of meteorological stations in the region of the LMGS site. Figure 2.7-1 shows the locations of these stations.

As discussed in Section 2.7.1.2, per 10 CFR 100.20(c)(2) and the guidance contained in RG 1.23, an applicant must show that meteorological data used in analyses that support a 10 CFR Part 50 Construction Permit Application is representative of site conditions. Wind roses from all four regional airports surrounding the LMGS site and STP are similar and correlation analysis further supported the suitability of the regional meteorological tower data for the LMGS evaluation.

Wind roses from Palacios – R. B. Trull Municipal Airport (KPSX) are provided in Figure 2.7-2 through Figure 2.7-13 which are representative of the LMGS site's wind speed and direction due to its proximity to the LMGS site. The average annual wind speed for the recorded time period is 10.65 mph (17.14 km/hr). The wind direction is predominately from the south-southeast throughout the year but rotates to the north during the winter months.

Table 2.7-10 summarizes normal maximum and minimum temperatures recorded at the Victoria NWS Station (KVCT) for the time period of 1956 to 2022. Maximum temperatures usually occur between the months of April and October. Minimum temperatures are recorded from November through March. The highest daily maximum at the Victoria NWS Station (KVCT) is 111 °F (43.9 °C) and lowest daily minimum is 9 °F (-12.8 °C).

Table 2.7-11 summarizes the mean wind speeds at the Victoria NWS Station (KVCT). The mean annual wind speed is 9.4 mph (15 kph) with peak mean wind speeds occurring from February through May. The maximum 3-s wind speed is 83 mph (133.6 kph), which was recorded in August 2017.

Table 2.7-12 summarizes the normal precipitation recorded at Victoria NWS Station (KVCT). The monthly normal average is 3.37 in. (8.56 cm) and the annual normal total is 40.41 in. (102.64 cm).

2.7.1.3.1 Severe Weather

2.7.1.3.1.1 Tornadoes

Tornado intensity is classified according to the Enhanced Fujita Tornado Intensity Scale (EF-Scale) (Table 2.7-2). This scale associates wind speeds from a tornado event to the corresponding magnitude of observed damage according to 28 indicators. The EF-Scale ranks tornadoes in categories EF-1 to EF-5 using more specific structural damage indicators than the original and previously used tornado intensity classification scale, the Fujita Scale (F-Scale), which was established in 1971 (SPC, 2021).

The NCEI Storm Events Database was queried to extract statistics on regional tornadoes in Calhoun County, Texas (NCEI, 2023). A total of 30 tornadoes have been reported in Calhoun County, Texas, from 1955 through 2018, with the highest rated tornadoes rated at F2 on the F-Scale. These occurred on the following dates: 11/02/1961, 09/20/1967, 08/03/1970, 05/07/1972, and 10/29/1972. Tornado path lengths spanned from less than 1 mi to 15.4 mi (1.6 km to 24.8 km) and tornado widths spanned from less than 1 ft to 200 ft (0.3 m to 61 m) in Calhoun County. The occurrences of tornadoes are summarized in Table 2.7-3.

2.7.1.3.1.2 Hurricanes and Tropical Storms

The LMGS site is exposed to hurricanes and/or tropical storms. The NCEI Storm Events Database (NCEI, 2023) was queried to extract statistics within 50 mi (80.5 km) of the LMGS site for the time period of 1950 - 2023. A total of 13 hurricanes have been recorded that have affected the LMGS site from 2003 through 2021. From 1998 to 2021, 52 tropical storms were recorded in the area within 50 mi (80.5 km) of the LMGS site.

2.7.1.3.1.3 Extreme Wind

ASCE, 2016, provides maps of 100-year mean return-interval wind gusts. The 100-year return-interval 3-s gust wind speed at 29 ft (8.8 m) above ground level (AGL) for the LMGS site is 122 mph (54.54 m/s) for risk factors I through IV (ASCE, 2016).

2.7.1.3.1.4 Thunderstorms and Lightning

A climatological summary of thunderstorm days recorded at the Victoria National Weather Service (NWS) Station (KVCT) is provided in Table 2.7-4 (NCEI, 2023). The period of record for the meteorological station utilized 63 years. Thunderstorms and associated lightning occur on an average of 52.6 days per year. Thunderstorms occur most frequently from May through September in the LMGS site region with a peak of thunderstorms in August.

The mean frequency of lightning strikes to earth is estimated using the method from the Electric Power Research Institute as recommended by the USDA (USDA, 1998). This method assumes a correlation between the average number of thunderstorms per year (T) and the number of lightning strikes to earth per square miles (mi^2) per year (N). The formula for calculating lightning strike frequency is as follows:

$$N = (0.31)(T) \quad \text{(Equation 2.7-1)}$$

The number of lightning strikes to earth per mi^2 per year is computed for the LMGS site based on the average number of thunderstorm days per year at the Victoria NWS station (KVCT) (52.6 days per year). Using these data, the frequency of lightning strikes to earth per mi^2 per year is 16.31 (42.24 strikes per square kilometers (km^2) per year) for the LMGS site.

Since 2008, 22 wildfires have been recorded in the area surrounding the LMGS site. However, only one wildfire event, on April 5, 2009, resulted in property damage.

2.7.1.3.1.5 Hail

The NCEI Storm Events Database (NCEI, 2023) was queried to extract statistics of observed hail near the LMGS. A total of 652 hailstorm occurrences were documented during the summarized time period in the surrounding counties of Aransas, Bee, Calhoun, Colorado, DeWitt, Jackson, Lavaca, Matagorda, Refugio, Victoria, and Wharton. Approximately 38 percent of the hailstorm occurrences did not produce hailstones larger than or equal to 1 in. (2.54 cm) in diameter. From 1955 to 2023 there were 407 hail events with hailstones larger than or equal to 1 in. (2.54 cm) in diameter documented. The largest size of hailstones recorded during the referenced period was 4.5 in. (11.4 cm) on February 19, 1991, in DeWitt County, on April 11, 1995, in Calhoun County, and on June 20, 1996, in Wharton County, Texas.

2.7.1.3.1.6 Ice and Snowstorms

The majority of ice and snowstorm events occur during the months of December, January, and February. Table 2.7-5 summarizes normal snowfall at the LMGS site. The normal annual snowfall is 0.1 in. (0.25 cm). Maximum monthly snowfall is 2.1 in. (5.3 cm), recorded in January 1985. This is also the maximum snowfall in 24 hours recorded (NCEI, 2023).

Glaze is a coating of generally clear and smooth ice which is formed by super-cooled drizzle/rain on exposed objects (AMS, 2012a). Tattelman and Gringorten (1973) estimated glaze and wind loads for eight regions (I — VIII) of the contiguous United States. The estimates were based on observed ice storms in which the maximum ice thickness of 2.5 cm (1.0 in.) or more and 5 cm (2 in.) or more occurred during a 50-year period.

The state of Texas is in region VI of their study. The number of ice storms in 50 years with a thickness greater than or equal to 2.5 cm (1.0 in.) for Region VI is 10 and the regional probability of an ice storm in one year with an ice thickness greater than or equal to 2.5 cm (1.0 in.) is 0.18.

South Texas and Florida were not included in Tattelman and Gringorten's analysis due to the rarity of icing events; therefore, the use of data from Region VI for North/Central Texas is conservative. Tattleman and Gringoten recommend the use of estimated glaze thickness from region III (New England) as bounding values because the most severe conditions documented in their study occurred in this region (Tattelman and Gringorten, 1973).

2.7.1.3.1.7 Fog

Fog is defined as water droplets suspended in the atmosphere in the vicinity of earth's surface that affect visibility. Fog reduces visibility below 1 km (0.62 mi) (AMS, 2012b). The number of days with heavy fog at the Victoria NWS Station (KVCT) is summarized in Table 2.7-6 (NCEI, 2023). Heavy fog occurred an average of 46.9 days per year in the time period from 1964 to 2022, with the most occurrences in November, December, and January. Heavy fog is defined in NUREG-1555, Section 2.7, as visibility less than 0.4 km (0.25 mi).

2.7.1.3.1.8 Precipitation Extremes

This subsection describes the precipitation extremes at the Victoria NWS Station (KVCT) and in the region surrounding the LMGS site. Maximum monthly precipitation recorded was 20.34 in. (51.7 cm) in July 2007. The maximum monthly snowfall was recorded in January 1985, totaling 2.1 in. (5.3 cm). Maximum monthly precipitation and snowfall are presented in Table 2.7-7 and Table 2.7-8.

2.7.1.3.1.9 Ground Snow Load and 100 Year Two Day Duration Liquid Equivalent Precipitation

ASCE, 2016, Figure 7.2-1 provides site-specific estimates of the 50-year ground snow load for locations in Texas from observed snowpacks. The 50-year ground snow load is 0 pounds per square foot (lb/ft^2) (kilograms per square meter [0 kg/m^2]) (ASCE, 2016).

NRC Interim Staff Guidance DC/COL-ISG-007 provides an algorithm that converts a historical maximum snowpack depth to a ground snow load. The algorithm relates the snowpack depth in inches (D) to the resulting ground snow load (L) in lb/ft^2. The mathematical equation for calculating ground snow load is:

$$L= (0.279)(D1.36) \qquad \text{(Equation 2.7-2)}$$

The maximum snow depth recorded at the Victoria NWS Station (KVCT) was 3 in. (7.62 cm) and occurred in February 1985. Using the algorithm provided by the NRC (Equation 2.7-2) results in a ground snow load of 1.24 lb/ft^2 (6.07 kg/m^2).

NRC Interim Staff Guidance DC/COL-ISG-007 also provides an algorithm that converts a snowfall event to a ground snow load. The algorithm relates the snowfall depth in inches (S) to the resulting ground snow load (L) in lb/ft^2. The mathematical equation is as follows:

$$L= (0.15)(S)(5.2) \text{(Equation 2.7-3)}$$

In Equation 2.7-3, the constant (0.15) represents the ratio of the volume of melt water derived from a snow sample and the constant (5.2) is the weight of 1 in. of water in lb/ft^2. Using this algorithm and the maximum snowfall in 24 hours (2.1 in/24 hr. [5.33 cm/24 hr.]) recorded at the Victoria NWS Station (KVCT), the maximum ground snow load based on the maximum snowfall event in 24 hours is 1.64 lb/ft^2 (8.01 kg/m^2).

2.7.1.3.1.10 Dry and Wet Bulb Temperatures

The mean DBT at the Victoria NWS Station (KVCT) is 70.6 °F (21.4 °C) with a mean maximum of 84.7 °F (29.3 °C) and mean minimum of 54 °F (12.2 °C). The mean WBT at the Victoria NWS Station (KVCT) is 63.0 °F (17.2 °C) with a mean maximum of 75.2 °F (24.0 °C) and mean minimum of 47.7 °F (8.7 °C) (NCEI, 2023).

2.7.1.3.1.10.1 Design Dry and Wet Bulb Temperatures

Design basis DBT and WBT were estimated for the LMGS using local meteorological data (Table 2.7-9). These include the following temperatures:

- Normal DBT
- Mean DBT
- Mean WBT
- Maximum Normal DBT
- Maximum Mean DBT
- Maximum Mean WBT
- Minimum Normal DBT
- Minimum Mean DBT
- Minimum Mean WBT
- DBT with Annual Exceedance Probability of 0.4 percent
- Mean Coincident WBT With Annual Exceedance Probability of 0.4 percent
- DBT With Annual Exceedance Probability of 1.0
- Mean Coincident WBT With Annual Exceedance Probability of 1.0 percent
- DBT With Annual Exceedance Probability of 2.0 percent
- Mean Coincident WBT With Annual Exceedance Probability of 2.0 percent
- WBT (Non-Coincidence) With Annual Exceedance Probability of 0.4 percent
- WBT (Non-Coincidence) With Annual Exceedance Probability of 1.0 percent

Climatological and air quality-related data sources generally do not record humidity related parameters, which includes WBT; therefore, the mean coincident WBT was estimated from a DBT/WBT joint frequency distribution (JFD).

ASHRAE, 2017, does not provide DBT and WBT or DBT/Mean Coincident WBT pairs at the 5 percent, 95 percent, and 98 percent annual exceedance probabilities (temperatures [e] through [g] above).

The 100-year return interval minimum DBT ([i] in the above list) is estimated using a technique described in ASHRAE, 2017. This technique calculates the n-year return interval extreme maximum or minimum temperature using the average and standard deviation of a series of annual maximum and minimum temperatures with the following equation:

Tn = M + I F s(Equation 2.7-4)

Where:

- Tn = n-year return period value of the extreme temperature computed (years)
- M = mean annual extreme temperature
- I = +1 if the maximum temperature is being computed, -1 if the minimum temperature is being computed
- s = standard deviation of the annual extreme temperature
- n = return period in years (such as n = 100 for a 100-year return interval)
- $-F = \frac{\sqrt{6}}{\pi}\left\{0.5772 + ln\left[ln\left(\frac{n}{n-1}\right)\right]\right\}$ (Equation 2.7-5)

Where:

F = a function that converts the standard deviation of annual extreme temperature parameters to a new variable that is linearly related to the n- year return interval extreme temperature (Tn)

ASHRAE, 2017, provides the mean annual extreme maximum and mean annual extreme minimum temperature (M) and the corresponding standard deviation (s) used in Equation 2.7-4. The 100-year return maximum (non-coincident) WBT (temperature [k] above) was calculated using Equations 2.7-4 and 2.7-5 for the LMGS site.

2.7.1.4 Local Meteorological Data Analysis

Meteorological data for the LMGS site are used for the development of an input data set to compute relative atmospheric concentration (X/Q) and radiological dose assessments at the LMGS site. Hourly wind and Pasquill data from the STP dated 2017 through 2021 were obtained and utilized for this computation. The STP Tower is the nearest source with published representative meteorological data with the Pasquill stability class computed in accordance with RG 1.23, Revision 1 (i.e., vertical delta-T).

Data collected were analyzed for the X/Q and radiological dose calculations. The annual joint data recovery availability is required to be minimally 90 percent for the data to be used in the analysis. The joint data recovery for the time period of 2017 through 2021 at the STP exceeded the 90 percent for all years used in the analysis.

Wind speed and direction JFDs from the STP are provided in Table 2.7-13 through Table 2.7-21 for the periods of record specified on these tables. This period of record is also used for the JFD input to the X/Q and radiological dose calculations (NCEI, 2023).

2.7.1.4.1 Atmospheric Stability

The Pasquill stability class is derived from the temperature difference between 10 m (32.8 ft) and 60 m (196.9 ft) levels measured at STP Tower, per RG-1.23, Revision 1, Table 2.7-13 summarizes the annual Pasquill class frequency distributions for the period of 2017 to 2021. The most frequently occurring stability class are Pasquill classes D and E. The Pasquill classes B, C, and G are the least frequently occurring at the STP.

2.7.1.4.2 Effects of Plant Buildings and Operations on Local Meteorology

Plant buildings generate downwash that is incorporated into air dispersion models. Interactions between building downwash and pollutant sources around the LMGS site, such as stacks from emergency generators, are also incorporated in the air dispersion modeling. The plant uses air cooled condensers instead of mechanical draft cooling towers, therefore, there is no impact from the cooling system on the local environment from plume shadowing, fogging, or icing. Quantitative results of air dispersion modeling are provided in Section 5.4, Physical Impacts of Station Operation.

2.7.1.5 Climate Variations and Climate Change

2.7.1.5.1 Climate Variations

Decadal scale and global scale climate variation affect weather patterns. Variations are related to the hemispheric temperature and precipitation effects caused by the frequency and phase of the global scale El Nino–Southern Oscillation (ENSO) (NCEI, 2021b) and the Pacific Decadal Oscillation (PDO) (Mantua et al., 1997).

The ENSO and PDO patterns, with cycles of two to seven years and approximately 10 to 17 years, respectively, affect Pacific Ocean sea surface temperature patterns. These medium- and long-range sea surface temperature patterns collectively modulate decadal-scale and longer regional temperature and precipitation trends (Mantua et al., 1997).

2.7.1.5.2 Climate Change

Historical long-term meteorological data is considered in the project's impact on the surroundings of LMGS. Though the impact of global climate change is uncertain, projected trends are discussed in this section. Consistent with NRC Interim Staff Guidance COL/ESP-ISG-026 (NRC, 2014), the normal project lifetime, decommissioning period, and resources that may be impacted by climate change are considered.

The Office of the Texas State Climatologist 2024 report, Extreme Weather in Texas (EWT), 1900–2036, (Nielsen-Gammon et.al., 2024) assesses historical climate trends and potential future climate change in Texas based on historic trends that are expected to continue according to currently available science. The National Climate Assessment (NCA) Report provides detailed information related to the potential effects of climate change on the United States by region (USGCRP, 2023). LMGS is located in the Southern Great Plains (SGP) region of the U.S. as defined by the report. In general, the NCA report states that the SGP region has seen less direct large-scale impacts of climate change than other regions because of its relatively low latitude, flat terrain, and high natural climate variability. However, some changes have been observed such as increased annual average temperature and precipitation. As a result, the SGP region is vulnerable to sea level rise, coastal flooding, extreme heat events, increased precipitation, and drought (USGCRP, 2023).

The combination of coastal subsidence and sea level rise is contributing to or driving a general retreat of the Texas coastline, both along the barrier islands and in coastal wetlands. Relative sea level rise is expected to continue at similar average rates in the near future, as reduced groundwater extraction is balanced by accelerating sea level rise (Nielsen–Gammon et al., 2024). The extensive impervious surfaces (e.g., parking lots, roofs) of metropolitan areas, such as Houston, increase the likelihood of widespread flooding because of increased runoff. Coastal cities have added risk from sea level rise. By 2100, under a projected 3.3 ft of sea level rise along the Texas Gulf Coast, a Category 2 hurricane is estimated to cause 3-10 times more damage to buildings and be $10.4 billion (in 2022 dollars) more costly (from averages of $3.7 to $14.1 billion) than a similar storm today (USGCRP, 2023). Storm surges from hurricanes will tend to be more severe because of higher relative sea levels, and a possible increase in extreme hurricane intensity may further increase storm surge risk (Nielsen–Gammon et al., 2024).

The NCA reports that by mid-century, annual average temperatures are projected to exceed historical record levels regardless of emissions pathway. In addition, the number of extremely hot days and the intensity of drought conditions are projected to increase, and the number of extremely cold days is expected to decrease. In general, southwestern and southern areas of the SGP are projected to become drier, and northeastern areas are expected to become wetter.

The rate of temperature increase since 1895 has averaged 0.12 °F (0.07 °C) per decade, less than the global average of 0.17 °F (0.09 °C) per decade. Since 1950, the trend has been 0.29 °F (0.16 °C) per decade, and since 1975, 0.62 °F (0.34 °C) per decade. The global trend since 1975 was 0.36 °F (0.20 °C) per decade. Recent temperatures have increased in all seasons and in all regions of Texas. The historic Texas temperature trend simulated by the Coupled Model Intercomparison Project Phase 5 (CMIP5) global climate models for 1950–2020 is 0.32 °F (0.18 °C) per decade, and for 1975-2020, 0.55 °F (0.31 °C) per decade. The simulated current rate of increase in Texas, based on the average of climate model projections for 2020–2040 for the low-emissions representative concentration pathway (RCP) 4.5, is around 0.62 °F (0.34 °C) per decade. Up to mid-century, climate projections are not very sensitive to the choice of emissions pathway (Nielsen–Gammon, et.al., 2024, USGCRP, 2023).

On average, across the region, extreme one-day precipitation has increased 5 to 15 percent since the latter part of the 20th century. Within Texas, the local experience of extreme rainfall varies widely from place to place, with some locations experiencing a decrease in intensity of extreme rainfall over the period of data availability while the majority of locations experienced an increase. Annual precipitation increased across most of the region except far west Texas. In addition, days with 2 or more inches of precipitation have become more frequent across the SGP, with larger increases in the eastern half of the region than the western half. Between 2000 and 2021, Texas endured its five wettest months on record, as well as 19 named tropical storms; 8 of these storms were hurricanes, including Harvey (2017), Ike (2008), and Rita (2005) (USGCRP, 2023).

Much of this recent record is influenced by the tracks of Hurricane Harvey and Tropical Storm Imelda, both of which hit southeast Texas instead of South Texas. In addition to the overall precipitation effect, extreme rainfall is strongly affected by increased temperatures. Based on projected temperatures and the dominance of the direct temperature effect on extreme rainfall, the EWT suggests an additional increase of about 10 percent in expected extreme rainfall intensity in 2036 compared to 2001–2020 and an overall increase of over 20 percent compared to 1950–1999. These changes in amount correspond to increases in the odds of extreme precipitation of over 50 percent and over 100 percent, respectively (Nielsen–Gammon et.al., 2024).

Potential cumulative effects of global climate change and increases in average annual temperatures, higher probabilities of extreme heat events, higher occurrences of extreme rainfall (intense rainfall or drought), and changes in the wind patterns could affect concentrations of air pollutants and their long-range transport. Their formation partially depends on the temperature and humidity and is a result of the interactions between hourly changes in the physical and dynamic properties of the atmosphere, atmospheric circulation features, wind, topography, and energy use.

2.7.2 Air Quality

The discussion of air quality includes the six air pollutants for which the EPA has set NAAQS: ozone (O_3), particulate matter (includes PM_{10} and $PM_{2.5}$, which are particulate matter with a mean aerodynamic diameter of less than or equal to 10 micrometers (μm) and 2.5 μm, respectively), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and lead (Pb). These six pollutants are called criteria air pollutants. This discussion also includes GHGs, primarily CO_2 (EPA, 2024a).

2.7.2.1 National Ambient Air Quality Standards

The Clean Air Act (CAA) requires the EPA to set NAAQS for pollutants considered harmful to public health and the environment.

The CAA identifies two types of NAAQS. Primary NAAQS provide public health protection, including protecting the health of sensitive populations such as asthmatics, children, and the elderly. Secondary NAAQS provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

The EPA has specified NAAQS for six principal pollutants, which are called criteria air pollutants CO, Pb, NO_2, O_3, particulate matter (PM, PM_{10}, $PM_{2.5}$), and SO_2. The criteria air pollutants and their respective NAAQS are listed in Table 2.7-22. NAAQS maintenance areas are geographical areas that have a history of non-attainment with a particular NAAQS but are demonstrating attainment of the NAAQS either through air quality monitoring or through EPA-approved alternate methods (EPA, 2024a).

2.7.2.2 Regional Air Quality

The LMGS site is located in Calhoun County, Texas. Calhoun County is in the southeastern portion of Texas and is in attainment for all NAAQs pollutants.

2.7.2.3 Class I Areas

Class I areas are national parks and wilderness areas that are potentially sensitive to visibility impairment. Class I visibility analysis is necessary for major sources locating within 100 km (63 mi) of any Class I area (EPA, 2023c). The nearest Class I area to the LMGS site is Big Bend National Park, located approximately 370 mi (595 km) to the west (NPS, 2022).

2.7.2.4 Greenhouse Gas Emissions

2.7.2.4.1 Emissions at the Global and National Level

From the pre-industrial era (i.e., ending about 1750) to 2022, concentrations of GHGs like carbon dioxide (CO_2), methane, and nitrous oxide have increased globally by 49.5, 161.9, and 24.3 percent, respectively (IPCC 2013; NOAA/ESRL 2024a, 2024b, 2024c). In 2022, total gross U.S. GHG emissions were 6,343.2 million metric tons of carbon dioxide equivalent (MMT CO_2e). Total gross U.S. emissions decreased by 3.0 percent from 1990 to 2022, down from a high of 15.2 percent above 1990 levels in 2007. Gross emissions increased from 2021 to 2022 by 0.2 percent (14.4 MMT CO_2e). Net emissions (including sinks) were 5,489.0 MMT CO_2e in 2022. Overall, net emissions increased by 1.3 percent from 2021 to 2022 and decreased by 16.7 percent from 2005 levels. Between 2021 and 2022, the increase in total GHG emissions was driven largely by an increase in CO_2 emissions from fossil fuel combustion across most end-use sectors due in part to increased energy use from the continued rebound of economic activity after the height of the COVID-19 pandemic. In 2022, CO_2 emissions from fossil fuel combustion increased by 1.0 percent relative to the previous year and were 1.1 percent below emissions in 1990. CO_2 emissions from natural gas use increased by 5.2 percent (84.8 MMT CO_2e) from 2021, while CO_2 emissions from coal consumption decreased by 6.1 percent (58.6 MMT CO_2e) from 2021 to 2022. The increase in natural gas consumption and associated emissions in 2022 is observed across all sectors except U.S. Territories, while the coal decrease is due to reduced use in the electric power sector. Emissions from petroleum use also increased by 0.9 percent (19.0 MMT CO_2e) from 2021 to 2022. Carbon sequestration from the Land Use, Land Use Change, and Forestry (LULUCF) sector offset 14.5 percent of total emissions in 2022.

2.7.2.4.2 Emissions at the State Level

At the state level GHG emissions in the state of Texas are 873.1 MMT CO_2 (TCEQ, 2024d). GHG emissions have fluctuated but have an upward trend since 2000. Since 2000 the lowest emissions occurred in 2009 with 589.5 MMT of CO_2 and the greatest emissions occurred in 2018 with 681.0 MMT of CO_2 (USEIA, 2021). From 1970 to 2022, CO_2 emissions have increased 84.2 percent.

2.7.3 Pre-Operational Meteorological Monitoring

This section describes the meteorological monitoring program prior to operation of LMGS. Meteorological monitoring in the operational phase is discussed in Section 6.4, Meteorological Monitoring.

2.7.3.1 Meteorological Tower

The LMGS site utilizes on- and off-site meteorological towers that support the LMGS environmental monitoring program. Towers and data will be described in the LMGS annual environmental reports (Section 6.2.4) submitted to the NRC. Refer to Section 2.7.3.3 for additional details regarding operational monitoring on-site.

2.7.3.1.1 Location

The STP Tower is located approximately 47 mi (76 km) to the east northeast of the LMGS site and the Victoria NWS Station (KVCT) is located approximately 24 mi (38 km) to the north northwest.

2.7.3.1.2 Configuration and Instrumentation

Meteorological data used to support the LMGS is obtained from meteorological towers that comply with the NRC's RG 1.23, Revision 1, ensuring high standards for data accuracy and reliability. Measurements are taken at two critical heights: 10 m (32.8 ft) and 60 m (196.9 ft) AGL, allowing for comprehensive vertical profiling of atmospheric conditions. The towers measure key meteorological parameters including wind speed, wind direction, temperature, relative humidity, air pressure, and precipitation. Each measurement level utilizes clusters of redundant instruments to minimize the amount of missing data points.

Anemometers are mounted on booms that extend away from the side of the meteorological tower. The booms are designed to meet the separation distance requirement outlined in and that meets the separation distance requirements of RG 1.23, Revision 1, and are oriented to account for sites with bimodal wind direction distributions, ensuring accurate measurements.

The boom is oriented consistent with the requirement of RG 1.23, Revision 1, in locations with bimodal wind direction distributions.

2.7.3.2 Description of the Local Topography

The topography surrounding the LMGS site within 50 mi (80 km) is shown in Figure 2.7-14. The figure includes the area encompassing where the reactor modules are built and surrounding terrain. Information on topographic features modified by the LMGS within a 5 mi (8 km) radius is not yet available due to design immaturity and will be provided at Operating License Application. Maximum elevation versus the distance from the center of the site within a 50 mi (80 km) radius is provided in Figure 2.7-16 (1 through 8).

2.7.3.3 Operational Monitoring

During building of the LMGS the primary source of meteorological data is the Victoria, Texas, NWS Station (KVCT). Long Mott Energy, LLC plans to build an on-site meteorological tower that meets the requirements of RG 1.23, Revision 1, to be the primary source of meteorological data for operations of the LMGS. The final location of this tower is to be determined.

Once the LMGS meteorological tower is constructed and has captured sufficient on-site data, additional information will be provided to demonstrate that conditions at the STP are representative of the those at the LMGS. After construction of this tower, data from the Victoria, Texas, NWS Station (KVCT) is a supplemental source of data for the LMGS site if there is a malfunction of the on-site meteorological tower. Meteorological monitoring in the operational phase is discussed in Section 6.4, Meteorological Monitoring.

Tables

Table 2.7-1: Locations of Meteorological Stations

Station Name	Station Identifier
Victoria NWS Station	KVCT
Calhoun County-Port Lavaca Airport	KPKV
Palacios-R.B. Trull Municipal Airport	KPSX
Aransas County Airport Rockport	KRKP
South Texas Project Nuclear Generating Station	STP
Seadrift, TX	SDRT2
Abbreviations: NWS = National Weather Service; TX = Texas	

Table 2.7-2: Fujita and Enhanced Fujita Tornado Intensity Scale

Fujita Scale	3-Second Wind Gust	Enhanced Fujita Scale	3-Second Wind Gust
F Number	(mph)	EF Number	(mph)
0	45 – 78	0	65 – 85
1	79 – 117	1	86 – 110
2	118 – 161	2	111 – 135
3	162 – 209	3	136 – 165
4	210 – 261	4	166 – 200
5	262 – 317	5	> 200
Source: NOAA, 2022			

Table 2.7-3: Tornadoes and Waterspouts Observed in Calhoun County

Tornadoes and Waterspouts	
Tornadoes	
Date	**F or EF Number**
6/5/1955	F1
11/2/1961	F2
9/20/1967	F2
9/27/1967	F1
8/3/1970	F2
9/2/1970	F0
5/7/1972	F2
7/10/1972	F1
9/22/1972	F0
9/22/1972	F0
9/22/1972	F0
10/29/1972	F2
6/13/1973	F1
5/13/1982	F1
5/22/1990	F0
7/21/1992	F0
7/25/1996	F0
3/17/1997	F0
3/17/1997	F0
5/5/2001	F0
7/15/2003	F0
4/6/2004	F0
4/6/2004	F0
10/16/2006	F1
10/16/2006	F0
8/25/2011	EF0
9/29/2012	EF0
8/25/2017	EF0
3/29/2018	EF1
Waterspouts	
Date	**F or EF Number**
9/3/1999	N/A
9/28/1999	N/A

Source: NCEI, 2023
Abbreviations: EF = Enhanced Fujita; F = Fujita; N/A = not applicable

Table 2.7-4: Average Thunderstorm Days Observed at the Victoria NWS Station (KVCT)

Month	Average Thunderstorm Days
January	1.5
February	1.6
March	3
April	3.5
May	5.9
June	6.5
July	7.3
August	9
September	7.4
October	3.5
November	2
December	1.4
Annual	52.6

Source: NOAA, 2022
Note: Period of Record: 1960–2022
Abbreviation: NWS = National Weather Service

Table 2.7-5: Normal Snowfall Recorded at the Victoria NWS Station (KVCT)

Month	Normal Snowfall (in.)
January	0.1
February	0
March	0
April	0
May	0
June	0
July	0
August	0
September	0
October	0
November	0
December	0
Annual	0.1

Source: NOAA, 2022
Note: 30-year Normals: 1991–2020
Abbreviation: NWS = National Weather Service; in. = inches

Table 2.7-6: Number of Heavy Fog Days Observed at the Victoria NWS Station (KVCT)

Month	Heavy Fog Days
January	7
February	5.7
March	5.5
April	3.9
May	2.5
June	1
July	0.8
August	0.9
September	1.7
October	4.2
November	6.7
December	7
Annual	46.9

Source: NOAA, 2022
Note: Period of Record: 1965–2022
Abbreviation: NWS = National Weather Service

Table 2.7-7: Maximum Precipitation Recorded at the Victoria NWS Station (KVCT)

Month	Maximum Monthly Precipitation (in.)
January	7.76
February	9.08
March	11.61
April	11.7
May	20.28
June	13.5
July	20.34
August	16.94
September	19.05
October	12.44
November	16.14

Source: NOAA, 2022
Note: Period of Record: 1961–2022
Abbreviation: NWS = National Weather Service; in. = inches

Table 2.7-8: Maximum Snowfall Recorded at the Victoria NWS Station (KVCT)

Month	Maximum Monthly Snowfall (in.)
January	2.1
February	1
March	Trace
April	0
May	Trace
June	0
July	0
August	Trace
September	0
October	0
November	0.2
December	Trace

Source: NOAA, 2022
Note: Period of Record: 1987–2022
Abbreviation: NWS = National Weather Service; in. = inches

Table 2.7-9: Design Dry and Wet Bulb Temperatures

Parameter	Value (deg F)	Value (deg C)
Normal DBT	70.7	21.5
Mean DBT	70.6	21.4
Mean WBT	63	17.2
Maximum Normal DBT	84.8	29.3
Maximum Mean DBT	84.7	29.3
Maximum Mean WBT	75.2	24
Minimum Normal DBT	54.4	12.4
Minimum Mean DBT	54	12.2
Minimum Mean WBT	47.7	8.7
DBT With Annual Exceedance Probability of 0.4%	97.9	36.6
Mean Coincident WBT With Annual Exceedance Probability of 0.4%	76.5	24.7
DBT With Annual Exceedance Probability of 1.0%	95.9	35.5
Mean Coincident WBT With Annual Exceedance Probability of 1.0%	76.6	24.8
DBT With Annual Exceedance Probability of 2.0%	94.1	34.5
Mean Coincident WBT With Annual Exceedance Probability of 2.0%	76.6	24.8
WBT (Non-Coincident) With Annual Exceedance Probability of 0.4%	80.3	26.8
WBT (Non-Coincident) With Annual Exceedance Probability of 1.0%	79.8	26.6
Source: ASHRAE, 2017 Abbreviations: deg F = degrees Fahrenheit; deg C = degrees Celsius; DBT = dry bulb temperature; WBT = wet bulb temperature		

Table 2.7-10: Normal Maximum and Minimum Temperatures

Month	Normal Maximum (deg F)	Normal Minimum (deg F)
January	65.2	43.6
February	69.1	47.7
March	75	53.9
April	80.8	60
May	86.8	67.7
June	92.3	73.1
July	94.6	74.5
August	95.5	74.1
September	90.7	70
October	84.1	61
November	74.1	51.4
December	67.3	45.2
Annual Mean	**81.3**	**60.2**

Source: NOAA, 2022
Note: 30-year Normals: 1991–2020
Abbreviation: deg F = degrees Fahrenheit

Table 2.7-11: Mean Wind Speeds and Prevailing Wind Direction

Month	Mean Wind Speed (mph)[(a)]	Prevailing Wind Direction (in tens of degrees)[(b)]
January	9.6	36
February	10.3	36
March	10.8	16
April	11.1	16
May	10.7	15
June	9.3	16
July	8.5	17
August	7.9	17
September	7.8	13
October	8.4	36
November	8.9	36
December	9.2	36
Annual	**9.4**	**17**

Source: NOAA, 2022, Victoria, TX (KVCT) LCD
Notes:
a) 1984–2022
b) 1980–2022
Abbreviation: mph = miles per hour

Table 2.7-12: Normal Precipitation Observed at the Victoria NWS Station (KVCT)

Month	Normal Precipitation (in.)
January	2.67
February	1.96
March	2.99
April	3.01
May	5.23
June	4.21
July	3.46
August	3.11
September	4.53
October	3.97
November	2.93
December	2.34
Annual Normal	**40.41**
Annual Normal Average	**3.37**

Source: NOAA, 2022
Note: 30-year Normals: 1991–2020
Abbreviation: NWS = National Weather Service; in. = inches

Table 2.7-13: Occurrence of Stability Classes A – G from the South Texas Nuclear Station Generating Station Tower

Stability Class	Total Occurrences	Percentage of Overall Total
A	5376	13%
B	2377	6%
C	2269	5%
D	11,444	27%
E	12,303	29%
F	4460	11%
G	4241	10%
Total	**42,470**	**100%**

Note: Period of Record: 2017–2021

Table 2.7-14: Joint Frequency Distribution of Wind Speed and Wind Direction from the South Texas Nuclear Generating Station Tower (Pasquill Stability Class A)

Wind speed (mph)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Percent Total
Calm	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	**1**	**0.00%**
1.0 – 3.5	3	1	0	5	5	2	1	3	0	1	1	1	1	1	0	1	**26**	**0.50%**
3.6 – 7.5	25	31	22	14	13	14	9	10	43	43	30	6	15	29	26	15	**345**	**6.40%**
7.6 – 12.5	91	102	91	43	17	34	84	152	724	298	99	26	18	25	46	71	**1921**	**35.70%**
12.6 – 18.5	112	98	61	30	46	157	362	438	492	94	52	5	1	13	76	125	**2162**	**40.20%**
18.6 – 24.5	27	14	6	10	19	97	245	197	32	5	3	0	0	3	34	107	**799**	**14.90%**
24.6 – 32.5	2	1	2	0	1	6	54	27	0	0	0	0	0	0	3	24	**120**	**2.20%**
32.6 +	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	**2**	**0.00%**
Total	**260**	**247**	**182**	**102**	**101**	**310**	**755**	**828**	**1291**	**441**	**185**	**38**	**35**	**71**	**187**	**343**	**5376**	
Percent Total	**4.80%**	**4.60%**	**3.40%**	**1.90%**	**1.90%**	**5.80%**	**14.00%**	**15.40%**	**24.00%**	**8.20%**	**3.40%**	**0.70%**	**0.70%**	**1.30%**	**3.50%**	**6.40%**		

Note: Period of Record: 2017–2021

Abbreviations: mph = miles per hour; NNE = north-northeast; NE = northeast; ESE = east-southeast; ENE = east-northeast; NNW = north-northwest; SSE = south-southeast; E = east; NW = northwest; SSW = south-southwest; W = west; WSW = west-southwest; SE = southeast; WNW = west-northwest; S = south

Table 2.7-15: Joint Frequency Distribution of Wind Speed and Wind Direction from the South Texas Nuclear Generating Station Tower (Pasquill Stability Class B)

Wind speed (mph)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Percent Total
Calm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0.00%**
1.0 – 3.5	3	1	1	0	1	2	0	1	1	0	0	0	1	0	1	**2**	**14**	**0.60%**
3.6 – 7.5	28	15	28	18	13	14	15	19	51	54	17	13	15	21	22	21	**364**	**15.30%**
7.6 – 12.5	31	52	58	46	37	55	98	105	226	67	27	5	8	8	28	46	**897**	**37.70%**
12.6 – 18.5	39	38	24	28	36	81	212	209	61	9	4	1	1	1	17	44	**805**	**33.90%**
18.6 – 24.5	9	4	3	3	11	31	106	46	6	0	0	0	1	0	10	30	**260**	**10.90%**
24.6 – 32.5	2	1	0	0	1	1	14	5	0	0	0	0	0	0	1	10	**35**	**1.50%**
32.6 +	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	**2**	**0.10%**
Total	**112**	**111**	**114**	**95**	**99**	**184**	**445**	**385**	**345**	**130**	**48**	**19**	**26**	**30**	**81**	**153**	**2377**	
Percent Total	**4.70%**	**4.70%**	**4.80%**	**4.00%**	**4.20%**	**7.70%**	**18.70%**	**16.20%**	**14.50%**	**5.50%**	**2.00%**	**0.80%**	**1.10%**	**1.30%**	**3.40%**	**6.40%**		

Note: Period of Record: 2017–2021

Abbreviations: mph = miles per hour; NNE = north-northeast; NE = northeast; ESE = east-southeast; ENE = east-northeast; NNW = north-northwest; SSE = south-southeast; E = east; NW = northwest; SSW = south-southwest; W = west; WSW = west-southwest; SE = southeast; WNW = west-northwest; S = south

Table 2.7-16: Joint Frequency Distribution of Wind Speed and Wind Direction South Texas Nuclear Generating Station Tower (Pasquill Stability Class C)

Wind speed (mph)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Percent Total
Calm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0.00%**
1.0 – 3.5	2	1	1	4	2	2	5	3	0	1	3	1	2	4	2	4	**37**	**1.60%**
3.6 – 7.5	28	16	28	34	27	16	20	20	62	45	20	13	12	29	23	18	**411**	**18.10%**
7.6 – 12.5	46	53	52	53	40	51	114	121	193	56	27	5	8	6	16	36	**877**	**38.70%**
12.6 – 18.5	28	40	39	25	29	88	163	134	50	13	4	1	1	6	15	29	**665**	**29.30%**
18.6 – 24.5	17	4	5	0	12	27	95	54	1	0	0	0	0	1	11	32	**259**	**11.40%**
24.6 – 32.5	1	0	0	0	0	2	9	3	0	0	0	0	0	0	4	0	**19**	**0.80%**
32.6 +	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	**1**	**0.00%**
Total	**122**	**114**	**125**	**116**	**110**	**186**	**406**	**335**	**306**	**115**	**54**	**20**	**23**	**46**	**72**	**119**	**2269**	
Percent Total	**5.40%**	**5.00%**	**5.50%**	**5.10%**	**4.80%**	**8.20%**	**17.90%**	**14.80%**	**13.50%**	**5.10%**	**2.40%**	**0.90%**	**1.00%**	**2.00%**	**3.20%**	**5.20%**		

Note: Period of Record: 2017–2021

Abbreviations: mph = miles per hour; NNE = north-northeast; NE = northeast; ESE = east-southeast; ENE = east-northeast; NNW = north-northwest; SSE = south-southeast; E = east; NW = northwest; SSW = south-southwest; W = west; WSW = west-southwest; SE = southeast; WNW = west-northwest; S = south

Table 2.7-17: Joint Frequency Distribution of Wind Speed and Wind Direction South Texas Nuclear Generating Station Tower (Pasquill Stability Class D)

Wind speed (mph)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Percent Total
Calm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0.00%**
1.0 – 3.5	15	28	18	20	15	11	6	12	9	10	8	7	11	27	17	17	**231**	**2.00%**
3.6 – 7.5	99	134	177	143	68	73	94	123	236	131	55	46	37	54	76	125	**1671**	**14.60%**
7.6 – 12.5	314	384	316	291	230	282	469	545	579	190	72	36	28	36	80	227	**4079**	**35.60%**
12.6 – 18.5	541	294	187	130	270	420	787	714	144	26	23	14	17	28	91	370	**4056**	**35.40%**
18.6 – 24.5	232	63	19	15	50	99	294	191	11	1	0	0	1	2	35	191	**1204**	**10.50%**
24.6 – 32.5	29	4	1	3	6	10	37	18	0	0	0	0	0	0	17	72	**197**	**1.70%**
32.6 +	1	0	0	1	0	1	0	1	0	0	0	0	0	0	1	1	**6**	**0.10%**
Total	**1231**	**907**	**718**	**603**	**639**	**896**	**1687**	**1604**	**979**	**358**	**158**	**103**	**94**	**147**	**317**	**1003**	**11,444**	
Percent Total	**10.80%**	**7.90%**	**6.30%**	**5.30%**	**5.60%**	**7.80%**	**14.70%**	**14.00%**	**8.60%**	**3.10%**	**1.40%**	**0.90%**	**0.80%**	**1.30%**	**2.80%**	**8.80%**		

Note: Period of Record: 2017–2021

Abbreviations: mph = miles per hour; NNE = north-northeast; NE = northeast; ESE = east-southeast; ENE = east-northeast; NNW = north-northwest; SSE = south-southeast; E = east; NW = northwest; SSW = south-southwest; W = west; WSW = west-southwest; SE = southeast; WNW = west-northwest; S = south

Table 2.7-18: Joint Frequency Distribution of Wind Speed and Wind Direction South Texas Nuclear Generating Station Tower (Pasquill Stability Class E)

Wind speed (mph)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Percent Total
Calm	16	3	2	1	1	1	3	0	1	0	0	1	0	0	1	0	**30**	**0.20%**
1.0 – 3.5	44	53	78	56	42	45	49	44	19	16	9	13	21	26	33	38	**586**	**4.80%**
3.6 – 7.5	178	246	308	262	288	343	467	608	617	363	112	52	63	81	101	165	**4254**	**34.60%**
7.6 – 12.5	298	311	190	182	302	493	968	1207	943	258	93	36	27	19	86	243	**5656**	**46.00%**
12.6 – 18.5	147	60	31	23	65	127	363	454	72	3	7	2	7	6	44	104	**1515**	**12.30%**
18.6 – 24.5	29	7	3	3	14	13	43	50	2	1	0	0	3	1	12	40	**221**	**1.80%**
24.6 – 32.5	6	0	0	0	3	5	5	3	0	0	0	0	0	0	8	6	**36**	**0.30%**
32.6 +	0	0	0	0	0	1	2	2	0	0	0	0	0	0	0	0	**5**	**0.00%**
Total	**718**	**680**	**612**	**527**	**715**	**1028**	**1900**	**2368**	**1654**	**641**	**221**	**104**	**121**	**133**	**285**	**596**	**12,303**	
Percent Total	**5.80%**	**5.50%**	**5.00%**	**4.30%**	**5.80%**	**8.40%**	**15.40%**	**19.20%**	**13.40%**	**5.20%**	**1.80%**	**0.80%**	**1.00%**	**1.10%**	**2.30%**	**4.80%**		

Note: Period of Record: 2017–2021

Abbreviations: mph = miles per hour; NNE = north-northeast; NE = northeast; ESE = east-southeast; ENE = east-northeast; NNW = north-northwest; SSE = south-southeast; E = east; NW = northwest; SSW = south-southwest; W = west; WSW = west-southwest; SE = southeast; WNW = west-northwest; S = south

Table 2.7-19: Joint Frequency Distribution of Wind Speed and Wind Direction South Texas Nuclear Generating Station Tower (Pasquill Stability Class F)

Wind speed (mph)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Percent Total
Calm	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	**2**	**0.00%**
1.0 – 3.5	60	119	154	202	166	179	138	40	19	11	7	9	17	45	44	57	**1267**	**28.40%**
3.6 – 7.5	109	222	189	194	256	278	497	333	81	36	20	23	45	71	90	132	**2576**	**57.80%**
7.6 – 12.5	42	103	30	25	49	53	96	49	13	5	2	7	2	10	34	63	**583**	**13.10%**
12.6 – 18.5	4	2	0	0	4	1	6	0	1	0	0	1	0	0	6	3	**28**	**0.60%**
18.6 – 24.5	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	**1**	**0.00%**
24.6 – 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	**1**	**0.00%**
32.6 +	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	**2**	**0.00%**
Total	**215**	**446**	**373**	**423**	**475**	**511**	**738**	**423**	**115**	**52**	**29**	**40**	**64**	**126**	**175**	**255**	**4460**	
Percent Total	**4.80%**	**10.00%**	**8.40%**	**9.50%**	**10.70%**	**11.50%**	**16.50%**	**9.50%**	**2.60%**	**1.20%**	**0.70%**	**0.90%**	**1.40%**	**2.80%**	**3.90%**	**5.70%**		

Note: Period of Record: 2017–2021

Abbreviations: mph = miles per hour; NNE = north-northeast; NE = northeast; ESE = east-southeast; ENE = east-northeast; NNW = north-northwest; SSE = south-southeast; E = east; NW = northwest; SSW = south-southwest; W = west; WSW = west-southwest; SE = southeast; WNW = west-northwest; S = south

Table 2.7-20: Joint Frequency Distribution of Wind Speed and Wind Direction from South Texas Nuclear Generating Station Tower (Pasquill Stability Class G)

Wind speed (mph)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Percent Total
Calm	3	5	3	3	1	2	1	0	1	0	0	0	0	2	1	0	**22**	**0.50%**
1.0 – 3.5	148	245	357	284	211	243	130	28	12	14	13	14	44	87	100	107	**2037**	**48.00%**
3.6 – 7.5	127	275	299	203	214	164	205	65	10	3	2	15	39	113	129	134	**1997**	**47.10%**
7.6 – 12.5	11	63	20	8	22	5	8	4	1	0	0	0	2	6	17	15	**182**	**4.30%**
12.6 – 18.5	0	0	0	0	0	0	1	0	1	0	0	0	1	0	0	0	**3**	**0.10%**
18.6 – 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0.00%**
24.6 – 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0.00%**
32.6 +	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0.00%**
Total	**289**	**588**	**679**	**498**	**448**	**414**	**345**	**97**	**25**	**17**	**15**	**29**	**86**	**208**	**247**	**256**	**4241**	
Percent Total	**6.80%**	**13.90%**	**16.00%**	**11.70%**	**10.60%**	**9.80%**	**8.10%**	**2.30%**	**0.60%**	**0.40%**	**0.40%**	**0.70%**	**2.00%**	**4.90%**	**5.80%**	**6.00%**		

Note: Period of Record: 2017–2021

Abbreviations: mph = miles per hour; NNE = north-northeast; NE = northeast; ESE = east-southeast; ENE = east-northeast; NNW = north-northwest; SSE = south-southeast; E = east; NW = northwest; SSW = south-southwest; W = west; WSW = west-southwest; SE = southeast; WNW = west-northwest; S = south

Table 2.7-21: Joint Frequency Distribution of Wind Speed and Wind Direction from South Texas Nuclear Generating Station Tower (Pasquill Stability Class A – G)

Wind speed (mph)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Percent Total
Calm	19	8	5	4	2	3	5	1	3	0	0	1	0	2	2	0	**55**	**0.10%**
1.0 – 3.5	275	448	609	571	442	484	329	131	60	53	41	45	97	190	197	226	**4198**	**9.90%**
3.6 – 7.5	594	939	1051	868	879	902	1307	1178	1100	675	256	168	226	398	467	610	**11,618**	**27.40%**
7.6 – 12.5	833	1068	757	648	697	973	1837	2183	2679	874	320	115	93	110	307	701	**14,195**	**33.40%**
12.6 – 18.5	871	532	342	236	450	874	1894	1949	821	145	90	24	28	54	249	675	**9234**	**21.70%**
18.6 – 24.5	314	92	36	31	106	267	783	539	52	7	3	0	5	7	102	400	**2744**	**6.50%**
24.6 – 32.5	40	6	3	3	11	24	119	56	0	0	0	0	0	0	34	112	**408**	**1.00%**
32.6 +	1	0	0	3	0	2	2	3	0	0	0	0	0	0	6	1	**18**	**0.00%**
Total	**2947**	**3093**	**2803**	**2364**	**2587**	**3529**	**6276**	**6040**	**4715**	**1754**	**710**	**353**	**449**	**761**	**1364**	**2725**	**42,470**	
Percent Total	**6.90%**	**7.30%**	**6.60%**	**5.60%**	**6.10%**	**8.30%**	**14.80%**	**14.20%**	**11.10%**	**4.10%**	**1.70%**	**0.80%**	**1.10%**	**1.80%**	**3.20%**	**6.40%**		

Note: Period of Record: 2017–2021

Abbreviations: mph = miles per hour; NNE = north-northeast; NE = northeast; ESE = east-southeast; ENE = east-northeast; NNW = north-northwest; SSE = south-southeast; E = east; NW = northwest; SSW = south-southwest; W = west; WSW = west-southwest; SE = southeast; WNW = west-northwest; S = south

Table 2.7-22: Criteria Pollutants and National Ambient Air Quality Standards

Pollutant	Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide (CO)	Primary	8-Hour 1-Hour	9 ppm 35 ppm	Not to be exceeded more than once per year
Lead (Pb)	Primary and Secondary	Rolling 3-Month Average	0.15 µg/m^3 [(a)]	Not to be exceeded
Nitrogen Dioxide (NO_X)	Primary	1-Hour	100 ppb	98th Percentile of 1-hour daily maximum concentrations average over 3 years
	Primary and Secondary	1-Year	53 ppb [(b)]	Annual mean
Ozone (O_3)	Primary and Secondary	8-Hour	0.070 ppm [(c)]	Annual fourth-highest daily maximum 8-hour concentration averaged over 3 years
Particulate Matter 2.5 ($PM_{2.5}$)	Primary	1-Year	9.0 µg/m^3	Annual mean averaged over 3 years
	Secondary	1-Year	15.0 µg/m^3	Annual mean averaged over 3 years
	Primary and Secondary	24-Hour	35 µg/m^3	98th percentile averaged over 3 years
Particulate Matter 10 (PM_{10})	Primary and Secondary	24-Hour	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO_2)	Primary	1-Hour	75 ppb [(d)]	99th Percentile of 1-hour daily maximum concentrations averaged over 3 years
	Secondary	2-Hour	0.5 ppm	Not to be exceeded more than once per year

Source: EPA, 2024a

Notes:

a) In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 µg/m^3 as a calendar quarter average) also remain in effect.

b) The level of the annual NO_2 standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.

c) Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O_3 standards are not revoked and remain in effect for designated areas. Additionally, some areas may have certain continuing implementation obligations under the prior revoked 1-hour (1979) and 8-hour (1997) O_3 standards.

d) The previous SO_2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2) any area for which an implementation plan providing for attainment of the current (2010) standard has not been submitted and approved and which is designated nonattainment under the previous SO_2 standards or is not meeting the requirements of a SIP call under the previous SO_2 standards (40 CFR 50.4(3)). A SIP call is a EPA action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the required NAAQS.

Abbreviations: µg/m^3 = micrograms per cubic meter; CFR = Code of Federal Regulations; NAAQS = national ambient air quality standards; ppb = parts per billion; ppm = parts per million; SIP = State Implementation Plan

Figures

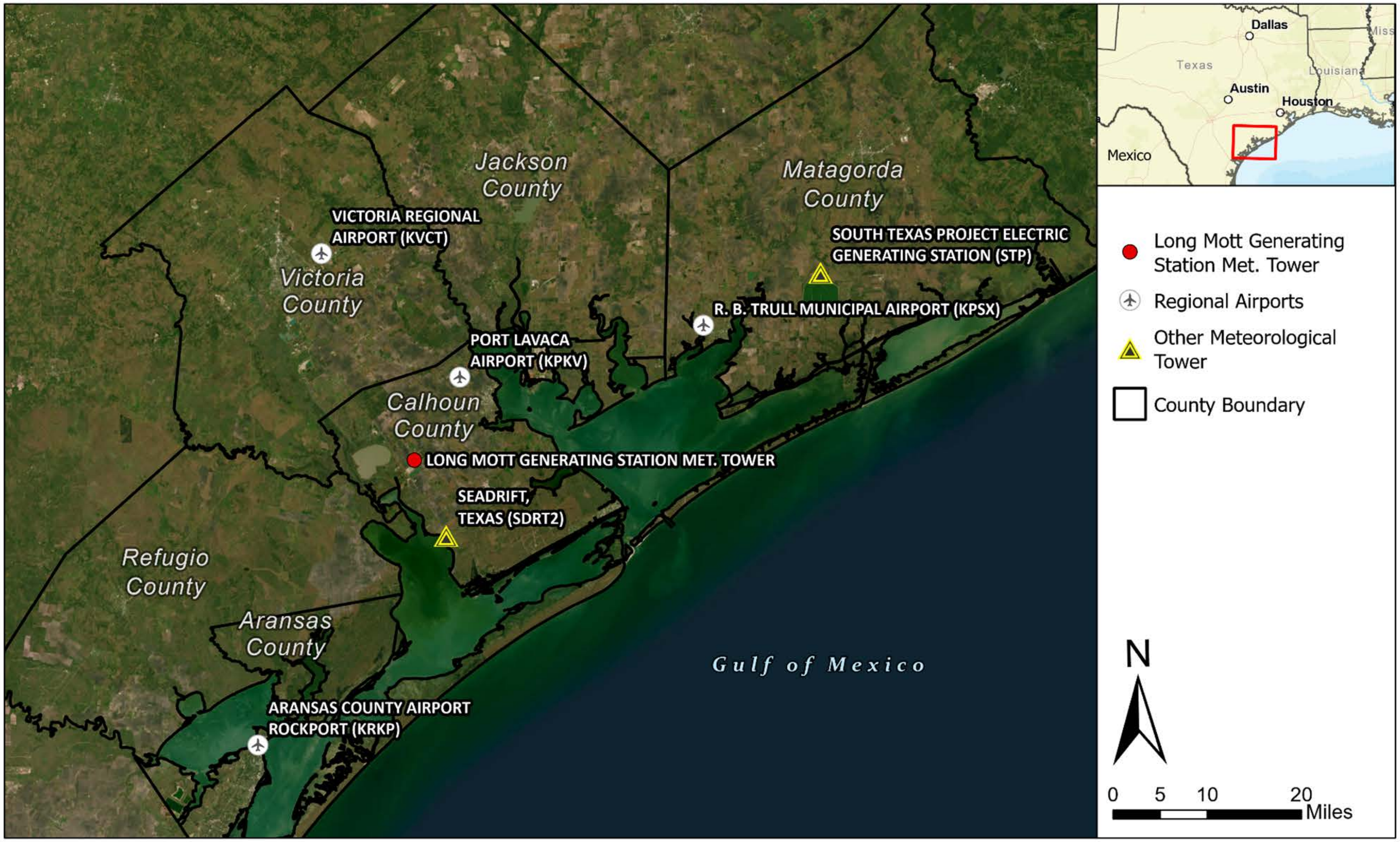


Figure 2.7-1: Weather Observing Station Locations

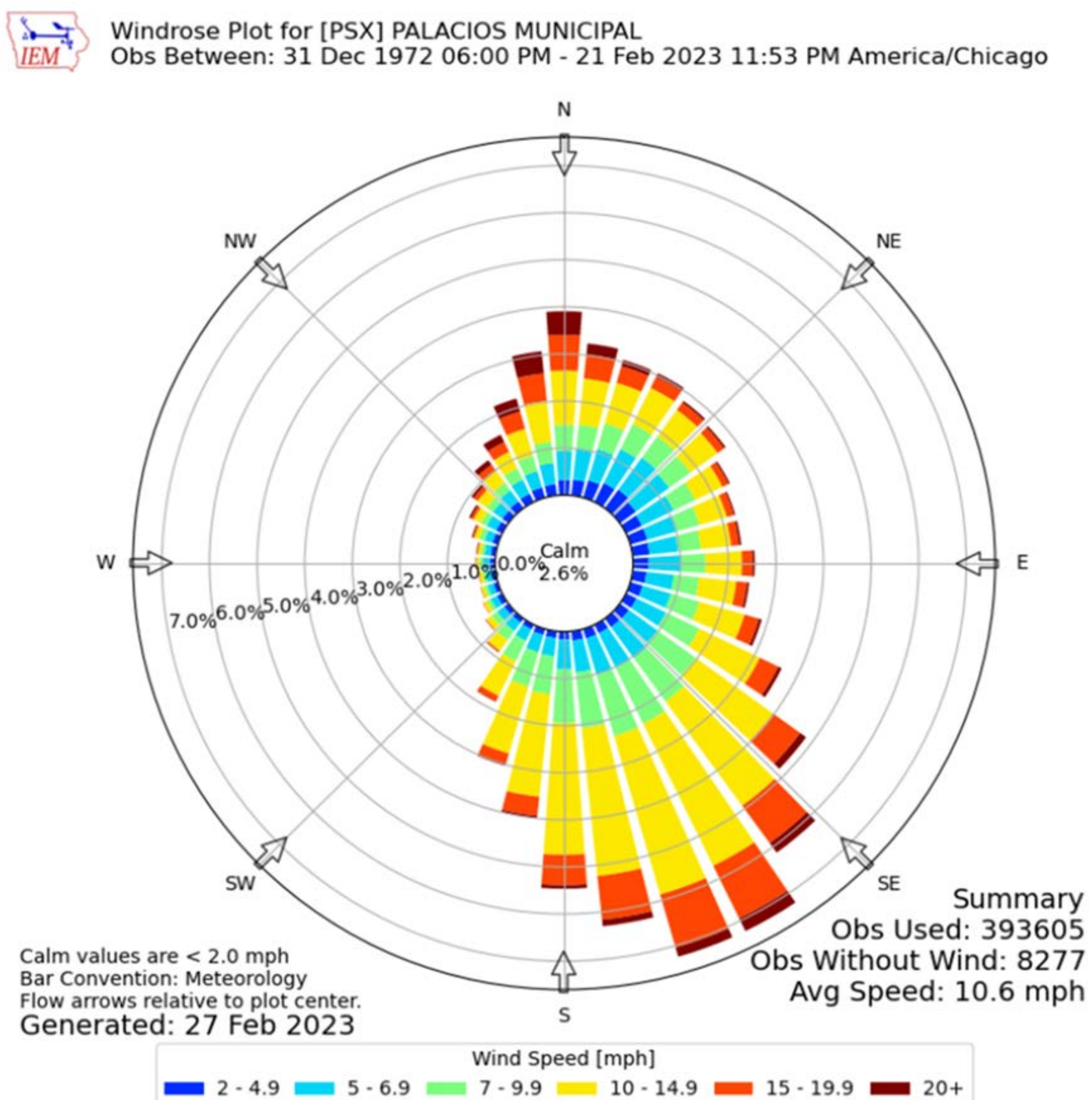


Figure 2.7-2: January Wind Rose Palacios — R. B. Trull Municipal Airport (KPSX) (1972 — 2023)

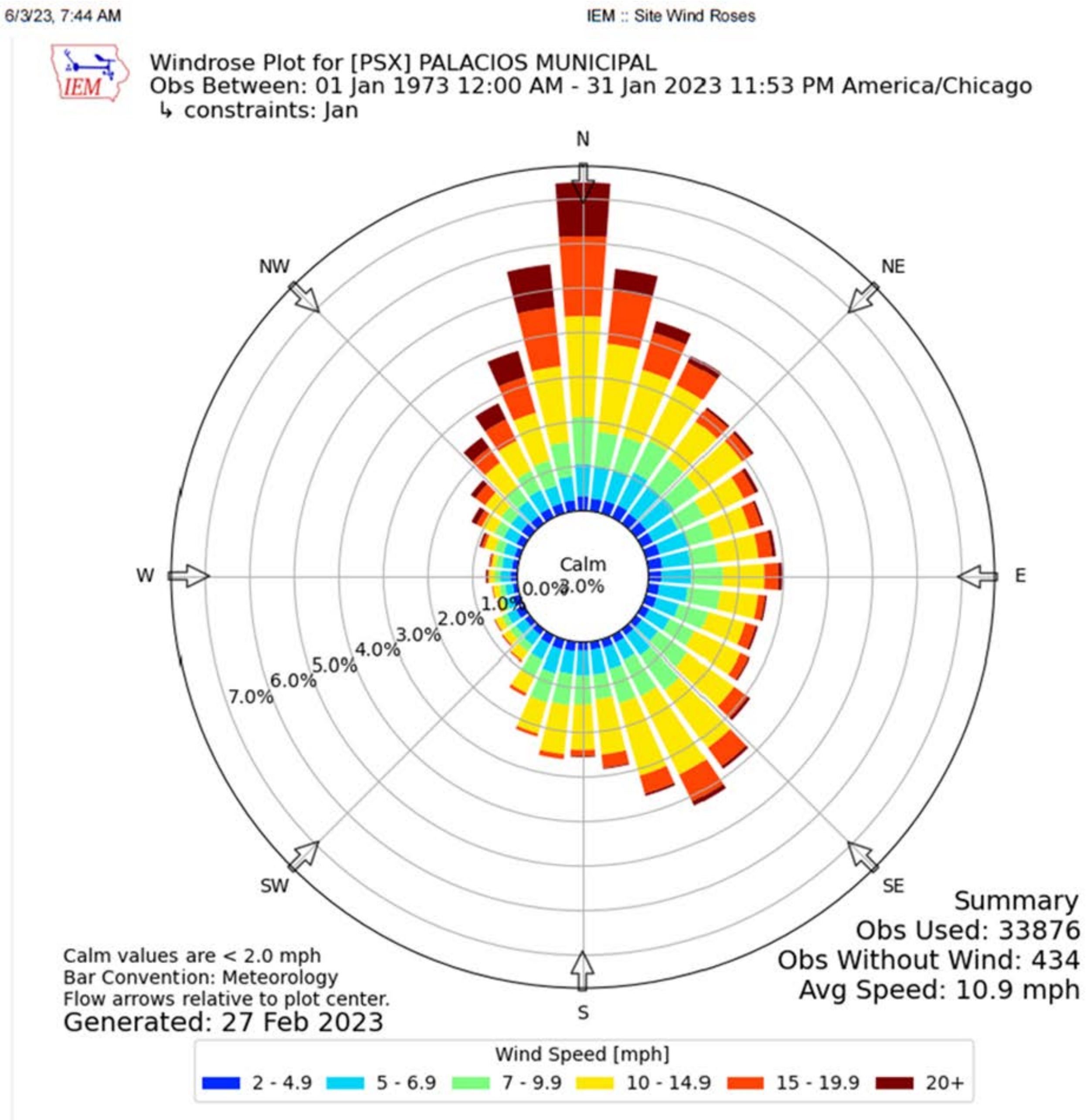


Figure 2.7-3: February Wind Rose Palacios — R. B. Trull Municipal Airport (KPSX) (1973 — 2023)

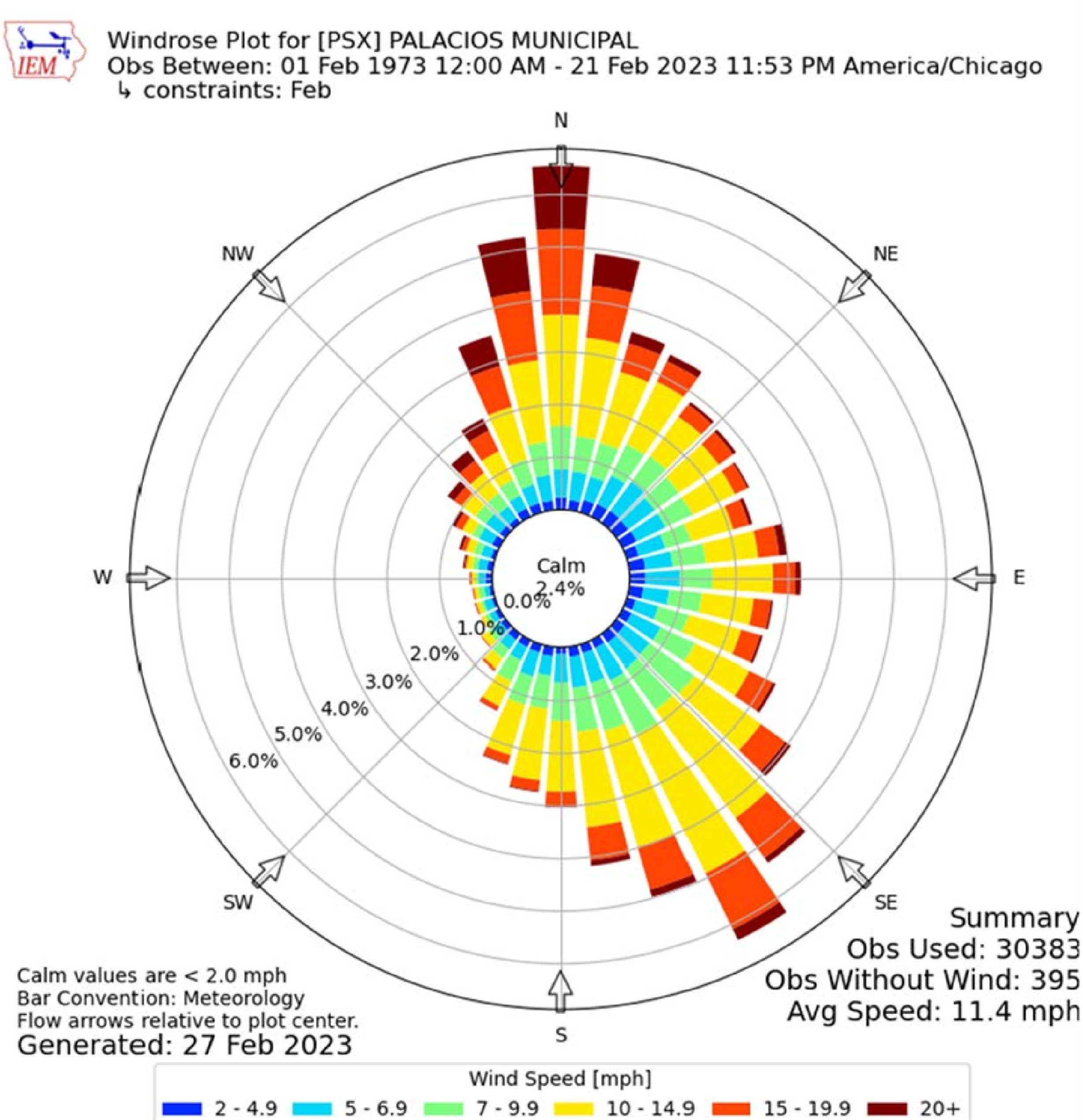


Figure 2.7-4: March Wind Rose Palacios — R. B. Trull Municipal Airport (KPSX) (1973 — 2023)

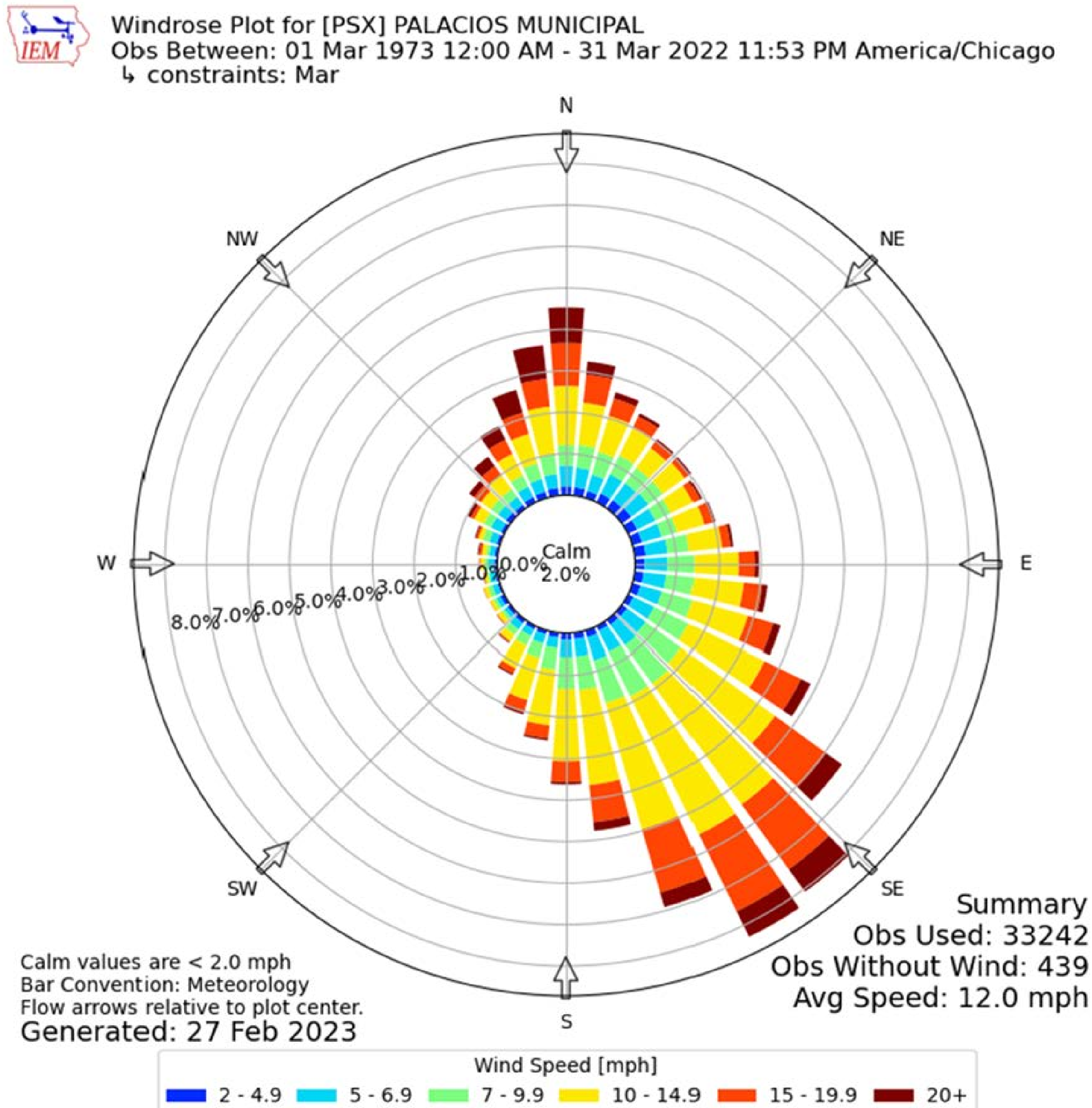


Figure 2.7-5: April Wind Rose Palacios — R. B. Trull Municipal Airport (KPSX) (1973 — 2022)

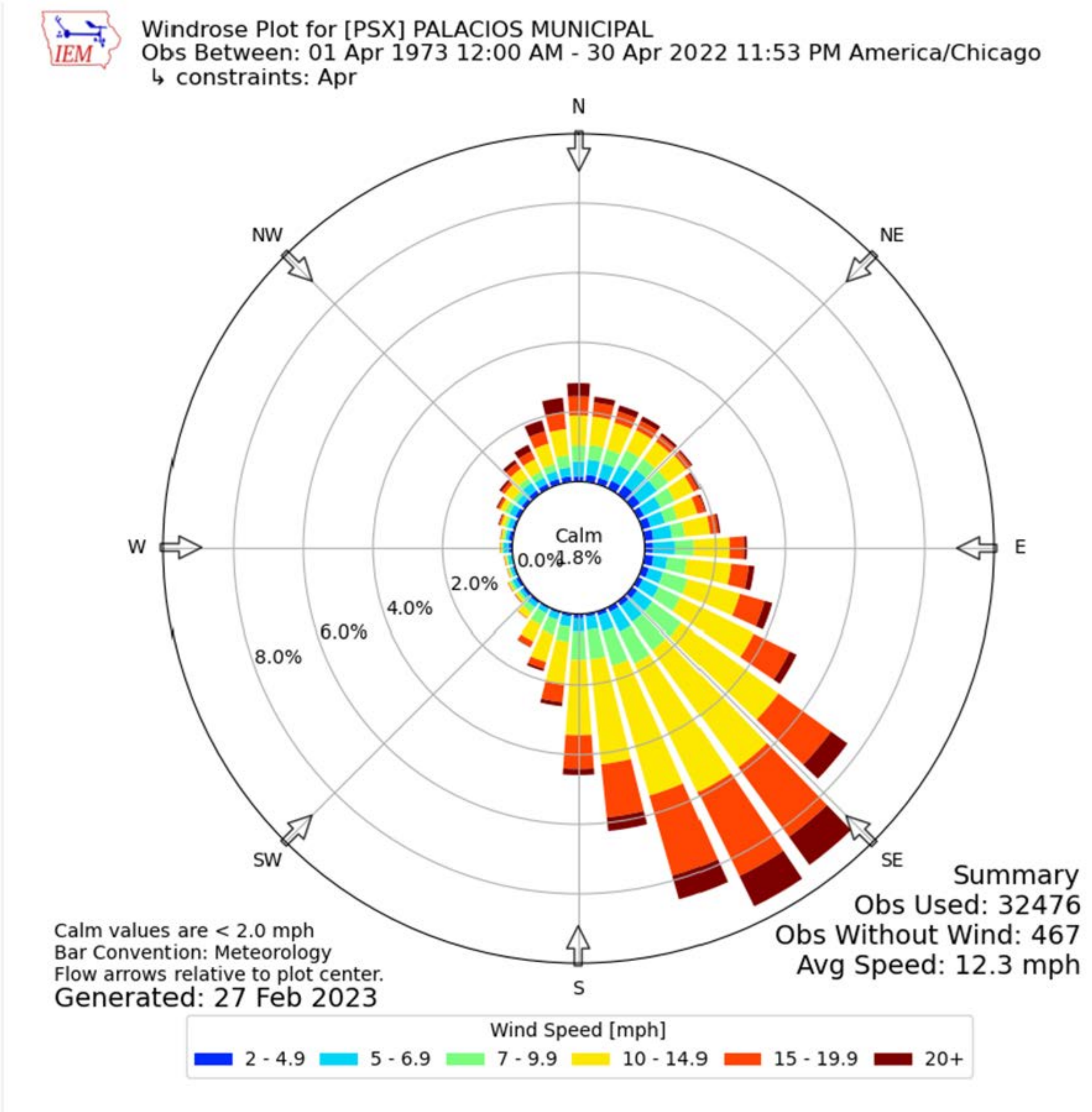


Figure 2.7-6: May Wind Rose Palacios — R. B. Trull Municipal Airport (KPSX) (1973 — 2022)

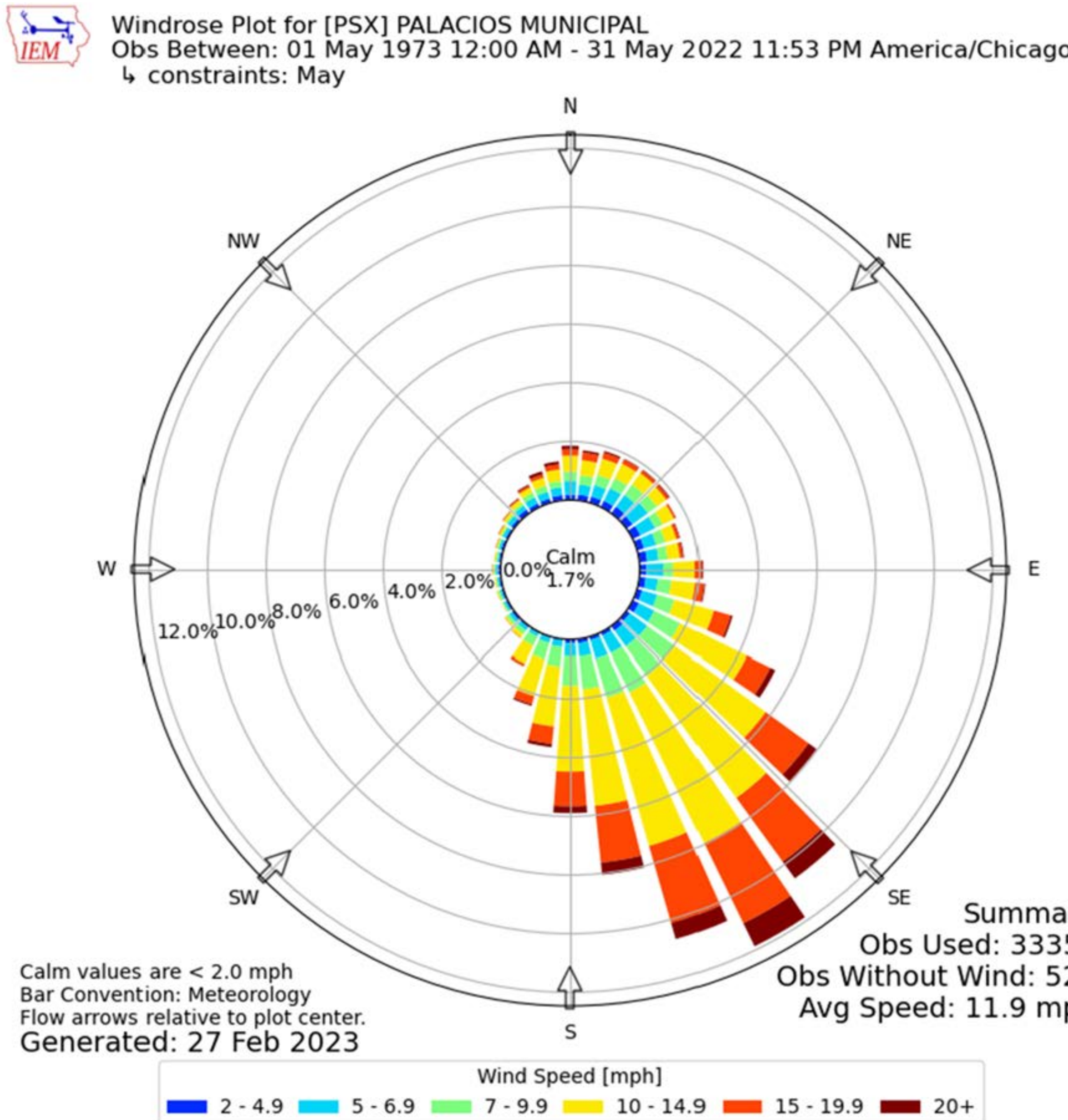


Figure 2.7-7: June Wind Rose Palacios — R. B. Trull Municipal Airport (KPSX) (1973 — 2022)

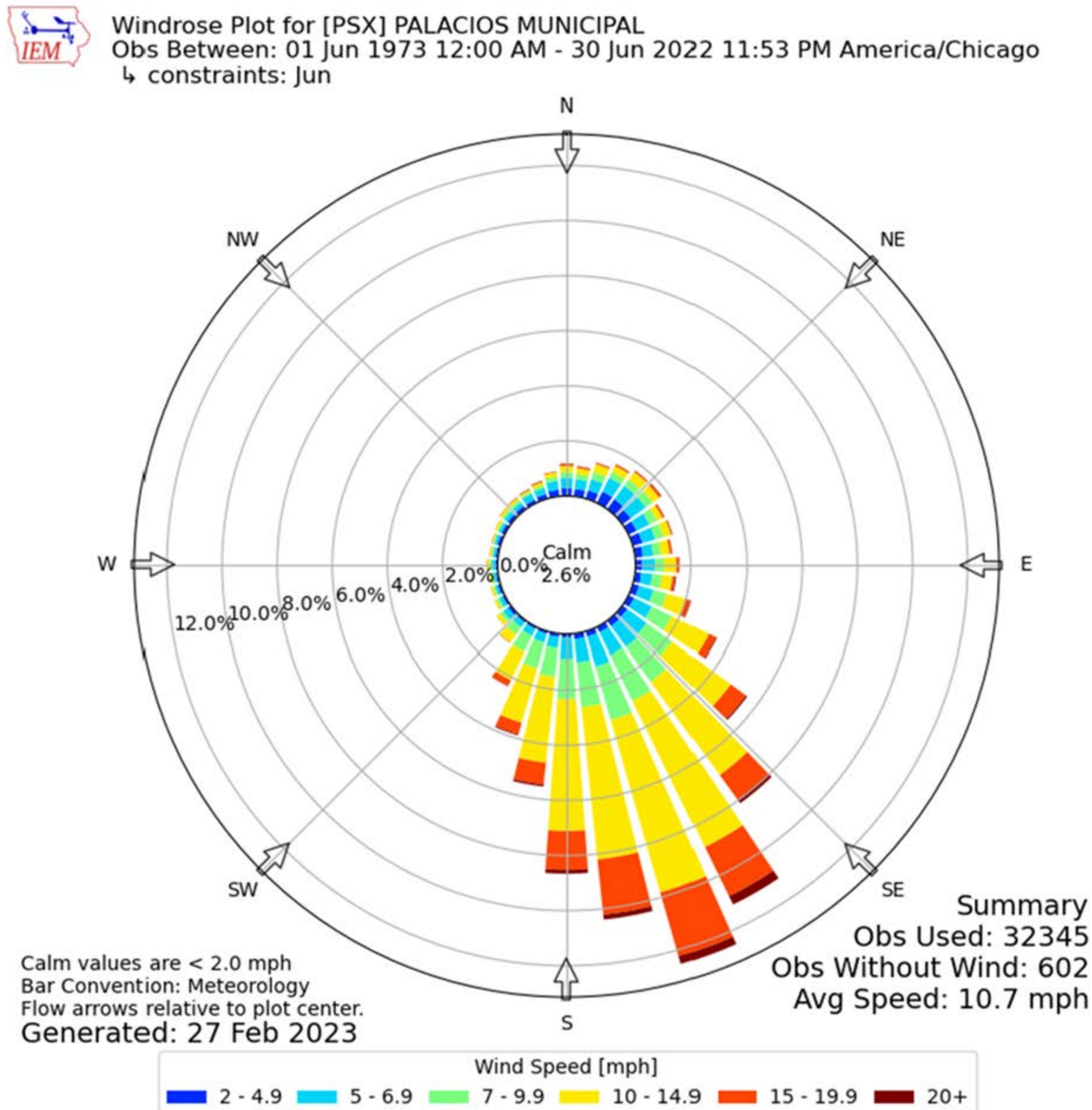


Figure 2.7-8: July Wind Rose Palacios — R. B. Trull Municipal Airport (KPSX) (1973 — 2022)

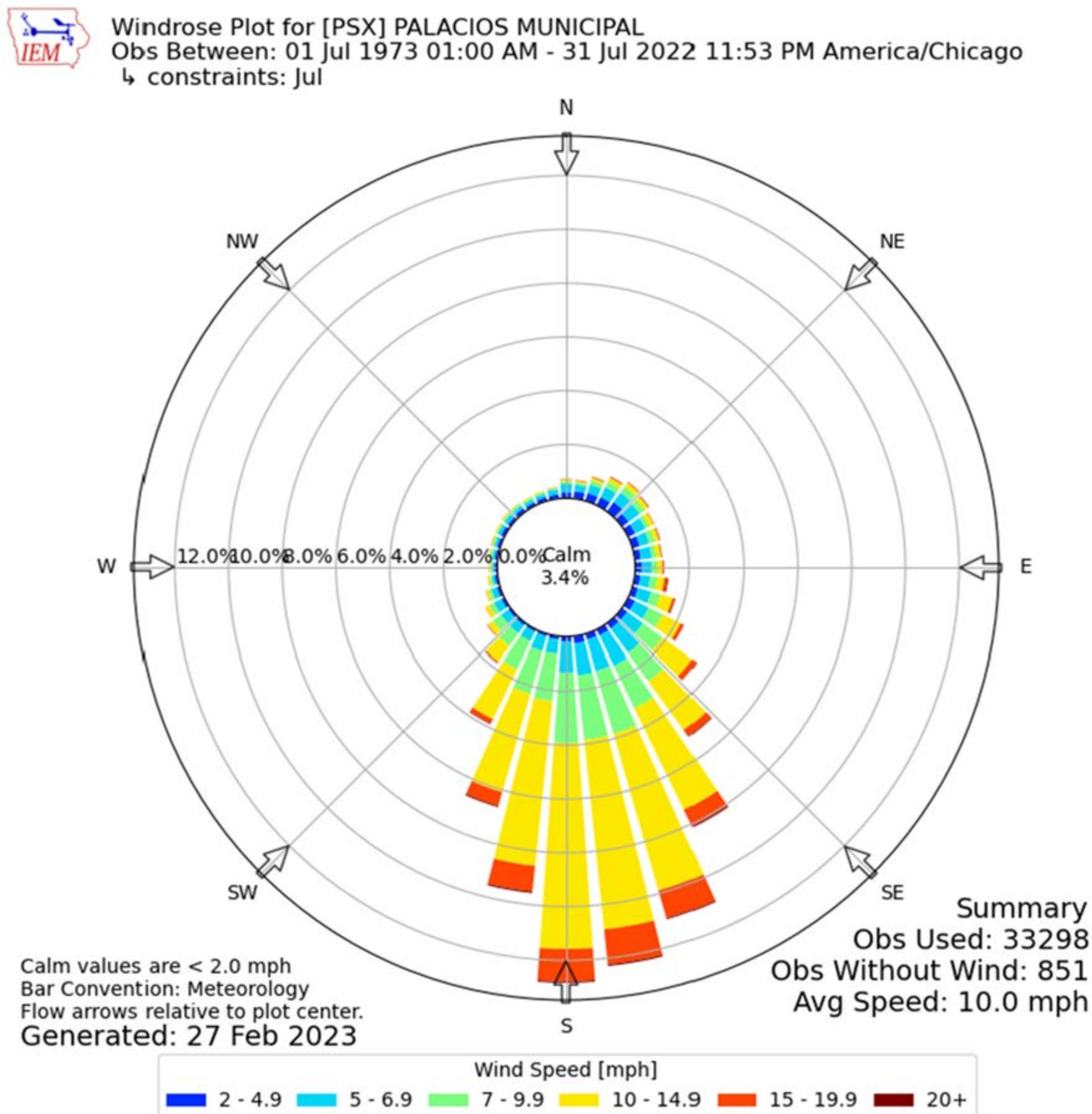


Figure 2.7-9: August Wind Rose Palacios — R. B. Trull Municipal Airport (KPSX) (1973 — 2022)

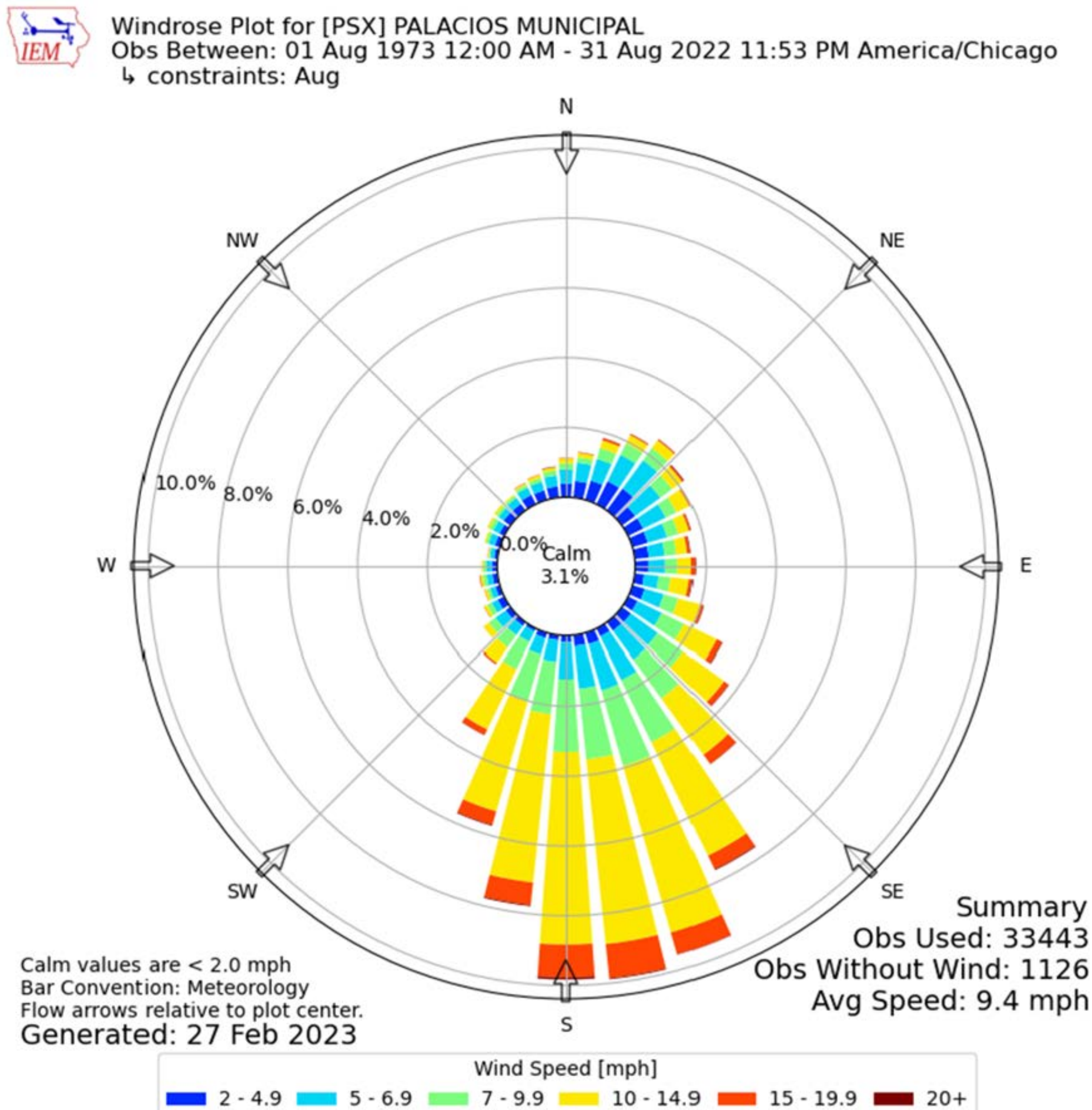


Figure 2.7-10: September Wind Rose Palacios — R. B. Trull Municipal Airport (KPSX) (1973 — 2022)

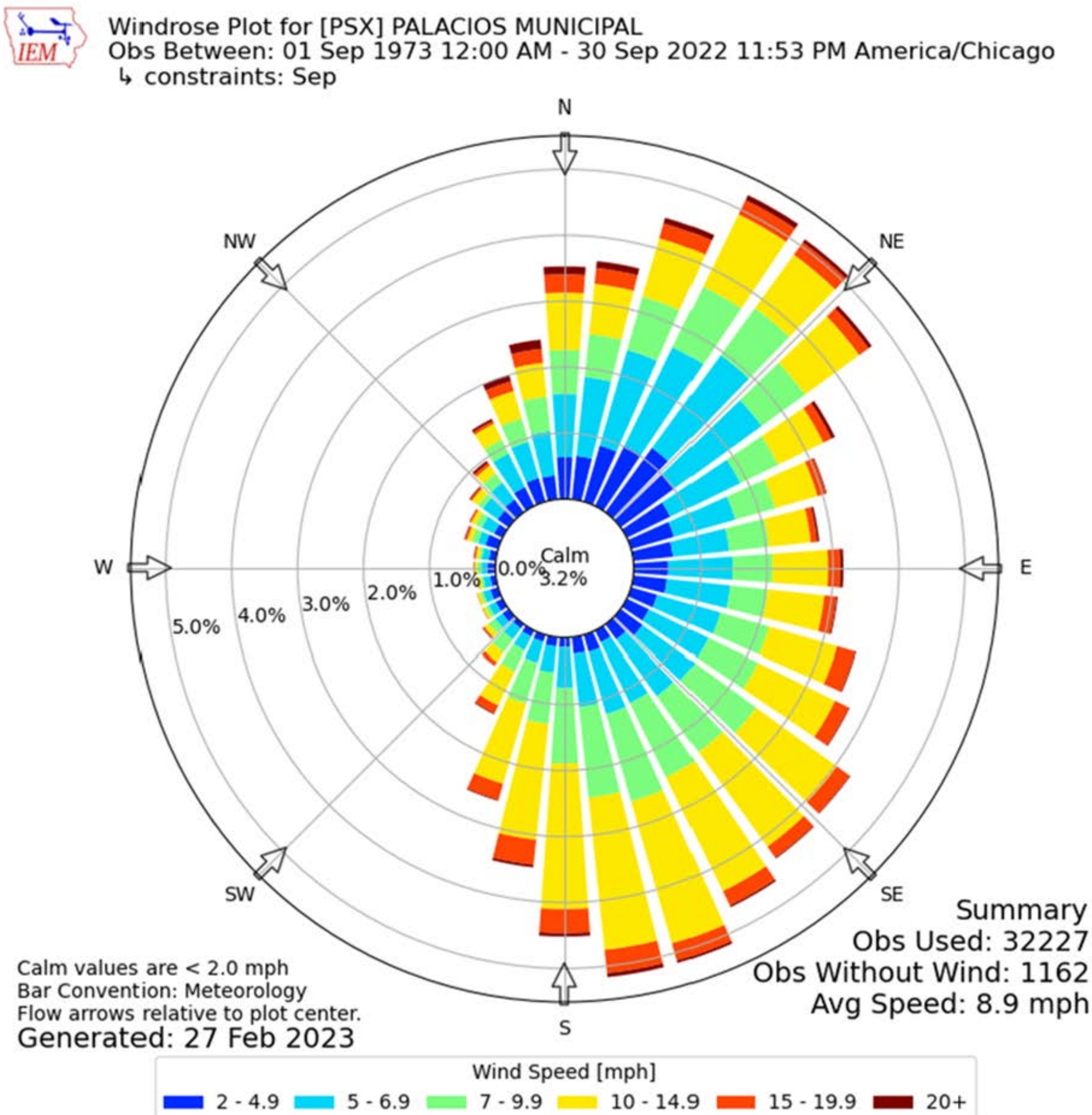


Figure 2.7-11: October Wind Rose Palacios — R. B. Trull Municipal Airport (KPSX) (1973 — 2022)

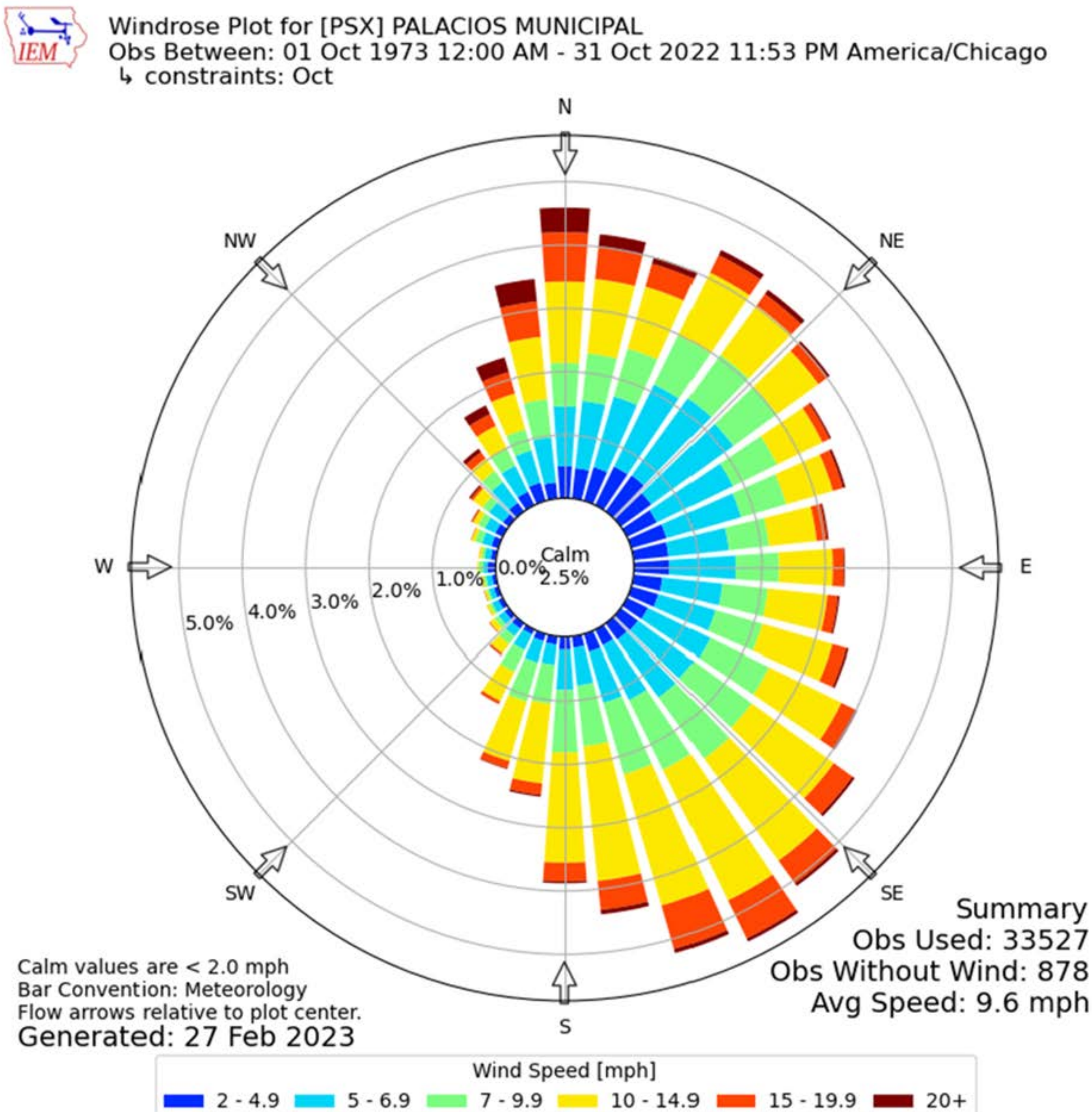


Figure 2.7-12: November Wind Rose Palacios — R. B. Trull Municipal Airport (KPSX) (1973 — 2022)

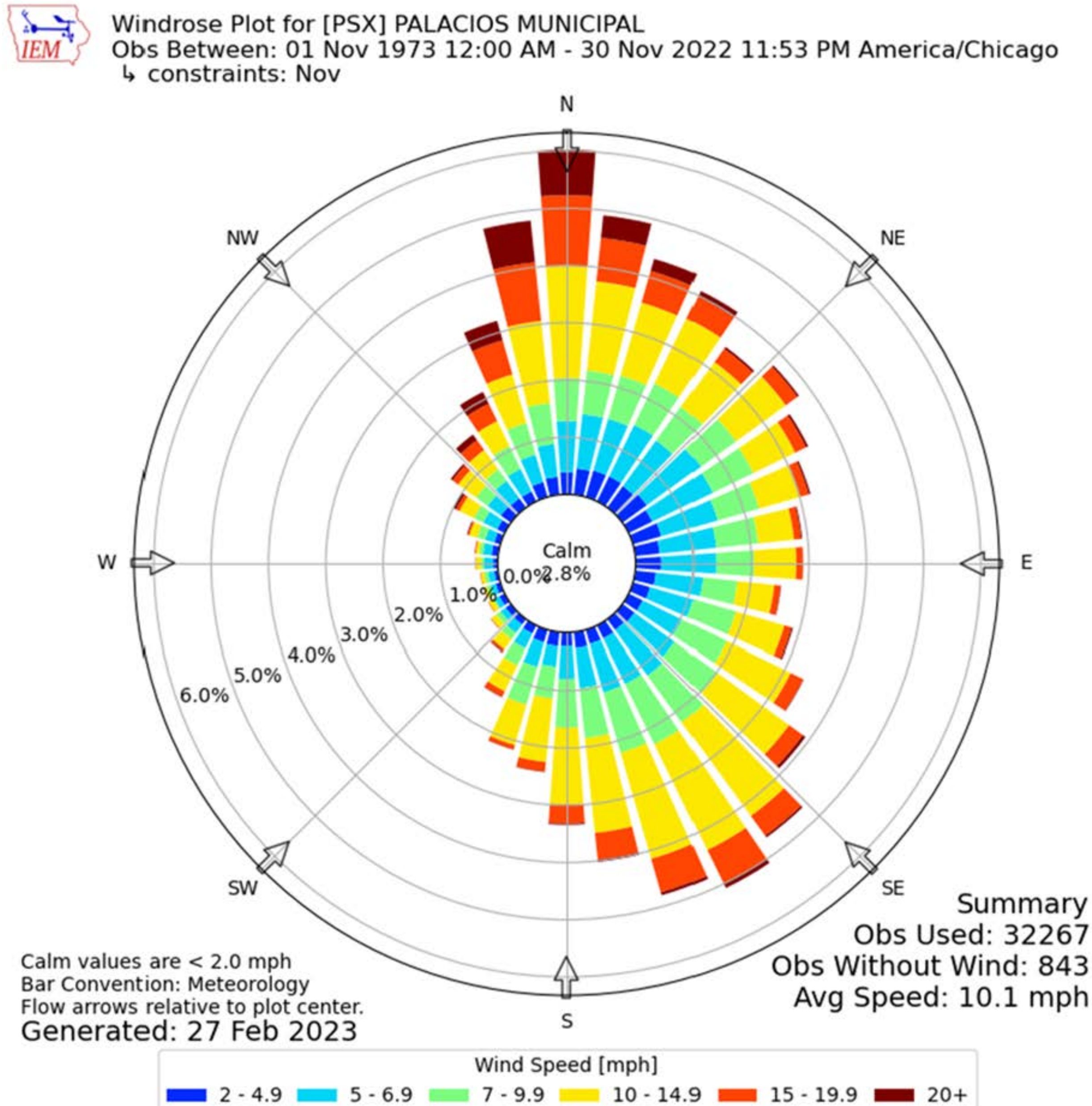
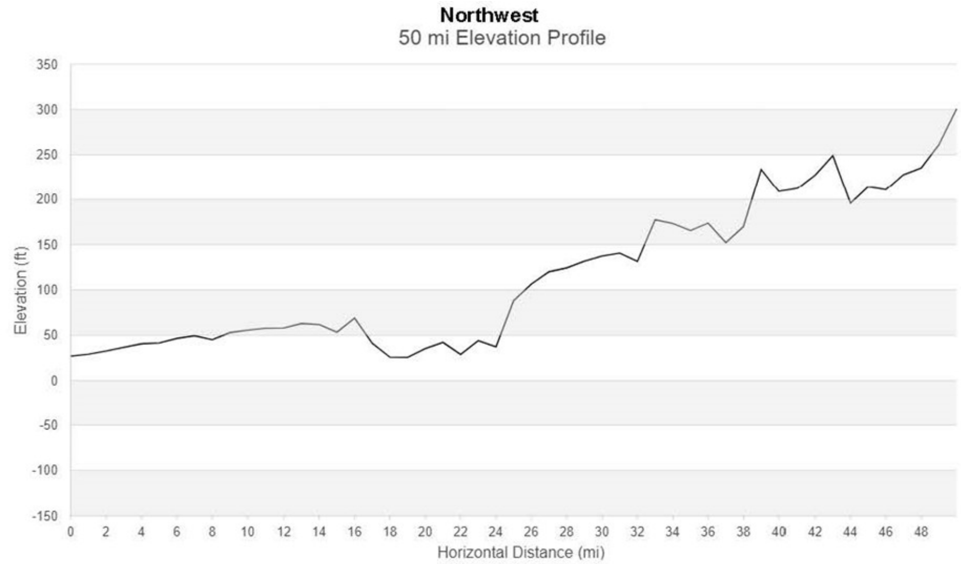
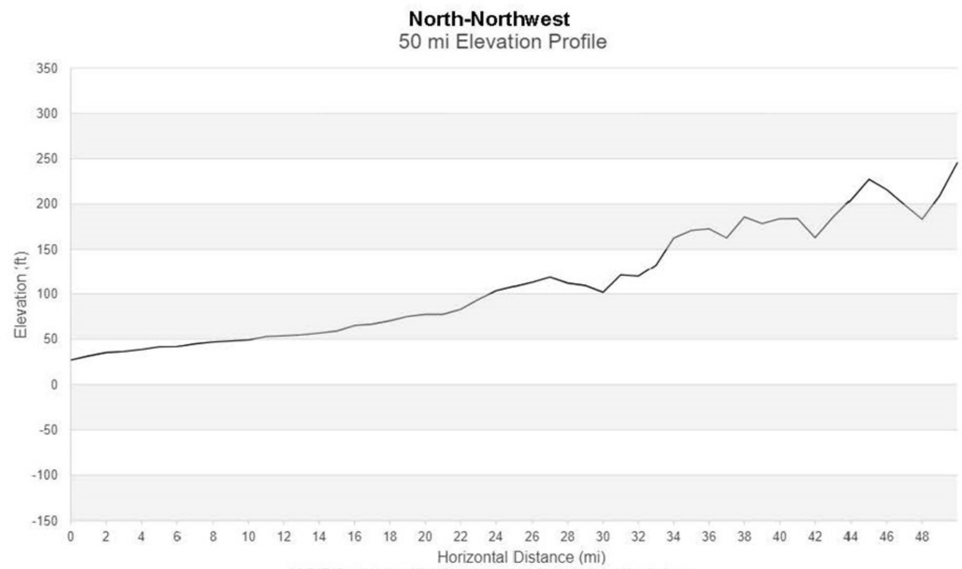


Figure 2.7-13: December Wind Rose Palacios — R. B. Trull Municipal Airport (KPSX) (1973 — 2022)

Figure 2.7-14: Topography Surrounding the Long Mott Generating Station Site

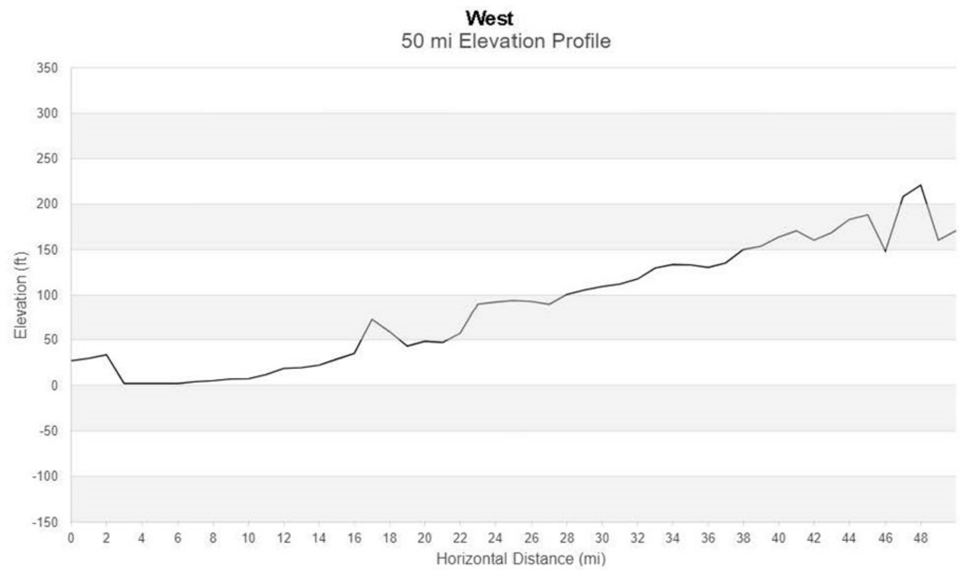
Figure 2.7-15: Figure Intentionally Not Used





USGS, https://www.sciencebase.gov/catalog

Figure 2.7-16 (1 of 8): Maximum Elevations Surrounding the Long Mott Generating Station Site



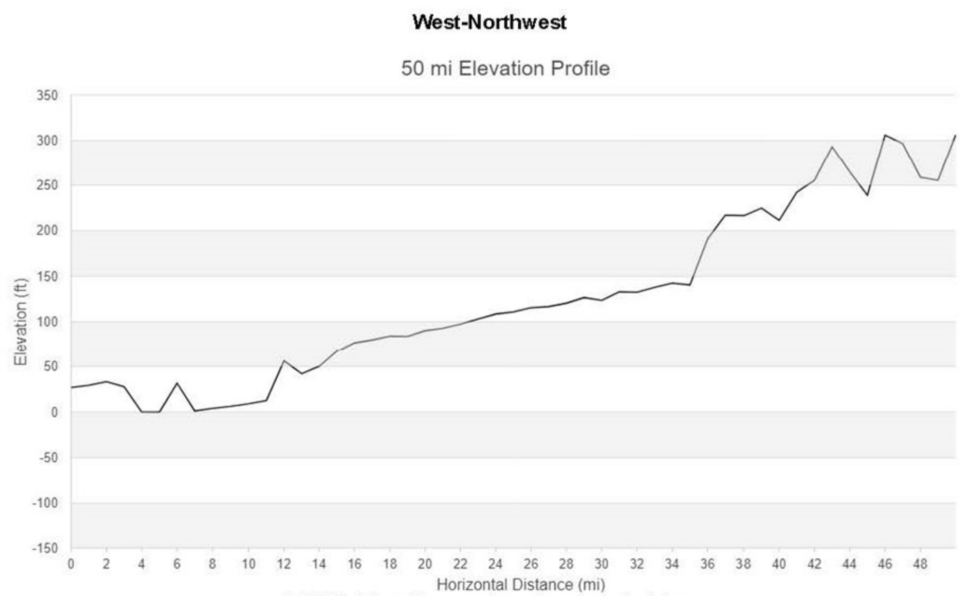


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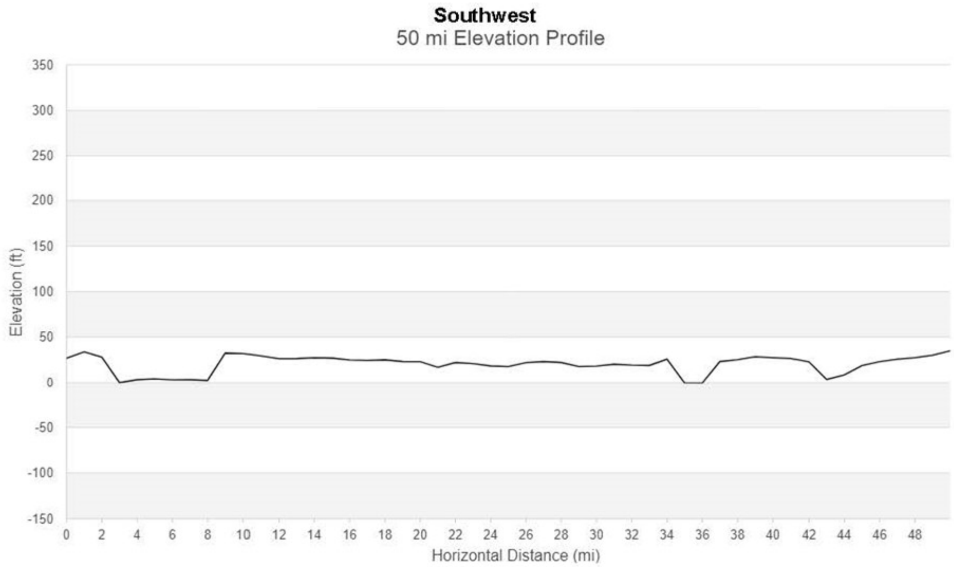
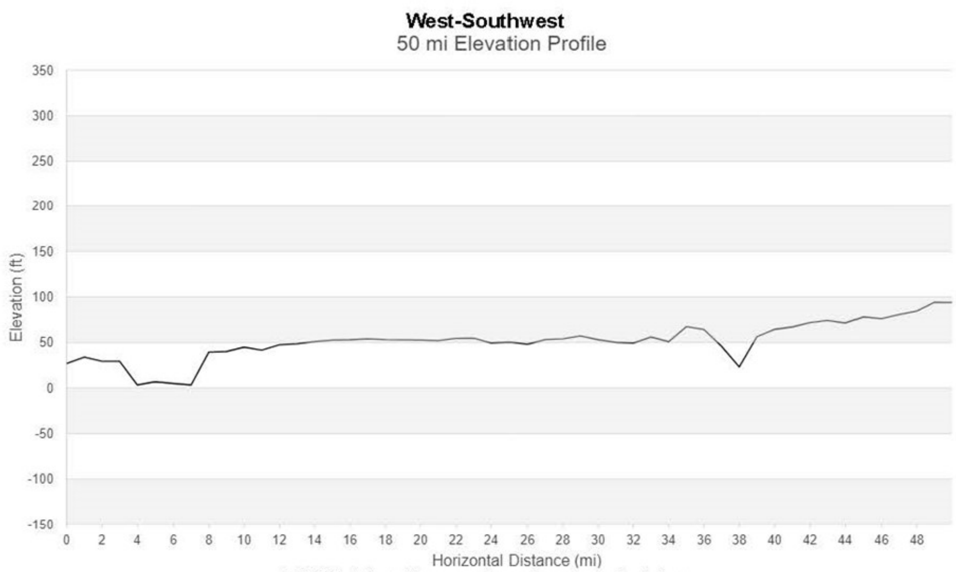
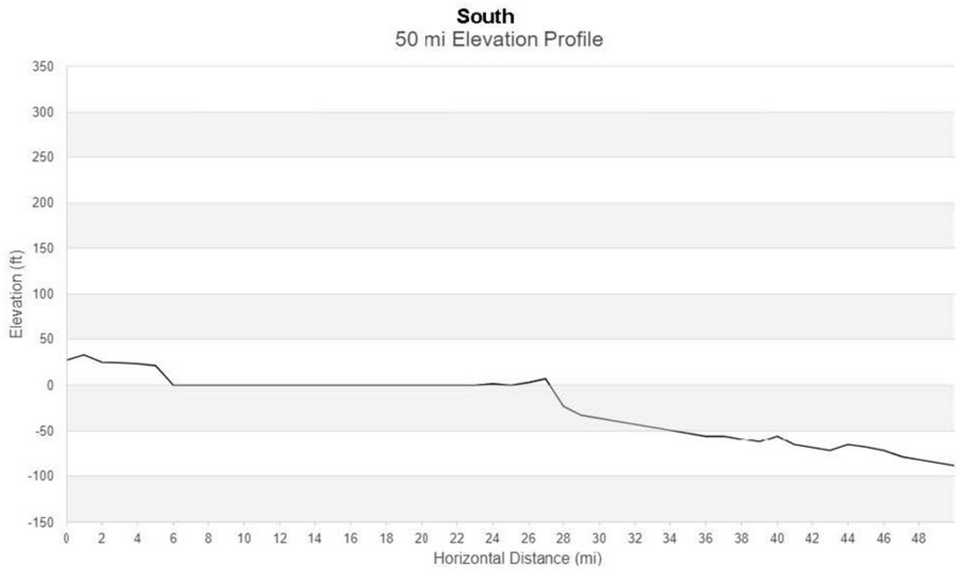
Figure 2.7-16 (2 of 8): Maximum Elevations Surrounding the Long Mott Generating Station Site

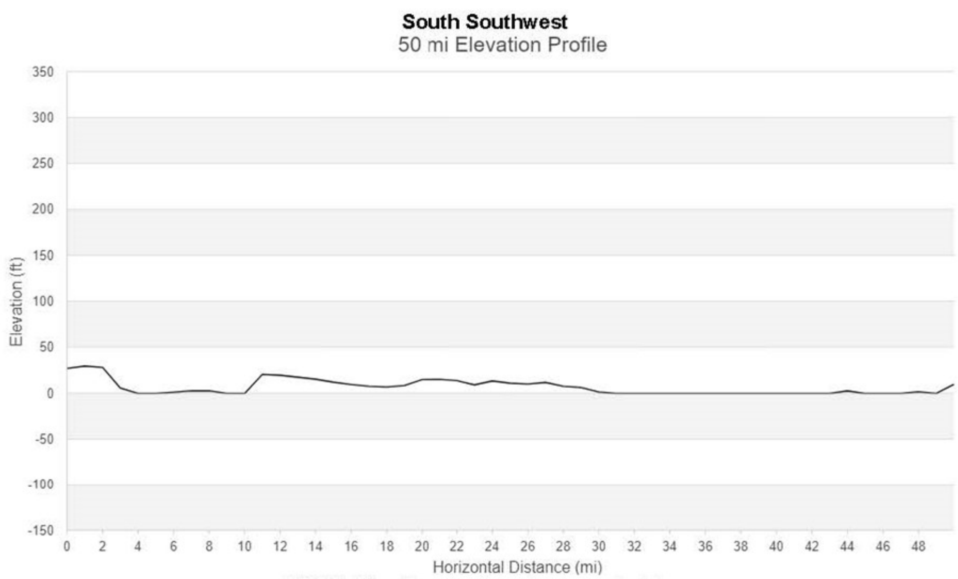




USGS, https://www.sciencebase.gov/catalog

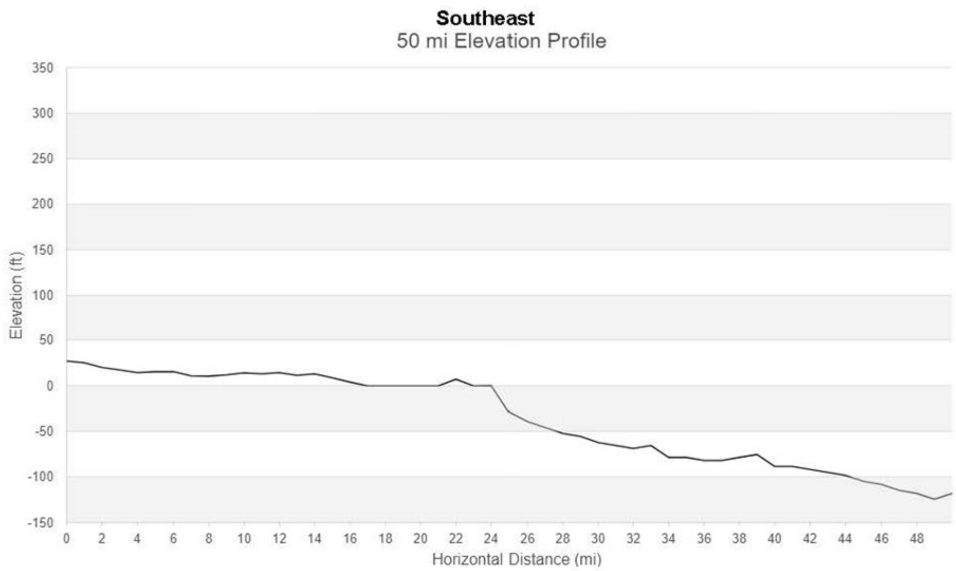
Figure 2.7-16 (3 of 8): Maximum Elevations Surrounding the Long Mott Generating Station Site

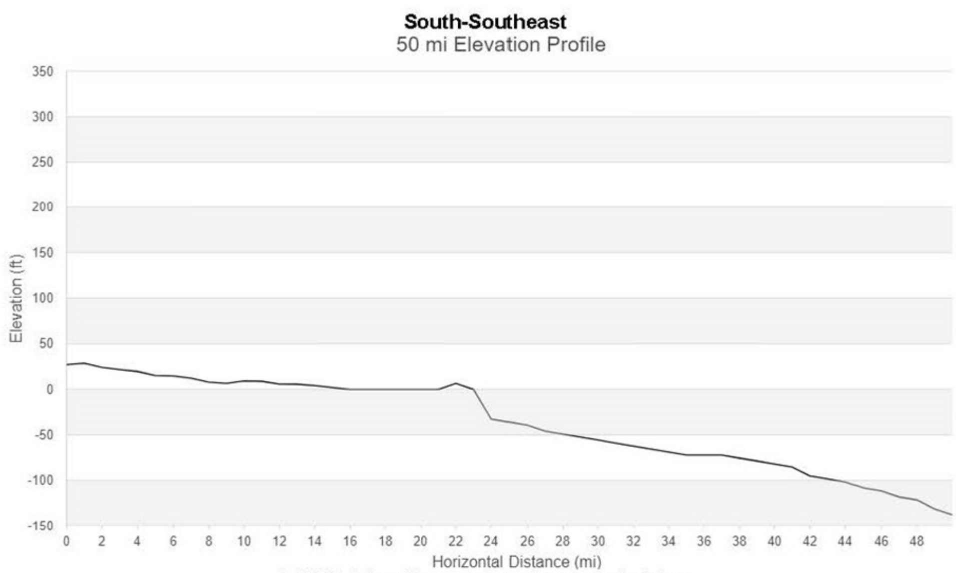




USGS, https://www.sciencebase.gov/catalog

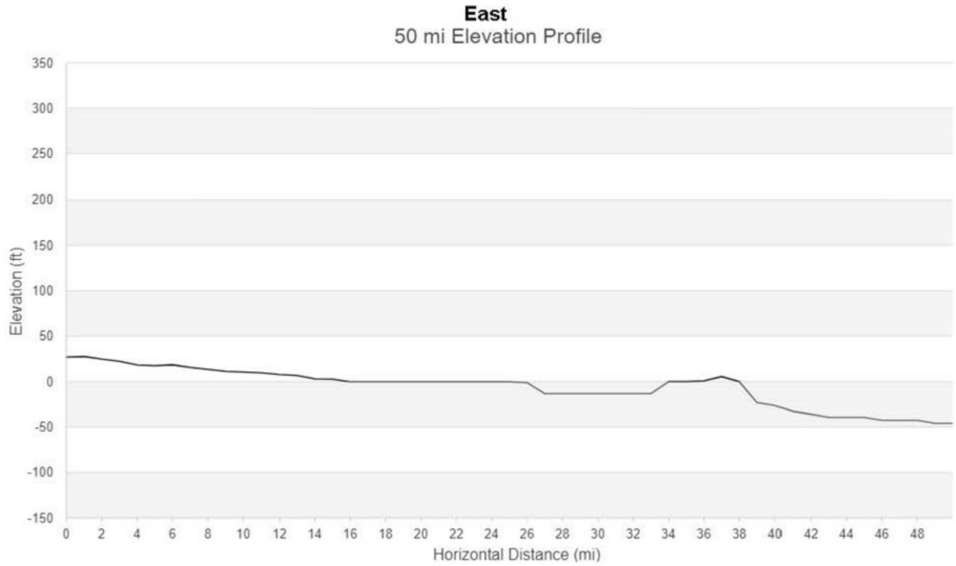
Figure 2.7-16 (4 of 8): Maximum Elevations Surrounding the Long Mott Generating Station Site

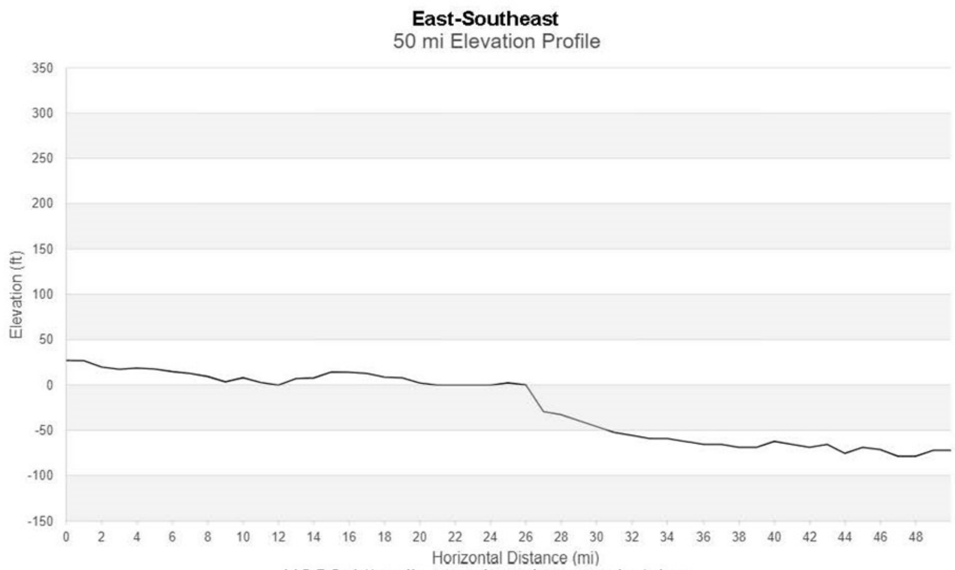




USGS, https://www.sciencebase.gov/catalog

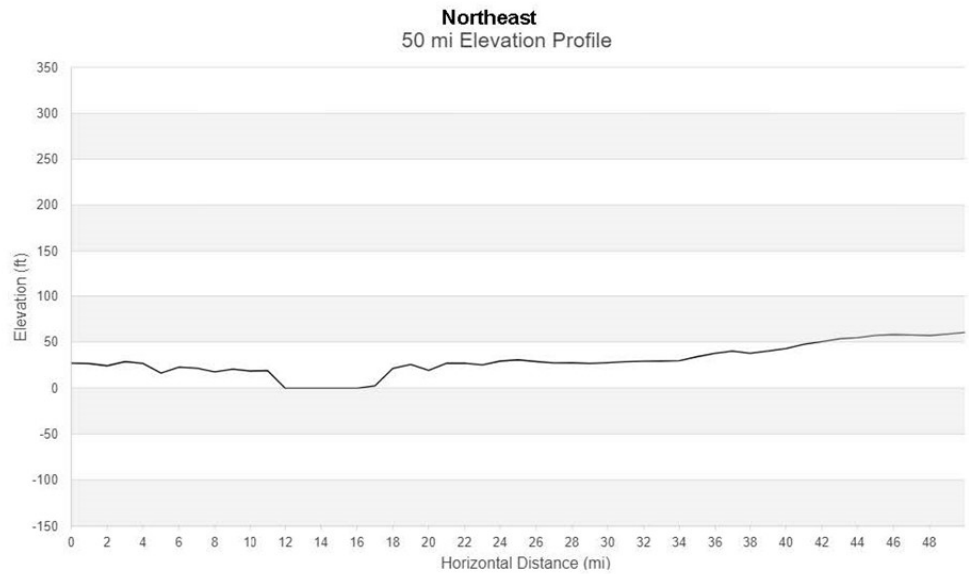
Figure 2.7-16 (5 of 8): Maximum Elevations Surrounding the Long Mott Generating Station Site

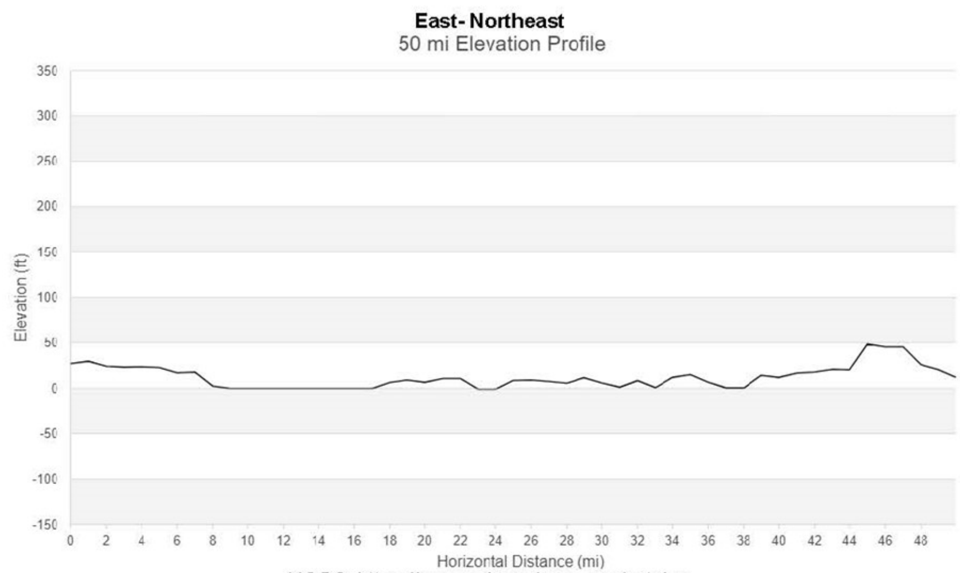




USGS, https://www.sciencebase.gov/catalog

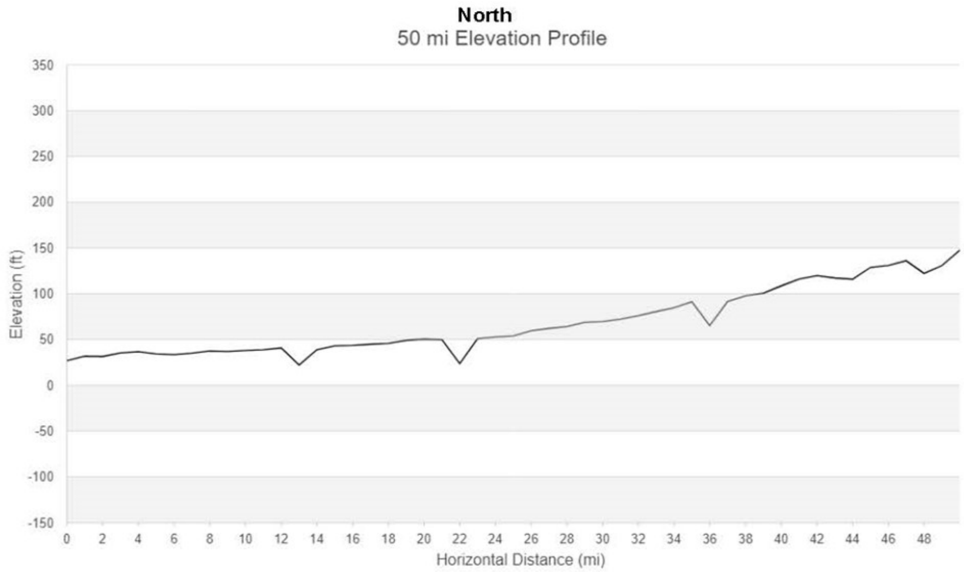
Figure 2.7-16 (6 of 8): Maximum Elevations Surrounding the Long Mott Generating Station Site

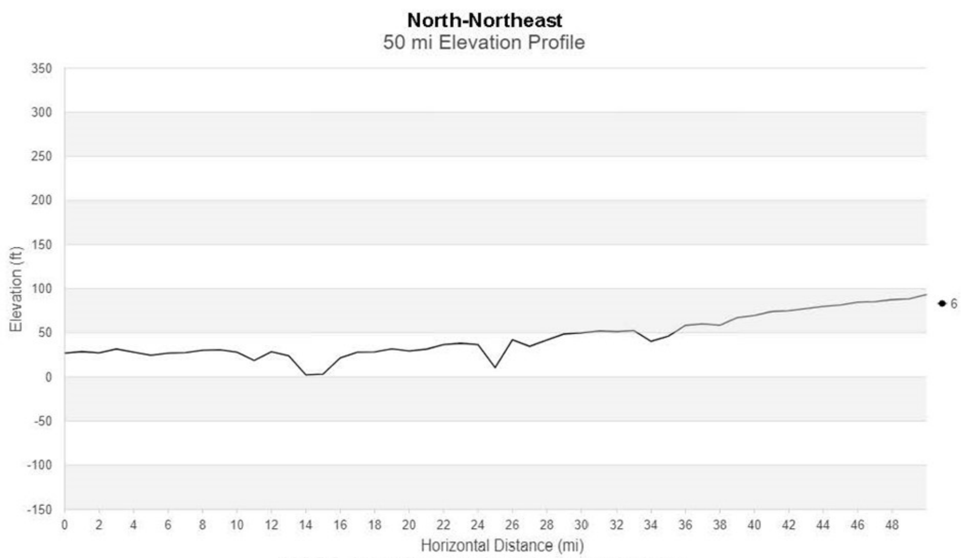




USGS, https://www.sciencebase.gov/catalog

Figure 2.7-16 (7 of 8): Maximum Elevations Surrounding the Long Mott Generating Station Site





USGS, https://www.sciencebase.gov/catalog

Figure 2.7-16 (8 of 8): Maximum Elevations Surrounding the Long Mott Generating Station Site

2.8 Related Federal Project Activities

The identification of related federal project activities is included in NUREG-1555, Section 2.8. Specifically the regulations identify any federal activities related to this project that may affect plant siting, transmission line routing, plant water supply, or the need for power, and whether another federal agency should participate in the review of the environmental report as a cooperating agency.

RG 4.2, Revision 3, directs the applicant to aggregate the analysis of related federal project activities as part of the overall cumulative effects analysis. The term “cumulative effects” refers to the effects on the environment that result from the incremental effects of an action when added to the effects of other past, present, and reasonably foreseeable actions regardless of what agency (federal or non-federal) or person undertakes such other actions. In other words, it is the aggregated effect of a subject federal action in combination with other projects (NAA, 2023).

Therefore, the discussion of related federal projects is integrated into the cumulative effects analysis included in Chapter 7, Cumulative Impacts. This approach helps to identify and assess the potential environmental impacts of a proposed action in relation to other past, present, and reasonably foreseeable actions.

Tables

None

Figures

None

2.9 Nonradiologic Health

This section describes aspects of the affected environment at the LMGS site and within the vicinity of the LMGS associated with nonradiological human health. It provides the basis for evaluation of impacts on human health from building and operation at the LMGS site. Section 2.9.1 describes public and occupational health, Section 2.9.2 discusses noise, Section 2.9.3 discusses transportation safety, and Section 2.9.4 discusses electromagnetic fields (EMF).

2.9.1 Public and Occupational Health

This section describes public and occupational health at the LMGS site and within the vicinity associated with occupational injuries, exposure to hazardous chemicals, and etiological agents (i.e., disease-causing microorganisms).

In 2020, approximately 5159 people lived within 10 mi (16 km) of LMGS (Table 2.5-1). As identified in Section 2.5.1.2, the nearest residence is located approximately 0.20 mi (0.32 km) north of LMGS at its closest point. Land use within the LMGS site and vicinity is described in Section 2.2.1. The LMGS site is currently comprised of cultivated cropland and a portion of the site supports the existing SDO facility. Recreational areas within the LMGS vicinity are identified in Section 2.5.2.2. The nearest recreational area is the Mission Lake Unit of the Guadalupe Delta WMA located approximately 1.37 mi (2.20 km) west of the LMGS site at its closest point.

Those vulnerable to noise, fugitive dust, and gaseous emissions resulting from building and operations activities at the LMGS site are listed below in order of most vulnerable to least vulnerable:

- Construction workers and on-site personnel working at the LMGS site
- Operational workers at the DOW SDO
- People living near the LMGS site
- Transient populations (i.e, temporary employees, recreational visitors, tourists)

Occupational hazards within existing industries surrounding LMGS including SDO are managed and minimized by compliance with Occupational Safety and Health Administration (OSHA) regulations. As described in Section 4.4.4 and 5.8.2.5, building activities and operations at the LMGS site are subject to similar Federal and State occupational safety and health regulations.

2.9.1.1 Occupational Injuries

In general, occupational health risks to workers and on-site personnel engaged in activities related to building and operating nuclear power plants would be predominantly occupational injuries (e.g., falls, electric shock, asphyxiation) or occupational illnesses. Recent Bureau of Labor Statistics (BLS) data, which lists incidence rates of nonfatal occupational injuries and illnesses by industry, were reviewed to estimate relevant occupational injury rates to provide a context for analysis of potential project impacts. The incidence rate is defined as the number of recordable cases per 100 full-time equivalent workers. Industries that are relevant to building and operation of the LMGS include the Professional and Business Services, Manufacturing, and Service Providing industry categories as classified under the North American Industry Classification System (NAICS).

Table 2.9-1 summarizes the average incidence rates of non-fatal occupational injuries in 2022 for selected industries. The 2022 incidence rates for non-fatal occupational injuries to construction workers were 2.4 nationally and 1.3 in Texas. Across all private industries, the national rate of recordable cases was 2.7, whereas those for industries that may reflect operations at the LMGS (Professional and Business Services, Manufacturing, Service Providing, and Electric Power Generation) ranged from 1.0 to 3.2. The overall rate of recordable cases was 1.9 for Texas, whereas those for industries that may reflect operations (Professional and Business Services, Manufacturing, Service Providing) in Texas ranged from 0.8 to 2.1.

Comparable BLS data exist for occupational fatal injury rates and are also summarized in Table 2.9-1. Fatal injury rates are defined by the BLS as the number of fatal occupational injuries per 100,000 full-time equivalent workers. The 2022 incidence rates for fatal occupation injuries to construction workers were 9.6 nationally and 10.6 in Texas. The national fatality rate across all private industry in 2022 was 3.9 and in Texas was 4.3 per 100,000 full-time equivalent workers. Fatality rates for construction workers exceeded the fatality rates across all private industry for both the national and Texas average in 2022. Overall, within the state of Texas, industries that are relevant to the building and operation of the LMGS with reported data have more fatalities per 100,000 full-time equivalent workers in all industries but Professional and Business Services.

Nuclear Electric Power Generation is one of eight electric generation classifications of the NAICS and falls within the Electric Power Generation, Transmission, and Distribution Industry, which is further classified under the larger Utilities industry sector. The national occupational injury and illness rate for the electric generation industry was lower than all other industry categories shown in Table 2.9-1 (BLS, 2023a).

Occupational injury and fatality risks are controlled by compliance with OSHA safety standards, practices, and procedures to minimize worker exposures to injuries or illnesses. OSHA sets enforceable permissible exposure limits for about 500 hazardous chemicals to protect workers against the health effects of exposure to hazardous substances, including limits on the airborne concentrations of hazardous chemicals in the air and skin contact. Most permissible exposure limits are 8-hour time-weighted averages, although there are also ceiling and peak limits. Regulatory limits for chemical hazards are found in 29 CFR Part 1910. Section 4.4.4 and Section 5.8.2.5 describe measures which will be taken to minimize the incidence of injuries and illnesses to workers and the public during building and operations.

2.9.1.2 Chemical Hazards

The EPA Facility Registry Service (FRS) is a centrally managed database that identifies facilities or sites subject to environmental regulation. Sources of facility information come from a variety of EPA programs including Assessment, Cleanup, and Redevelopment Exchange System (ACRES), Superfund Enterprise Management System (SEMS), and the Toxics Release Inventory System (TRIS). The Envirofacts Multisystem Search Form provided by the SDO. EPA allows users to search multiple environmental databases for facility information, including those within the FRS. EPA's Enforcement and Compliance History Online (ECHO) tool within Envirofacts allows users to access integrated site-specific compliance data from a variety of EPA data systems compiled in one location.

A search within a 1 mi (1.6 km) radius of the LMGS site center point was conducted using FRS geographic information system data from the ACRES, SEMS, and TRIS databases to identify existing issues involving hazardous chemicals on or near the site, including brownfields, superfund sites, and toxic releases. No toxic release sites, superfund sites, or brownfields are located within a 1 mi (1.6 km) radius of the LMGS site center point. The nearest toxic release site is 1.35 mi (2.17 km) from the LMGS site at the existing SDO facility (EPA, 2023d). Potential releases from the existing SDO facility may be a source of chemical exposure and are indicative of storage, use, or production of the reported chemicals at the facility. However, SDO stores, uses, and produces chemicals in accordance with all relevant state and federal regulations including the CAA, CWA, RCRA, Safe Drinking Water Act, Emergency Planning and Community Right-to-Know Act, and Toxic Substances Control Act (EPA, 2023e).

Section 2.2 of the PSAR presents detailed information on chemical hazards within the vicinity of the LMGS site center point.

2.9.1.3 Etiological Agents

The presence of disease-causing microorganisms (etiological agents) was analyzed for occurrence within the State of Texas. Microorganisms of concern include enteric pathogens (such as Salmonella spp. and *Pseudomonas aeruginosa*), bacteria (including Legionella spp.), thermophilic fungi, and free-living amoeba (such as *Naegleria fowleri* and Acanthamoeba spp.). Information from the CDC's National Outbreak Reporting System was reviewed to identify the number and nature of cases associated with non-foodborne etiological outbreaks within Texas from 2011 to 2021. The statistics for Texas are summarized in Figure 2.9-1 and Figure 2.9-2.

The most predominant pathogen within the state of Texas is Shigella spp., which is most often transferred person-to-person. Cryptosporidium spp. and Legionella spp. are pathogens predominantly spread through contact with water. Based on data from the CDC, water sources known to cause exposure to Cryptosporidium spp. and Legionella spp. include treated recreational water, such as that found in waterparks and swimming pools, as well as untreated recreational water from a lake, reservoir, or impoundment. Campylobacter spp., Shigella spp., and Escherichia spp. have also spread through contact with water within the State of Texas. This transference is predominantly attributable to contact with untreated recreational water such as that found in lakes, reservoirs, impoundments, rivers, streams, and oceans; in addition to treated recreational water found in swimming pools (CDC, 2023).

2.9.2 Noise

Noise is defined as the intensity, duration, and character of sounds from all sources. Sound waves are characterized by frequency, measured in Hertz (Hz), and sound pressure is expressed as decibels (dB). The human threshold of audibility ranges from about 60 dB at a frequency of 31 Hz to less than about 1 dB between 900 Hz and 8000 Hz. For regulatory purposes, noise levels for perceptible frequencies are weighted to provide an A-weighted sound level (dBA) that correlates highly with individual community response to noise. Sound levels outside the range of human hearing are not considered noise in a regulatory sense, even though wildlife may hear sounds at these frequencies (PNNL, 2007).

Noise levels are often reported as the equivalent sound level (L_{eq}). The L_{eq} is expressed in dBA over a specified period, usually 1 hour or 24 hours. The L_{eq} is the equivalent steady sound level that, if continuous during a specified time period, would contain the same total energy as the actual time-varying sound over the monitored or modeled time period (PNNL, 2007).

As noted in Section 2.2, Land, the majority of the LMGS site is comprised of cultivated cropland, while a portion of the site supports the existing SDO facility. The LMGS site is flat, with little change in elevation or presence of dense vegetation that would affect the propagation of sound across the property. Additional details regarding land uses on and in the vicinity of the LMGS site are described in Section 2.2.

The current noise environment at the LMGS site is influenced by the operation of SDO and related adjacent activities. According to an industrial hygiene noise study conducted in February 2021, the most significant sources of noise at the existing SDO site (i.e., those requiring hearing protection when in immediate proximity) are the pump station and raw water intake located west of the LMGS between the Victoria Barge Canal and State Highway 185, and equipment associated with the North Landfill Area, which is located within the portion of SDO included in the LMGS site boundary.

Noise-sensitive receptors typically include residences, recreational areas, and public buildings or other developed sites where frequent public use occurs. While the closest human receptors to the LMGS are the employees and visitors of SDO, it is not publicly accessible and is an industrial site where high noise levels are compatible with the use of the facility. The nearest off-site noise-sensitive receptor in proximity to the LMGS is a residence located north adjacent to State Highway 35, approximately 0.20 mi (0.32 km) north of the LMGS site at its closest point. The nearest recreational area is the Mission Lake Unit of the Guadalupe Delta WMA (Figure 2.1-2) located approximately 1.37 mi (2.20 km) west of the LMGS site at its closest point. There are no schools, churches, or other public buildings in a 2 mi (3.2 km) radius of the LMGS site that would be vulnerable to noise impacts from the LMGS.

2.9.2.1 Ambient Noise Survey

An ambient noise survey was conducted in July 2023 to characterize the baseline acoustical conditions at the LMGS and adjacent noise-sensitive receptors. The noise survey incorporated environmental sound monitors at eight locations around the LMGS site. Monitoring sites were established to characterize the baseline acoustical conditions at the LMGS site and at the nearest noise-sensitive receptors.

Based on these noise-monitoring objectives, the following noise monitoring locations (NM) one through eight were identified for inclusion in the survey and are depicted on Figure 2.9-3:

- NM-1 is adjacent to the northwestern boundary of the LMGS and by Gate 5 of SDO. The Gate 5 entrance is representative of the normal SDO traffic flow prior to building of the LMGS
- NM-2 is adjacent to the south-central boundary of the LMGS, located at the edge of a corn field adjacent to SDO
- NM-3 is near the southwestern boundary of the LMGS adjacent to chemical processing equipment and is representative of baseline noise at the existing SDO site
- NM-4 is adjacent to the southeastern boundary of the LMGS, on the edge of a corn field
- NM-5 is adjacent to the eastern boundary of the LMGS located near adjacent farmland and an area of woody vegetation
- NM-6 is adjacent to the northern boundary of the LMGS, adjacent to a train yard and Jesse Rigby Road
- NM-7 is adjacent to the northeastern boundary of the LMGS and is located in a corn field
- NM-8 is north of the LMGS, adjacent to SH 35, and is representative of a residential neighborhood, which includes the closest noise-sensitive receptors to the LMGS

2.9.2.1.1 Methodology

Ambient noise measurements were collected using a sound level meter that complies with the requirements of the American National Standards Institute Methods for Electroacoustics Sound Level Meters. The sound level meter was calibrated within the previous 12 months by a certified laboratory and was field calibrated prior to and after the field measurements. At each monitoring location, the meter was placed on a tripod at approximately 5.9 ft. (1.8 m) off the ground, and a windscreen was placed over the microphone to minimize the influence of wind noise on the measurements. Instrument settings used the L_{eq} averaging routine in the dBA scale.

Ambient noise levels were measured continuously over approximately 15-minute intervals. A total of five measurements were recorded at each location between Wednesday, July 12, 2023, and Friday, July 14, 2023, with three measurements recorded during the daytime period (7:00 a.m. to 10:00 p.m.) and two measurements recorded during the nighttime period (10:00 p.m. to 7:00 a.m.). Ambient noise measurements were recorded at these times to capture noise emissions associated with operations at SDO.

2.9.2.1.2 Weather Conditions During the Sound Survey

Based on field observations, the weather conditions at the LMGS site during the three days that ambient noise measurements were collected were mostly clear to partly cloudy, with temperatures ranging between 80°F and 95°F (26.7°C and 35.0°C). There were relatively calm winds with gusts up to 20 mph (32 kph), and no measurable precipitation. The ground was dry and free of precipitation during the survey.

Section 2.7, Meteorology and Air Quality, provides monthly and annual summaries of meteorological data and a description of the regional climate. Ambient noise levels are somewhat variable based on seasonal changes and weather conditions. However, the results of the noise survey are generally representative of typical conditions due to the absence of precipitation or other weather extremes during the sound survey monitoring events.

2.9.2.1.3 Sources of Noise Observed

A number of natural and human-generated noise sources were observed during the ambient noise survey. Dominant noise sources included area traffic on nearby State Highway 35, Jesse Rigby Road, and entrances to SDO, as well as noise from the train yard and tractors harvesting corn in adjacent fields. Other sources of noise observed during the survey included corn crops rustling in the wind, barking dogs, and operational noise from SDO.

2.9.2.1.4 Monitoring Results

Ambient noise monitoring results for each monitoring location are shown in Table 2.9-2. The L_{eq} sound levels observed during the field survey vary considerably based on both location and sampling event, indicating that higher noise levels are generally intermittent rather than continuous, dependent upon the occurrence of noise events such as high vehicle traffic, train movements, and crop harvesting. The roadways and entry points to the SDO site were observed to be in heavy use during the daytime hours, especially during the morning and late afternoon hours, contributing to high sound levels at NM-1, NM-6, and NM-8. Although located on the SDO site, NM-3 had fewer noise producing activities nearby as it was located on the “back side” of the SDO facility next to an electrical substation and multiple holding tanks. Sources of noise measured near monitoring locations adjacent to farmland included distant tractor noise (NM-5) and wind through corn fields (NM-7).

Each L_{eq} measurement was converted to sound energy, adding a 10 dBA penalty to nighttime measurements to reflect the sensitivity of receptors during those hours. The average sound power was then calculated by averaging the sound energy from each of the three daytime measurements (weighting the daytime average sound energy by 15 hours per day) and two nighttime measurements (weighting the nighttime average sound energy by nine hours per day). The sound energy weighted average was then used to calculate the day-night average community noise level (L_{dn}) for each monitoring location. The L_{dn} for each monitoring location is shown in Table 2.9-2. Sound levels at NM-4, which is the most isolated receptor, resulted in an L_{dn} of 56.6 dBA, consistent with the L_{dn} for normal suburban areas which range from 53-57 dBA (EPA, 1974). In contrast, sound levels at the monitoring locations adjacent to the

SDO site, train yard, and/or State Highway 35 ranged from an L_{dn} of 64.6-77.6 dBA, approaching or exceeding the L_{dn} for very noisy urban areas, which range from 68-72 dBA (EPA, 1974).

2.9.2.2 Sound Level Regulations

There are no municipal, county, or state-level regulations that establish quantitative noise level limits applicable to the LMGS.

At the federal level, the EPA has a broad-ranging set of guidelines for environmental noise levels. EPA guidelines recommend outdoor noise levels do not exceed L_{dn} of 55 dBA, which is sufficient to protect the public from the effect of broadband environmental noise in typical outdoor and residential areas. This level is not a regulatory goal but is intentionally conservative to protect the most sensitive portion of the American population with an additional margin of safety (EPA, 1974).

2.9.3 Transportation

From the roadway safety perspective, the TxDOT collects and analyzes a wide variety of traffic safety data, including crash statistics. Overall, between 2021 and 2022, the state of Texas experienced a decrease in the number of motor vehicle traffic fatalities. The 2022 death toll of 4481 was a decrease of 0.36 percent from the 4497 deaths recorded in 2021. There were 2304 deaths in rural traffic crashes in 2022. Fatalities in traffic crashes in rural areas of the state accounted for 51.42 percent of the state's traffic fatalities (TxDOT, 2022c).

SH 35 and SH 185 are the main roads providing access to the LMGS site (Figure 2.5-4). Crash rates for these roads and intersections in the vicinity of LMGS are shown in Table 2.9-3. The location of the roadway segments and intersections analyzed are shown on Figure 2.9-4. Crash rates, which represent the number of crashes per million vehicle miles traveled, were calculated using the University of Florida Transportation Institute Highway Safety Software (HSS) (University of Florida Transportation Institute, 2024). Crash rates include all types of crashes (property damage, injury and fatalities) and are an effective tool to measure the relative safety at a particular location.

2.9.4 Electromagnetic Fields

All nuclear power plants have electrical power transmission systems associated with them. The operation of power transmission systems generates both electrical and magnetic fields, referred to collectively as EMFs. Public and worker health can be compromised by acute and chronic exposure to electrical sources associated with power transmission systems, including switching stations (or substations) on the site and transmission lines connecting the plant to the regional electrical distribution grid. Transmission lines operate at a frequency of 60 Hz (60 cycles per second), which is considered to be an extremely low frequency.

Electric fields are produced by voltage, and their strength increases with increases in voltage. An electric field is present as long as equipment is connected to the source of electric power. The unit of electric field strength is volts per meter (V/m) or kilovolts per meter (kV/m) (1 kV/m = 1000 V/m). The flow of current through wires or electrical devices produces a magnetic field, and its strength increases as the current increases. Thus, operating transmission lines produce both electrical and magnetic fields, or EMFs. Members of the public near transmission lines may be exposed to the EMFs produced by the transmission lines. The EMF varies in time in a manner equivalent to the current and voltage change; therefore, the frequency of EMF is the same (e.g., 60 Hz) as standard alternating current (AC). Electrical fields can be shielded by objects such as trees, buildings, and vehicles. Magnetic fields, however, penetrate most materials, but their strength decreases with increasing distance from the source according to NUREG-1437.

Power lines associated with nuclear power plants usually have voltages of 230 kV, 345 kV, 500 kV, or 765 kV (a voltage used primarily in the eastern United States). EMF strength at ground level varies greatly under these lines, generally being stronger for higher voltage lines, a flat configuration of conductors, relatively flat terrain, terrain with no shielding obstructions (e.g., trees or shrubs), and a closer approach of the lines to the ground. At locations where the field strength is at a maximum, the measured values under 500-kV lines often average about 4 kV/m but sometimes exceed 6 kV/m. Maximum electric field strengths at ground level are 9 kV/m for 500-kV lines and 12 kV/m for 765-kV lines based on guidance in NUREG-1437.

Potential hazards associated with transmission lines include both acute and chronic effects. Acute effects are related to the potential for shock hazard. As indicated in NUREG-1437, the shock hazard issue is evaluated by referring to the National Electric Safety Code, which provides practical safeguards of persons during the installation, operation, or maintenance of electric supply and communication lines and associated equipment.

With respect to chronic effects, a series of events during the 1960s and 1970s heightened public interest in the possibility of health effects from nonionizing radiation exposures and resulted in increased scientific investigation in this area. Epidemiological studies have suggested a correlation between proximity to high-current wiring configurations and incidence of childhood leukemia. However, no consistent evidence linking harmful effects with 60-Hz exposures has been presented. Many studies have been conducted on the safety of the electric field, but no health effects have been associated with the magnitude of the electric fields that are associated with electrical power usage as noted in NUREG-1437.

More recently, the National Cancer Institute provided a summary of research on the health effects from EMFs, including potential effects associated with exposure from power lines. Several studies have analyzed the combined data from multiple studies of power line exposure and childhood leukemia (NCI, 2022):

- A pooled analysis of nine studies reported a twofold increase in risk of childhood leukemia among children with exposures of 0.4 microtesla (μT) or higher.
  - Less than one percent of the children in the studies experienced this level of exposure.

- A meta-analysis of 15 studies observed a 1.7-fold increase in childhood leukemia among children with exposures of 0.3 µT or higher.
    - A little more than three percent of children in the studies experienced this level of exposure.
- More recently, a pooled analysis of seven studies published after 2000 reported a 1.4-fold increase in childhood leukemia among children with exposures of 0.3 µT or higher.
    - However, less than one half of 1 percent of the children in the studies experienced this level of exposure.

The interpretation of the finding of increased childhood leukemia risk among children with the highest exposures (at least 0.3 µT) is unclear (NCI, 2022).

The existing transmission corridors at the LMGS site are described in Section 3.7, Power Transmission System. Two new 138-kV transmission lines are planned for the power transmission installation. As described above, long-term or chronic exposure to power transmission lines has been studied for a number of years. The scientific evidence regarding the chronic health effects from EMFs, including the potential effects associated with exposure to electrical fields that are associated with electric power usage, does not conclusively link EMF exposure to adverse health impacts.

Tables

Table 2.9-1: Summary of Occupational 2022 Incidence Rates for Selected Industries

Nonfatal Occupational Injuries and Illnesses (Recordable Cases per 100 Full-Time Workers)		
Industry Category	**National Average[(a)]**	**Texas Average[(b)]**
All Private Industry	2.7	1.9
Construction	2.4	1.3
Manufacturing	3.2	2.1
Electric Power Generation	1	-
Service Providing (all)	2.7	2
Professional and Business Services	1.2	1.5
Fatal Occupational Injuries (Number of Fatalities per 100,000 Full-Time Equivalent Workers)		
Industry Category	**National Average[(c)]**	**Texas Average[(d)]**
All Private Industry	3.9	4.3
Construction	9.6	10.6
Manufacturing	2.6	2.9
Electric Power Generation	-	-
Service Providing (all)	4.2	-
Professional and Business Services	3.1	2.8

Sources:
a) BLS, 2023a
b) BLS, 2023b
c) BLS, 2023c
d) BLS, 2023d
Notes:
"-" denotes category not reported

Table 2.9-2: Ambient Noise Monitoring Results

Monitoring Location Number[a]	Measured Daytime[b] Ambient Noise Level Event 1 (L_{eq}, dBA)	Measured Daytime[b] Ambient Noise Level Event 2 (L_{eq}, dBA)	Measured Daytime[b] Ambient Noise Level Event 3 (L_{eq}, dBA)	Measured Nighttime[c] Ambient Noise Level Event 4 (L_{eq}, dBA)	Measured Nighttime[c] Ambient Noise Level Event 5 (L_{eq}, dBA)	Calculated Average Community Noise Level (L_{dn}, dBA)[d]
NM-1	58.7	74.4	68.5	68.3	70.3	76
NM-2	67	73.3	61.7	67.1	63.6	72.9
NM-3	58.3	60.2	57.8	58.1	58	64.6
NM-4	57.8	57.6	41.6	48.8	45.8	56.6
NM-5	66.8	66.2	43.8	55.4	53.8	64.7
NM-6	70.6	73.9	69.6	67.4	69.8	75.8
NM-7	69.3	55.6	62.1	53.8	54.8	65.1
NM-8	74.4	77.2	68.7	62.3	72.8	77.6

Notes:

a) Refer to Figure 2.9-3 for noise monitoring locations

b) Daytime events occur between 7:00 a.m. and 10:00 p.m

c) Nighttime events occur between 10:00 p.m. and 7:00 a.m

d) A 10 dBA penalty was added to the measured nighttime L_{eq} sound levels in calculating the average community noise level to reflect the sensitivity of receptors during those hours

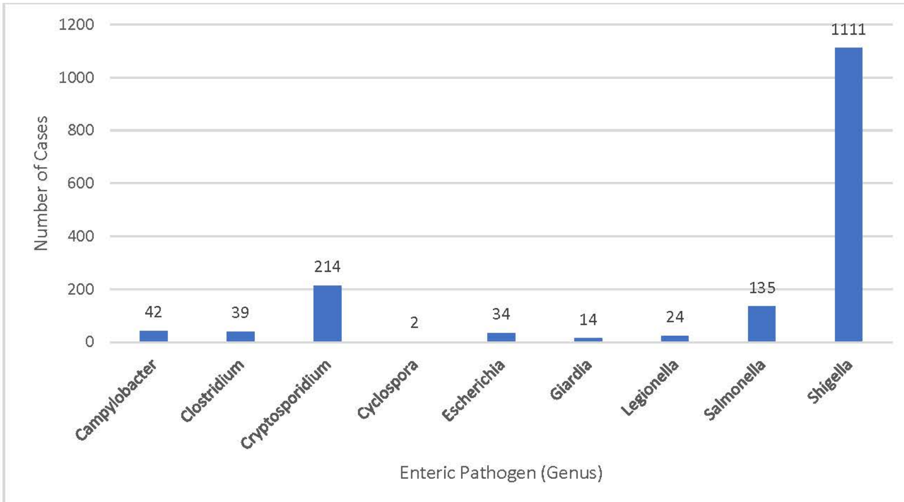
Abbreviations: L_{dn} = day-night average community noise level; L_{eq} = equivalent noise level; dBA = A-weighted decibel

Table 2.9-3: Crash Rates in the Long Mott Generating Station Vicinity

Roadway Segment	2022 AADT	Crash Rate (100 MVM)	2022 Texas Statewide Crash Rate (100 MVM) [a]
SH 185 (N of Bloomington) (Multi-Lane Segment)	7292	51.44	57.59
SH 185 (S of Bloomington) (Two-Lane Segment)	3213	68.81	96.28
SH 35 (Two-Lane Segment)	4244	73.19	96.28
Intersection	**2022 AADT**	**Crash Rate (per 1 million entering vehicles)**	**-**
SH 185 & 2nd Street West/2nd Street East (Signalized Intersection)	4068	2.29	-
SH 185 & FM 616 (Non-signalized Intersection)	2485	1.00	-
SH 185 & SH 35 North Approach (Non-signalized Intersection)	3729	0.96	-
SH 35 & Jesse Rigby Road (Non-signalized Intersection)	2122	0.00	-

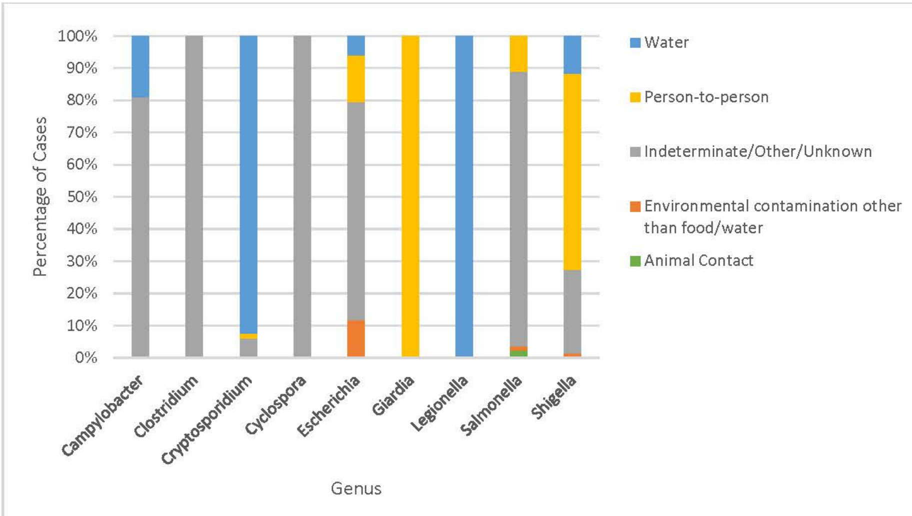
Notes:
a) TxDOT, 2022d
Abbreviations: AADT = annual average daily traffic; MVM = million vehicle miles; SH = state highway; FM= Farm-to-Market Road

Figures



Source: CDC 2023

Figures 2.9-1: Number of Cases — Enteric Pathogens Reported in Texas from 2011 — 2021



Source: CDC 2023

Figure 2.9-2: Mode of Contamination for Enteric Pathogens Recorded in Texas from 2011 — 2021

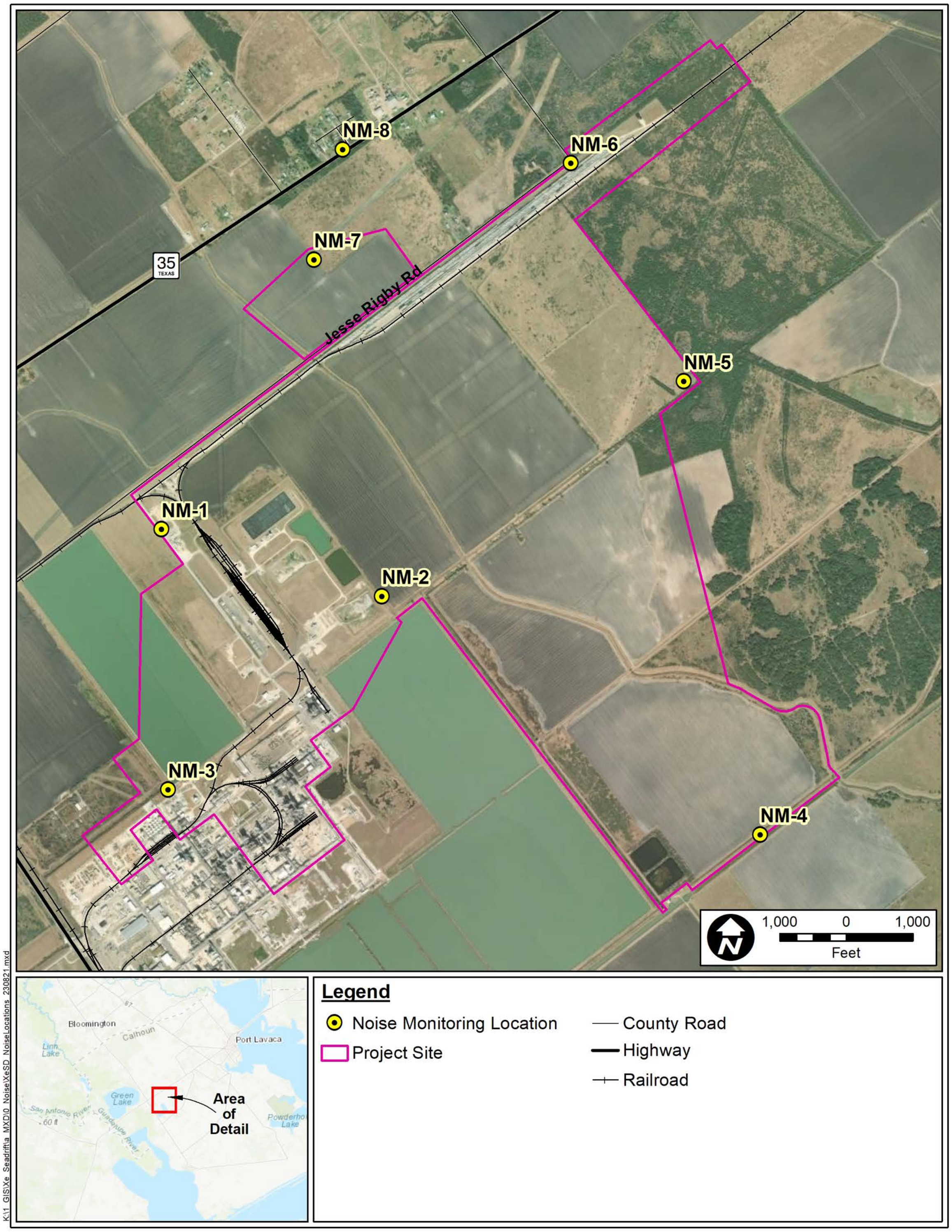


Figure 2.9-3: Noise Monitoring Locations for the Ambient Noise Survey

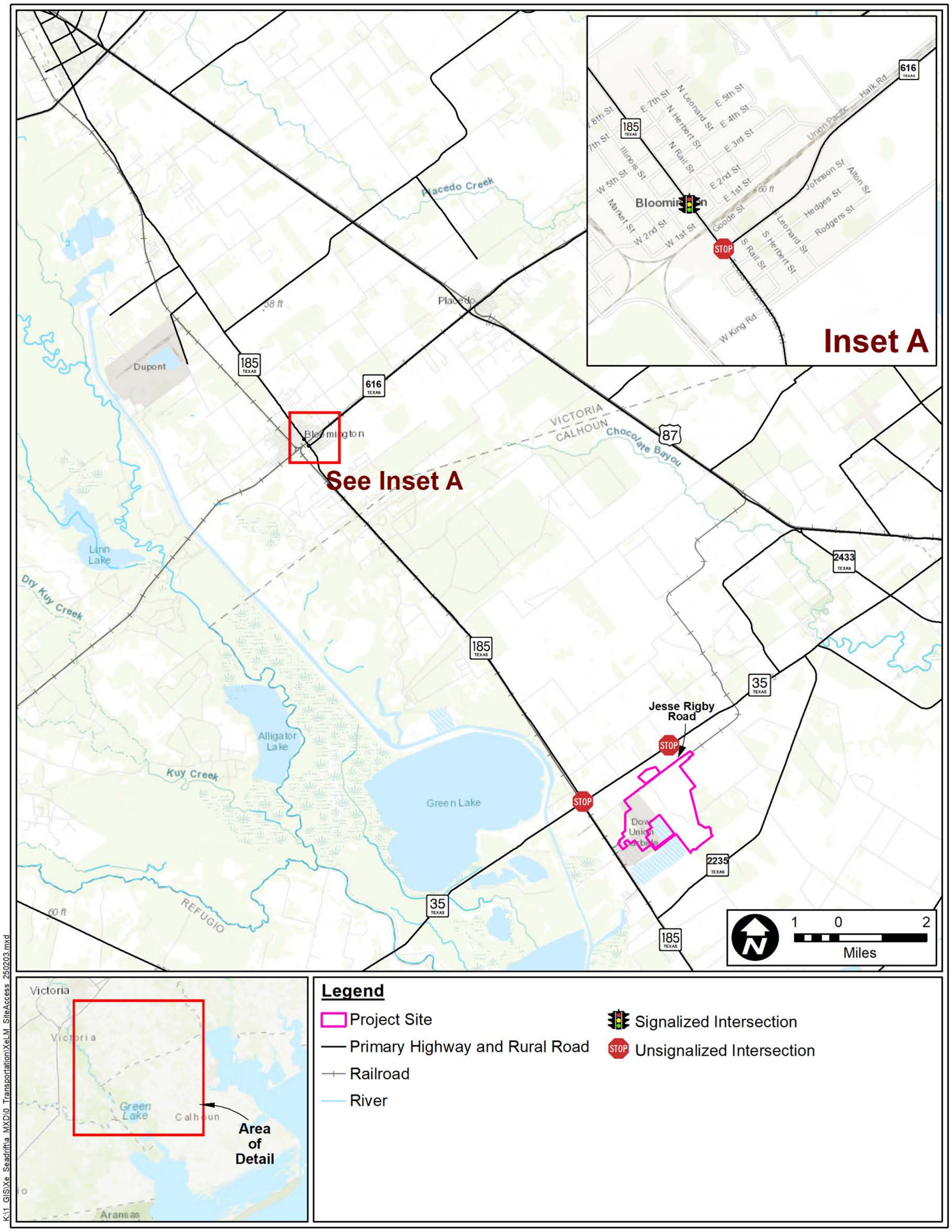


Figure 2.9-4: Roadway Segments Analyzed in the Long Mott Generating Station Vicinity

2.10 Radiological Environment and Radiological Monitoring

This section discusses the preoperational Radiological Environmental Monitoring Program (REMP) at the LMGS site. Section 2.10.1 describes background radiation exposure at the LMGS site.

The preoperational REMP is used to establish the baseline for the local radiation environment, measuring background levels and their variations along the anticipated exposure pathways in the area surrounding the LMGS site. Baseline radiological conditions are used to identify and assess radiological environmental impacts resulting from plant operation. Programs for radiological environmental monitoring are based on the guidance provided in NRC RG 4.1, Radiological Environmental Monitoring for Nuclear Power Plants, and the requirements of 10 CFR 20.1501. Preoperational monitoring programs are implemented two years before scheduled fuel load.

In addition to establishing a baseline for local radiation, the preoperational REMP is used to train personnel and evaluate procedures, equipment, and techniques.

The preoperational REMP contains routine surveillance necessary to adequately characterize the radiological conditions in the vicinity of LMGS. Once initiated, the collection of samples and analysis of data should follow the sampling and analyses schedule and should continue for the first three years of commercial operation.

The elements for both the preoperational and operational REMP phases are essentially the same. As such, the description of the preoperational and operational REMP (i.e., exposure environmental pathways, number and location of proposed sample collection points and measuring devices for direct radiation and effluents, sample collection frequency, type of analysis, reporting requirements, and the quality assurance program) is provided in Section 6.2, Radiological Monitoring.

2.10.1 Background Radiation Exposure

Background radiation at the LMGS site has been characterized in accordance with Section 2.9 of RG 4.2, Preparation of Environmental Reports for Nuclear Power Stations.

Average background radiation to the public is 620 millirem per year (mrem/yr) 6.2 milliSievert per year [mSv/yr]) in the U.S., with approximately half from medical procedures and man-made sources and half from natural sources (EPA, 2024b).

2.10.1.1 Natural Sources

The NRC divides natural sources of radiation into three categories: cosmic, internal, and terrestrial. Cosmic radiation is the result of radiation received from extraterrestrial sources, such as the sun and other stars, that penetrates the Earth's atmosphere. Internal radiation is the result of naturally occurring potassium-40 and carbon-14 in all humans. Lastly, terrestrial radiation is the result of dose received from naturally occurring uranium, thorium, and radium found in soil and rock. In addition to these three categories, radon and thoron gas seeps through the ground and into the air where it is inhaled. The inhaled radon and thoron gas represents about two-thirds of the natural background radiation dose for an average member of the public whereas, cosmic, internal, and terrestrial radiation account for the rest (NRC, 2020).

Based on information in the following subsections, there are no natural features in the vicinity of the LMGS site that would result in natural background radiation at levels higher than the United States average; therefore, the public receives a natural background dose of about 310 mrem/yr (3.1 mSv/yr). Natural background radiation doses attributed to cosmic, internal, and terrestrial radiation are discussed in the following subsections:

2.10.1.1.1 Cosmic Radiation

Cosmic radiation exposure depends on the site elevation. The elevation of Calhoun County, Texas ranges between sea level and 50 ft. (0 to 15 m). The annual dose due to cosmic radiation at sea level is 26 mrem/yr (0.26 mSv/yr) (EPA, 2023); therefore, it is appropriate to use the average annual dose due to cosmic radiation, 33 mrem/yr (0.33 mSv/yr) (EPA, 2024b).

2.10.1.1.2 Internal Radiation

The average annual dose due to internal radiation, 29 mrem/yr (0.29 mSv/yr), is applicable to the vicinity of LMGS (EPA, 2024b).

2.10.1.1.3 Terrestrial Radiation

The national average for terrestrial radiation, 21 mrem/yr (0.21 mSv/yr), (which includes uranium, thorium, and radium found in soil and rock) is applicable to the vicinity of LMGS (EPA, 2024b).

2.10.1.1.4 Man-Made Sources

A portion of background radiation comes from human activities. Man-made sources of radiation to the public include medical sources, consumer products, and nuclear reactor facilities as discussed below. Trace amounts of radioactive elements have dispersed in the environment from nuclear weapons tests and accidents like the one at the Chernobyl nuclear power plant in Ukraine. Background dose due to fallout from nuclear weapons tests contributes about 1 mrem/yr (EPA, 2023f). Normally operating nuclear reactors emit small amounts of radioactive elements (EPA, 2024b).

Based on the information in the following subsections, there are no abnormal sources of radiation located in the vicinity of LMGS; therefore, the public receives an average dose due to man-made radiation sources of 310 mrem/yr (3.1 mSv/yr) (NRC, 2020).

2.10.1.1.5 Medical Sources

Medical procedures like X-rays and CT scans provide the majority of man-made radiation exposure to the public. Medical personnel may receive a higher radiation dose than the non-medical public. Radiation exposures from diagnostic medical examinations are generally low and are almost always justified by the benefits of accurate diagnosis of possible disease conditions. There is no direct evidence of radiation causing any harm at the exposure levels encountered with diagnostic radiological examinations. Therapeutic uses of radiation naturally involve higher exposures and physicians consider the risks of the treatment against the potential benefits. In diagnostic uses, there are theoretical models that suggest the possibility of cancer risks, but these models all extrapolate results from higher exposures to these low levels, and it is uncertain whether any real risks are involved. Medical exposures are about 48 percent of the average background dose and are therefore comparable to doses received routinely from natural sources of radiation (HPS, 2024).

2.10.1.1.6 Consumer Products

Ionizing radiation dose from the use of consumer products fluctuates based on the lifestyle of the individual in question; therefore, a best estimate of the average annual dose due to consumer products, 13 mrem/yr (0.13 mSv/yr), is used (EPA, 2024b).

2.10.1.1.7 Nuclear Reactor Facilities

The STP is located approximately 47 mi. (76 km) northeast of the LMGS site. Recent effluent reports indicate that the public dose near the LMGS site from the STP nuclear site is well within regulatory limits.

The dose to the public near the LMGS site from the STP site is expected to be lower than 0.031 mrem/yr (3.1E-04 mSv/yr) due to the distance between the sites.

SH 185 and SH 35 are approximately 2 mi. (3.2 km) from the LMGS site boundary, which has the potential to increase radiation exposure to the public due to transportation of radioactive material. However, transportation of radioactive material to and from STP is expected to be conducted in accordance with all federal and state regulations. Additionally, based on Summary Table S-4 of 10 CFR 51.52, the NRC has determined the environmental risk of radiological effects due to transportation to be small regardless of the number of reactors on-site; therefore, the dose to the public near the LMGS site due to transportation of radioactive material from external sources is expected to be a small fraction of the total background dose.

Tables

None

Figures

None

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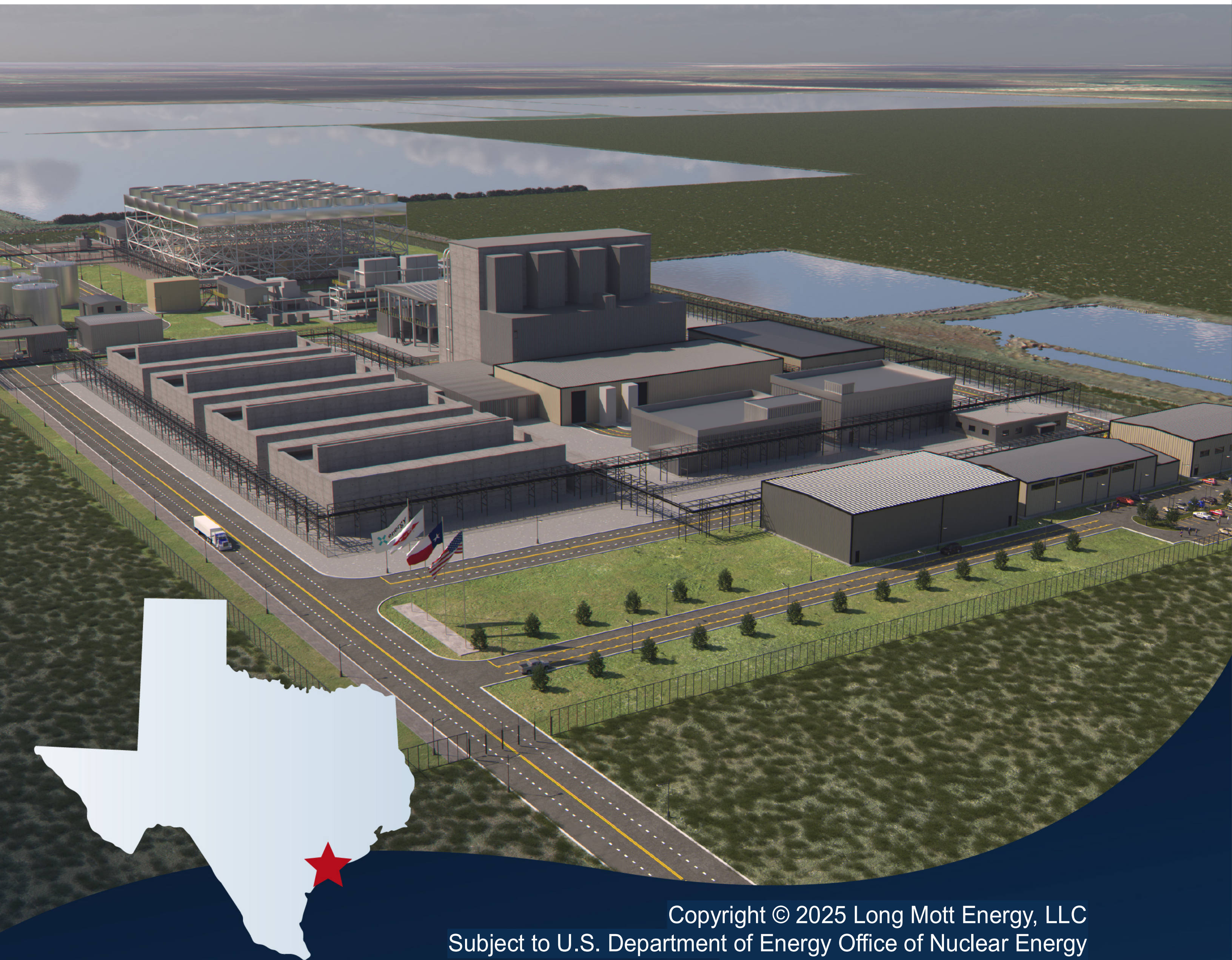
Long Mott Generating Station

Environmental Report
Chapter 3 - Plant and Project Description



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3.1 External Appearance and Plant Layout

This section provides a general discussion of the Long Mott Generating Station (LMGS) plant layout and appearance. Section 3.1.1 describes the location of the site and Section 3.1.2 discusses the layout of the site. Bounding parameters from the plant design specifications and site-specific characteristics are used to establish conceptual site descriptions.

3.1.1 Site Location

LMGS is located on land owned by The Dow Chemical Company, through its subsidiary, Dow Hydrocarbons and Resources, LLC at its Union Carbide Corporation (UCC) Seadrift Operations (SDO), located in Calhoun County, Texas (TX), approximately 8 mi (13 km) north-northwest of Seadrift, TX, just east of the intersection of Texas State Highway (SH) 185 and Texas SH 35. Prior to determination of the final site layout, a site center point was established at coordinates latitude: 28°31'42.00” N, and longitude: 96°45'43.00” W. This site center point is used in this analysis and described in Section 2.1, Station Location. Figure 3.1-1 shows the location of the site within the region, and Figure 3.1-2 shows the location of the site within the vicinity.

3.1.2 Proposed Site Layout

Building structures and site arrangement are established at LMGS in a manner that is both functional and aesthetically consistent, to the degree practical, with the existing site architecture.

As discussed in Section 1.2, Proposed Project, the plant consists of four Xe-100 reactor modules. Per Section 2.2, Land, the area disturbed by LMGS building activities is 1537 ac (622 ha). When complete, the Nuclear Island/Conventional Island (NI/CI) footprint occupies an area consisting of approximately 34.4 ac (13.9 ha).

The LMGS Site Utilization Plot Plan (SUPP) is shown in Figure 3.1-3 and the new plant layout is shown in Figure 3.1-4. The facility abbreviations used in Figure 3.1-4 are defined in Table 3.1-1. The Exclusion Area Boundary (EAB) is a minimum distance of 400 m (1312 ft) from the edge of the Reactor Building (RB), the Fuel Handling Annex Building (FHAB) and the Helium Service Facility (HSF). The EAB is shown in Figure 3.1-8. Permanent land impact and the temporary borrow area are indicated on the SUPP as a cross-hatched area. The land used for building is indicated as diagonal hatching on the SUPP. A location for a meteorological tower is depicted in Figure 3.1-3. While the primary intention is to install meteorological monitoring instrumentation on an existing tower at the SDO site, this location is included to provide the option to place a standalone meteorological tower if the existing tower is found to be insufficient for project requirements.

The tallest building in the plant design is the RB including the Reactor Building Cooling Water (RBCW) expansion tank located on top of the RB with an overall approximate height of 129 ft (40 m) from finished grade to top of structure. Additional information regarding the RB is provided in the Preliminary Safety Analysis Report (PSAR) Section 1.1.4.4.1. In general, buildings are composed of concrete, metal with metal siding, or wood with metal, vinyl, or other aesthetically acceptable siding. Figure 3.1-5 and Figure 3.1-6 depict the major plant features superimposed on ground level, and low oblique aerial photographs of the plant site, respectively. Figure 3.1-7 provides an architectural rendering of the completed plant depicting the major plant features. These figures depict the full build-out of the facility, including features that this ER assesses.

The ACC Utility Building (AUB) covers nearly two acres and contains two air-cooled condensers (ACCs) positioned side by side, one for each turbine. Table 3.1-1 provides the footprint dimensions and height of these structures. Because the ACCs act as direct air-water heat exchangers without evaporative cooling, they do not produce a visual plume.

In addition to the structures identified in Table 3.1-1, and shown in Figure 3.1-3, LMGS also includes a permanent stormwater basin and a temporary sediment basin (for construction). Sanitary waste is discharged to the SDO sanitary waste treatment facility. As discussed in Section 3.3, Plant Water Use, SDO supplies raw water from their existing Basin #5 to LMGS via a dedicated, newly constructed intake structure and supply pipeline. Currently the Guadalupe-Blanco River Authority (GBRA) supplies makeup water to the basin through the existing SDO facility intake system. A new intake structure and pipeline are used to provide makeup water from the GBRA Calhoun Canal to Basin #5 (Figure 3.1-3). New transmission lines are routed from the LMGS switchyard to the SDO Substation. See Section 3.7, Power Transmission System, for a description of the transmission system.

Tables

Table 3.1-1: Long Mott Generating Station Building and Exterior Equipment Data

Exterior Equipment or Building		Approximate Plan Area (m x m)	Approximate Height (m)	No. for LMGS
NI Civil Structures				
Reactor Building	RB	25 x 55	40	1
Nuclear Island Auxiliary Structure	NIAS	40 x 60	15	1
Fuel Handling Annex Building	FHAB	20 x 60	35	1
Radwaste Building	RWB	25 x 40	10	1
Helium Service Facility	HSF	35 x 70	10	1
Spent Fuel Intermediate Storage Facility	SFISF	35 x 50	15	4
Inter-Unit Access Tunnel	IUAT	10 x 130	5	1
Access & Security Building	ASB	25 x 15	5	1
Controls & Electrical Building	CEB	35 x 25	15	1
Canister Processing Facility	CPF	20 x 45	5	1
Main Electrical Building	MEB	30 x 50	10	1
CI Civil Structures				
Turbine Area Structures/Foundations	TA	140 x 65	20	1
PW/FP Tank Structures/Foundations	PWTS	15 DIA	15	2
Transformer Foundation & Containment Structure	TFCS	20 x 10	10	2
Switchyard Equipment Foundations	SYEF	140 x 80	-	1
ACC Utility Building (Two ACCs, each with 16 cells)	AUB	85 x 95	30	1
Engineering, Administration, & Training Building	EATB	45 x 30	10	1
Maintenance & Storage Building	MSB	45 x 20	10	1
Water Treatment Structures/Foundations	WTSF	60 x 40	10	1
Fire Pump-House & Fire Water Storage Structures	FWB	15 x 10	10	1
Compressed Air Building	CAB	20 x 20	10	1
Warehouse	WH	25 x 40	10	1

Abbreviations: LMGS = Long Mott Generation Station; ACC = air-cooled condenser; FP = fire protection; m = meter; PW = process water; DIA = diameter

Figures

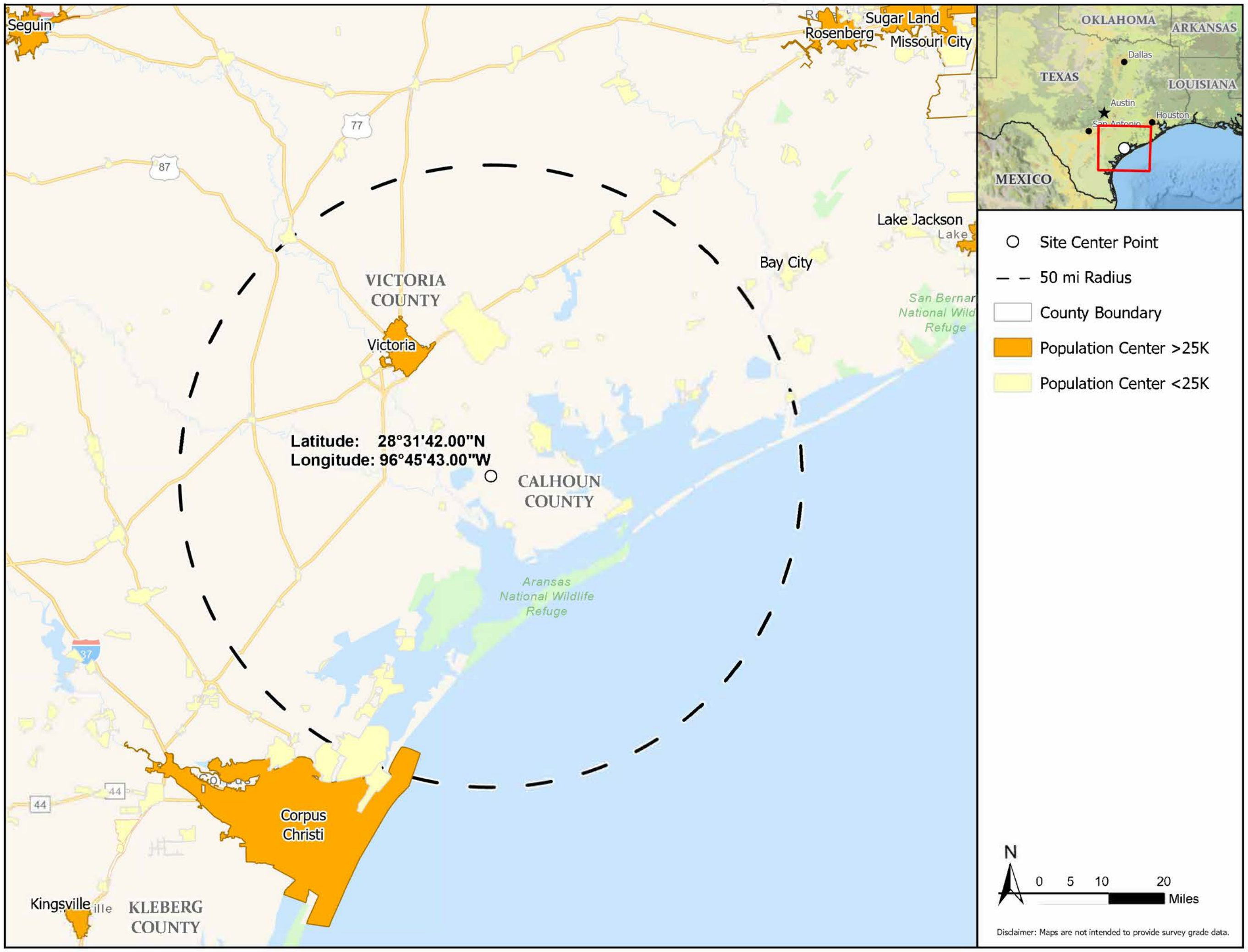

Figure 3.1-1: Long Mott Generating Station Site Location and Region (50 Mi. Radius)

Figure 3.1-2: Long Mott Generating Station Site Location and Vicinity (10 Km Radius)

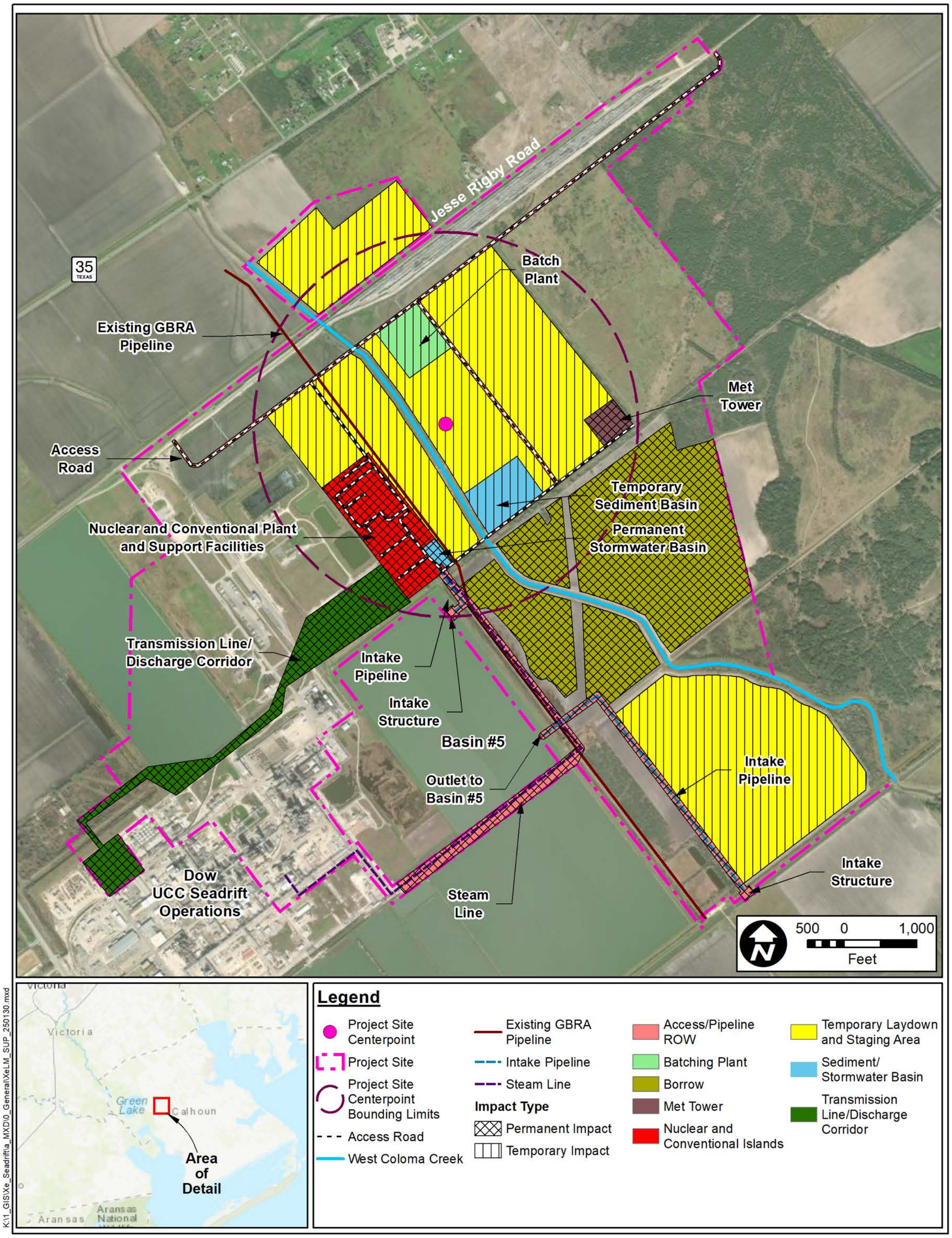

Figure 3.1-3: Site Utilization Plot Plan

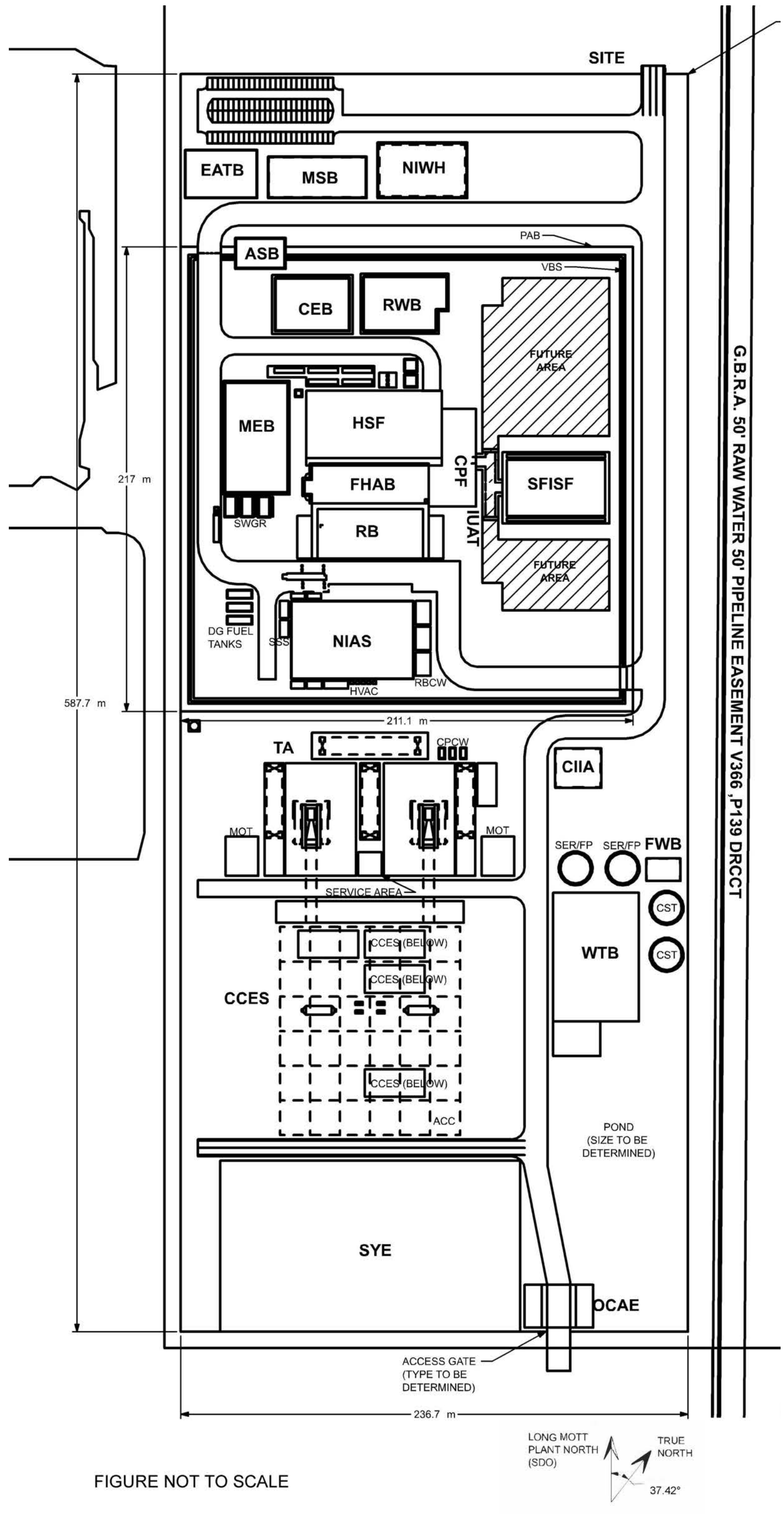

Figure 3.1-4: Site Layout

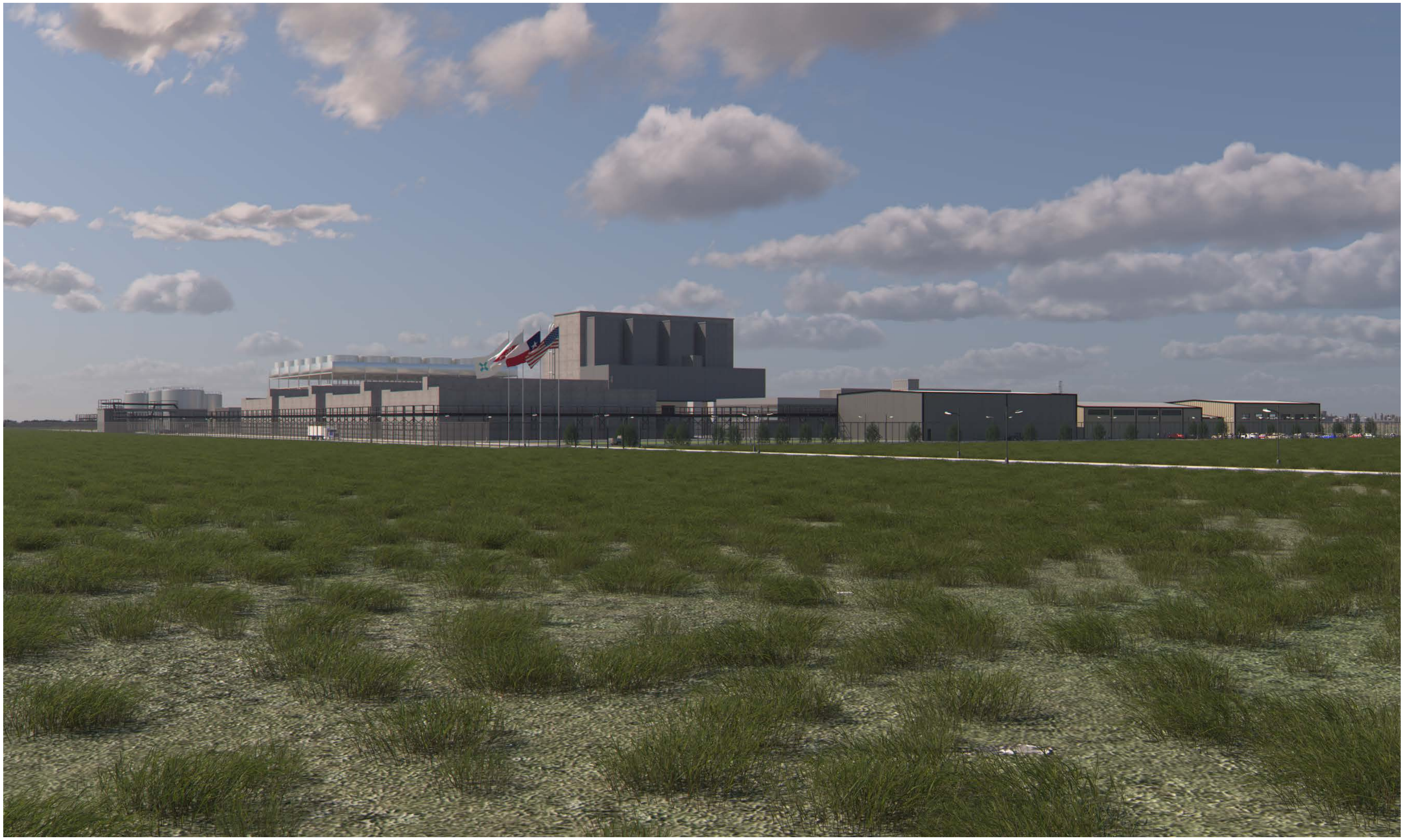

Figure 3.1-5: Ground Level Photograph of Site with Major Station Features Superimposed

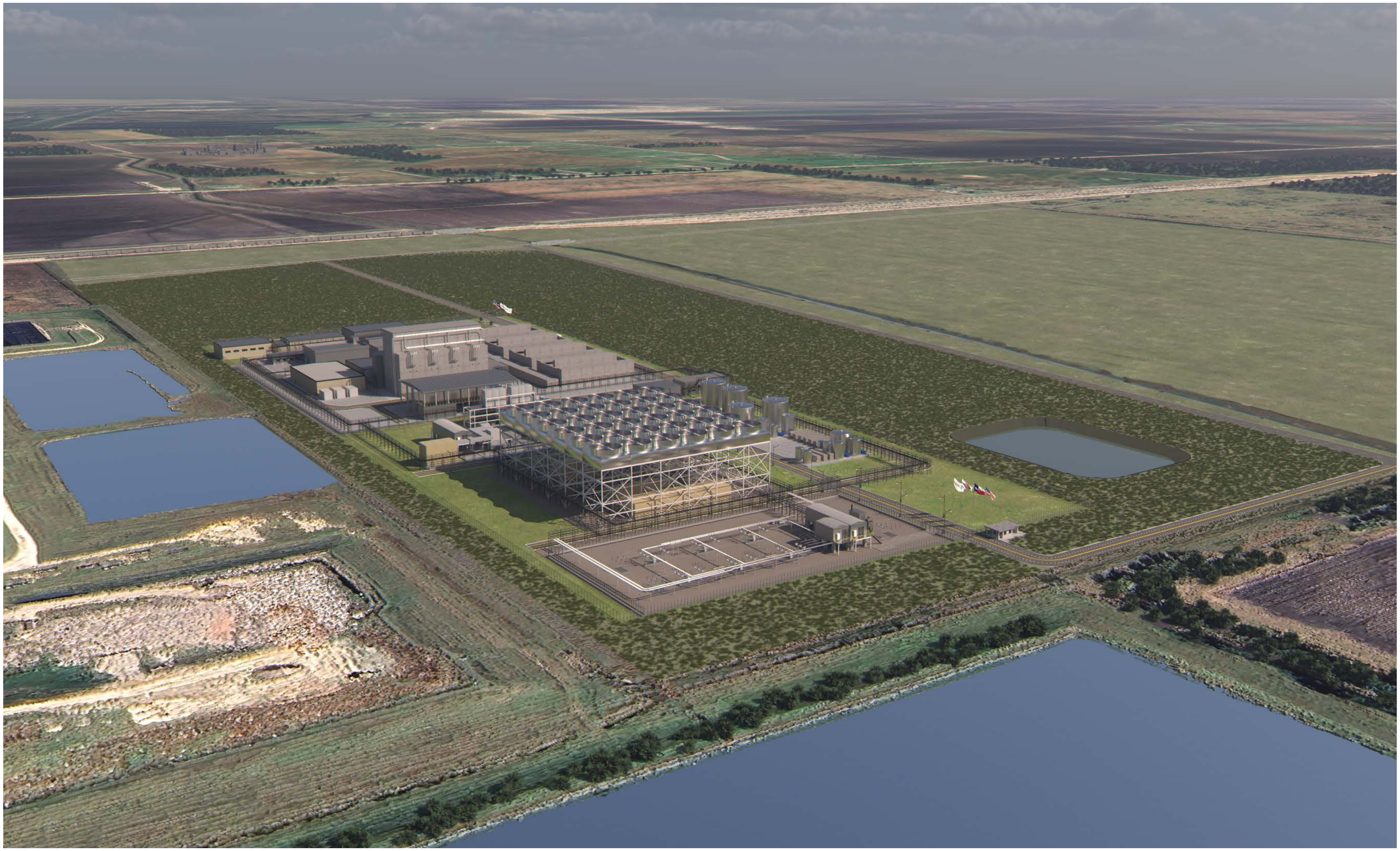

Figure 3.1-6: Low Oblique Aerial Photograph of Site and Vicinity with Major Station Features Superimposed

Figure 3.1-7: Architectural Rendering of Plant Including Major Station Features

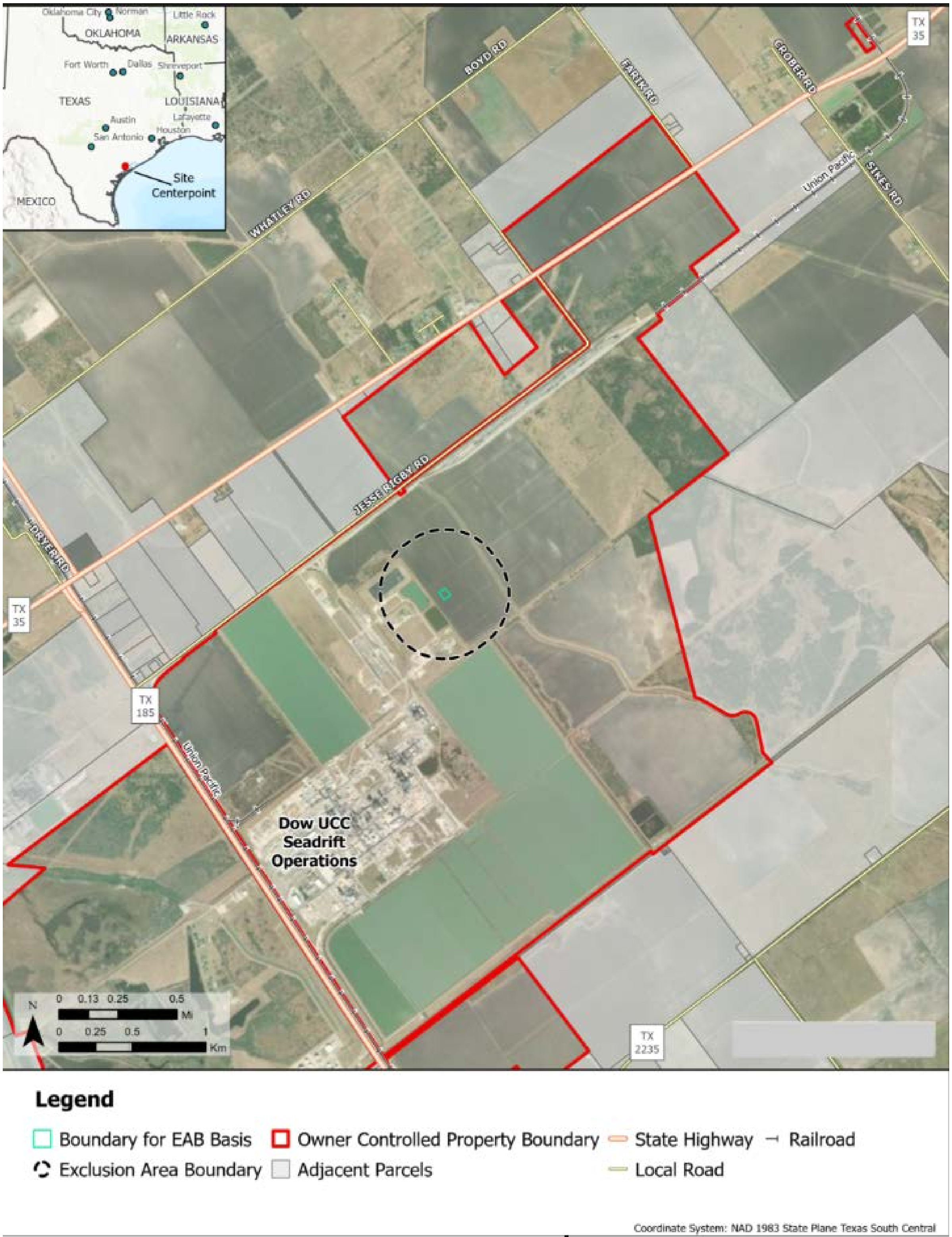

Figure 3.1-8: Long Mott Generating Station Exclusion Area Boundary

3.2 Reactor Power Conversion System

LMGS consists of four reactor modules, two turbine-generator sets, ACCs, and auxiliaries to support operation. Each reactor module can generate 200 megawatts thermal (MWt) of steam for electricity production and/or process heat. LMGS can supply both electrical power and steam to the SDO.

The power source for LMGS is the Xe-100 high-temperature gas-cooled reactor (HTGR), which uses uranium oxy-carbide (UCO) Tri-Structural Isotropic (TRISO) coated fuel embedded in spherical fuel elements to form fuel pebbles. In the primary loop, helium gas circulates through the reactor, where it is heated by the UCO TRISO fuel. The heated gas then passes through the steam generator (SG) transferring heat to the secondary loop before returning to the reactor. Water in the secondary loop is heated beyond its vaporization point in the SG to produce superheated steam. This steam drives the turbine-generator system, and a portion is diverted to supply process steam to SDO.

Process steam for SDO's demand can be extracted from either the main steam system or downstream from the 1st stage turbine as extraction steam. A connection from the main steam pipe to the process steam blowdown station enables direct conversion of the main steam to process steam when neither turbine is in service.

The steam exiting the turbine is condensed in the ACC and returned to the steam generator. The four Xe-100 reactor modules have four primary loops, one for each reactor module, and two secondary loops, each providing feedwater to the four steam generators. Figure 3.2-1 illustrates a simplified flow diagram of the reactor power conversion system.

At design summer conditions with a dry bulb temperature of 104°F (40°C), each Xe-100 reactor module generates up to 120 MWt of waste heat to the environment, when operating at the rated reactor thermal power of 200 MWt. The gross generator output for two modules operating in power generating mode is 160 megawatts electric (MWe), or 80 MWe per reactor module. The gross generator output with no process steam at 100% Maximum Continuous Rating (4 modules) is 328.7 MWe. With a house load of 37.4 MWe, the net output is 291.3 MWe for the plant. When operating at 100 percent turbine bypass mode, with maximum steam flow sent to the SDO facility, each Xe-100 reactor module can generate 601,000 lb/hr (75.57 kg/s) of steam.

As steam is delivered to the SDO, both the power output and the waste heat rejected to the environment are decreased. The peak steam demand for SDO is 802,400 lb/hr (101.1 kg/s). More detailed parameters on the reactor module, associated fuel, steam power conversion system, and the engineered safety features are provided below.

3.2.1 Xe-100 Reactor Design

The Xe-100 is a Generation IV advanced reactor based on pebble-bed HTGR technology, utilizing UCO TRISO coated fuel embedded in spherical fuel elements to form fuel pebbles.

The reactor module operates in the thermal spectrum and uses graphite as the moderator. Its fueled zone is made up of a cylindrical volume filled with approximately 220,000 graphite fuel pebbles, which make up the pebble bed core.

The defining characteristic of the pebble-bed reactor and key to safety of the Xe-100 is the use of TRISO coatings on UCO kernels embedded in spherical fuel elements, also known as pebbles. The fuel pebble consists of an inner fuel core with TRISO-coated particles embedded in a graphite matrix material surrounded by a fuel-free shell of graphite matrix isostatically pressed around the fuel core. High-Assay Low-Enriched Uranium (HALEU) reactor fuel pebbles use UCO kernels with 15.5 weight percent uranium-235 (U-235) enrichment and at least 7 grams (g) uranium loading in approximately 19,000 particles in pebbles.

The average end of life burnup for HALEU pebbles during full power equilibrium core conditions is approximately 163 gigawatt days (GWd)/metric ton uranium (MTU), and pebbles with a measured burnup greater than 160 GWd/MTU will be removed from the system. Given the average end of life burnup for HALEU reactor fuel and at least 7 g uranium loading, each pebble produces an average of about 1.14 megawatt days or 27.4 megawatt hours of energy before being discharged from the reactor. Details of the uranium fuel cycle impacts are described in Section 5.7, Uranium Fuel Cycle Impacts.

During normal operation, pebbles are introduced from the top of the core, approximately 180 pebbles per full power day in each reactor module. These form a conical heap at the top of the pebble bed where the pebbles contact the inside surface of the graphite reflector blocks. Sufficient height is provided above the pebble bed to ensure, under all postulated operational conditions, the fuel pebbles do not come within two pebble diameters of the bottom of the top reflector structure. The total fuel volume in the reactor module is approximately 41.56 m^3 (1468 ft^3).

The spaces between the fuel pebbles in the pebble bed provide adequate volume for helium to flow through the entire pebble bed with sufficient mass flux to effectively remove heat from the pebble bed. The maximum total pressure difference between the inlet and outlet is less than 116 ± 50 kilopascals (kPa) (16.8 ± 7.25 pounds per square inch [psi]) at maximum heat transport medium flow rate for normal operation. Helium flow is from the top of the reactor to the bottom to avoid pebble bed fluidization caused by upward lifting coolant drag forces on the pebbles.

3.2.2 Steam and Power Conversion

The LMGS power conversion system uses a helium-cooled reactor that transfers heat produced by the fuel to the primary coolant (helium gas), which transfers heat to the secondary coolant (water) that is then used to generate steam which can be used to generate electric power through the turbine-generator or used directly by the Dow SDO facility as process steam. The SG transfers heat from the helium to the water/steam cycle. The SG is a forced circulation once-through system of helical tube design. Heating is provided by helium flowing downwards through the tube bundle, and feedwater is heated beyond its vaporization point to create superheated steam as it flows upwards through the tube bundle. Steam from each SG is combined in a main steam header and is transported by the main steam piping to drive two (2) steam turbines, each connected to an electric generator to produce electricity. After passing through the steam turbine, the exhaust steam is condensed back to water in the ACC. Heat from the exhaust steam is transferred to the atmosphere in the ACCs. The ACCs utilize finned tube heat exchangers to transfer heat from the steam exhaust to the ambient atmosphere. Air flows via an induced draft over the cooling surface of the ACC, drawn by axial fans. A simplified flow diagram for the reactor-power conversion system is provided in Figure 3.2-1.

Steam for the SDO facility can be extracted from the main steam supply header to the steam turbines or from extraction steam lines from the steam turbine. Makeup is provided from the Water Treatment System (WTS) to account for the inventory of steam transferred to the SDO facility.

3.2.3 Engineered Safety Features

The primary safety goal of the Xe-100 reactor module is to retain fission products within the TRISO-coated fuel particles under normal operating conditions and all postulated accidents. This goal drives the fundamental design principle for the Xe-100, which is that all safety goals and functions are met through inherent and/or passive design features.

Because the TRISO layers in the fuel act as the primary radionuclide barrier and the functional containment for the design, there are no active structures, systems, and components (SSC) requiring qualification to control fission product release to the public.

The fuel is supported by SSCs performing sub-functions to control heat generation, control heat removal, control water and steam ingress, and maintain core geometry. During postulated design basis accidents (DBAs), heat generation is primarily controlled through inherent negative reactivity feedback. Movable poisons provide an additional means of controlling heat generation.

During postulated DBAs, heat removal is controlled through passive heat transfer from the fuel to the environment without the need for active components. During other events, active heat removal via forced cooling provides an additional means of controlling heat removal. During postulated steam generator tube rupture events, isolation valves in the steam and feedwater lines are designed to limit moisture ingress into the reactor. Refer to the Preliminary Safety Analysis Report (PSAR) Chapter 6 for additional details.

Tables

None

Figures

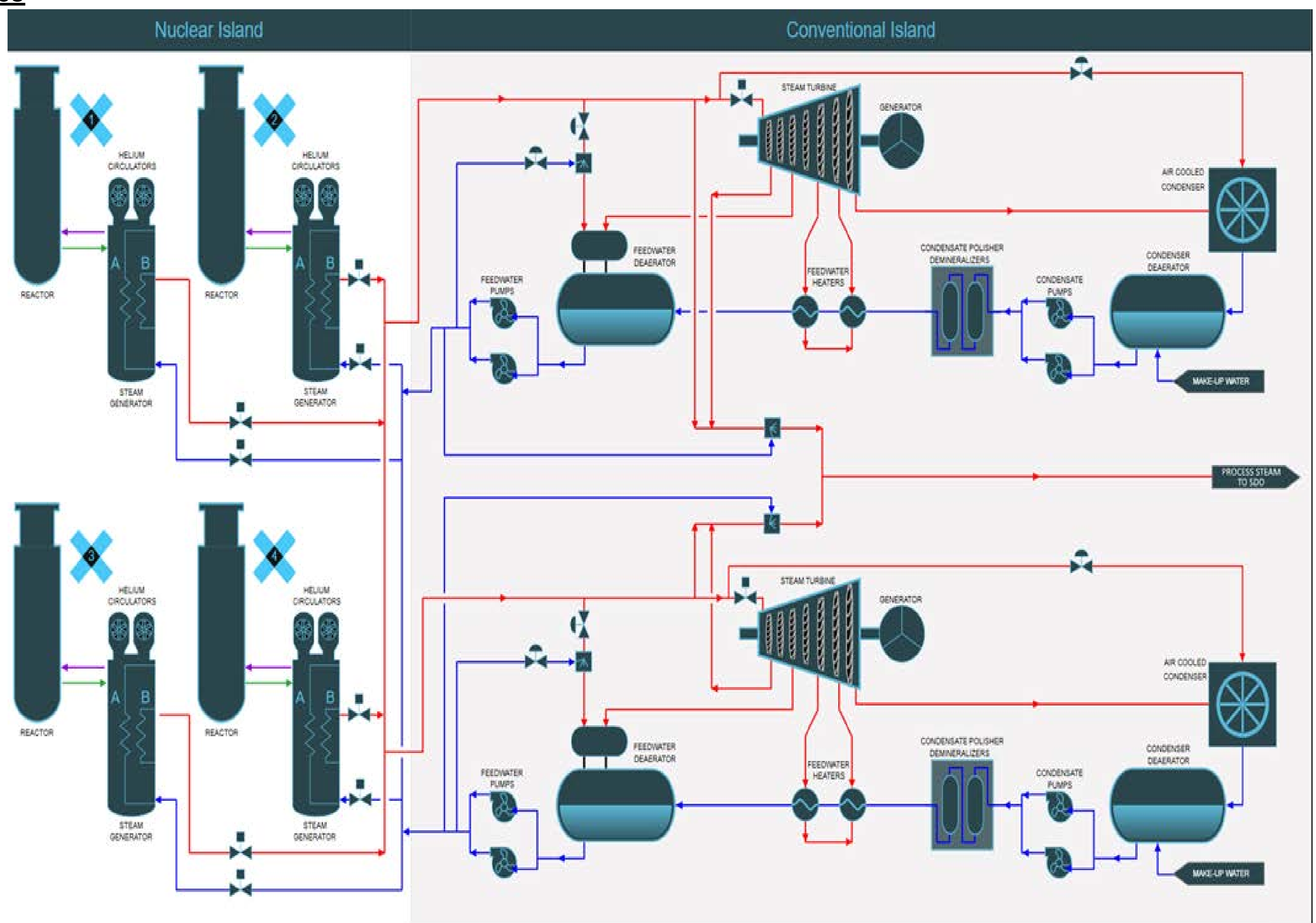

Figure 3.2-1: Simplified Flow Diagram for Reactor-Power Conversion System

3.3 Plant Water Use

Plant water use is required to support makeup for various plant systems and processes including the following (all flows below are based on normal operating condition):

- Makeup for steam consumption supporting SDO operations (547 ft^3/sec or 54 percent of total intake flow).
- Makeup for water treatment processes (346 ft^3/sec or 34 percent of total intake flow).
- Miscellaneous makeup for demineralized water systems, including cooling systems (87 ft^3/sec or 9 percent of total intake flow).
- Miscellaneous makeup for Service Water Systems (21.4 ft^3/sec or 2 percent of total intake flow).

As indicated in Section 1.2, Proposed Project, one of the primary objectives of LMGS is to provide steam to support SDO facility operations. As a result, the majority of water use by LMGS is to support the steam demand for the SDO facility rather than for LMGS cooling.

SDO supplies raw water from their existing Basin #5 to LMGS via a dedicated intake structure and supply pipeline. The GBRA currently supplies makeup water to the basin through the existing SDO facility intake system. A new intake structure and pipeline are provided from the GBRA Calhoun Canal to Basin #5 to support LMGS. Water for LMGS is provided for general operations and provides a makeup source of water for plant auxiliary systems including the Service Water System (SER) and the Demineralized Water Treatment System (DMNT). Potable water is either transported via truck to the site or supplied from the existing SDO potable water system. Wastewater from the CI is transferred to the SDO wastewater system and treated prior to final discharge to the Victoria Barge Canal. The final disposition pathway for the wastewater from the CI will be determined as design progresses. During operations, wastewater from the NI that can be considered potentially radioactive liquid waste is shipped off-site for final disposal. The plant water balance for LMGS is provided in Figure 3.3-1.

Section 3.3.1 discusses water makeup and discharge for the various water systems, including the average and maximum flows. Water availability during periods of drought is discussed in Chapter 5. Section 3.3.2 discusses plant water treatment methods. CI wastewater is transferred to the SDO wastewater system and eventually to the Victoria Barge Canal through the existing SDO outfall. Bounding parameters for plant design and site-specific characteristics are used to establish water consumption rates and water treatment requirements.

3.3.1 Water Consumption

The consumptive use of water is primarily the result of makeup required to support steam demand by the SDO facility. Average and maximum water consumption and discharge rates by the various water systems are provided in Table 3.3-1. This includes water makeup for the Conventional Island Cooling Water (CICW) System, Nuclear Island Process Water (NIPW) System, Condensate and Feedwater System (CDFS), and SER. Also included is the discharge flow rate for each applicable system. Average values are those expected for normal plant operation and maximum values are those expected for upset or abnormal conditions. Cooling water systems do not require an active, safety-related, makeup system. Total intake and discharge flows are provided in Table 3.3-1 based on both average operating conditions and maximum design conditions.

3.3.2 Water Treatment

The WTS intakes source water, treats it, and distributes it to the various downstream processes and systems requiring water. Water treatment for service water and demineralized water will be contracted to a third party (i.e., Water as a Service or WaaS) rather than traditional owner designed and maintained water treatment systems.

The following discussion is based on typical water treatment systems that would be utilized by LMGS to support potable water, service water, and demineralized water needs. Final design of the WTS may vary depending on the selected vendor processes that will be used to meet the water quality requirements for each of the systems.

All treated water comes from the vendor supplied WTS. The downstream users of treated water include the SER, CICW, NIPW, and CDFS. Through the subsystems, Raw Water Treatment (RAWT) System and DMNT, the WTS produces service water and demineralized water for use by LMGS.

3.3.2.1 Raw Water Treatment System

The description of the water treatment is based on a typical water treatment plant to produce service water meeting water quality requirements. The actual system design and chemicals used may differ based on the selected vendor process design.

The RAWT System is designed to treat surface water from Basin #5 and to feed treated water downstream to the SER, Fire Protection System (FPS), and the DMNT. Once water is processed through the RAWT System, it will meet the following minimum water quality requirements:

- Turbidity ≤ 1 NTU
- Total Suspended Solids ≤ 3 ppm
- Total Iron ≤ 0.2 ppm
- Total Manganese ≤ 0.05 ppm
- pH range is 6 – 8.5

The system is specified to have a maximum service water production rate of 650 gpm (2.46 m^3/min) with a normal operating capacity of approximately 200 gpm (0.76 m^3/min). SER and FPS water is stored in two 400,000-gallon (1514 m^3) tanks.

Raw water treatment begins as source water from Basin #5 flows through a traveling screen and pumped to LMGS via a dedicated, above-ground pipeline. Ultrafiltration is used to remove suspended solids. Biocides and coagulants may be added to increase removal efficiency and prevent biofouling. A summary of chemicals generally used for water treatment is provided in Section 3.3.2.4 and Table 3.3-2.

3.3.2.2 Demineralized Water Treatment System

The DMNT System employs reverse osmosis (RO) and additional demineralization processes to further remove dissolved solids from filtered water produced by the RAWT. It will be designed to meet the following water quality requirements to support demineralized water needs:

- Cation Conductivity ≤ 0.2 µmho/cm
- Chloride ≤ 1 µg/L
- Hydrazine ≤ 20 µg/L[1]
- Oxygen ≤ 10 µg/L
- Silica ≤ 10 µg/L
- Sodium ≤ 1 µg/L
- Sulfate ≤ 2 µg/L
- Total Conductivity ≤ 0.08 µg/L
- Total Iron ≤ 5 µg/L

The DMNT is designed to meet a production rate of 1600 gpm (6 m^3/min) nominal with a peak production rate of 2000 gpm (7.57 m^3/min). While these flows are less than the demineralized water makeup flow identified in the water balance, the water balance provides bounding flow requirements to support environmental impact reviews. The DMNT is sized based on more site-specific water requirements. Demineralized water will be stored in two 530,000-gallon (2007 m^3) tanks.

Typically, the DMNT includes a RO system and an electro-deionization system. In addition to demineralization, deaeration is required to reduce oxygen levels required for steam generation.

The DMNT feeds the CICW, CDFS, and NIPW systems that distribute demineralized water to downstream users on the CI and NI.

Chemicals generally used as part of a DMNT include an antiscalant to minimize mineral scale formation and sodium bisulfite to remove residual chlorine. Sulfuric acid may be used for pH

1. Hydrazine would only be present if a hydrazine-based technology were utilized for the removal of dissolved oxygen.

control. An interstage caustic is often added between the first and second RO passes to maximize the removal of alkalinity present as carbon dioxide. A summary of chemicals generally used for water treatment is provided in Section 3.3.2.4 and Table 3.3-2.

3.3.2.3 Sewer System

Sanitary wastes are gathered via gravity collection lines and accumulated into a subgrade sanitary lift station. Grinder pumps transfer the effluent into a dedicated above-ground storage tank. Wastes are manually transferred by tanker trucks to the existing SDO wastewater treatment facility, treated, and discharged under SDO's current permit using existing infrastructure.

3.3.2.4 Water Treatment Chemicals

Chemical treatment is an integral part of the WTS to produce service water and demineralized water for LMGS. The following chemicals are used for water treatment:

- Ferric Chloride ($FeCl_3$)
- Polymer
- Sodium Hypochlorite (NaClO)
- Sulfuric Acid (H_2SO_4)
- Caustic Soda (NaOH)
- Sodium Bisulfite ($NaHSO_3$)
- High pH Cleaning In Place Solution
- Low pH Cleaning In Place Solution
- DBNPA (commonly used non-oxidizing biocide)
- Antiscalant

A summary of chemicals along with expected storage capacity and use is provided in Table 3.3-2.

3.3.3 Wastewater Discharge

Effluent from water treatment and drains throughout the plant, including sanitary wastes, is treated and discharged by the existing SDO wastewater systems. Water quality at the plant discharge is monitored and controlled in accordance with the Texas Pollution Discharge Elimination System (TPDES) permit. Liquid wastewater from the NI is collected in an equalization tank and shipped off-site due to potential radioactivity in the NI liquid waste stream.

Tables

Table 3.3-1: Plant Water Use

System	Average Flow (m^3/hr)[(a)(b)]	Maximum Flow (m^3/hr)[(b)(c)]
WATER SUPPLY		
Plant Intake	1011.1	1322
Potable Water Treatment Intake	1.8	47.0[(d)]
WATER USE		
Demineralized Water – Nuclear Island		
Nuclear Island Cooling Water	9.6	9.6
Reactor Cavity Cooling System	70.4	80.0
Steam Generator Dump System	1.2	20
Feedwater System Makeup	1.2	1.2
Polisher Regeneration	2.4	2.4
Demineralized Water – Conventional Island		
Component Cooling Water	0.64	4.6
Condensate Storage Tank	1.6	19.3
Condenser Vacuum System	0.4	6.8
Service Water		
Diesel Generator Building Makeup	0.2	2.27
Nuclear Island Hose Drops	8.5	18.16
Conventional Island Hose Drops	12.7	20.43
Fire Water System Makeup	0	150.0
Water Treatment System (WTS)		
Ultrafiltration Backwash	66	88.7
Reverse Osmosis Reject	279.6	304
Steam Export to SDO[(e)]	547	547
DISCHARGE STREAMS / POTABLE WATER		
Discharge Sanitary Treatment Facility	0.8	4.25
Consumptive Potable Water Use[(e)]	0.6	0.6
Nuclear Island		
Liquid Wastewater Shipped Off-Site[(e)]	93.5	131.4
Steam Losses[(e)]	1.1	1.1
Conventional Island		
Liquid Wastewater to SDO	368.1	493.6
WTS Sludge Dewatering[(e)]	0.8	0.8
Total Plant Consumptive Water Use	**643**	**680.9**

Notes:
a) Average flow values are based on water balance provided in Figure 3.3-1
b) All flow values are based on a 4 reactor module Xe-100 plant
c) Maximum flows are not considered concurrent
d) Maximum potable water flow is based on maximum flow for a 4 reactor module plant of 47.0 m^3/hr
e) Consumptive use
Abbreviations: m^3/hr = cubic meters per hour; SDO = Seadrift Operations

Table 3.3-2: Water Treatment Chemical Summary

Chemical[a]	Function	System	On-Site Storage Capacity (gal)
Caustic (NaOH)	pH control	WTS	~2000[b]
Ferric Chloride (Coagulant)	Ferric chloride is a positively charged coagulant used to remove non-organic matter (mostly metal ions); used to improve feed water quality by increasing coagulation thus limiting membrane fouling in ultrafiltration system.	WTS	300
Sodium Hypochlorite (NaOCl)	A broad-spectrum disinfecting agent effective against viruses, bacteria, fungi, and mycobacterium.	WTS	~2000[b]
Sodium Bisulfite	Reducing agent used for pH control and chlorine scavenger.	WTS	500
Antiscalant	Proprietary formulations used to prevent the scaling & fouling of the RO membranes. Typical scale could be sulfate precipitates or calcium carbonate.	WTS	55
Sulfuric Acid	Acid used for pH control to prevent salts from coming out of solution and settling out. Also controls alkaline scales and metal oxides on membranes and pipe. This is shared amongst pre-treatment of RO feedwater, and on-site regeneration of mixed-bed polishers.	WTS	~2000[b]
Polymer	Long chain, high molecular weight, organic chemicals that facilitate the separation of solid and liquid in mixed raw water. Can be cationic, anionic, or non-ionic depending on the constituents of the source water.	WTS	55
High pH CIP Solution	High pH solutions are effective at removing biological matter. Permeate must be neutralized prior to disposal.	WTS	55
Low pH CIP Solution	Low pH is best at removing mineral scale. Low pH cycles usually precede high pH ones.	WTS	55
DBNPA	A non-oxidizing, organic bromine-based biocide that readily breaks down in water across a range of pHs. More environmentally friendly than oxidizing or halogen biocides. Used to limit biofouling in RO membranes.	WTS	55

Notes:

a)Other chemicals required for UF and RO cleaning may be identified during detailed design

b)The symbol “~” denotes an approximate amount

Abbreviations: CIP = Clean in Place; DBNPA = 2,2-dibromo-3-nitrilopropionamide; gal = gallon(s); RO = reverse osmosis; UF = Ultrafiltration; WTS = water treatment system

Figures

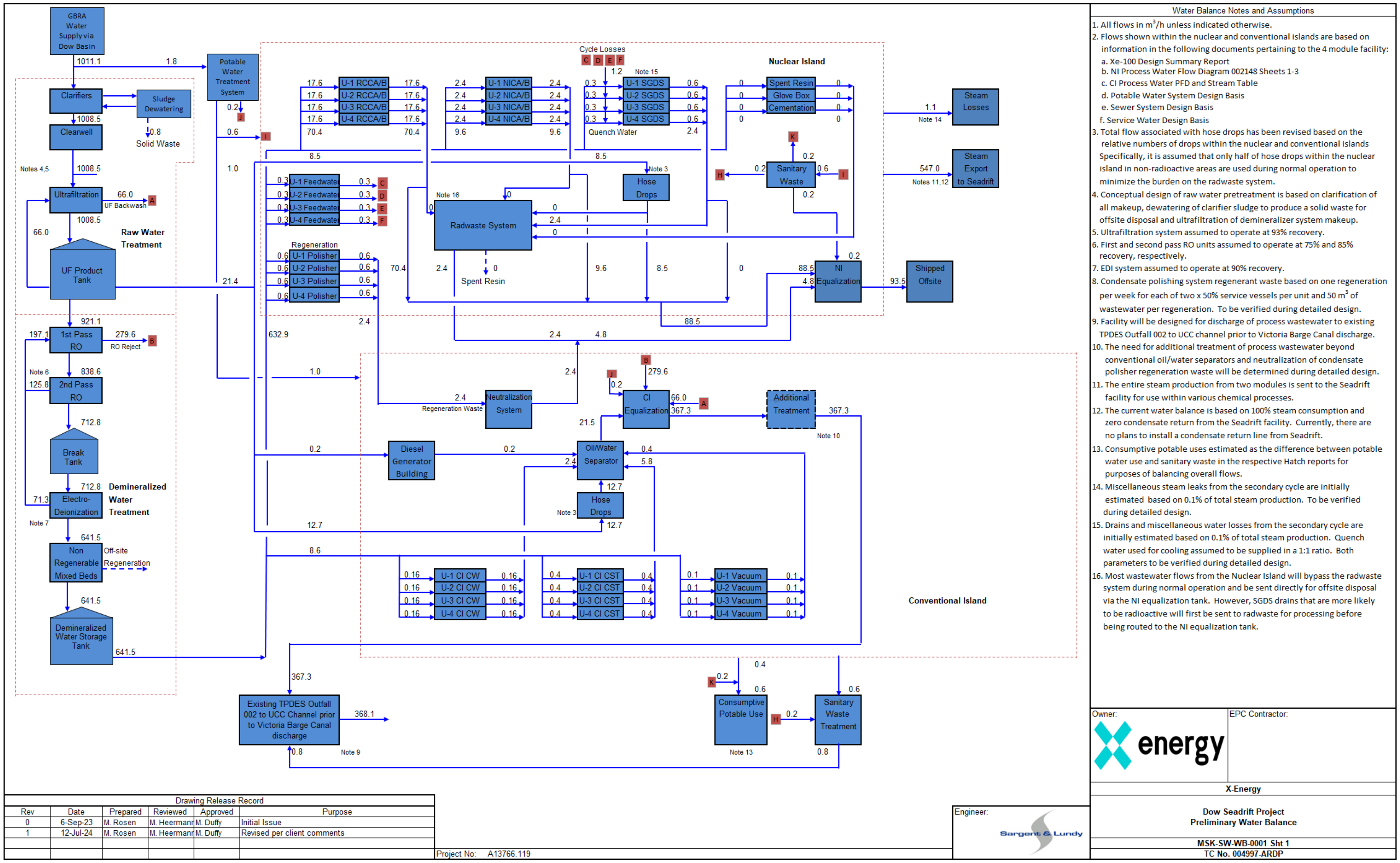

Figure 3.3-1: Plant Water Balance

3.4 Cooling System

Plant cooling systems and the anticipated cooling system modes of operation are described in Section 3.4.1. Design data and performance characteristics for the cooling system components are presented in Section 3.4.2. As described in Section 3.3, Plant Water Use, the majority of water use for LMGS is not for cooling systems. All cooling systems are closed-loop cooling systems. Makeup from Basin #5 is provided to address water loss associated with each system. Heat is discharged through air-cooled heat exchangers with no heat discharged to water bodies.

3.4.1 Description and Operational Modes

A general description and expected operating modes for each of the cooling systems is provided below. Table 3.4-1 provides a list of the operating modes for LMGS and the normal heat sink associated with each operating mode.

3.4.1.1 Condenser System

The ACC functions as a heat exchanger to remove heat from the turbine exhaust and transfers the heat to the outside ambient air. Steam leaving the turbine is cooled and condensed inside the condenser tubes. The pressure in the condenser steam space is at vacuum to extract the maximum amount of energy from the steam cycle.

The ACC is the primary heat dissipation system for LMGS (Table 3.4-1). A simplified flow diagram of the system is provided in Figure 3.2-1. Heat extracted from the turbine exhaust steam in the ACC is transferred to the outside air by axial fans that draw air over the bundles of finned tubes. The ACC is designed to serve the condensing requirements for the turbine exhaust steam and turbine bypass steam during hot standby and power operation modes and capable of turbine bypass flow to support plant transients such as loss of load or turbine trip.

3.4.1.2 Reactor Cavity Cooling System

The reactor cavity cooling system (RCCS) provides cooling for the reactor cavity walls during normal operation. RCCS passive heat removal is designed to maintain the RPV metallics temperatures below ASME III Division 5 limits. During normal operations, the RCCS removes approximately 500 kilowatt (kW) (1.706 million British thermal units per hour (MMBtu/hr) of heat from the Reactor Building to maintain the Reactor Building walls below 65 °C (149 °F). To support heat removal needs during normal operation, three pumps, each capable of providing 50 percent capacity, supply cooling water for all four reactor modules. The heat from the RCCS during normal operation is removed by six 1 MW (3.4 MMBtu/hr) air-cooled heat exchangers to support all four reactor modules.

During a DBA condition, the heat from the reactor is transferred to water in standpipes that surround the reactor vessel. Water in the RCCS is boiled off in the standpipes. As water is boiled off in the inner standpipes, the steam is replaced by water from the Boil-Off Makeup

Supply Tanks through the outer downcomer headers. The volume of water within the standpipes and the associated Boil-Off Makeup Supply Tanks is sufficient to support 72 hours of passive cooling with no active components operating.

3.4.1.3 Nuclear Island Cooling Water System

The Nuclear Island Cooling Water System (NICW) is comprised of the RBCW and the Helium Services Cooling Water System (HSCW).

3.4.1.3.1 Reactor Building Cooling Water System

The RBCW is designed to support water-cooled equipment in the RB, including the Reactivity Control and Shutdown System (RCSS), and the Helium Circulator (HC) cooling jackets. Heat from the RBCW is rejected to the atmosphere through a chilled water system. The heat load for four reactor modules operating at full power is 1930 kW (6.585 MMBtu/hr).

3.4.1.3.2 Helium Services Cooling Water System

The HSCW is designed to support a variety of water-cooled equipment in the HSF and the FHAB. The HSCW is expected to provide chilled water to the NI Heating Ventilation and Air Conditioning (HVAC) Air Handling Units. Operating at peak heat load conditions, the NI HVAC system total heat load is 4780 kW (16.309 MMBtu/hr).

3.4.1.4 Startup and Shutdown System

The Startup and Shutdown System (SSS) provides feed water and decay heat removal support during normal operation and during specific licensing basis events (LBEs). During reactor startup, the SSS controls SG outlet pressure, generates steam to heat up the CI, provides conveyance of steam to the Condenser System (CDS), and transitions the SGs from watering to steaming conditions. During reactor shutdown, the SSS allows continuity of steam to the CDS for heat rejection. During normal power operations, SSS operates in a standby mode in preparation for response during specific LBEs to provide feed water when main feedwater is not available and remove decay heat when the Condenser System is not available. Heat is removed from the SSS through two air-cooled feed water heat exchangers.

3.4.1.5 Conventional Island Cooling Water System

The CICW removes heat from turbine-generator coolers for lubricating oil, generator air coolers and various support systems. The CICW rejects the heat to the outside ambient air through a closed-loop air-cooled chilled water system.

3.4.1.6 Operational Modes

The main source of decay heat removal for Modes 1 through 3, including Power Operation, Startup, and Shutdown, is the condenser system. If the Condenser is not available during startup or shutdown, the SSS can provide means for decay heat removal. During Modes 4 (Depressurized) and Mode 5 (Defuel), there is negligible decay heat removal required (Table 3.4-1).

The RCCS removes heat from the reactor cavity for all modes of operation. During normal operation, the maximum heat load occurs at 100 percent maximum continuous rated power condition when the heat in the reactor cavity is the greatest. For this condition, three pumps at 50 percent capacity at 100 kg/s (794,000 lb/hr) feed all four reactor modules.
Six 1.0 megawatt (MW) (3.4 MMBtu/hr) air-cooled heat exchangers are available to provide cooling during normal operation.

The RBCW is required to provide cooling during both normal operating conditions and normal shutdown. The peak heat load in the system occurs during normal operation, with an operating heat load of 482 kW (1.64 MMBtu/hr) per operating reactor module. During normal shutdown, one HC is required to support decay heat removal without relying on the RCCS, with an operating heat load of 180 kW (0.614 MMBtu/hr) per reactor module.

The HSCW is expected to support heat removal of the HSF and NI HVAC System during all modes of operation. The CICW supports the cooling needs of the CI during all modes of operation. The CICW chillers design heat removal rate is 6.366 MW (21.72 MMBtu/hr) total or 3.183 MW (10.86 MMBtu/hr) per turbine-generator set.

3.4.1.6.1 Station Load Factor

LMGS is designed with adequate margin and redundancy to achieve a 99.99 percent availability of steam to the SDO. A conservative station load factor of 100 percent is assumed when evaluating heat discharge to the environment.

3.4.1.6.2 Makeup Water Temperature

No ice-mitigation features are required at the intake structure. The minimum river water temperature recorded for the Guadalupe River in Calhoun County, Texas, near the Gulf of Mexico is 7 °C (44.6 °F).

3.4.1.6.3 Guadalupe-Blanco River Basin Water Level

The intrinsic safety and other characteristics of the LMGS design enable safety functions to be satisfied with inherent and passive features. Of the above cooling systems, only the RCCS is credited as having a cooling function required for safety. Since the system is passive and does not use makeup water from the Guadalupe-Blanco River Basin, it does not serve as an active nuclear safety-related makeup water supply for ultimate heat sink cooling. As a result, there is no minimum water level defined for LMGS to meet its safety requirements for safe shutdown.

3.4.1.6.4 Anti-Fouling Treatment

Refer to Section 3.3.2 for a description of the anti-fouling treatment.

3.4.2 Component Descriptions

3.4.2.1 Condenser System Air-Cooled Condenser

LMGS consists of two turbine-generator sets with each turbine exhausting steam to an ACC. Each ACC consists of 16 modules, or cells, with two rows of five cells and one row of six cells. The ACC footprint is 50 m (158 ft) by 85 m (280 ft). The total number of cells for both turbine-generator sets is 32. Total heat rejection capability for the two ACCs combined is 479.2 MW (140.4 MMBtu/hr). Performance data for the ACC is provided in Table 3.4-2. Design and performance data listed in Table 3.4-2 is based on one turbine-generator system.

3.4.2.2 Reactor Building Cooling Water System Components

Major components of the RBCW include the RBCW expansion and head tank, four 50 percent capacity RBCW chillers, and four 50 percent capacity RBCW pumps. The pumps are located in the Nuclear Island Auxiliary Structure (NIAS). The chillers are located outside the NIAS. The RBCW expansion tank is located on the roof of the RB.

3.4.2.3 Helium Services Cooling Water System Components

Major components of the HSCW include one HSCW expansion tank, five 25 percent capacity HCSW chillers, and three 50 percent capacity HCSW pumps. The HSCW pumps and chillers are located outside the HSF. The HSCW expansion tank is located on the FHAB roof.

3.4.2.4 Startup and Shutdown System Components

Major components of the SSS include the following:

- Blowdown tanks (BDTs) – Two 100 percent capacity BDTs receive steam from the Steam Generator System (SGS) to support active decay heat removal and to contain steam during LBEs that involve a SG tube leak or rupture
- SSS Feed Pumps – Two 100 percent capacity feed pumps pressurize the SSS piping to provide feed flow to the SGS during LBEs that involve a loss of main feedwater to support active decay heat removal
- SSS Feed heat exchangers – Two air-cooled feed heat exchangers removed heat from the SSS flow from the BDTs prior to injection into the SGS. Each heat exchanger is sized for a heat removal capacity of 8 MW (27.3 MMBtu/hr)
- Attemperation tank – One attemperation tank provides net positive suction head for attemperation pumps to support reducing the inlet temperature to, and maintaining the

pressure of, the BDTs. In addition, the attemperation tank provides sufficient water volume to fill the SGs and sufficient space to dump the SG inventory

- Attemperation pumps – Two attemperation pumps pressurize the attemperation loop, each with redundancy, to reduce the inlet temperature and maintain the pressure of the BDTs.
- Attemperation heat exchangers – Two air-cooled attemperation heat exchangers remove heat from the attemperation loop to support reducing the inlet temperature to, and maintaining the pressure of the BDTs. Each heat exchanger is sized for a heat removal capacity of 6 MW (20.4 MMBtu/hr)

3.4.2.5 Conventional Island Cooling Water System Components

The CICW includes a chilled water system that rejects the heat from the CICW heat exchangers to the ambient air. The air-cooled chiller system consists of air-cooled chiller(s) and cooling water pump(s) The air-cooled chiller system is sized based on a total system heat load of 6.366 MWt (21.72 MMBtu/hr) total or 3.183 MW (10.86 MMBtu/hr) per turbine-generator set.

3.4.2.6 Plant Intake System

SDO and the GBRA, individually and collectively, own surface water rights downstream of the Guadalupe-San Antonio River confluence authorizing the diversions from the Guadalupe River totaling up to 175,501 ac-ft (21,648 ha-m) per year. Once in the canal, water flows via gravity through the man-made canal until it enters the naturally occurring Goff Bayou. At the end of the Goff Bayou, two pipelines convey water underneath the Victoria Barge Canal to the pump suction structure of the GBRA/Dow Pump Station. The GBRA/Dow pump station is equipped with seven submersible pumps with varying capacities totaling 160,000 gpm (606 m^3/min). The pumps are operated by Dow under the direction of the GBRA to balance the pump flow with the consumptive rates by the various other users.

The SDO/GBRA pump station output flows to the GBRA Calhoun Canal south of the SDO basins. As part of LMGS, a new intake structure and pump station installed on the GBRA Calhoun Canal provides water into Basin #5 via a new pipeline. The LMGS pump station is located nearby and downstream of the existing GBRA Relift 1 Pump Station. The expected location of the GBRA Calhoun Canal intake structure, intake pipeline to Basin #5 and the LMGS intake from Basin #5 are shown in Figure 3.1-3.

The LMGS intake structure is a similar design to the existing GBRA Calhoun Canal lift station. Because the design of the new LMGS intake structure is not yet mature, plan and elevation drawings of the existing GBRA Relift 1 Pump Station are provided in Figure 3.4-1 and Figure 3.4-2. The design of the intake structure will comply with Section 316(b) of the Clean Water Act. Table 3.3-1 provides flow rates for the intake structure. Environmental controls used in the design of the intake structure include a trash rack to prevent debris from entering the pump suction and the use of riprap to prevent soil erosion. Additional information about the design of the new intake structure and pump station will be provided in the Operating License Application.

3.4.2.7 Plant Discharge System

As noted in Section 3.3, Plant Water Use, liquid waste from the NI is shipped off-site for final disposal. Liquid waste from the CI is transfered to the SDO liquid waste system, where it is combined with the SDO liquid effluent waste stream. This waste stream is treated and eventually discharged to the Victoria Barge Canal under the existing SDO outfall. As a result, no new discharge structure or plant outfall is associated with LMGS. The discharge line corridor is shown in Figure 3.1-3.

Tables

Table 3.4-1: LMGS Modes and Normal Heat Sink

Plant Mode	Plant Heat Sink
1: Power Operation	CI CDS (ACC)
2: Startup	CI CDS (ACC) / SSS
3: Shutdown	CI CDS (ACC) / SSS
4: Depressurized	Negligible Decay Heat
5: Defuel	Negligible Decay Heat
Abbreviations: CI = Conventional Island; CDS = Condenser System; ACC = air-cooled condenser; SSS = Startup and Shutdown System	

Table 3.4-2: Air-Cooled Condenser Selection and Performance Data per ACC

Air-Cooled Condenser Selection and Performance Data per ACC	
Air-Cooled Condenser Model	TBD
Number of Modules	16
Initial Temperature Difference (ITD)	18.6°C
Steam Turbine Exhaust Flow	117.2 kg/s
Steam Turbine Back Pressure	164.2 mbara
Inlet Dry Bulb Temperature	37.3°C
Total Heat Transfer	239.6 MW
Approximate Width	50 m
Approximate Length	85 m
Approximate Height	30 m
ACC Fan Power	2982 kW
ACC Noise Sound Level at 1.5 m Above Grade	<85 dBA at 1 m from ACC perimeter
Heat Load	479.2 MW (total for 2 Turbine-Generator Sets Combined)
Abbreviations: TBD = to be determined; °C = degrees Celsius; ACC = air-cooled condenser; dBA = decibel A-weighted sound level; kg/s = kilograms per second; kW = kilowatt; m = meter; mbara = millibar absolute; MW = megawatt	

Figures

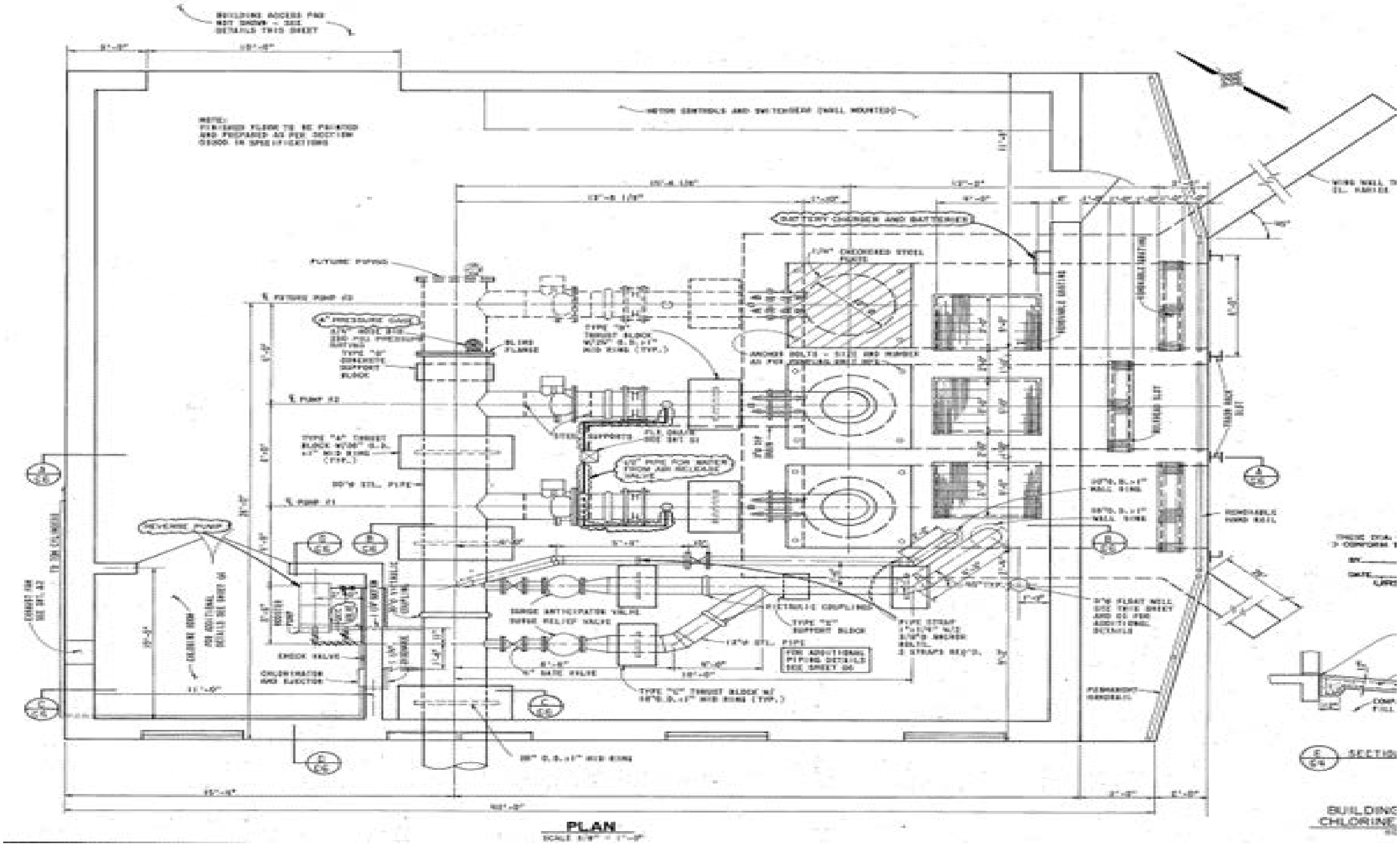

Figure 3.4-1: Plan Drawing of GBRA Calhoun Canal Pump Lift Station

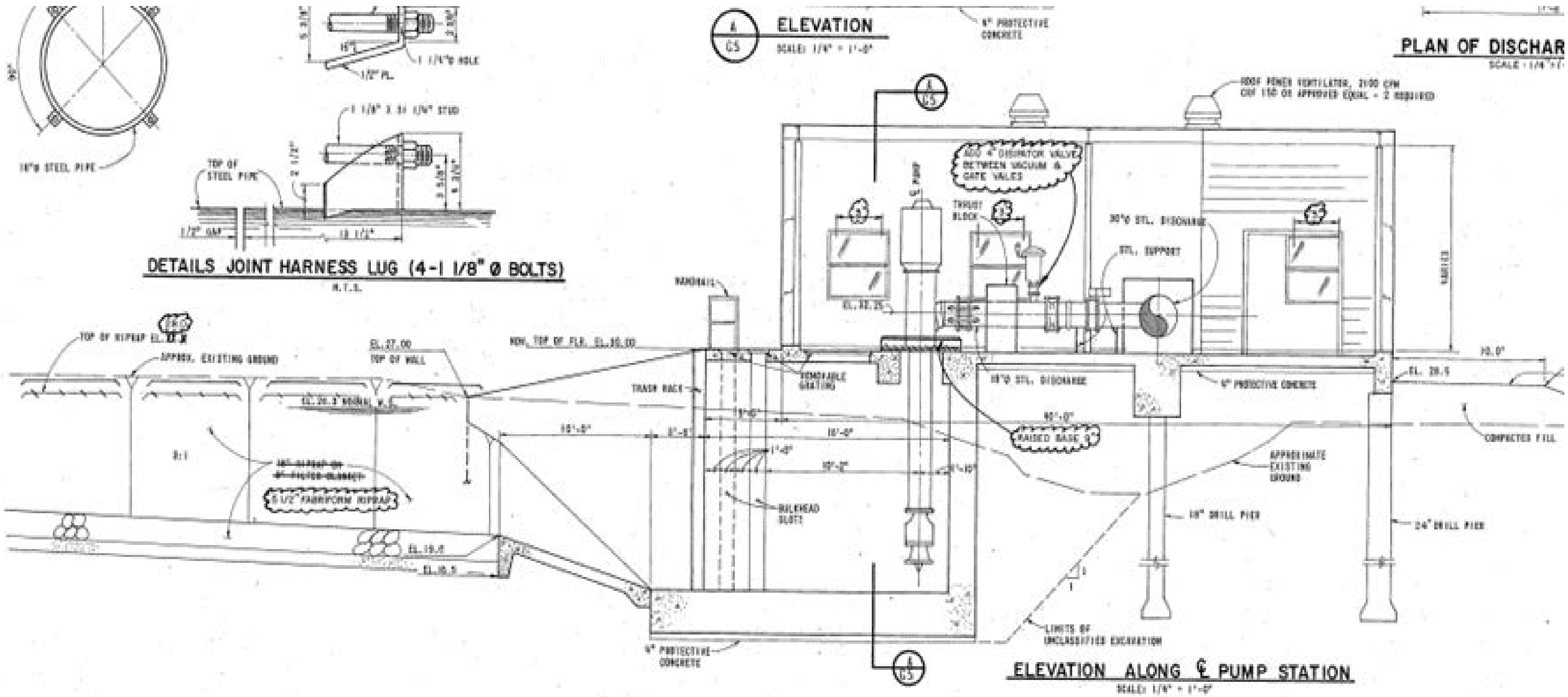

Figure 3.4-2: Elevation Drawing of GBRA Calhoun Canal Pump Lift Station

3.5 Radioactive Waste Management System

LMGS is designed such that during normal operation, or during Anticipated Operational Occurrences (AOOs), radiation exposures within the facility, or due to any planned release of radioactive material are kept below prescribed limits and as low as (is) reasonably achievable (ALARA). In addition, the Xe-100 is designed to not generate mixed waste.

The application of the ALARA principle in the Xe-100 design is implemented through an ongoing optimization and development process. ALARA principles are considered at all stages in the process from the design of processes, structures, systems, and components, through to operation, decommissioning and waste management.

The ALARA optimization process starts with the identification of exposure situations and preliminary analysis of the type and level of doses expected, which occurs in the evolution of the design. In alignment with ALARA principles, the preferred method of exposure control is through elimination or reduction of the hazard. If elimination or significant reduction is not possible, the primary method for controlling exposure is through engineered controls. The use of physical design features, including these engineered controls, is integrated into the LMGS development process.

The LMGS Radioactive Waste Management System (RWM) is designed to handle, treat, and package solid and liquid radwaste generated during operation of one to four Xe-100 reactor modules. The RWM is located inside the Radwaste Building (RWB) and consists of the Liquid Radioactive Waste Handling (LRWH) and Solid Radwaste Handling (SRWH) subsystems. The Nuclear Island Liquid Radwaste Drainage System (NILR) provides a means to collect and transfer liquid radwaste from the NI buildings to the LRWH subsystem in the RWB.

The RWM and associated systems and subsystems (NILR, LRWH, SRWH) operate in batch processing modes to collect radwaste from NI buildings, transport it to the RWB for treatment and packaging.

3.5.1 Liquid Radwaste Handling Subsystem

The LRWH provides means to collect, handle, and process low-activity liquid waste that originates in NI buildings including the FHAB, HSF, Inter-Unit Access Tunnel (IUAT), RB, RWB, and Spent Fuel Intermediate Storage Facility (SFISF). Liquid radwaste is collected via floor drains or equipment drains, transferred by gravity draining to designated NILR sump pits, and pumped to the LRWH system in the RWB. The LRWH system also provides for the handling and transfer of spent ion-exchange resin via a dedicated pump and piping to the SRWH for packaging. A schematic of the LRWH is presented in Figure 9.2-1 of the Preliminary Safety Analysis Report (PSAR).

All liquid radwaste inputs (other than spent resins) are transferred to one of the Radwaste Treatment (RWT) low activity waste storage tanks. Two low activity storage tanks are provided to allow for separation of different types of low activity wastes to optimize processing capabilities as required. Spent resins and planned higher activity generated waste are transferred to the spent resin tank.

Liquid radwaste stored inside the RWT storage tanks is processed by filtration and ion exchange to remove the radioactive materials to the extent practical. Liquid radwaste that meets the requirements of 10 Code of Federal Regulations (CFR) 20.2006 is stored within the RWB and periodically transported off-site for disposal at the Texas Compact Waste Facility operated by Waste Control Specialists (WCS) in Andrews, Texas. Low activity waste stored in an RWT storage tank may also be discharged to a mobile processing system, should unusual conditions exist that require special processing.

Spent resins and planned higher activity generated waste are stored in the LRWH Spent Resin Tank and are pumped to the SRWH, dewatered, and packed in a waste container. The waste container is transferred to the RWB for interim storage or prepared for off-site shipment.

3.5.1.1 Sources of Liquid Radwaste

Based on engineering judgment and experience, review of liquid radwaste generation estimates from other designs, and adaptation of the generic guidance for light-water reactors, the following liquid radwaste generation sources have been identified:

- NI component leakage and building floor drains in the RB, HSF, and FHAB
- Liquid from the SG tube bundles following a SG tube rupture event
- Hand wash sinks and showers used for personnel decontamination
- Generated tritiated liquid waste from the Helium Purification System (HPS)
- Water collected from the HPS during normal operation and from the Helium Water Removal System in emergency situations. This is expected to be a minor contributor to liquid radwaste, limited to short-term startup and off-normal events.
- Leakage from sampling or sample analysis activities in the RWB Laboratory

3.5.1.2 Annual Liquid Radwaste Generation Estimates

Table 3.5-1 lists the radionuclides generated as liquid radwaste and an estimate of activity from annual liquid radwaste generated for each radionuclide at LMGS. The operation is estimated to generate approximately 1.23 m^3 of liquid radioactive waste per day. Information about liquid radwaste shipments is provided in Section 5.7.2.

3.5.2 Solid Radwaste Handling System

The SRWH provides for the handling, treatment, and packaging of spent ion-exchange resins and medium and low-level dry solid radwaste for on-site storage in the RWB packaged waste repository, or shipment to an off-site disposal facility.

Dry Active Waste (DAW) is sorted, as necessary, and packed into drums. Compactable DAW is packed into consumable small drums (typically 35-gallon compactable drums), hydraulically compacted, and then overpacked into a larger container (typically 55-gallon drums). Non-compactable DAW is packed directly into larger containers (typically 55-gallon drums).

The contents of each drum are measured, and the drum is capped. Filled drums are stored on-site until they are shipped to an off-site disposal facility. The SRWH includes a waste interim storage area in the RWB for packaged low-level solid radwaste.

3.5.2.1 Sources of Solid Radwaste

LMGS generates the following types of solid radwaste:

- Spent filters from HVAC systems supporting habitability in radiological areas
- Spent filters and adsorber elements from the HPS and FHS
- Spent ion-exchange resins and filters from the treatment of liquid radwaste
- Compactable DAW (e.g., clothing from workers, packaging materials, swabs and wipes, plastic sheeting, and papers)
- Non-compactable DAW

3.5.2.2 Estimated Solid Radwaste Volumes

Table 3.5-2 lists the solid waste streams generated and an estimate of annual solid radwaste volume generated for each solid waste stream for LMGS.

3.5.2.3 Radwaste Storage and Disposal

Low-level radwaste shipments (i.e., Class A, B, or C low-level waste) will be transported to the Texas Compact Waste Facility operated by WCS in Andrews, Texas. Transportation to the disposal facility is by truck or train, in accordance with 10 CFR 71, with final modality confirmed as part of the development of the site-specific waste management Process Control Program.

Table 3.5-3 lists the solid waste streams and an estimate of annual solid radwaste shipments for each solid waste stream at LMGS.

3.5.3 Gaseous Radwaste Management

Gaseous effluents originate from the clean-up of the primary gas-containing products and operational processes. These wastes are handled by the HVAC systems and HPS. A schematic including these systems is presented in Figure 9.1-1 of the PSAR.

The HVAC systems use a cascading approach to create negative pressures in areas with higher radiation environments. Under normal operational conditions, exhaust air is discharged via the stack to the atmosphere. However, preliminary dose estimates evaluate the exhaust as ground-level release for conservatism (“Radiological Impacts of Normal Operation” on page 1, Radiological Impacts of Normal Operation). The radioactivity of the exhausted air from the HVAC systems is monitored to maintain gaseous releases below regulatory limits.Following any abnormal event with a radioactive release, the area of concern is switched to a secured sub-atmospheric pressure system. This system includes appropriate filtration to reduce radioactivity.

3.5.3.1 Helium Service System

The Helium Service System (HSS) supplies and stores clean helium for the station and purifies a partial flow of helium diverted from the primary loop to maintain the helium volume above a high purity threshold. To support the high purity requirements in the primary loop, the HSS minimizes contamination of helium in the primary loop of each reactor module to limit the amount of oxidation/carbonization in the reactor, steam generator, and primary loop components. The HPS and Helium Recovery System (HRS) are the subsystems that perform this function.

The HPS utilizes filters, a catalytic reactor, absorbers, and cryogenic absorbers to purify the helium. Some helium impurities are not easily removed in the HPS and are eventually released to the atmosphere via the HVAC effluent as appropriate.

The HRS is responsible for receiving helium and gaseous waste from all parts of the HSS and directing gas to the HVAC system, or, recycling the gas back though the HPS. The system primarily consists of compressors, filters, valves, check valves, and gas quality monitors. Helium gas, from various sources, is collected in the HRS. Sources include: HPS, Gas Analysis and Sampling System, and FHS Recycled Helium Manifold System.

A manual sampling location is located at the HRS outlet for periodic monitoring. Gas that is discharged from the HRS through the HVAC system to a stack is ultimately monitored by the Radiation Monitoring System.

3.5.4 Direct Radiation Sources

LMGS is designed such that during normal operation or AOOs, radiation exposures within the facility are maintained ALARA. The primary method for controlling exposure is through engineered controls.

With respect to radiation exposure, structures are designed to provide sufficient shielding to protect workers and equipment in areas of the plant where there are significant radiological sources, thus maintaining exposures ALARA.

The Spent Fuel Storage System (SFSS) safely transfers and stores irradiated spent and used fuel pebbles in spent fuel canisters for a period of up to 80 years. The SFSS also stores graphite pebbles (irradiated and non-irradiated) used during initial plant startup and any damaged fuel pebbles that are removed by the sphere unloading machine. However, it is expected that some portion of damaged fuel pebbles may be sent off-site for analysis. The SFSS includes all the systems, structures, and components that support safely transferring fuel spheres from the FHS discharge gate to the SFISF via the Canister Processing Facility (CPF) and through the IUAT for storage during the lifetime of the plant.

The Remotely Operated Special Tooling (ROST) cart is used to pick up filled canisters at the FHS discharge gate and transfers the loaded canister to the CPF processing area. The ROST cart then transfers the canister from the CPF, through the IUAT to the SFISF for final storage The IUAT provides a seismic category II above-ground structure that supports transfer of spent fuel canisters from the CPF to the SFISF structures.

The SFISF is located within the protected area boundary and is a large above-ground space used to store spent fuel. The dimensions of an SFISF to support a single module are approximately 50 m by 35 m (164 ft by 108 ft) with a height of approximately 10 m (35 ft) above grade. A single SFISF unit would be initially constructed, with three additional units constructed as needed to store fuel from the 4-module plant. The impacts of building and operating SFISF units to support all four modules are described in Chapters 4 and 5. The SFISF is constructed with a deep foundation system consisting of driven piles to support the concrete base mat and adequate to support the weight of the containers, as well as the fully loaded spent fuel canisters (SFC). Each SFISF unit contains space for multiple rows of containers and the four units ultimately constructed provide space for all spent fuel expected during the lifetime operation of a 4-module site. The spent and used fuel canisters are cooled by natural circulation within the SFISF.

Tables

Table 3.5-1: Estimated Annual Liquid Radwaste Activity for Long Mott Generating Station

Nuclide	4-Module Activity (Bq/year)
Ag-110m	1.62E+12
I-131	1.92E+11
Cs-134	2.14E+12
Cs-137	1.34E+12
Ba-137m	1.25E+12
Ba-140	4.37E+10
La-140	4.37E+10
Xe-133	1.30E+08
H-3	2.16E+10
Abbreviations: Bq = becquerel; Ag = Silver; m = metastable I = Iodine; Cs = Cesium; Ba = Barium; La = Lanthanum; Xe = Xenon; H-3 = tritium	

Table 3.5-2: Estimated Annual Solid Radwaste for Long Mott Generating Station

Solid Radwaste Stream	LMGS Annual Volume (m^3/yr)
Spent HVAC Filters	33.6
Spent HPS Filter Elements	1.6
Spent HPS Adsorber Element Generation	10.8
Spent FHS Filter Elements	18.8
Spent LRWH Process Filter Cartridges	0.3
Spent LRWH Ion Exchange Media	4
Compactable Dry Active Waste	36.4
Non-Compactable Dry Active Waste	1.2
Total Volume	**106.7**
Abbreviations: LMGS = Long Mott Generating Station; FHS = Fuel Handling System; HPS = Helium Purification System; HVAC = heating, ventilation, and air conditioning; LRWH = Liquid Radioactive Waste Handling Subsystem; m^3/yr = cubic meters per year	

Table 3.5-3: Estimated Annual Solid Radwaste Shipments for Long Mott Generating Station

Solid Radwaste Stream	Packaged Radwaste Volume for LMGS (m^3/year)	Annual Shipments for LMGS (shipments/year)
Spent HVAC Filters	50.4	23
Spent HPS Filter Elements	2.4	2
Spent HPS Adsorber Element Generation	16.2	8
Spent FHS Filter Elements	28.2	13
Spent LRWH Process Filter Cartridges	0.5	1
Spent LRWH Ion Exchange Media	6	3
Compactable Dry Active Waste	12.1	6
Non-Compactable Dry Active Waste	2.4	2
TOTAL	**118.2**	**58**

Abbreviations: LMGS = Long Mott Generating Station; FHS = Fuel Handling System; HPS = Helium Purification System; HVAC = heating, ventilation, and air conditioning; LRWH = Liquid Radioactive Waste Handling Subsystem; m^3/yr = cubic meters per year

Figures

None

3.6 Nonradioactive Waste Systems

Nonradioactive waste is generated during the construction and operation of LMGS. This section addresses the management of nonradioactive waste generated at LMGS during various stages including site preparation, construction, and operations.

Typical nonradioactive waste streams include construction debris, water pumped from excavations during construction, spoils, CI process water that may contain water treatment chemicals or biocides, waste from floor and equipment drains, municipal and sanitary waste, stormwater runoff, gaseous effluents, used oils, universal waste, and hazardous waste.

To ensure safe handling and minimize environmental impacts, all nonradioactive waste is segregated based on waste type and its potential hazards. Waste segregation occurs at the point of generation, and waste will be labeled accordingly to facilitate proper disposal.

3.6.1 Effluents Containing Chemicals or Biocides

Liquid process waste streams with the potential to contain chemicals and/or biocides include the process waste streams from the CI. The water balance diagram provided in Figure 3.3-1 identifies the process waste streams and the estimated quantity of waste.

Table 3.3-2 summarizes the chemicals utilized, along with their expected storage capacities. As noted in Section 3.3.3, nonradioactive effluent from water treatment and drains throughout the plant is treated and discharged through the existing permitted SDO wastewater systems.

3.6.2 Sanitary System Effluents

The LMGS sanitary waste system for the site is discussed in Section 3.3.2.3. Sanitary wastes are gathered via gravity collection lines, accumulated into a subgrade sanitary lift station, and then pumped to an above-ground storage tank. Wastes are pumped into tanker trucks and transferred to the existing SDO sanitary wastewater treatment facility. Wastes are treated and discharged under SDO’s current TPDES Permit No. WQ0000447000 requirements using existing infrastructure.

3.6.3 Other Effluents

Nonradioactive waste streams, separate from the liquid process and sanitary waste systems described above, are described in this section. The following waste streams are included in this section:

- Solid waste management
- Hazardous waste management
- Stormwater runoff
- Gaseous effluents

3.6.3.1 Solid Waste Management

LMGS operations generate solid waste, which is primarily regulated by the Texas Commission on Environmental Quality (TCEQ). Common types of operational solid waste include paper, plastic, glass, vegetative debris, food waste, and industrial wastes such as hazardous waste, used oils, and universal wastes. LMGS will identify, segregate, and when feasible recycle solid waste in accordance with Texas Administrative Code (TAC) Title 30 Section 335.1. LMGS will determine if any solid wastes are hazardous through process knowledge and/or analytical data.

LMGS would use permitted treatment and disposal facilities such as:

- Clean Harbors, Deer Park, Texas – incineration
- Clean Harbors, El Dorado, Arkansas – incineration
- Clean Harbors, Lone Mountain, Oklahoma – hazardous landfill
- US Ecology/ Republic, Robstown, Texas – hazardous and non-hazardous landfill
- Republic – City of Victoria Landfill – non-hazardous, class 2 waste
- Dow Freeport Kiln – certain wastes for incineration

LMGS will manage solid waste in compliance with federal, state, and local regulations. The LMGS waste management program will track and document waste generation through final disposal.

3.6.3.2 Hazardous Waste Management

Hazardous waste in the State of Texas is regulated by the U.S. Environmental Protection Agency (EPA) under the Resource Conservation and Recovery Act (RCRA) Subtitle C, codified in 40 CFR Parts 260 through 280 (EPA, 2024a), and by the TCEQ under various chapters of the TAC Title 30, Part 1, which incorporates RCRA (TCEQ, 2024a). LMGS is expected to operate as a Small Quantity Generator (SQG) of hazardous waste, generating between 100 kg (220 lb.) and 1000 kg (2200 lb.) of hazardous waste per month (EPA, 2024a).

As an SQG, LMGS must manage hazardous waste in accordance with RCRA Subtitle C, which includes requirements for manifesting, labeling, storage limits, waste determinations, recordkeeping and reporting, employee training, and risk management (EPA, 2024a). LMGS follows administrative procedures to ensure hazardous waste, universal waste, and used oil adhering to all federal and state regulations. These procedures establish responsibilities and controls for waste management handling, storage, pollution prevention, and disposal.

In Texas, SQGs must comply with TAC 335.473 and develop a pollution prevention plan as outlined in TAC 335.474 (TCEQ, 2024a). LMGS will ensure waste is minimized to the extent economically feasible and implement operational procedures to support source reduction.

Engineering controls are also employed to minimize waste. LMGS is designed with engineered barriers to separate key effluent streams and sources of nuclear and hazardous substances to prevent mixed wastes. The Waste Handling and Storage System is designed to minimize any release of effluent and emissions. Maintenance programs are in place to monitor and maintain the integrity of these barriers and controls.

The LMGS waste management program will document and track waste from its generation to final disposal.

3.6.3.3 Stormwater Runoff

The Clean Water Act (CWA), 33 U.S. Code 1251 establishes the basic structure for regulating discharges of pollutants into waters of the U.S. and regulates quality standards for surface waters (EPA, 2024b). Section 402 of the CWA (40 CFR Part 122) authorizes the National Pollutant Discharge Elimination System (NPDES) Program, which require permits to control point source discharges (EPA, 2024c). TCEQ is responsible for administering this program and maintaining and enhancing water quality in Texas (TCEQ, 2024b).

Because the construction of LMGS will exceed more than five acres (two hectares), a TPDES general permit to discharge stormwater associated with construction is required. Stormwater is managed in accordance with a site-specific Stormwater Pollution Prevention Plan (SWPPP), which establishes best management practices (BMPs) to manage stormwater runoff and minimize pollutant loading within receiving waterbodies (TCEQ, 2023). A Notice of Intent will be submitted prior to any construction activities.

During operation, LMGS manages stormwater runoff through engineering controls and BMPs. Stormwater runoff is routed through various components of the stormwater infrastructure, with the ultimate discharge routed to the West Coloma Creek via a new stormwater outfall. Stormwater discharges from LMGS are subject to a TPDES permit (TCEQ, 2024b). The stormwater system is designed to comply with relevant federal, state, and local stormwater regulations.

3.6.3.4 Gaseous Effluents

Air quality in the LMGS region is described in Section 2.7, Meteorology and Air Quality, while impacts from station operation are detailed in Section 5.9.1.3. The ACCs function as a heat exchanger to remove heat from the turbine exhaust and transfer it to the ambient air as described in Section 3.2, Reactor Power Conversion System. The primary source of pollutants from nonradioactive gaseous effluents is from the intermittent testing and operation of the standby power and fire protection diesel systems.

LMGS incorporates up to five Tier 2 diesel generators (3100 kW standby) to ensure controlled shutdown and restart capability, operating within regulatory thresholds for emergency use. While the final design of the standby power system may include five Tier 4 diesel generators (3250 kW standby), emissions are conservatively estimated based on the operation of the Tier 2 generators. In addition, a 300-horsepower diesel-driven fire water pump will be installed. Effluents from these operations typically consist of particulates, carbon monoxide, hydrocarbons, and nitrogen oxides. Estimated air emissions are provided in Table 5.9-1 and permitted emission thresholds detailed in Table 5.9-2.

LMGS monitors air pollutants released into the environment through gaseous effluent emissions via stacks, supported by maintenance programs to ensure the continued availability and performance of these systems. These air emissions comply with federal, state, and local air quality standards.

<u>Tables</u>

None

<u>Figures</u>

None

3.7 Power Transmission System

The existing electrical system interfacing with the existing substation is owned and operated by American Electric Power (AEP). The existing substation will be closed and decommissioned. The location of the new substation is shown in Figure 3.7-1. The new substation connects to the LMGS. The re-location of the substation is independent of LMGS and not within the project scope.

There are eight existing overhead transmission lines in the area between the existing substation and LMGS. Two new 138 kilovolt (kV) transmission lines are planned for the power transmission installation.

3.7.1 Transmission System Interconnection

A new AEP replacement substation will serve as a future interconnection between the SDO and the regional transmission system. The lines from the SDO will be constructed, owned, and operated by SDO.

3.7.2 Transmission System Upgrades

LMGS will supply electricity to the SDO via two redundant 138 kV transmission lines installed on fifteen new utility poles. In the conceptual design, the right-of-way (ROW) width of the new transmission corridor is approximately 100 ft. (30 m). Both new lines are built on the same structure utilizing compact braced posts. Figure 3.7-1 provides a preliminary outlined map of the LMGS transmission corridor along with existing high voltage transmission lines located in the vicinity. See Table 3.7-1 and Table 3.7-2 for additional information concerning the existing transmission lines and the new transmission lines route.

There are eight existing transmission lines in the area; the LMGS transmission route was selected based on the available land. The standards/procedures for interconnection and ROW maintenance meet Federal Energy Regulatory Commission, North American Electric Reliability Corporation (NERC), and local codes.

3.7.2.1 Selection of Transmission Corridor

The transmission corridor was selected from a preliminary list of preferred corridors. Two existing transmission lines (TL3 and TL4) run along the south edge of Basin #6 and six transmission lines run between Basin #5 and Basin #6 (Figure 3.7-1).

3.7.2.2 Characteristics of Transmission Corridor

The National Electrical Safety Code (NESC) is the governing standard for transmission system design criteria. Transmission lines will be designed to conform with NESC requirements, which include standards related to line clearance to limit shocks from induced currents. Additional information on maintenance of transmission corridors, electric field effects, induced current hazards, corona noise, and radio/television interference is provided in Section 5.6, Transmission System Impacts.

The principal characteristics of the new transmission corridor are:

- Transmission design voltage is 138 kV
- Minimum conductor clearance to ground is 20.6 ft. (6.3 m) (IEEE, 2022)
- Additional ROW will be required, adjacent to existing transmission corridors

The preliminary structure type(s) selected are double circuit with braced post insulators for tangent structures, and dead-end string insulators on davit arms for dead-end structures. Drilled pier foundations are expected for all new structures. See Figure 3.7-1 for preliminary stringing locations and substation locations.

Tables

Table 3.7-1: Existing Transmission Lines

Transmission Line Number	Voltage (kV)	Land Category
TL1	69+	Industrial
TL2	138	Industrial & Rural
TL3	138	Industrial & Rural
TL4	138	Industrial & Rural
TL5	138	Industrial
TL6	69+	Industrial
TL7	69	Industrial
TL8	69+	Industrial
Abbreviation: kV = kilovolt		

Table 3.7-2: Proposed Route Corridor Information

Proposed Route	
Transmission Line Crossings:	TL1, TL2, TL3 & TL4
Special Land Use:	N/A
Limitations:	Existing transmission corridors, crossing existing transmission lines, blow-out clearance

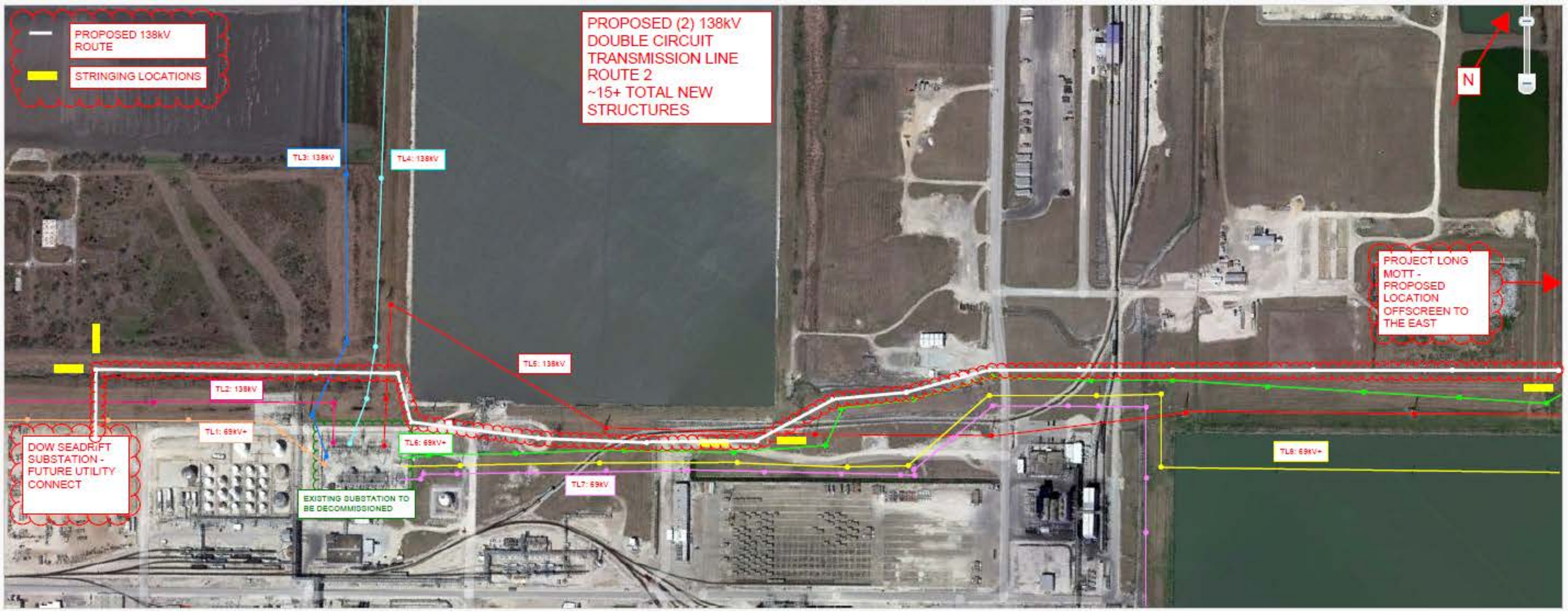

Figure 3.7-1: Proposed Transmission Line Route

3.8 Transportation of Radioactive Materials

This section describes the transportation of unirradiated fuel, irradiated fuel, and radioactive waste associated with the normal operation of LMGS.

3.8.1 Transportation of Unirradiated Fuel

The material transported to LMGS consists of TRISO fuel pebbles (TRISO-X fuel). Section 3.2, Reactor Power Conversion System, provides a description of the fuel.

Fabricated fuel manufactured at the TRISO-X Facility in Oak Ridge, Tennessee, is transported by truck to LMGS in Seadrift, Texas. LMGS is approximately 1072 mi (1725 km) from Oak Ridge, Tennessee.

Fabricated TRISO-X fuel is transported in Versa-Pac 55 (VP-55) packages. The VP-55 package meets the requirements of 10 CFR 71 and 49 CFR 173, approved by the NRC (Docket Number 71-9342). The VP-55 package can contain TRISO-X fuel at a mass limit of 605 g of U-235. Twenty shipments of fabricated fuel occur annually with each truck containing 48 VP-55 packages. The VP-55 containers meet the external surface dose rate limits of 10 CFR 71.47(a) and 49 CFR 173.441(a) and the group of containers meet the 1 m (3.3 ft) dose rate limits of 49 CFR 173.441(d). Section 5.7.2 provides annual doses associated with transportation of unirradiated fuel.

3.8.2 Transportation of Irradiated Fuel

Irradiated fuel remains on-site in the SFISF during the life of the facility or until transported to a disposal site when the U.S. Department of Energy (DOE) accepts the waste for permanent disposal.

The SFSS for LMGS includes all the systems, structures, and components that support transferring fuel spheres to the SFISF. The purpose of the SFSS is to safely transfer fuel spheres in SFC from the FHS discharge gate to the CPF. The SFC is welded shut and decontaminated. Once it is decontaminated, the SFC is safely transferred from the CPF through the IUAT and safely stored in the SFISF during the life of the facility or until transported to a disposal site.

The SFISF is located within the protected area boundary. Within the SFISF, there are multiple rows containing a base support structure that prevents the SFC from tipping over and provides an open area below the canister to promote natural circulation cooling the canisters. Annual doses due to transportation of irradiated fuel from LMGS to a disposal site are provided in Section 5.7.2. Details of the SFISF are provided in Section 3.5.4.

3.8.3 Transportation of Radioactive Waste

Radioactive wastes transported from LMGS consist of low-level solid radioactive wastes generated during normal operation.

Section 3.5, Radioactive Waste Management System, provides details on the types of radioactive wastes, including the solidification, compaction, sorting, and packaging processes.

Liquid radioactive waste is stored on-site in the Radwaste Building and periodically transported off-site for disposal at the Texas Compact Waste Facility operated by WCS in Andrews, Texas. Section 3.5.1 details liquid radioactive waste handling.

Solid radioactive waste is shipped in either 55-gallon drums or B-25 boxes. Shipments will meet the dose rate limits of 10 CFR 71. Section 3.5.2 details solid radioactive waste handling.

Low-level radioactive waste (e.g., Class A, B, or C low-level waste) is sent off-site. The destination for low-level radioactive waste is the Texas Compact Waste Facility operated by WCS in Andrews, Texas. LMGS is approximately 539 mi. (868 km) from the Texas Compact Waste Facility in Andrews, Texas. Energy Solutions, located in Clive, Utah, is considered an alternative disposal facility for low-level radioactive waste. The mode of transportation is by truck.

Section 3.5.2.3 provides information on radioactive waste disposal facilities and transportation. Table 3.5-3 lists the solid waste streams and an estimate of annual solid radioactive waste shipments for each solid waste stream at LMGS. Section 5.7.2 provides annual doses associated with off-site transportation of radioactive waste.

Tables

None

Figures

None

3.9 Building Activities

Section 3.9 describes building activities, including the preconstruction and construction-related activities that influence the environmental effects of LMGS and form the basis for analyses in Chapter 4 – Environmental Impacts of Plant Construction. As defined in 10 CFR 51.4, “construction” means the activities cited below.

Activities constituting construction are the driving of piles, subsurface preparation, placement of backfill, concrete, or permanent retaining walls within an excavation, installation of foundations, or in-place assembly, erection, fabrication, or testing, which are for:

- Safety-related SSCs of a facility, as defined in 10 CFR 50.2
- SSCs relied upon to mitigate accidents or transients or used in plant emergency operating procedures
- SSCs whose failure could prevent safety-related SSCs from fulfilling their safety-related function
- SSCs whose failure could cause a reactor scram or actuation of a safety-related system
- SSCs necessary to comply with 10 CFR 73
- SSCs necessary to comply with 10 CFR 50.48 and Criterion 3 of 10 CFR 50, Appendix A
- On-site emergency facilities necessary to comply with either 10 CFR 50.160 or 10 CFR 50.47 and 10 CFR 50, Appendix E

Construction activities do not include preconstruction activities such as site exploration, preparing the site for construction, excavation, and other activities described in 10 CFR 51.4, which are not related to nuclear safety and are generally more site-wide in scope (NRC, 2018).

Separate descriptions are provided for preconstruction and construction activities because these activities take place at different times, are authorized under separate NRC regulatory provisions and have environmental effects that differ in magnitude and duration. In summary:

- Preconstruction activities can be performed before receiving an NRC Construction Permit (CP). However, this project is funded through the DOE Advanced Reactor Demonstration Program, which requires a NEPA review of these preconstruction activities. Preconstruction activities include preparatory activities performed to support other work at the site and unrelated to the construction of safety-related SSCs.
- Construction activities require an NRC CP and are related to the construction of safety-related SSCs.

Upon receipt of required regulatory approvals, but before receipt of the NRC CP, preconstruction activities will be initiated at LMGS, including initial site excavation and rough grading; installation of environmental controls; installation of temporary facilities; and building of support facilities, service facilities, utilities, access roads, and other non-safety related

SSCs. All required permissions, permits, and licenses will be obtained prior to the initiation of each preconstruction activity. Construction activities, as defined above, begin following receipt of the NRC CP.

Figure 3.1-3 shows the layout of the permanent structures and the laydown areas for building.

3.9.1 Preconstruction Activities

The following paragraphs describe the specific preconstruction activities.

3.9.1.1 Clearing, Grubbing, and Grading

Clearing and grubbing of the site begins with the removal of vegetation. Herbicides are used as needed to control plant growth and revegetation. Spoils and topsoil areas are established, and topsoil is removed to the storage area in preparation for excavation. Areas denoted for the permanent structures and areas designated for laydown and borrow are identified on the SUPP in Figure 3.1-3.

The LMGS site topography is described in Section 2.2.1. The final grade of the site will be approximately 31.5 ft (9.6 m) North American Vertical Datum 88 (NAVD 88). Roughly 2 ft (0.6 m) of topsoil is stripped from the area and backfilled to final grade with treated on-site borrow material with a slope of 10H:1V. Soil for backfill is obtained from on-site borrow areas and treated with lime at a rate of approximately 5 lb. (2 kg) per cubic foot of soil.

Temporary laydown and staging areas, concrete batching plant area, and the Met Tower area are stripped of roughly 2 ft (0.6 m) of topsoil and backfilled with approximately 2 ft (0.6 m) of treated on-site borrow material. These areas are topped with 6 in. (15 cm) of crushed stone obtained from rock quarries.

Backfill for site grading is be obtained from designated on-site borrow areas as identified in the SUPP (Figure 3.1-3). Borrow areas are stripped of approximately 2 ft (0.6 m) of topsoil and excavated as required to obtain the required volume of backfill. Upon completion of building activities, borrow areas are graded as designed for drainage, covered with reserved topsoil, and permanently stabilized with vegetation.

A summary of earthwork including soil and fill estimates is provided in Table 3.9-2. A summary of transportation of materials with estimates is provided in Table 3.9-3.

3.9.1.2 Installation and Establishment of Environmental Controls

Erosion and sediment control BMPs are implemented to control erosion and stormwater runoff during preconstruction activities and direct it to the newly constructed permanent stormwater basin or temporary sediment basin. Sediment and erosion control BMPs include silt fences, drainage channels, drainage blocks, tire cleanout at site exit, and similar erosion and sediment control structures. Sediment and erosion control BMPs are designed to mitigate effects to surface waters and wetlands. On-site wetlands will be delineated prior to initiation of preconstruction activities.

Preconstruction activities associated with the installation of environmental controls include the development, installation, or establishment of:

- Permanent and temporary roads
- Site clearing and grubbing
- Stormwater management system with BMPs
- Site grading with borrow, cut, stockpiling, and fill operations
- Dust suppression controls
- Site drainage and stormwater and sediment basins
- Spill containment structures and controls
- Solid waste disposal areas
- Use of herbicides to control plant growth

All site drainage systems are designed and installed in compliance with applicable federal, state, and local environmental regulations and requirements.

3.9.1.3 Road and Parking Lot Development

The location of access roads, parking, and temporary laydown locations are shown in Figure 3.1-3. Preconstruction activities associated with road and parking lot development include the following:

- Site clearing and grubbing
- Stormwater management system with BMPs
- Site grading with borrow, cut and fill operations
- Spoils and topsoil storage areas
- Dust suppression controls
- Site drainage and associated facilities (e.g., stormwater and sediment basins)
- Use of herbicides to control plant growth

3.9.1.4 Security Measures

Those site security measures not required to comply with 10 CFR Part 73, including fencing, access control points, lighting, physical barriers, and guard houses, are part of the preconstruction activities. The development of security measures includes the following activities:

- Site clearing and grubbing along fence work zones
- Stormwater management system with BMPs
- Site grading with borrow, cut/fill operations, disposal of spoils, and topsoil storage areas
- Dust suppression controls
- Drilling to install fence posts
- Installation of fencing, gates, and control buildings

3.9.1.5 Temporary Facilities

Temporary facilities include offices, warehouses, equipment laydown and storage, concrete batch plants, personnel toilets and change rooms, as well as training and personnel access facilities. The temporary laydown areas, shown in Figure 3.1-3, are prepared for aggregate unloading and storage. Additionally, cement storage silos and the concrete batch plants are erected. Water needed for preconstruction activities is provided from the existing SDO facility.

3.9.1.6 Temporary Utilities

Temporary utilities include aboveground and underground infrastructure for power, potable water, wastewater and waste treatment facilities, fire protection, and building-related gas and air systems. The temporary utilities support the entire site and associated activities, including offices, warehouses, storage and laydown areas, and fabrication and maintenance shops.

3.9.1.7 Laydown, Fabrication, Shop Area Preparation

Activities associated with constructing the equipment laydown areas include site grading and stabilization and installing and grading gravel laydown areas. Activities associated with the building of the equipment fabrication, maintenance, and shop structures include site grading and stabilization, installation of the concrete slabs for formwork laydown, installation of concrete pads for cranes, crane assemblies, and equipment parking, and structures for equipment maintenance, fuel, and lubricant storage. Gravel is transported to the site via dump trucks.

3.9.1.8 Underground Utility Installation

Nonsafety-related underground utilities are installed and backfilled concurrent with the NI and CI earthwork. Backhoes are used to excavate the trenches, trucks are used to haul the appropriate bedding, and backfill and compaction equipment is used when backfilling the trenches. Trucks are used to haul away the excavated material.

3.9.1.9 Excavation of Stormwater and Temporary Sediment Basin

Excavation of the temporary sediment basin and permanent stormwater basin for stormwater control is performed as part of the preconstruction activities. Soil removed during the excavation is used as fill, as needed, to support other areas. Soil not re-used is disposed of as nonhazardous solid waste or stockpiled for future use.

3.9.1.10 Erection of Support Buildings and Structures

Support buildings for construction activities are erected as part of the preconstruction activities. Support buildings include equipment sheds; plant warehouse(s); administrative, engineering, maintenance, and storage buildings; site access and security buildings; and docking and unloading facilities. In addition, transmission lines from the connecting substation to the facility are constructed during this phase.

3.9.2 Construction Activities

Construction activities, including construction of SSCs as defined in 10 CFR 50.10(a)(1) begin after the NRC CP is issued. The NI and CI consist of a series of buildings and structures. Much of the commodity installation consists of the setting of prefabricated civil/structural, electrical, mechanical, and piping with field connections.

On-site construction of the other related site structures and facilities involves the installation of civil, structural, mechanical, HVAC, electrical, piping, and instrumentation commodities. Shallow excavations are performed using backhoes and dump trucks, with cranes used to place equipment into their locations as discussed below.

Building and operation schedule details are provided in Table 1.3-1.

3.9.2.1 Nuclear Island/Conventional Island Construction

The RB area, including an additional 10 ft (3 m) on all sides, will be stripped of approximately 2 ft (0.6 m) of topsoil and filled with qualified backfill (e.g., crushed rock) to the final grade. The RB and the IUAT building are completely above grade and will be constructed on piles with a mat foundation. Qualified backfill for the RB will be obtained from off-site rock quarries in the vicinity of San Antonio, Texas and delivered by trucks.

Construction of NI and CI facilities generally include tasks associated with:

- Structural Concrete:
  - Excavation and compaction of subgrade
  - Installation of piles
  - Construction of formwork
  - Placement of reinforcing steel
  - Placement of concrete
  - Application of curing compounds
  - Removal of forms
  - Backfill placement and compaction
- Structural Steel:
  - Erection of structural steel using cranes and lifts
  - Bolting
  - Welding
  - Priming
  - Painting

The remaining mechanical, piping, fire sprinkler system, heating, ventilation, and air conditioning, and electrical installations begin in the lower elevations and progress to the higher elevations.

The sequence of activities from commodity installation to commercial operation is:

- Civil completion of structures with mechanical and electrical equipment installed
- Bulk piping and electrical commodities installed
- Completion and connection of the mechanical, piping, and electrical systems in each structure
- Component testing, system testing, flush/hydro and functional testing
- Fuel load and power ascension
- Commercial operation

3.9.2.2 Other Buildings

Other buildings, in addition to the RB and NIAS, constructed to support LMGS include the RB, HSF, SFISFI (four per four reactor module plant), Controls and Electrical Building, FHAB, CPF, IUAT, the Compressed Air Building, and the Main Electrical Building. Additional ancillary structures constructed to support LMGS include the ACC Utility Building, turbine area, switchyard, Fire Water Pump House and Fire Water Storage Structures, Main Transformer, and miscellaneous storage tanks.

3.9.3 Water Use During Preconstruction and Construction

Water is used to support preconstruction and construction activities. Activities that require water and their estimated peak usage is provided below:

- Concrete batching: 66,000 gallons per day (gpd)
- Hydrostatic pipe testing: 20,000 gpd
- Dust control: 320,000 gpd
- Compaction: 100,000 gpd

Total water usage during preconstruction and construction activities is provided in Table 3.9-1.

3.9.4 Earthwork Summary

Backfill is needed to raise the entire facility (NI and CI) footprint approximately 3 ft (0.9 m) back to the original grade. Additional fill is needed to raise the site up to the final grade elevation of 31.5 ft (9.6 m). Backfill is either excavated soil, excavated soil that has been engineered (admixtures), imported material, or a combination of these.

Table 3.9-2 provides a summary of excavated soil and backfill quantities.

3.9.5 Building Methodology

Standard sequencing is used to construct LMGS. Environmental controls include installation of sediment and erosion control BMPs that direct runoff to the newly constructed permanent stormwater basin or temporary sediment basin and flood control measures. Sediment and erosion control BMPs include silt fences, drainage channels with drainage blocks, exit cleanout for trucks, and topsoil placement with seeding.

3.9.6 Building Equipment

Types of building equipment used include the following:

- Land Clearing:
    - Tractor Crawler

- Motor Grader
- Bulldozer

- Grading:
  - Motor Grader
  - Vibratory Roller
  - Water Truck
- Excavation:
  - Excavator & Tractor Crawlers
  - Motor Grader
  - Articulating Truck
  - Dump Truck
- Extent of Civil Equipment:
  - Excavators
  - Rough Terrain Cranes
  - Tamper Plate
  - Motor Graders
  - Articulating Trucks
  - Dump Trucks
  - Skid Steers
  - Front End Loader
  - Loader Hoe
  - Rome Plow-style Heavy Duty Tiller/Scraper
  - Pneumatic Roller
  - Tamp Foot Roller (Sheepsfoot Roller)
  - Trench Roller
  - Vibratory Roller
  - Tractor Crawler
  - Crawler Dozer
  - Water Truck
  - Pipe Installation Equipment
  - Cranes

Tables

Table 3.9-1: Water Use During Preconstruction and Construction

Activity	Peak Water Use (gpd)	Estimated Total Water Use (gallons)
Preconstruction Activities		
Concrete Batch Plant	66,000	2,000,000
Pipe Testing	None	None
Dust Control	320,000	7,650,000
Compaction	100,000	22,000,000
Construction Activities		
Concrete Batch Plant	66,000	4,300,000
Pipe Testing	20,000	150,000
Dust Control	320,000	35,000,000
Compaction	100,000	23,000,000
Abbreviation: gpd = gallons per day		

Table 3.9-2: Earthwork Summary

Description	Quantity[a]	Notes
Topsoil Removed	908,130 yd^3	On-site disposal
Stabilized Backfill	1,198,488 yd^3	From on-site borrow areas
Qualified Backfill	5,232 yd^3	From off-site
Gravel	191,087 yd^3	From off-site
Lime	80,898 tons	From off-site
Note: a) Estimated quantities include a 10% contingency Abbreviation: yd^3 = cubic yard		

Table 3.9-3: Transportation of Materials Summary

Material	Method	Capacity	Total[a]
Qualified Backfill	Truck	12 yd^3/truck	440 trucks
Gravel/Crushed Rock	Truck	12 yd^3/truck	15,930 trucks
Lime (if by road)	Truck	25 ton/truck	3240 trucks
Lime (if by rail)	Railcar	100 ton/railcar	810 railcars
Note: a) Estimated quantities include a 10% contingency Abbreviation: yd^3 = cubic yard			

Figures

None

3.10 References

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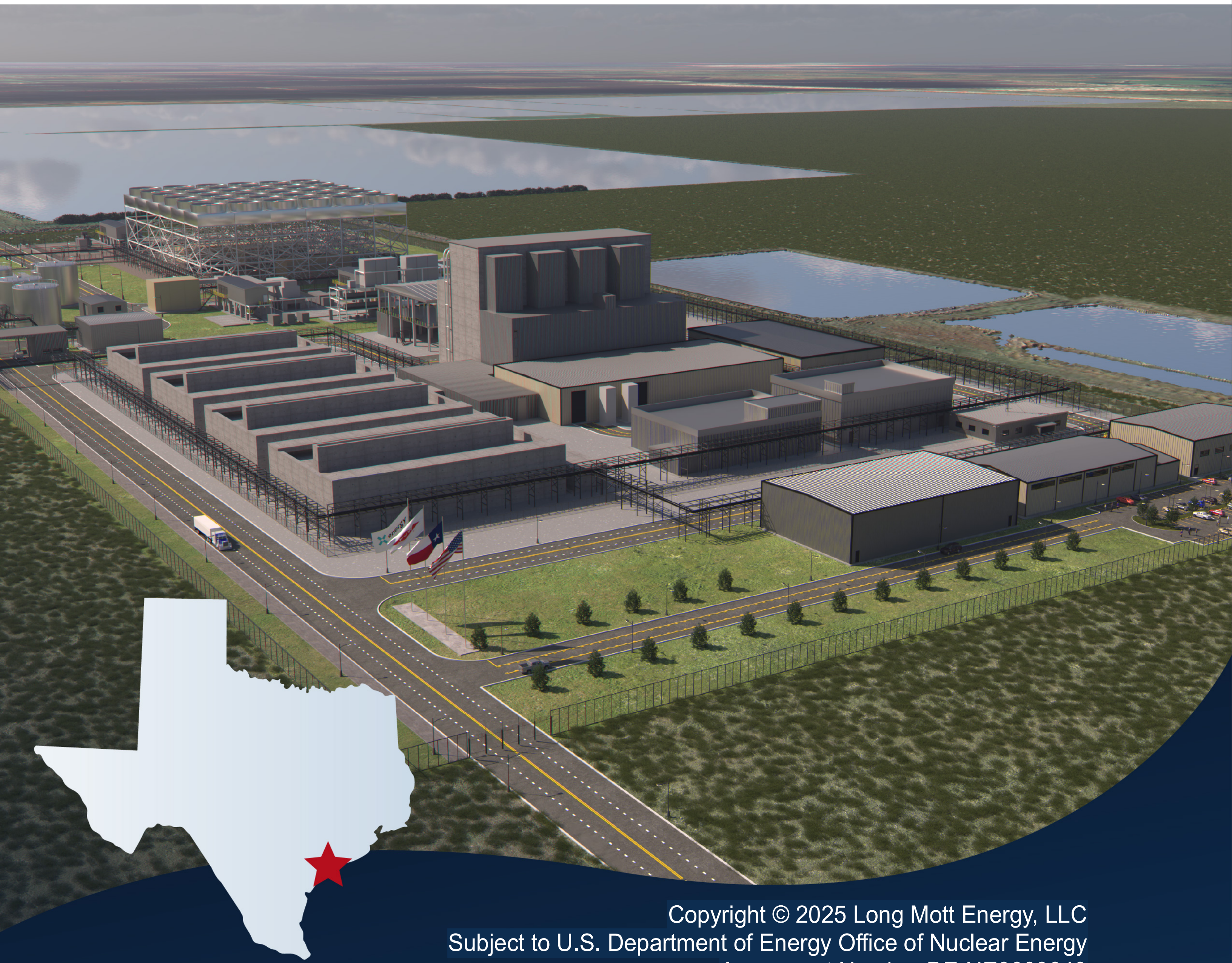
Long Mott Generating Station

Environmental Report
Chapter 4 - Environmental Impacts of Plant Construction



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Chapter 4 - Environmental Impacts of Plant Construction

Chapter 4 presents the potential environmental impacts of preconstruction and construction activities, collectively referred to as building activities, for Long Mott Generating Station (LMGS). Impacts are analyzed and assigned a significance level of potential impact to each resource (i.e., SMALL, MODERATE, or LARGE) consistent with the criteria that the U.S. Nuclear Regulatory Commission (NRC) established in Title 10 of the Code of Federal Regulations (CFR) Part 51 (10 CFR 51), Appendix B, Table B-1, Footnote 3. Unless the impact is identified as beneficial, the impact is adverse. In the case of “SMALL”, the impact may be negligible. The definitions of significance are as follows:

SMALL—Environmental effects are not detectable or are so minor that they 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 regulations are considered SMALL.

MODERATE—Environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.

LARGE—Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

This chapter is divided into seven sections:

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

In addition, this chapter presents ways to avoid, minimize, or mitigate adverse impacts of building activities for LMGS to the maximum extent practical. The site, vicinity, and region are defined in Chapter 2.

4.1 Land Use Impacts

This section describes the impacts of building activities on the LMGS site and the 6 mi (10 km) vicinity as well as impacts to historic and cultural resources. As noted in Section 2.2.2.1, no new transmission line corridors are planned for off-site connections from LMGS.

4.1.1 The Site and Vicinity

Land cover within the LMGS site is summarized in Table 2.2-1 and shown on Figure 2.2-3. Land cover within the LMGS site vicinity is summarized in Table 2.2-2 and shown on Figure 2.2-3. As noted in Section 2.2.1, land cover categories shown on Table 2.2-3 and Figure 2.2-3 are consistent with the land use classification codes listed in the Multi-Resolution Land Characteristics Consortium National Land Cover Database.

4.1.1.1 The Site

Building activities affect how the land is utilized as existing landscapes are altered and land functions (such as agriculture or recreation) are impacted. The land that is disturbed during building is shown on the Site Utilization Plot Plan (SUPP) (Figure 3.1-3). Table 4.1-1 provides an estimate of the number of acres for each land cover type that is disturbed during building of LMGS and supporting facilities. Construction primarily occurs on approximately 721 acres (ac) (292 hectares [ha]) of the 1537 ac (622 ha) site. Approximately 320 ac (130 ha) are permanently dedicated to operation of the LMGS and its supporting facilities. Approximately 401 ac (162 ha) are temporarily impacted from building activities, including a batch plant, temporary laydown and staging areas, and a temporary sediment basin. All temporary and permanent facilities are located within the existing LMGS site on land that has been substantially disturbed by cultivation and industrial use.

Building activities that affect land use include clearing, grubbing, grading and excavating, stockpiling soils, and disposal of building-related debris. As stated in Section 3.9.1.9, soil removed during excavation including materials necessary for building pipelines and the intake structure on the Guadalupe-Blanco River Authority (GBRA) Calhoun Canal is used as fill, as needed, to support other areas used during the building phase. Soil not re-used is either stockpiled for future use or tested and disposed of in accordance with appropriate regulatory requirements. The construction laydown and construction parking areas are covered with aggregate rock. Potential mitigative measures for impacts to agricultural land include avoidance, minimization, and restoration. For example, potential avoidance and minimization may be achieved in conjunction with detailed site design to reduce the land area used for building. In addition, depending upon the final design, the volume of borrow material may be lessened, which may correspondingly reduce the area of agricultural land needed for building. Potential restoration measures may also be considered for lands temporarily used for building by integrating appropriate land reclamation practices such that restored lands may be considered for agricultural use again in the future. However, for the purposes of this report, all impacted agricultural land on the LMGS site is assumed permanently converted to an industrial use. Upon completion of building the borrow area is graded to drain, covered with reserved topsoil and permanently stabilized with vegetation.

As indicated in Section 2.2.1, prime farmland has been identified on the site, and approximately 70 percent of the land in the vicinity of the site is considered prime farmland (Table 2.2-3). In accordance with the requirements of the Farmland Protection Policy Act, Long Mott Energy, LLC coordinated with the U.S. Department of Agriculture's Natural Resources Conservation Services (NRCS) regarding impacts to prime and unique farmlands. A Farmland

Conversion Impact Rating (Form AD-1006) was completed in consultation with the NRCS to evaluate the potential impacts to prime farmland. The impact rating score considers the acreage of converted prime farmland, the relative abundance of prime farmland in the surrounding county, and other criteria such as distance from urban support services and built-up areas, potential effects of conversion on the local agricultural economy, and compatibility with existing agricultural use. Sites with a total score of at least 160 have the potential to adversely affect prime farmland. The impact rating score developed by NRCS for the LMGS site was 190 points (Appendix 1A). As the project score exceeds 160, but is under 220, the NRCS requires evaluation of alternative site locations or demonstration that there are overriding reasons for the current location. Section 1.1.1 identifies the purpose and need of the project is to provide electrical power and steam to support the demands for Seadrift Operations (SDO), the Seadrift, Texas, facility owned and operated by the Union Carbide Corporation, an affiliate of The Dow Chemical Company. In conjunction with the need to provide steam to the SDO, LMGS is located immediately adjacent to the SDO, proximate to established infrastructure. Given the magnitude of impacts to agricultural lands and the extensive amount of agricultural lands within the vicinity and region, impacts are noticeable, but not destabilizing. As design progresses, further coordination with the NRCS will be conducted regarding impacts to prime farmland, as appropriate.

All building activities are conducted in accordance with applicable federal, state, and local regulations. As described in Section 3.9, Building Activities, the necessary permits and authorizations will be acquired, and environmental controls such as storm water management systems and spill containment controls will be implemented before beginning earth-disturbing activities.

Mitigation measures that are the site, designed to reduce the impact of building activities, are specific to erosion control, dust control, controlled site access for personnel and vehicular traffic, and restricted construction zones. Site restoration and management of areas temporarily affected by building activities includes seeding and revegetation using native or noninvasive plant species. Permanently disturbed locations are stabilized and contoured in accordance with design specifications.

LMGS is located within the official boundary of the Texas Coastal Management Program (CMP) (Figure 2.2-5). A Texas Coastal Management Program Consistency Certification package was submitted to the Texas General Land Office (Appendix 1A). Due to the project dependence upon proximity to the SDO, the established adjacent industrial use of the SDO, and the distance from the coast, site use is consistent with the goals and polices of the Texas CMP.

As stated in Section 2.2.1, Calhoun County does not have any zoning regulations; therefore, rezoning is not required for this project. Additionally, there are no known mineral resources within or near the site that are currently being exploited or are considered valuable. Building activities within the LMGS site are not within a floodplain (Section 2.3.1.1.1.2). Impacts to wetlands during building are described in Section 4.3.1.1.2. As stated in Section 2.2.1, no known natural resource management activities or mineral resources are within or adjacent to LMGS that are being exploited or are of any known value. All building activities are contained within the LMGS site and do not disrupt access to adjacent properties or public water access areas.

4.1.1.2 The Vicinity

As identified in Section 2.2.1, land use in the vicinity of the LMGS is predominantly agricultural land (Figure 2.2-3). The Guadalupe Wildlife Management Area (WMA) is located in the vicinity and is further discussed in Section 2.2.1.

Because all building activities are contained within the LMGS site, changes in land use in the vicinity are limited to indirect impacts that are attributable to in-migrating workers and the likely places these workers live. As discussed in Section 4.4.2, the in-migrating workforces use nearly half of the available housing units in the three-county region of influence (ROI). However, this demand is temporary and is distributed throughout the three-county ROI; therefore, no disruption of existing land use patterns within the vicinity occurs.

Debris generated during building activities are disposed in an existing licensed facility. Licensed disposal facilities that could accept solid waste are identified in Section 3.6.3.1. The nearest off-site landfill, the City of Victoria Landfill, is a municipal solid waste landfill that accepts construction debris. This landfill has 22.5 years (yr) of remaining capacity, based on 2022 data (TCEQ, 2023a). Dow's Global Waste Management group audits and approves all disposal facilities for use to ensure they meet Dow's criteria for disposal facilities. Disposal of nonradioactive waste from building is further discussed in Section 4.4.5.

4.1.1.3 Summary

Land use impacts from building activities result from effects to agricultural lands, coastal zones and prime farmland. Based on the AD-1006 impact score, there is a potential adverse and noticeable impact to prime farmland. However, given the amount of prime farmland in the vicinity, the impact would be noticeable, but would not destabilize the availability of prime farmland in the vicinity. However, as design progresses, the impacts to prime farmland may be reduced. Additionally, based upon final design, impacts to agricultural land will be minimized through avoidance/minimization and/or restoration measures. Changes in land use occur in an area adjacent to an existing industrial facility and are compatible with existing land uses and would represent a minor coastal zone alteration within the vicinity and region; therefore, impacts to land from building activities are MODERATE.

4.1.2 Transmission Corridors and Off-Site Areas

No new electrical transmission line corridors are planned for off-site connections from LMGS. As discussed in Section 3.7.2, two new 138-kilovolt (kV) transmission lines connect LMGS to the SDO substation. The transmission lines extend from LMGS to the SDO substation, as shown in Figure 3.1-3. The new on-site transmission corridor between LMGS and new substation is approximately 48 ac (19 ha). Land use within the transmission corridor is predominantly 23.2 ac (9.4 ha) of developed land, medium intensity and 21.2 ac (8.6 ha) of herbaceous land. Because the transmission corridor is contained within the LMGS site, impacts to these land cover categories are accounted for within the permanent impacts provided in Table 4.1-1.

Building activities along the transmission corridor primarily occur on land that has been disturbed by prior construction activities associated with SDO and agricultural use and therefore does not require special mitigative measures. As such, impacts to land use associated with construction of the transmission corridor are minor and are incorporated into the assessment of impacts on land use from construction of LMGS in Section 4.1.2 above. Given that building of the transmission lines are within the LMGS site, there are no impacts to off-site areas.

4.1.3 Historic Properties

Existing archaeological resources and historic properties on and immediately adjacent to the LMGS site are identified in Section 2.5.3. This subsection focuses on the potential for building activities to affect identified historic properties.

A Phase I intensive archaeological survey and architectural viewshed survey was conducted to identify the potential occurrence of archaeological and historic resources potentially eligible for the National Register of Historic Places (NRHP) on and near the LMGS site. The methodologies and results are described in detail in Section 2.5.3. No archaeological sites, cultural materials, or historic properties eligible for listing on the NRHP are located within the LMGS site or within the architectural survey area. Additionally, no historic and cultural resources that were determined ineligible but may be considered important in the context of the National Environmental Policy Act of 1969, as amended, (e.g., sacred sites, cemeteries, local gathering areas) were identified.

4.1.3.1 Background

As noted in Section 2.5.3.1, a review of the Texas Archaeological Sites Atlas, the Texas Historical Commission (THC) Atlas, and the NRHP were used to research NRHP-listed properties within the archaeological survey area and a 0.6 mi. (1 km) buffer surrounding the LMGS site. No archaeological sites are located within the LMGS site or in the buffer surrounding the site.

In addition to research and documentation of historic properties within the architectural survey area, the THC Atlas was used to research NRHP-listed properties within 10 mi (16.1 km) of the LMGS site center point. As identified in Section 2.5.3.2, none of these properties are listed in the NRHP; therefore, there is no indirect visual impact to historic resources in the 10 mi (16.1 km) viewshed.

4.1.3.2 State and Federal Regulations

As a federal project requesting a permit from a federal agency, this project is subject to review and consultation under Section 106 of the National Historic Preservation Act (16 United States Code [USC] 470 et seq.) and its implementing regulations (36 CFR 800). Additionally, this project is subject to the Native American Graves Protection and Repatriation Act (25 USC 3001 et seq.), the Archaeological Resources Protection Act (16 USC 470aa-mm), the American Indian Religious Freedom Act (42 USC 1996), and the Archaeological and Historic Preservation Act (16 USC 469).

4.1.3.3 Consultation

As identified in Section 2.5.3.2.1, the THC concurred on February 16, 2024, with the archaeological findings and the architectural viewshed findings that no historic properties are present or affected by this project (Appendix 1A and Part VI Supplemental Information).

4.1.3.4 Cultural Resource Inadvertent Discovery Plan

Due to the absence of historic cemeteries and prehistoric mounds within the boundaries of the LMGS site, the potential for the presence of human burials or human remains is small. Prior to the initiation of building activities, a Cultural Resource Inadvertent Discovery Plan will be prepared. The following provisions will be included in accordance with that Plan:

- If human burials or human remains are identified at any time, work will immediately stop with no further disturbance of the human remains
- If human remains are discovered, construction personnel will contact a representative of Dow who will contact the appropriate local law enforcement and will communicate that human remains have been discovered
- If the human remains are archaeological in nature, consultation with the THC will be initiated to determine further actions

4.1.3.5 Summary

As indicated in Section 4.1.3, no archaeological sites, cultural materials, or historic properties eligible for listing on the NRHP are located within the LMGS site or within the architectural survey area. Additionally, no historic and cultural resources that were determined ineligible but may be considered important in the context of the National Environmental Policy Act of 1969, as amended, (e.g., sacred sites, cemeteries, local gathering areas) were identified; therefore no historic properties are present, and no direct or indirect impacts to historic properties would occur as a result of building activities.

Tables

Table 4.1-1: Land Cover Types Disturbed by Development on the Long Mott Generating Station Site

Land Cover Type	Permanent Acreage Impacted		Temporary Acreage Impacted		No Impact		Total Area
	Area	**Percent**	**Area**	**Percent**	**Area**	**Percent**	
Cultivated Crops	241.6	15.7	400.4	26	88.3	5.7	730.3
Deciduous Forest					0.2	<1	0.2
Developed, Medium Intensity	23.2	1.5			173	11.3	196.2
Emergent Herbaceous Wetlands	1.9	0.1			21.7	1.4	23.6
Evergreen Forest					2.2	0.1	2.2
Herbaceous	37.9	2.5	0.2	<1	404.3	26.3	442.4
Open Water	10.1	0.7			71.8	4.7	81.9
Shrub/Scrub	3.6	0.2			53.8	3.5	57.4
Woody Wetlands	1.8	0.1			1.5	0.1	3.3
Total:	**320.1**	**20.8**	**400.6**	**26.1**	**816.5**	**53.1**	**1537.2**
Note: Column total may not equal sum of individual values due to rounding							

Figures

None

4.2 Water-Related Impacts

This section describes the hydrologic alterations and water use impacts that result from building activities. Section 4.2.1 addresses impacts to surface water resources, and Section 4.2.2 addresses groundwater effects. Each subsection evaluates effects associated with hydrologic alterations, water use, and water quality. Additionally, the best management practices (BMPs) to minimize any adverse impacts are identified. The manner in which the Applicant complies with applicable federal, state, and local standards and regulations is also discussed.

4.2.1 Surface Water Resources

Surface water resources within the vicinity include on-site and near-site streams and wetlands, the GBRA Calhoun Canal, and the Victoria Barge Canal. As noted in Section 2.3.1, delineated resources include two perennial streams (including West Coloma Creek), two intermittent channels, and six ephemeral ditches. Streams, ponds, and lakes within the vicinity include West Coloma Creek, East Coloma Creek, Mission Lake, Green Lake, and the Guadalupe River. Man-made basins on the SDO site are constructed water features that are used for operational water supply. As noted in Section 2.3.1, these basins are not jurisdictional and are not subject to regulation under the Clean Water Act (CWA); nonetheless, impact analysis was performed on these features. It is assumed that analysis of the canal is similar to the basin. Similarly, the GBRA Calhoun Canal is an artificial water distribution system that is not subject to regulation by the U.S. Army Corps of Engineers (USACE) or the Texas Commission on Environmental Quality (TCEQ). However, the use of water from the GBRA Calhoun Canal is subject to authorization by GBRA. As such, potential effects on the GBRA Calhoun Canal are addressed in this section.

4.2.1.1 Hydrological Alterations

This section identifies and describes the hydrological alterations to surface water that result from the building activities. These effects are short-term and relevant to the building phase, whereas long-term operational effects, are described in Section 5.2, Water Related Impacts.

Building activities, as described in Section 3.9, Building Activities, have the potential to impact the surface water hydrology. Building activities that could affect water resources include clearing, grubbing, grading and excavating, stockpiling soils, building structures and disposal of building-related debris. Structures and other features include the Nuclear Island/Conventional Island (NI/CI) facilities, turbine area, other structures and site infrastructure (including subgrade piping and systems, roads, parking lots, and similar features). During building, lands within the overbank area of West Coloma Creek are modified for building permanent structures and for temporary uses such as laydown and staging areas, the temporary sediment basin and batch plant development (Figure 3.1-3).

4.2.1.1.1 Hydrological Alterations Associated with Stormwater

As described in Section 2.2, Land Use, the existing LMGS site is primarily comprised of agricultural land. Small agricultural drainage ditches collect and convey runoff to the West Coloma Creek channel. Soils at the site are predominantly Laewest clay that has a typical clay content of 49 percent that, because of its low permeability, results in relatively high runoff rates, especially during periods of tillage for crops when vegetative cover does not exist.

During building activities, local stormwater drainage patterns on the LMGS site are altered. Potential alterations include placement of fill, diversions related to excavation of the NI/CI area and installation of drainage ditches. Placement of fill includes use of qualified backfill to support permanent LMGS site structures, minor grading and placement of gravel over the temporary construction staging areas to support laydown activities. Some loss of temporary stormwater storage or ponding may occur but also may be mitigated by the temporary sediment basin adjacent to the temporary laydown and staging area and the permanent stormwater basin associated with the NI/CI area.

Local stormwater drainage and permanent and temporary facilities built within the overbank areas of West Coloma Creek may impact West Coloma Creek overbank flow during high flow conditions. A Federal Emergency Management Agency flood insurance study has not defined a floodplain for West Coloma Creek at the LMGS site. However, placement of materials or structures within the overbank area of West Coloma Creek affects both the storage and conveyance capacity of the overbank area during high runoff events. Approximately 6 in. (15 cm) of gravel is placed over the temporary construction staging areas to support building activities. Gravel placement during building activities extend across the 215 ac (86 ha) temporary laydown and staging area that includes the temporary sediment basin, meteorological tower and batch plant. The temporary construction laydown and staging areas have a total width of approximately 3100 ft (945 m) transverse to the creek flow direction. Placement of materials, backfill and building of structures within the approximately 29 ac (11.7 ha) NI/CI area has similar effects on storage and conveyance. As shown on Figure 3.1-3, the permanent NI/CI area has a width of approximately 777 ft (238 m) transverse to West Coloma Creek flow. Loss of conveyance and storage of stormwater within these areas has the potential to incrementally increase water levels on and upstream of the LMGS site. Some effects associated with permanent structures extend throughout the operational phase. However, other effects are short-term as gravel and temporary materials stockpiles within the temporary construction laydown and staging areas is removed following the building phase.

During building, stormwater alterations are managed by the incorporation of stormwater controls, or stormwater BMPs, through the operation of the stormwater management system. Stormwater from the LMGS site is controlled by the temporary sediment basin and permanent stormwater basin (Figure 3.1-3) and are discharged to West Coloma Creek. The size of the temporary sediment basin and permanent stormwater basin is 13.2 ac (5.3 ha) and 1.7 ac (0.7 ha), respectively. Stormwater management, including release rates and volumes, comply with regulatory requirements for site design and operation. Local requirements are established in the Calhoun County Regulations of Subdivision and Property Development (Calhoun County, Texas, December 2007). Drainage design standards include certain criteria for the

5- and the 25-yr. storm events calculated using the Rational Method (Part 3, 303. 3.). The Calhoun County regulation also references and requires compliance with the Texas Water Code (TWC) Chapter 26 and Article 16. As described in Section 4.2.1.1.4, the project requires a Calhoun County floodplain development permit and a stormwater discharge permit under the Clean Water Act's National Pollutant Discharge Elimination System (NPDES) regulations. The NPDES stormwater program has been delegated to the TCEQ.

Federal stormwater discharge regulations are established through the Clean Water Act NPDES regulations with a primary focus on water quality. However, stormwater runoff rates and water quantity are integral to stormwater quality control and best management practices address both stormwater quantity and quality. The TCEQ Construction General Permit No. TXR150000 (Texas Commission on Environmental Quality, 2023) for stormwater discharges associated with building activities requires a stormwater pollution prevention plan (SWPPP). The SWPPP must provide for implementation of BMPs and controls for stormwater pollution. Among the categories of BMPs identified in the General Permit are BMPs that control rates of peak discharge and runoff volume from storm events (Part IV, Section A).

The applicable regulations address both stormwater runoff quantity and quality. Stormwater quality controls and compliance during building activities are discussed in Section 4.2.1.3 and are interrelated with stormwater quantity. Based on adherence to regulatory requirements for proper design and operation of stormwater management facilities, impacts of stormwater management on West Coloma Creek are localized and minor.

4.2.1.1.2 Hydrological Alterations Associated with Regulated Waters

4.2.1.1.2.1 Alterations to West Coloma Creek

As noted in Section 2.3, West Coloma Creek is a jurisdictional water subject to USACE authority under Section 404 of the Clean Water Act. The West Coloma Creek channel passes through the LMGS site with building activities occurring on either side of the channel. The West Coloma Creek channel and overbank areas convey runoff from the upstream watershed.

There are two bridges designed for vehicle traffic that span the West Coloma Creek channel that impact 88 linear ft (26.8 m) of stream channel (Figure 4.2-1). During building of bridge and stormwater outfall structures within the West Coloma Creek channel, temporary features may be utilized that may create an obstruction to creek high flow. For example, temporary sheet pile may be used to isolate areas for building bridge abutments and piers. Such temporary structures comply with relevant regulations, agency approvals, and typical standards for building related to overall channel flow capacity.

No major alterations to the West Coloma Creek channel are anticipated other than building of stormwater outfall structures or utility crossings over the water levels in the channel or under the creek channel (i.e., below ground). However, there is potential for some bank shaping in segments adjacent to the bridges (immediately upstream and downstream) or where the existing channel bank may be in an unsatisfactory condition. Depending upon West Coloma Creek flow conditions, alterations within the established channel may result in changes in flow elevations and rates that may extend some distance upstream of each bridge crossing. However, detailed designs of these structures minimize such effects. Therefore, overall impacts on West Coloma Creek channel are localized, short term and minor.

4.2.1.1.2.2 Alterations to Intermittent and Ephemeral Streams

Intermittent and ephemeral streams are also affected by building activities (Table 4.2-1 and Figure 4.2-1). The water intake pipeline between the GBRA Calhoun Canal and Dow SDO crosses one intermittent stream (SD-STR-04), impacting 881 linear ft (269 m), and two ephemeral streams (SD-STR-06 and SD-STR-07), impacting 200 linear ft (61 m). Building activities result in disturbances at each stream crossing in conjunction with excavation activities to install the pipeline beneath the stream beds. The transmission line/discharge corridor crosses one ephemeral stream (SD-STR-01), impacting 1131 linear ft (345 m), and one perennial stream (SD-STR-10), impacting 72 linear ft (21.9 m). Building activities result in disturbances at each stream crossing to install transmission lines and pipeline across the stream beds. As stated in Section 2.3.1, only one of these streams, SD-STR-04, is preliminarily considered a jurisdictional water subject to USACE authority under Section 404 of the Clean Water Act. However, because a final jurisdictional determination will be made by the USACE once a permit application is submitted, all streams are considered jurisdictional to bound this analysis.

Impacts associated with installation of the water intake pipeline include disruption of flow, increased sedimentation and erosion, and potential localized scour around the pipeline crossing. Erosion control measures such as erosion control blankets or rip rap are placed in proximity of the building area to minimize adverse effects. In addition, disturbed areas along the streambanks will be properly restored to an appropriate grade and planted with native vegetation once building is completed. Therefore, overall impacts associated with stream crossings are localized, short term and minor.

4.2.1.1.2.3 Alterations in GBRA Calhoun Canal

The GBRA Calhoun Canal is an artificial water distribution system that is not subject to regulation by the USACE or the TCEQ. Impacts to Basin # 5 are assumed to be similar to those impacts discussed in this section. However, impacts to this surface water body are assessed as the use of water from the GBRA Calhoun Canal is subject to authorization by GBRA. Hydrologic alteration in the GBRA Calhoun Canal during building is limited to building the new pumping station. Although a design for the pumping station is not available, the intake structure is assumed to be recessed into the northern bank of the GBRA Calhoun Canal so that the pumping station creates no long-term flow obstruction to the canal flow. The intake structure is expected to consist of a vertical trash rack on the front vertical face of the structure. Flow through the trash rack enters the pumping station sump through a traveling water screen (i.e., no intake pipe or structure projecting into the deeper portion of the canal). It is anticipated that the building area is isolated from water in the GBRA Calhoun Canal by a temporary sheet pile wall or other means. This limits potential impacts to the GBRA Calhoun Canal to a localized area along the canal bank where the temporary isolating wall may project into the GBRA Calhoun Canal bank section. Erosion control measures such as rip rap are placed in proximity of the building area to minimize erosion. Disturbed areas on the streambank are restored with native vegetation once building is completed; therefore, overall impacts associated with alterations in the GBRA Calhoun Canal are localized, short-term and minor.

4.2.1.1.3 Summary of Impacts from Hydrological Alterations

Hydrologic alterations during building depend on final LMGS site design and building activity details and phasing. Natural clayey surface soils at the site result in runoff and ponding for relatively smaller rainfall events. Temporary drainage ditches will replace stormwater drainage via the existing agricultural drainage ditches. Placement of permanent or temporary fill or temporary material stockpiles may obstruct flood conveyance through West Coloma Creek overbank areas. Impacts associated with alterations of West Coloma Creek and crossing of three streams are minor, localized and temporary. Impacts associated with building the pumping station on the GBRA Calhoun Canal are minimal based on the location of the pumping station recessed into the northern canal bank and avoidance of significant building activities beyond the northern bank of the canal; therefore, impacts associated with surface water hydrologic alterations are SMALL.

4.2.1.1.4 Regulatory Compliance

Building activities comply with federal, state, and local regulations, including development of a SWPPP and the use of BMPs. TCEQ provides a NPDES general permit for stormwater discharge from building activities (TCEQ Construction General Permit No. TXR150000 effective March 5, 2023 to March 5, 2028). Permits/approvals are obtained from Calhoun County prior to building for floodplain development and for facilities that comply with the hydrologic/drainage provisions of the Calhoun County subdivision regulations, including compliance with Chapter 26 and Article 16 of the TWC. At completion of building activities, the LMGS stormwater management system meets the requirements of the TCEQ Multi-Sector General Permit for Industrial Activities (TXR050000 effective August 14, 2021 to August 14, 2026). Furthermore, a Department of Army Permit (Clean Water Act Section 404) is required by the USACE to address potential impacts to federally jurisdictional waters associated with the installation of crossings over West Coloma Creek.

4.2.1.2 Water Use Impacts

Activities that may impact surface water usage use include concrete mixing, dust abatement, pipe testing, soil compaction, and dewatering. All listed activities, except for dewatering, require the use of surface water, which is obtained from Basin #5. In total, building activities require water use at a rate of approximately 79 ac-ft/yr (97,147 m^3/yr) over the entire building phase. The average annual water usage rate required for building activities is less than 1 percent of the average annual water usage rate by SDO in 2022. Water obtained from Basin #5 for building activities is sourced from the GBRA Calhoun Canal; therefore, water use from building activities is minor relative to:

- Water availability associated with SDO basins

- Water uses by GBRA downstream of the SDO
- Other water users that are downstream of SDO on the GBRA Calhoun Canal

Runoff flowing into West Coloma Creek from lands disturbed by building activities is controlled via engineered structures, the temporary sediment basin, stormwater basin, and BMPs. Discharges into West Coloma Creek are authorized and maintained in compliance with all necessary state and federal permits, including an NPDES construction stormwater permit; therefore, there is no degradation of the quantity or quality of water for downstream users. Because water use from building activities is minor relative to water availability and does not result in adverse effects on water quality, impacts of surface water use due to building activities are SMALL based on incorporated design considerations and BMPs, and adherence to conditions of applicable permits.

4.2.1.3 Water Quality Impacts

Baseline water quality data for surface water bodies on the LMGS site are provided and discussed in Section 2.3.1.3.

Impacts on water quality of regulated waters result predominantly from building activities. Direct physical alteration of surface waters from activities such as in-filling of streams can result in adverse impacts to surface water quality. Indirect impacts on surface water quality may be caused by activities such as erosion and sedimentation, accidental spills or releases of stormwater. No reduction of flow in on-site and vicinity waterbodies is expected to occur as a result of building activities. There are no planned transmission corridors that cross jurisdictional waters.

Localized impacts to surface water quality result from erosion and sedimentation that occurs as a part of the building process. To minimize the impacts of building activities on surface water quality, BMPs are used to control erosion and limit the amount of soil and sediment entering surface waters. These controls may include silt fencing, mulching, geotextiles, sod stabilization, flow diversion, buffer strips, and establishment of temporary or permanent vegetation. Sediment controls may include silt fences, vegetative buffer strips, and sediment basins (TCEQ, 2004). Site conditions dictate the specific BMPs to use. Additionally, pursuant to 40 CFR Part 112, a Spill Prevention, Control and Countermeasure (SPCC) Plan will be prepared and implemented at the LMGS site, which would include the use of BMPs to minimize the occurrence of spills and limit their effects on surface water. These BMPs include actions such as proper vehicle and equipment maintenance, containment for fuel or oil storage tanks, and the maintenance of spill response equipment and materials.

Building activities that directly impact surface water systems include development of bridges across West Coloma Creek, building the water intake pipeline that crosses three streams and building the intake structure on the GBRA Calhoun Canal. Many of the land preparation, clearing, and grading activities are conducted within uplands and do not result in direct alteration of regulated waters. However, stormwater from disturbed lands that is conveyed to regulated waters may result in increased turbidity and localized sedimentation. During building of bridges across West Coloma Creek and the water intake pipeline, BMPs such as silt fencing, sod stabilization, drainage blocks, and flow diversion will be used to minimize sedimentation and erosion impacts.

A new pump station constructed on the GBRA Calhoun Canal supplies intake water to the SDO operating basins. Installation of the intake structure results in localized impacts to surface water quality that are related to erosion and sedimentation. BMPs as described above are used to minimize adverse water quality impacts within the GBRA Calhoun Canal.

Potential impacts related to accidental spills of petroleum products or industrial chemicals necessary for building activities may result in adverse effects on surface water quality. Designated storage areas for fuel and lubricants on the LMGS site are equipped with appropriate spill containment measures in accordance with SPCC plans to mitigate impacts.

Compliance with federal, state, and local requirements minimizes potential impacts of building activities on regulated waters. In the state of Texas, parties with operational control of construction sites in which five or more acres are disturbed must obtain a Texas Pollutant Discharge Elimination System (TPDES) general permit to discharge stormwater associated with building activities. A site-specific SWPPP is also part of the TPDES permit compliance to manage stormwater and minimize pollutant loading within receiving waterbodies. The SWPPP identifies potential sources of stormwater pollution and includes a description of BMPs that could minimize pollution in stormwater runoff (TCEQ, 2023b). In addition, a Section 404 permit issued by the USACE will be required for any alterations to West Coloma Creek or other waters regulated under the Clean Water Act.

In summary, impacts to surface water quality during building activities are primarily limited to those associated with the building of an intake structure on the GBRA Calhoun Canal, building of bridges across West Coloma Creek, and impacts of sedimentation and erosion to on-site streams. Indirect impacts to water quality are minimized through the use of BMPs and implementation of a SWPPP to reduce pollutant loading and decrease downstream impacts on water quality. The potential for spills of petroleum or industrial chemicals are managed through the use of SPCC plans. As such, the impacts of building activities to surface water quality are SMALL.

4.2.2 Groundwater

4.2.2.1 Hydrologic Alteration of Groundwater

This section identifies and describes the potential hydrological alterations to groundwater from building activities. Physical characteristics of groundwater aquifers within the site and surrounding area are identified in Section 2.3.2.

Potential hydrologic alterations to groundwater that may result from building activities include those associated with dewatering. As discussed in Section 3.9, Building Activities, temporary dewatering may be required to maintain a dry excavation for the building of the foundations for the LMGS structures. As proposed, the NI/CI building area is stripped of 2 ft of topsoil and filled to grade with crushed rock. Dewatering is accomplished by pumping from sumps located around the perimeter of the excavation and at the base of the excavation. These dewatering methods are localized to the NI/CI excavation area and to the areas immediately adjacent to the NI/CI excavations. Localized changes in water levels within the affected water bearing zone may occur from dewatering. All dewatering flows are routed to on-site sedimentation and stormwater basins (installed as part of initial building activities). Once building activities are completed, dewatering is no longer needed and the water table is expected to return to static conditions. Because of the shallowness of excavations related to building activities, foundation development does not impact groundwater levels, availability, or flow patterns; therefore, impacts of hydrologic alteration of groundwater during building activities are SMALL.

4.2.2.2 Groundwater Use Impacts

There are no planned uses of groundwater during building; therefore, the impacts from groundwater use are SMALL.

4.2.2.3 Groundwater Quality Impacts

Baseline water quality data for groundwater are provided in Section 2.3.2.3. Dewatering of the NI/CI area usually occurs within a limited area during the duration of the building of the below-grade NI/CI structures and foundations. Drainage sumps at the bottom of the excavation area pump water that may have entered the excavation area to an on-site temporary sediment basin prior to its permitted release to West Coloma Creek. Water quality effects of such releases on surface water are discussed in Section 4.2.1.3.

During building activities, gasoline, diesel fuel, hydraulic lubricants, and other similar products are used for building equipment. Inadvertent spills of these fluids have the potential to contaminate groundwater. Pursuant to 40 CFR Part 112, a SPCC plan will be prepared and implemented at the LMGS site, which would include the use of BMPs to minimize the occurrence of spills and limit their effects on groundwater. These BMPs include actions such as proper vehicle and equipment maintenance, containment for fuel or oil storage tanks, and the maintenance of spill response equipment and materials. BMPs are also employed during building activities to minimize potential discharges to the environment. Dewatering is managed in accordance with BMP procedures and construction stormwater permits.

In the unlikely event small amounts of contaminants are released into the environment, they would have only a small, localized, temporary impact on the groundwater because of the predominance of heavy clays on the site. Because engineering controls as described above which prevent or minimize the release of harmful effluents, and because concentrations of constituents in surface water are maintained at levels below permitted limits, any impacts to groundwater quality are SMALL.

Tables

Table 4.2-1: Stream Impacts on the Long Mott Generating Station Site

Feature ID (Site)	Stream Type	Impact Type	Channel Length (ft.)[(a)]	Impact Length (ft.)
SD-STR-01	Ephemeral	Permanent	3421	1131
SD-STR-02 (West Coloma Creek)	Perennial	Permanent	12,242	88
SD-STR-03	Intermittent	NONE	85	0
SD-STR-04	Intermittent	Permanent	1342	881
SD-STR-05	Ephemeral	NONE	625	0
SD-STR-06	Ephemeral	Permanent	2666	100
SD-STR-07	Ephemeral	Permanent	1456	100
SD-STR-08	Ephemeral	NONE	3595	0
SD-STR-09	Ephemeral	NONE	368	0
SD-STR-10	Perennial	Permanent	1440	72
Total Impacts	Ephemeral	Permanent	12,131	1331
	Intermittent	Permanent	1427	881
	Perennial	Permanent	13,682	160

Notes:
a) Length of the feature within the LMGS site only
Abbreviations: LMGS = Long Mott Generating Station; ft = feet

Figures

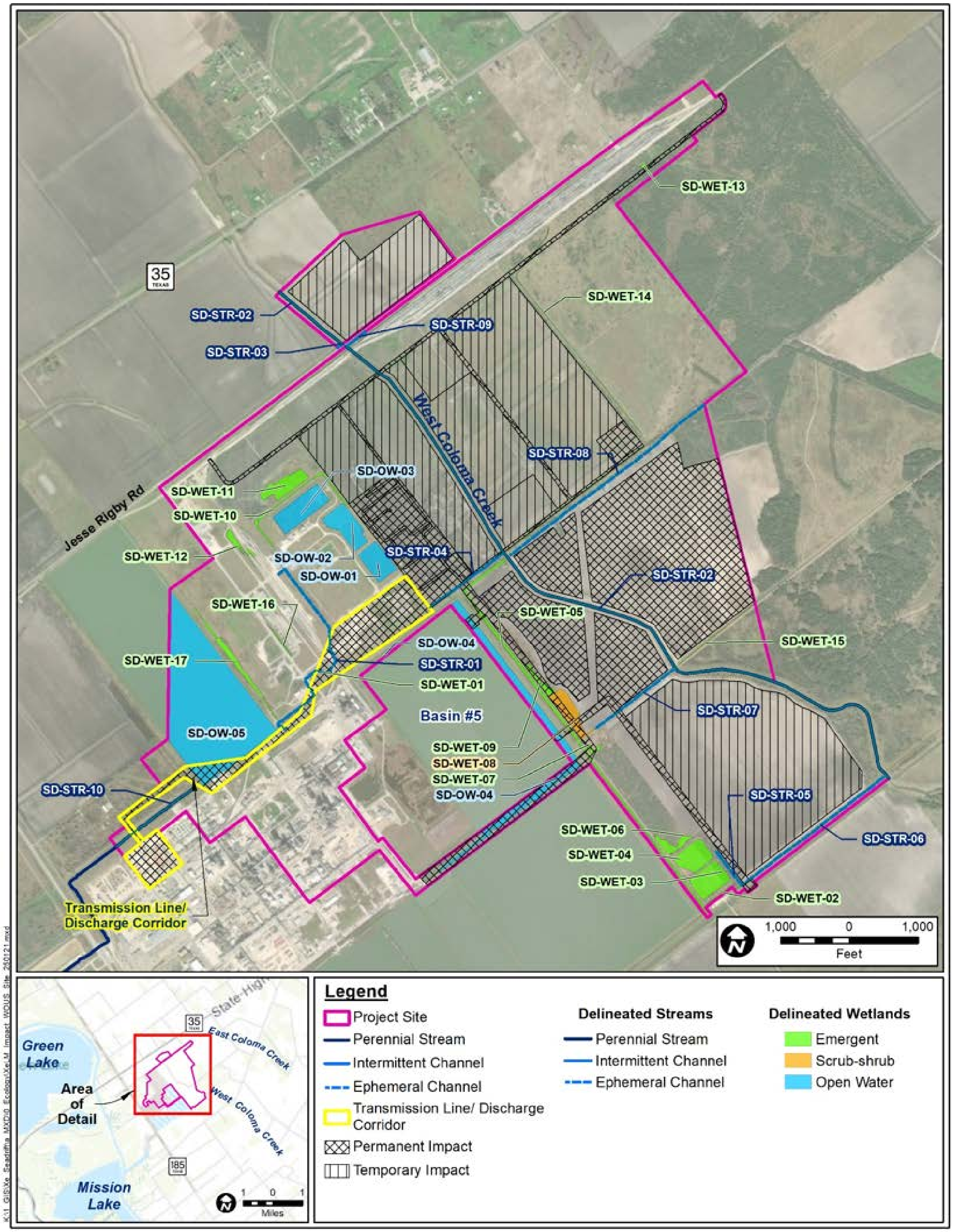

Figure 4.2-1: Streams and Wetlands Disturbed on the Long Mott Generating Station Site

4.3 Ecological Impacts

This section describes the potential effects on terrestrial and aquatic ecological resources from building activities.

Building activities occur over approximately 44 months. Ecological impacts predominantly occur when existing habitats are removed or altered in areas of the LMGS site to support the installation of temporary and permanent facilities.

Building activities could affect terrestrial and aquatic ecosystems occurring on and adjacent to the LMGS site. Potentially affected resources include the habitats and the associated ecological communities of upland terrestrial habitats, wetlands, and streams. Building activities, such as land clearing, grading, excavation, and filling, have the greatest potential to result in effects to ecosystems.

4.3.1 Terrestrial Ecosystem and Wetlands

Section 2.4.1 provides a detailed description of the terrestrial ecosystem of the LMGS site, vicinity, and region including upland and wetland habitats, associated ecological communities, and important species. Section 2.4.1 also briefly describes these features for potentially affected areas in proximity to the site. This section evaluates the potential effects of building activities on the terrestrial ecosystems that occur on the LMGS site and associated off-site areas. Additionally, measures to mitigate adverse environmental impacts are proposed, where necessary.

4.3.1.1 Terrestrial Habitats

4.3.1.1.1 Plant Communities and Habitats

Land clearing and grubbing for the building of LMGS result in the vegetation losses shown on Figure 4.3-1 and summarized in Table 4.3-1.

Building of LMGS results in the conversion of 320.1 ac (129.5 ha) of land to permanent uses. The predominant impacts are to 241.6 ac (97.8 ha) of cultivated cropland. Other impacts include 1.8 ac (0.7 ha) of woody wetlands, 23.2 ac (9.4 ha) of medium-intensity development, 3.6 ac (1.5 ha) of shrub/scrub, 1.9 ac (0.8 ha) of emergent herbaceous wetlands, 10.1 ac (4.1 ha) of open water, and 37.9 ac (15.3 ha) of herbaceous vegetation. Permanent uses within these areas include power-generating facilities, borrow areas, a permanent stormwater basin, access/pipeline right-of-way, the transmission line and pipeline/discharge corridor, and the meteorological tower. Total temporary impacts occur to approximately 401 ac (162 ha), most of which is cultivated cropland. Approximately 0.2 ac (0.1 ha) of herbaceous vegetation is also temporarily impacted. These temporary impacts result from the building of the concrete batch plant, temporary sediment basin, and laydown and staging areas.

As discussed in Section 2.4.1.4, plant communities on the LMGS site are common and abundant throughout the vicinity and local region. These communities exhibit significant land use changes and habitat degradation that reflect prior land uses in the vicinity. Approximately 21 percent of the LMGS site is permanently affected by building activities, and most of this land was already disturbed from cultivation or industrial uses and is generally low quality. Building activities also permanently affect other undeveloped land cover types (such as herbaceous, woody wetlands, and shrub/scrub habitats) but on a smaller scale, and these impacts are minor in the context of nearby areas (Table 4.3-1). For example, the most diverse herbaceous community within the LMGS site is located within the large rectangular herbaceous pasture south of the railyard in the northeast portion of the site. However, only a small portion of this area is permanently affected by the access road (as shown in Figure 4.3-1). Overall, permanent impacts to the land cover types on the LMGS site are minimal because of the existing levels of high disturbance and lack of natural land cover types.

As discussed in Section 2.4.1.4.7, invasive plant species are already present in substantial populations on the LMGS site. However, disturbance associated with building activities, such as earthmoving and excavation, can create conditions for opportunistic invasive species to become more established in different areas of the LMGS site. Establishment of invasive species from building activities are minimized by restoring temporarily affected areas with native or non-invasive plant species and periodic monitoring and control measures.

Temporary impacts from building activities alter another approximately 26 percent of the LMGS site. Similar to permanent impacts, temporary impacts affect predominantly cultivated crops, which are disturbed, low-quality land cover types. Temporary impacts do not alter any undeveloped, high-quality habitats. Temporarily affected areas are revegetated or otherwise restored after building using native or noninvasive plant species. Erosion and seed stabilization materials that avoid entanglement hazards to snakes and other wildlife species, such as no-till drilling, hydromulching, or hydroseeding, are used for revegetation of temporarily impacted areas. Erosion controls, including site stabilization with native grass species, pavement, and crushed stone are installed. BMPs are followed to control erosion from disturbed lands and reduce impacts to nearby waterways. Due to the prevalence of similar nearby habitat and the degraded quality of habitat on the LMGS site, potential impacts to terrestrial land cover and associated habitats as a result of building LMGS are SMALL.

4.3.1.1.2 Wetlands

Potential wetlands on the LMGS site and in the vicinity are described in Section 2.4.1.2. Permanent wetland impacts on the LMGS site total 3.7 ac (1.5 ha), as shown in Table 4.3-2, consisting of 1.8 ac (0.7 ha) of woody wetlands and 1.9 ac (0.8 ha) of emergent herbaceous wetlands. These permanent impacts result from building of the pipeline corridors and electrical transmission line. The pipeline corridors include the water intake pipeline from the GBRA Calhoun Canal to the SDO Basin #5, the water distribution pipeline from SDO Basin #5 to the NI/CI, and a steam pipeline to SDO. Among the delineated wetlands outlined in Table 4.3-2, it is anticipated that the USACE would regulate only one wetland (SD WET-14) because of its connection with West Coloma Creek; therefore, building activities permanently affect less than 0.1 ac (less than 0.1 ha) of regulated wetland (Figure 4.3-1). However, impacts to all potential wetlands are conservatively determined to be 3.7 ac (1.5 ha). Building activities do not temporarily affect any potential wetlands. Wetlands are subject to USACE regulatory authority pursuant to Sections 401 and 404 of the CWA. Applications for appropriate TCEQ and USACE permitting for wetlands will be made, and all TCEQ and USACE guidelines and mitigative requirements will be followed.

Indirect impacts to potential wetlands are also possible because potential wetlands are adjacent to building areas. SD-WET-15 is a potentially regulated wetland on the LMGS site (Figure 4.3-1) that borders a borrow area. Direct impact to this potential wetland is avoided during building activities based on the site utilization plan shown on Figure 3.1-3 and indirect impacts are minimized and is protected by implementation of BMPs, such as erosion and sedimentation controls that limit the transport of sediment to potential wetlands via stormwater. These BMPs largely eliminate the potential for these actions to indirectly affect nearby potential wetlands outside the building area, such as SD-WET-15. Erosion controls can include mulching, geotextiles, sod stabilization, and buffer strips, while sediment control can include silt fences or vegetative buffer strips. Building activities do not dewater potential wetlands or surface waters. Building activities do not alter surface drainage/patterns in a way that affects terrestrial biota or habitats and wildlife. As a result, there is no indirect impact to SD-WET-15 or other adjacent potential wetlands.

Direct and indirect impacts to potential wetlands are avoided and minimized as much as possible. Direct impacts are addressed through permit requirements, and indirect impacts are minimized through BMPs. Any required mitigation by USACE would comply with 33 CFR 332 “Compensatory Mitigation for Losses of Aquatic Resources” and would promote the national goal of “no net loss” of wetland acreage and function as described in the final rule supporting 33 CFR 332.

In summary, approximately half (1.8 ac of 3.3 ac [0.7 ha of 1.3 ha]) of the potential woody wetlands on the LMGS site are permanently impacted by building activities. Approximately eight percent (1.9 ac of 23.5 ac [0.8 ha of 9.5 ha]) of potential emergent herbaceous wetlands on the LMGS site are permanently impacted by building activities. As previously noted, impacts to all potential wetlands are conservatively determined to be 3.7 ac (1.5 ha). Based on the avoidance, and minimization and compensation of wetland impacts in conjunction with adherence to TCEQ and USACE guidelines, permitting requirements and mitigative requirements, including BMPs, the impacts of building activities on wetlands are SMALL.

4.3.1.1.3 Wildlife

The project disturbs approximately 721 ac (291.8 ha) of land, resulting in permanent impacts to cultivated crops and herbaceous vegetation, and temporary impacts to cultivated crops, as discussed in Section 4.3.1.1.1. Temporarily affected areas are restored by planting native vegetation and implementing erosion control measures, as necessary.

Wildlife occurrence at the LMGS site is discussed in Section 2.4.1.3. Building activities within the permanently disturbed areas of the site displace wildlife that temporarily and permanently use the habitat. As discussed in Section 2.4.1.4, plant communities found throughout the

LMGS site are common and well represented throughout the vicinity. Wildlife communities using cultivated crop habitat common within the LMGS site are of low diversity and are dominated by common species. Large areas of similar cultivated crop habitat are adjacent to the site; as such, larger, more mobile species likely disperse to these adjacent areas. However, smaller, less mobile species (such as small mammals, reptiles, and amphibians) may be displaced or suffer mortalities during building activities. The loss of these individuals will not affect regional species' populations.

In addition, in non-agricultural and undeveloped habitats at the LMGS site, the following mitigation measures are implemented to minimize impacts to wildlife during building include minimizing the number of open trenches, covering open trenches, inspecting trenches that are left open overnight to remove animals prior to backfilling, and installing escape ramps, as necessary. In cultivated cropland and developed areas maintained by SDO, mitigation measures are implemented when significant wildlife use of these areas is noted. The use of sediment control fences to exclude wildlife from the building area and examining the inside of the exclusion area daily ensures trapped wildlife species are provided safe egress prior to the initiation of building activities. Adherence to slow speed limits of 25 mph or less avoid harming wildlife in the path of vehicles. As described in Section 2.4.1.8, the LMGS site is located in the center of the Central Flyway migration route. BMPs to minimize impacts on migrating bird species include surveying for active nest sites if vegetation clearing occurs during general bird nesting season (March 15 - September 15) and establishing avoidance buffers as needed.

Birds flying across the LMGS site may collide with tall equipment used during the building phase, such as construction cranes, and electrical transmission lines during building activities. If artificial lighting is used to support nighttime building activities, collisions may be exacerbated (especially during migration) because some birds may be attracted to artificial lights during migration (Gauthreaux and Belser, 2006). However, as discussed in Section 4.4.1.3, artificial lighting used to support nighttime building activities is consistent with lighting at SDO to minimize disruption to the existing visual landscape. The NRC Generic Environmental Impact Statement (GEIS) for License Renewal of Nuclear Plants (NUREG-1437) concludes that bird collisions with cooling towers, other nuclear power plant structures, and transmission lines occur at rates that are unlikely to affect local or migratory bird populations. Mitigation measures such as minimizing the amount of permanent nighttime lighting needed, down shielding of lighting, and using full cutoff luminaries to avoid light emitting above the horizontal are implemented to help minimize impacts on birds and other species affected by artificial lighting; therefore, impacts of collisions and effects from artificial lighting on species during building activities are minor.

Section 4.4.1.1 describes noise that can result from building activities. As shown in Table 4.4-1, attenuated noise levels for construction equipment used on the LMGS site range from 80-85 A-weighted decibels (dBA) at 50 ft (15 m) from the noise source. At a distance of 98 ft (30 m) from the noise source, these noise levels decrease to below 80 dBA. The noise level at which birds and small mammals are startled or frightened is 80 to 85 dBA (Golden et al., 1980). Thus, wildlife within 50 ft (15 m) of building activities on the LMGS site may be startled, move away from the building activities, and avoid feeding or sheltering in nearby habitat. As discussed in Section 2.9.2, sound levels on the LMGS site range from those consistent with normal suburban areas (53-57 dBA) to exceeding those of noisy urban areas (68-72 dBA); therefore, wildlife traveling through or near the LMGS site already may be acclimated to higher noise levels. Some displacement of small mammals and birds is expected during building activities; however, this impact to wildlife is minor because it is generally localized, of short duration, and habitats are not ecologically sensitive.

Thus, overall impacts to general wildlife on the LMGS site as a result of building activities are SMALL. BMPs minimize impacts, and individual losses of species as a result of building activities do not affect species populations within the vicinity or region.

X-energy and Dow have initiated discussions with state, local, and tribal natural resource agencies related to LMGS. Agencies include U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service, and Texas Parks and Wildlife Department (TPWD). TPWD provided a number of general building phase recommendations in their February 16, 2024, letter to Dow. These recommendations have been incorporated into building activities described in this section where appropriate. To date, no other agency responses have been received. Correspondence and related discussions with the agencies are located in Appendix 1A.

4.3.1.2 Important Terrestrial Habitats and Species

4.3.1.2.1 Important Habitats

As noted in Section 2.4.1.2.1, important wetland habitats in the site vicinity include the Guadalupe Delta WMA. There are 5961 ac (2412.3 ha) of freshwater emergent wetlands, 599 ac (242.4 ha) of freshwater forested/shrub wetlands, and 866 ac (350.5 ha) of freshwater forested/shrub wetlands within the site vicinity. Building activities do not impact this habitat.

As discussed in Section 2.4.1.6, the only important habitat, as defined by NRC guidance, on the site are wetlands. However, wetland impacts on the site are minimal (Section 4.3.1.1.2). The site does not include any designated or proposed critical habitat. Impacts to potential wetlands from building are described in Section 4.3.1.1.2, and as discussed in this section, the impact to potential wetlands on the LMGS site as a result of building activities is not noticeable or destabilizing.

4.3.1.2.2 Important Terrestrial Species

As discussed in Section 2.4.1.1, terrestrial communities and associated habitats within the site are primarily composed of disturbed agricultural lands. Thus, important terrestrial species on the site are limited by suitable habitat. The following narrative is limited to small non-agricultural habitats on the LMGS site. As discussed in Section 2.4.1.5.1, no federally listed species were observed or have suitable habitat present on the LMGS site. Only one state-listed species, the white-tailed hawk (*Geranoaetus albicaudatus*), was observed. This hawk, was observed perched on an electrical transmission line tower and as a flyover to the

LMGS site; no raptor nests were observed. Thus, building impacts to this species are limited to removal of a small amount of foraging habitat.

Indianola beakrush (*Rhynchospora indianolensis*), a state-sensitive plant species, was observed, in low, wet areas of two heavily to moderately grazed upland livestock pastures in the southeastern portion of the LMGS site. This area is outside of site utilization plan building activities shown on Figure 3.1-3, so there are no impacts to this plant.

Suitable habitat exists on the LMGS site for other state-listed species, a federal candidate species, and state-sensitive species, as discussed in Section 2.4.1.5. None of these species have been observed on the LMGS site, and habitat disturbed by building activities is not unique to the LMGS site vicinity as discussed in Section 4.3.1.1.1. Thus, any impacts to these wildlife and plants are limited. General impacts to wildlife and plants are described in Section 4.3.1.1.1 and Section 4.3.1.1.3.

As noted in Section 2.4.1.5, other important species include recreationally valuable species observed on the LMGS site such as northern bobwhite, mourning dove, white-tailed deer, coyote, eastern cottontail, opossum, raccoon, striped skunk, feral hog, alligator, snapping turtle, bullfrog, and other migratory and upland game bird species. These species are common in the area and are expected to pass through since the site is primarily dominated by disturbed agricultural habitat. As discussed in Section 4.3.1.1.3, large areas of adjacent, similar cultivated crop habitat are available for larger, more mobile species, such as deer, raccoon, opossum, and coyote, to disperse. However, smaller, less mobile species, such as frogs and turtles may not be able to disperse as readily. Any losses of individual animals in the LMGS site during building activities do not substantially alter local populations, and the impacts of building on recreationally valuable species are minor.

Thus, overall, impacts to important terrestrial species from building activities are SMALL.

X-energy and Dow have initiated discussions with state, local, and tribal natural resource agencies. Agencies include USFWS and TPWD. TPWD provided a number of general building phase recommendations in their February 16, 2024, letter to Dow, including implementing slow speed limits during building, minimizing permanent night lighting, and measures to limit impacts to nesting birds during building activities. TPWD indicated that implementation of their general building phase recommendations would serve to minimize risk to species of greatest conservation need and other species of wildlife. These recommendations have been incorporated into building activities described in this section where appropriate. To date, no other agency responses have been received. Correspondence and related discussions with the agencies are located in Appendix 1A.

4.3.1.3 Transmission Corridors

As discussed in Section 3.7.2, two electrical transmission lines connect LMGS to the SDO substation. This transmission corridor is contained within the LMGS site. No new transmission line corridors are planned for off-site connections from the LMGS site. Habitat along the transmission line corridor within the LMGS site is shown on Figure 4.3-1. The transmission line corridor permanently affects 47.6 ac (19.3 ha) of the LMGS site and crosses a variety of land cover types, primarily medium intensity developed land (23.2 ac [9.4 ha]) and herbaceous land (21.2 ac [8.6 ha]). Only 0.2 ac (0.1 ha) of potential emergent herbaceous wetlands (SD-WET-01) (Figure 2.4-4) intersects the transmission line corridor, which is not considered a regulated resource. This potential wetland is included in the 1.9 ac (0.8 ha) of impacts to herbaceous wetlands as discussed in Section 4.3.1.1.2 and shown in Table 4.3-2.

The only designated important habitats within the transmission line corridor are potential wetlands. Support structures are sited to avoid and minimize direct impacts to potential wetlands. BMPs, such as silt fences and other sediment and erosion control practices, are implemented to further minimize indirect impacts to potential wetlands; therefore, transmission corridor impacts to important habitats are SMALL.

4.3.1.4 Summary of Impacts to Terrestrial Ecology and Wetlands

As previously discussed, impacts to plant communities and habitats are limited because of the degraded quality of habitat on the LMGS site and the availability of similar habitat nearby. Impacts to wildlife are limited as a result of poor habitat quality coupled with the implementation of mitigation measures, BMPs, and the short duration of certain impacts such as noise. Impacts to important terrestrial species are limited because these species are not found on the LMGS site or there is limited impact on habitats and populations found within the vicinity and region. The only important habitat on the LMGS site consists of wetlands, and approximately half of the potential woody wetlands on the LMGS site are permanently impacted. However, direct and indirect impacts to wetlands on the LMGS site are mitigated in accordance with the national goal of “not net loss” by compensation, avoidance, and minimization measures as required by federal or state mitigation requirements. Thus, overall, the impacts to terrestrial ecology and wetlands from building activities are SMALL.

4.3.2 Aquatic Ecosystems

The aquatic ecosystems of the LMGS site are described in detail in Section 2.4.2. Section 2.4.2 also briefly describes aquatic resources in potentially affected areas in the vicinity of the LMGS site. The principal aquatic ecosystem on the LMGS site is West Coloma Creek, while the primary aquatic systems in the vicinity of the LMGS site are the GBRA Calhoun Canal and the Victoria Barge Canal. Impacts to surface water resources as a result of building activities are described in Section 4.2.1. Building activities that can affect aquatic ecosystems include development of the features and structures associated with the intake structure on the GBRA Calhoun Canal, disturbances from building the associated water intake pipeline stream crossings, two bridges designed for vehicle traffic that span the West Coloma Creek channel, building of stormwater outfall structures or utility crossings over the West Coloma Creek, water levels in the channel or under the creek channel (below ground), and clearing and grading for temporary or permanent facilities, which can indirectly affect streams and ponds on the LMGS site and in adjacent areas. Indirect degradation of aquatic habitat quality results from sedimentation and accidental spills that reduce water quality.

Additionally, accidental discharges of building-related chemicals such as fuel, oil, or grease can occur during building activities. Compliance with federal, state, and local requirements minimizes potential impacts of building activities on aquatic ecosystems. A site-specific SWPPP as part of the TPDES permit compliance will manage stormwater and minimize pollutant loading within receiving waterbodies. In addition, compliance with the terms of applicable Section 404 permits, and coordination with the USACE are required.

4.3.2.1 Aquatic Habitats and Biota

Aquatic habitats impacted by building activities on the LMGS site are shown on Figure 4.3-1, and details regarding impacts to surface water during building activities are described in Section 4.2.1. Building activities that may impact aquatic ecosystems include site preparation activities such as clearing, grading, and preparation of land. Building activities that directly impact surface water systems include the building of two bridges across West Coloma Creek and the intake structure on the GBRA Calhoun Canal. During building activities associated with the bridges across West Coloma Creek, BMPs such as silt fencing, soil stabilization, and avoidance of building activities during ecologically sensitive times (i.e., spawning) are used to minimize sedimentation and erosion impacts.

As described in Section 4.2, Water Impacts, a new pump station to supply intake water to the existing SDO operating Basin #5 is located along the non-jurisdictional GBRA Calhoun Canal. The water intake pipeline between the GBRA Calhoun Canal and SDO crosses one intermittent stream (SD-STR-04) and two ephemeral streams (SD-STR-06, and SD-STR-07) (Figure 2.3.2-6). Additionally, a new intake structure is located within Basin #5. Building the intakes and pipeline result in localized loss of aquatic habitats and mortality for benthic non-motile organisms. Avoidance of the building area by mobile species decreases mortality and nonlethal adverse impacts to those individuals. The benthic macroinvertebrates displaced by the installation of the intakes and pipeline are not considered rare and are expected to reestablish in the disturbed area. Disturbances of habitats related to building of the intake structures and pipeline are temporary.

Localized impacts to aquatic ecosystems result from erosion and sedimentation that occurs as a part of the building process. To minimize the impacts of building on aquatic ecosystems, BMPs are used to control erosion and limit the amount of soil and sediment entering surface waters. These controls may include mulching, geotextiles, sod stabilization, flow diversion, buffer strips, and establishment of temporary or permanent vegetation. Sediment control can include silt fences, vegetative buffer strips, and sediment basins (TCEQ, 2003). To minimize stream disturbance, personnel and equipment will only enter riparian areas when essential to complete work. Site conditions will dictate specific BMPs. A SWPPP will be prepared that prescribes methods for collection, mitigation, and control of stormwater runoff from building activities in accordance with state and federal regulations and permit requirements.

Potential impacts related to accidental spills of petroleum products or industrial chemicals necessary for building activities may result in adverse effects on aquatic ecosystems. Potential impacts are mitigated by designating storage areas for fuel and lubricants on the LMGS site that are equipped with appropriate spill containment measures in accordance with SPCC plans.

X-energy and Dow have initiated discussions with state, local, and tribal natural resource agencies related to the LMGS site. Agencies include USFWS, National Marine Fisheries Service, and TPWD. TPWD provided a number of general building phase recommendations in their February 16, 2024, letter to Dow, including recommendations to avoid impacts to aquatic resources where possible and for use of BMP within riparian areas to minimize potential impacts to sensitive aquatic organisms. TPWD indicated that implementation of their general building phase recommendations would serve to minimize risk to species of greatest conservation need and other species of wildlife. These recommendations have been incorporated into building activities described in this section where appropriate. To date, no other agency responses have been received. Correspondence and related discussions with the agencies are located in Appendix 1A.

In summary, impacts occur in conjunction with building activities associated with the water intake system on the GBRA Calhoun Canal and the bridges across West Coloma Creek. Impacts of erosion and sedimentation to aquatic ecosystems are minimized through the use of BMPs, and a SWPPP mitigates impacts of stormwater runoff on the LMGS site. Additionally, potential impacts related to incidental spills are minimized through SPCC plans. As such, the impacts of building activities to aquatic habitats and biota are SMALL.

4.3.2.2 Important Aquatic Species and Habitats

4.3.2.2.1 Important Aquatic Species

Building activities on the LMGS site do not affect any federally listed aquatic species. As described in Section 2.4.2.3, alligator gar is the only potentially impacted state-listed species in the vicinity of the LMGS site. In seasonal surveys within and adjacent to the site, alligator gar were encountered in West Coloma Creek; however, this species was only encountered at the sampling location downstream of the LMGS site (WCC-03). Persistent aquatic habitat within the LMGS site is limited. Impacts of building activities near West Coloma Creek are not likely to significantly impact populations of alligator gar in the project vicinity because water is limited in the on-site reach of West Coloma Creek for much of each year, and no alligator gar were identified on-site within West Coloma Creek. Building activities that may result in negative water quality impacts to West Coloma Creek are minimized through the use of BMPs and a SWPPP to reduce water quality impacts of stormwater runoff. Building activities do not affect alligator gar spawning habitats because this species spawns primarily in shallow areas of vegetation in floodplain habitat that does not occur on the LMGS site.

Building activities that could promote growth or expansion of nonnative or nuisance species are limited to instream disturbances such as building the intake structure, and sedimentation and erosion. The impact of these activities is mitigated through the use of BMPs, as described in Section 4.3.2.1. As indicated in Section 2.4.2.6, nonnative species, such as water hyacinth and Asiatic clams, are relatively common in the GBRA Calhoun Canal. However, project building activities do not contribute to the increased propagation or expansion of these nonnative species, as all impacts are temporary and localized; therefore, overall impacts on important aquatic species are minor.

4.3.2.2.2 Important Aquatic Habitats

Potential indirect impacts to important aquatic habitats may occur downstream within West Coloma Creek. As described in Section 2.4.2.4, essential fish habitat (EFH) exists downstream of the creek within Powderhorn Lake, approximately 12 mi (19 km) from the LMGS site. Erosion, sedimentation, and incidental spills or chemical releases may result in adverse impacts on marine species, including the recreationally and commercially harvested red drum and shrimp within their EFH described in Section 2.4.2.4. However, potential impacts to important species and important aquatic habitats including EFH are limited in West Coloma Creek downstream of the LMGS site. These impacts are minor because the important habitats are distant and BMPs minimize the negative water quality impacts within and downstream of West Coloma Creek; therefore, impacts of building to important aquatic species and important aquatic habitats are minor.

4.3.2.3 Transmission Corridors

As described in Section 3.7.2, two 138 kV transmission lines support the LMGS site. The location of these transmission lines is indicated on Figure 3.1-3. No planned transmission lines at the LMGS site cross jurisdictional surface water resources or affect aquatic ecosystems; therefore, the impact of transmission line building activities on aquatic ecosystems is negligible.

4.3.2.4 Summary of Impacts to Aquatic Ecology

In summary, impacts to aquatic ecology during building activities are primarily limited to those associated with building the water intake system on the GBRA Calhoun Canal, building bridges across West Coloma Creek, and impacts of sedimentation and erosion to on-site streams. Indirect impacts to important species and habitats in West Coloma Creek are minimized through the use of BMPs and implementation of a SWPPP to reduce pollutant loading and decrease downstream impacts on water quality. No planned transmission corridors cross jurisdictional waters. The potential for spills of petroleum or industrial chemicals is managed through the use of SPCC plans. As such, the impacts of building activities on aquatic ecosystems are SMALL.

Tables

Table 4.3-1: Land Cover Types Disturbed by Building Activities on the Long Mott Generating Station Site

Land Cover Types	Area within Vicinity (6 mi) (10 km) (ac)	Area On-Site (ac)	Approximate Area Affected (ac)	Percentage of Site Area	Percentage within the Vicinity
Permanently Disturbed Areas					
Barren Land	123	0	0	0	0
Deciduous Forest	281.3	0.2	0	0	0
Herbaceous	352.5	442.4	37.9	2.5	<0.1
Evergreen Forest	426.6	2.2	0	0	0
Developed, High Intensity	430.8	0	0	0	0
Woody Wetlands	479	3.3	1.8	0.1	<0.1
Developed, Medium Intensity	572.4	196.2	23.2	1.5	<0.1
Mixed Forest	754.8	0	0	0	0
Developed, Low Intensity	1159.8	0	0	0	0
Developed, Open Space	1832.5	0	0	0	0
Shrub/Scrub	2886.2	57.4	3.6	0.2	<0.1
Emergent Herbaceous Wetlands	9715.7	23.5	1.9	0.1	<0.1
Open Water	11,566.70	81.9	10.1	0.7	<0.1
Hay/Pasture	19,496.20	0	0	0	0
Cultivated Crops	34,862.70	730.2	241.6	15.7	0.3
Subtotal Permanent:	84,940.20	1537.2	320.1	20.8	0.4
Temporarily Disturbed Areas (Laydown)					
Barren Land	123	0	0	0	0
Deciduous Forest	281.3	0.2	0	0	0
Herbaceous	352.5	442.4	0.2	<0.1	<0.1
Evergreen Forest	426.6	2.2	0	0	0
Developed, High Intensity	430.8	0	0	0	0
Woody Wetlands	479	3.3	0	0	0
Developed, Medium Intensity	572.4	196.2	0	0	0
Mixed Forest	754.8	0	0	0	0
Developed, Low Intensity	1159.8	0	0	0	0
Temporarily Disturbed Areas (Laydown) (continued)					
Developed, Open Space	1832.5	0	0	0	0
Shrub/Scrub	2886.2	57.4	0	0	0
Emergent Herbaceous Wetlands	9715.7	23.5	0	0	0
Open Water	11,566.70	81.9	0	0	0
Hay/Pasture	19,496.20	0	0	0	0
Cultivated Crops	34,862.70	730.2	400.4	26.1	0.5
Subtotal Temporary:	84,940.20	1537.2	400.6	26.1	0.5
Total All Affected Areas:	**84,940.20**	**1537.2**	**720.7**	**46.9**	**0.9**
Abbreviations: mi. = mile; km = kilometer; ac = acre					

Table 4.3-2: Wetland Impacts on the Long Mott Generating Station Site

Feature ID	Wetland Type[(a)]	Impact Type	Feature Area (ac)[(b)]	Impact Area (ac)
Site				
SD-WET-01	PEM	Permanent	0.24	0.2
SD-WET-02	PEM	NONE	0.19	0
SD-WET-03	PEM	NONE	4.16	0
SD-WET-04	PEM	NONE	3.71	0
SD-WET-05	PEM	Permanent	4.85	0.6
SD-WET-06	PEM	NONE	1.35	0
SD-WET-07	PEM	Permanent	0.34	0.2
SD-WET-08	PSS	Permanent	3.29	1.8
SD-WET-09	PEM	Permanent	0.89	0.8
SD-WET-10	PEM	NONE	1.06	0
SD-WET-11	PEM	NONE	3.17	0
SD-WET-12	PEM	NONE	0.7	0
SD-WET-13	PEM	Permanent	0.1	<0.1
SD-WET-14	PEM	Permanent	0.61	<0.1
SD-WET-15	PEM	NONE	0.17	0
SD-WET-16	PEM	NONE	0.15	0
SD-WET-17	PEM	NONE	1.83	0
Total Impacts by Wetland Type				
PEM		Permanent	23.52	1.9
PSS		Permanent	3.29	1.8

Notes:
a) Note that PEM are considered Emergent Herbaceous Wetlands, and PSS wetlands are considered Woody Wetlands, as depicted on Figure 4.3-1
b) Area of the feature within the LMGS site only
Abbreviations: PEM = palustrine emergent; PSS: palustrine scrub-shrub

Figures

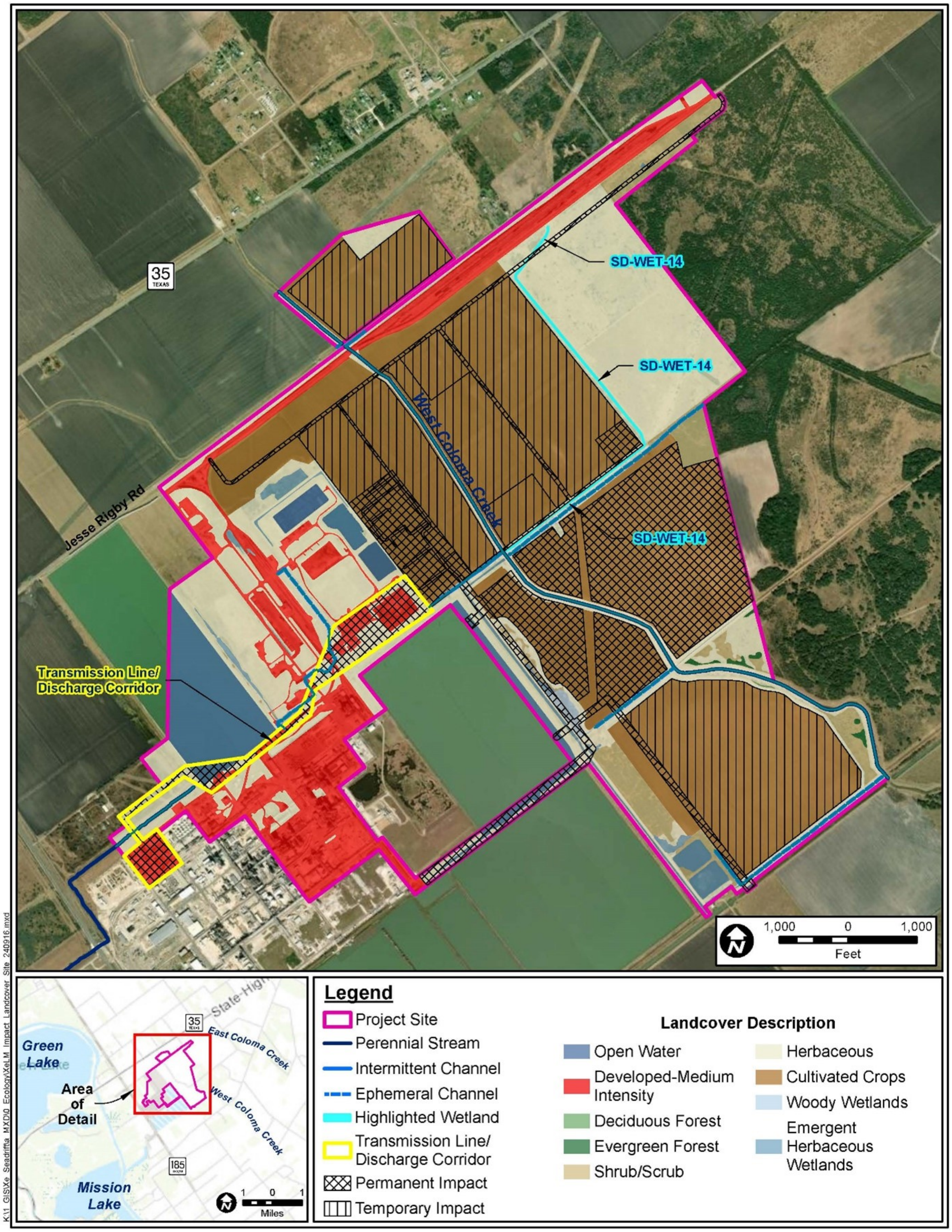

Figure 4.3-1: Habitats Disturbed on the Long Mott Generating Station Site

4.4 Socioeconomic Impacts

This section describes the socioeconomic impacts associated with building activities. The discussion is divided into the following five subsections:

- Section 4.4.1 describes physical impacts of building activities on the community
- Section 4.4.2 describes the social and economic impacts of the building activities on the ROI and surrounding region
- Section 4.4.3 describes environmental justice (EJ) impacts within the region
- Section 4.4.4 describes nonradiological health effects of building activities
- Section 4.4.5 describes effects of nonradioactive waste management during building activities

4.4.1 Physical Impacts

Building activities can cause temporary and localized physical impacts such as noise, vibration, shock from blasting, odors, vehicle exhaust, and dust. This section addresses potential building activities that may affect people (local public and on-site workers), buildings, transportation routes, and the aesthetics of areas located near the LMGS site.

4.4.1.1 Noise and Vibration

Section 2.9.2 provides information and data related to the background noise levels at the LMGS site. Additionally, as described in Section 2.9.2.2, there are no municipal, county, or state-level regulations that establish quantitative noise level limits applicable to the LMGS site. At the federal level, the U.S. Environmental Protection Agency (EPA) has a broad set of guidelines, which recommends that outdoor noise levels do not exceed a day-night average community noise level (L_{dn}) of 55 dBA. However, this level is not a regulatory goal; it is intentionally conservative to protect the most sensitive portion of the population with an additional margin of safety.

During building activities at the LMGS site, noise levels increase relative to background noise levels because of the operation of vehicles and machinery. Building activities require the use of heavy equipment for clearing, excavating, and grading, and for constructing the facilities. Section 3.9.6 identifies typical construction equipment that may be used during building activities on the LMGS site. Table 4.4-1 lists the construction equipment representative of the equipment that may be used on-site (listed in Section 3.9.6) and identifies the attenuated noise levels for each piece of equipment at various distances.

As described in Section 2.9.2, the nearest off-site noise-sensitive receptors in proximity to the LMGS site are residences located north adjacent to State Highway (SH) 35, the closest of which is approximately 0.2 mi (0.3 km) north of the site. Assuming straight line noise attenuation, the maximum noise levels from the construction equipment operated at the LMGS site attenuates to 58.6 dBA at the closest residence. Although the maximum noise level at the nearest residence attenuation slightly exceeds the EPA's conservative recommendation of 55 dBA for outdoor noise levels, the projected noise level is below the baseline ambient noise level for this area (represented by noise monitoring location [NM] 8 [Figure 2.9-3]), where the equivalent sound level (L_{eq}) ranged from 62.3 to 74.41 dBA (Table 2.9-2). Thus, noise from building activities is minimally perceptible to the nearest residents.

The nearest recreational area is the Victoria Barge Canal, which serves as the western boundary of the Mission Lake Unit of the Guadalupe Delta WMA, located approximately 1.3 mi (2.1 km) west of the LMGS site at its closest point. Noise from construction equipment is negligible at the nearest recreational areas because noise levels attenuate to 42.2 dBA or lower at the Victoria Barge Canal.

Increased traffic noise during the building period is attributed to construction workforce vehicle traffic, truck and equipment deliveries, and off-site borrow hauling. The on-site construction workforce peaks at 1473 personnel. As discussed in Section 4.4.2.3.1, the 1473 workers are divided into two shifts. The day shift includes 60 percent of all workers entering and the night shift includes the remaining 40 percent of the workforce. During the changeover period between day and night shifts, workers from both shifts will be present at the site at the same time. Truck, equipment, and borrow deliveries are generally intermittent and distributed over normal working hours; therefore, building-related traffic volumes and associated noise levels in the vicinity are highest when workers are arriving at and leaving the LMGS site. Vehicles primarily access the LMGS site from the local road, Jesse Rigby Road, via SH 35 and SH 185 (Section 4.4.2.3.1), where adjacent land uses are largely agricultural or industrial, and therefore less sensitive to increased noise levels. Noise from building-related traffic is also intermittent and temporary. Thus, impacts from the noise of building activities are SMALL and temporary and do not require mitigation or implementation of noise abatement strategies.

4.4.1.2 Dust and Air Pollution

Building activities result in increased air emissions. Fugitive dust and fine particulate matter are produced as a result of earth-moving and material-handling activities. Fugitive dust is also generated during operation of the concrete batch plants. Vehicles and engine-driven equipment (e.g., generators and compressors) generate combustion product emissions, such as carbon monoxide, oxides of nitrogen, and to a lesser extent, sulfur dioxides. Painting, coating, and similar operations also generate emissions from the use of volatile organic compounds.

Limited in duration and infrequent, air emissions are localized mostly to the LMGS site because they are generated from ground-level or near-ground-level activities. Additionally, emissions from building activities vary based on the duration of a specific activity throughout the approximate 44-month building phase. Because emissions are localized to the LMGS site, there is no impact to off-site sensitive receptors and recreation areas from dust and air pollution.

The Clean Air Act regulates air emissions from stationary and mobile sources. It authorizes the EPA to establish National Ambient Air Quality Standards (NAAQS) to protect public health and public welfare and to regulate emissions of hazardous air pollutants. Compliance with the applicable regulatory limits defined by the NAAQS (40 CFR 50) and National Emission Standards for Hazardous Air Pollutants (40 CFR 61) involves implementation of emissions-specific strategies and measures. Additionally, building activities are subject to air permits under state and federal laws that address the impact of air emissions on sensitive receptors.

To minimize temporary emissions, the following measures may be considered for implementation in the building activities mitigation plan:

- Scheduling building activities to minimize idling time of vehicles
- Phasing activities and equipment use
- Ensuring the use of heavy equipment that is in good condition, is properly maintained, and is compliant with applicable federal regulations
- Ensuring all machinery is maintained and operated in accordance with the manufacturer's specifications
- Maintaining low vehicle speeds on dirt cover roads and exposed areas to minimize dust generation
- Watering roadways and exposed areas
- Stabilizing on-site soil stockpiles
- Minimizing dust generating activities during high wind conditions
- Locating stationary equipment as far away from sensitive receptors as practical
- Phasing grading to minimize the area of disturbed soils
- Seeding and revegetating road slopes and medians

Emissions are generated from motor vehicles used for truck deliveries to the LMGS site and from the daily commute of construction workers. Contractor vehicles are properly maintained to minimize emissions. The total amount of air emissions associated with vehicular traffic are temporary and minor in comparison to traffic in the region and do not adversely affect local air quality (Section 2.5.2.2).

Air emissions impacts from building activities are SMALL because emissions are controlled using minimization measures and through maintaining the established regulatory limits designed to minimize impacts.

4.4.1.3 Visual

Visual resources within the LMGS vicinity are described in Section 2.5.2. The visual landscape immediately surrounding the LMGS site consists of the existing SDO to the west, the existing rail line and rural land and dispersed residences to the north, and rural land to the east and south (Section 2.2, Land Use). The closest residence is located 0.2 mi (0.3 km) northwest from the LMGS site boundary. Additionally, sensitive receptors also include recreators on the Victoria Barge Canal located 1.2 mi (1.8 km) west of the LMGS site at its closest point. The Victoria Barge Canal acts as the eastern boundary of the Guadalupe Delta WMA, and recreators within the Guadalupe WMA are considered sensitive receptors as well.

As described in Section 2.2, Land Use, the LMGS site is relatively flat and the topography in the vicinity is characteristic of the Gulf Coast Plains with gently rolling terrain. As shown on Table 2.2-2, land cover in the vicinity is dominated by cultivated crops and hay/pastureland. Building activities on the LMGS site may be visible to the public from adjacent areas of the site and the general vicinity. However, the visual impact of the building activities on the LMGS site diminishes with distance. Furthermore, because of the project's location adjacent to an existing industrial facility and railway, building activities do not destabilize the existing visual character within the vicinity.

Building activities require the use of an approximately 200 ft (61 m) heavy lift crane. The crane is likely visible to motorists along Jesse Rigby Road, SH 85, and SH 35 and visible from the Victoria Barge Canal. Additional building activities, such as the use of large earth-moving equipment, transmission line upgrades and relocations, and transportation of large materials onto the LMGS site, are also visible to the public and recreators within the project vicinity.

Direct visibility of building activities on the LMGS site is primarily limited to on-site construction workers, SDO employees, residents living along SH 35, and motorists on surrounding roadways (Jesse Rigby Road, SH 185, and SH 35). The presence of the SDO facility and railway minimize the visual discord associated with building activities. As the existing viewshed contains industrial development, the intermittent and temporary building activities on the LMGS site are not significantly altering the aesthetic integrity or the existing viewshed.

Building activities on the LMGS site are mostly obstructed within the vicinity by terrain and the existing SDO facility including the railyard along Jesse Rigby Road. However, building activities could be visible to recreators within those portions of the Victoria Barge Canal and the Guadalupe Delta WMA that are not directly obstructed by the SDO. However, the viewshed of the LMGS site is absorbed into the existing industrial viewshed and thus contributes only minimal additional visual nuance in the existing landscape. Lighting associated with overnight building activities is consistent with lighting at the SDO and therefore results in minimal disruption to the existing visual landscape.

Sensitive receptors along the routes used for hauling building materials to the LMGS site and direct access roads (Jesse Rigby Road, SH 185, and SH 35) near the LMGS site are exposed to increased visual discord due to the increase in vehicular traffic. Section 4.4.2.3.1 further discusses impacts to traffic from building activities. Traffic from the construction workforce primarily occurs during shift start and shift end. Increased traffic from on-site trucking of building materials is intermittent through normal working hours. However, these activities are temporary and condensed to a nine-month period. Because building activities are approximately 44 months, impacts to sensitive receptors from the visual intrusion of increased traffic is minor.

Building activities are contained within the LMGS site and are temporary over the course of approximately 44 months. For nearby residents and recreational users of the Victoria Barge Canal and Guadalupe WMA, building activities may impact the visual landscape through the introduction of temporary building structures and equipment. However, the visual impacts of building activities are likely integrated into the existing landscape which includes the SDO facility and are partially screened by existing infrastructure, vegetation, and topography; therefore, impacts to the aesthetic quality of the viewshed from building activities are SMALL.

4.4.1.4 Other Physical Impacts

People exposed to noise, fugitive dust, and gaseous emissions resulting from building activities include those working or living immediately adjacent to the LMGS site, using the Victoria Barge Canal, or visiting the Mission Lake Unit of the Guadalupe Delta WMA. As detailed above, impacts from fugitive dust and odors are contained on-site and building activity noise is minimally perceptible to the nearest residents.

Construction workers and employees of SDO are also vulnerable to noise, fugitive dust, and gaseous emissions from building activities. Construction workers and employees of SDO are properly trained to understand safety hazards and use personal protective equipment to minimize the risk of potentially harmful exposures.

The LMGS site is adjacent to the SDO. Buildings on the SDO may be affected by vibration associated with pile-driving activities. However, building activities are planned, reviewed, and conducted such that no adverse effect occurs on existing SDO operations. There are no other buildings located adjacent to the LMGS site.

Heavy-haul activities, deliveries, and construction worker commuting during the building phase may impact road conditions. Deliveries may be made by rail and are not expected to result in a notable increase in current rail traffic conditions. Material or haul transportation routes are selected based on accessibility, existing traffic patterns, logistics, distance, and costs.

As stated in Section 4.4.2.3.1, public roads may be adversely affected by increased traffic, congestion, and roadway deterioration. Mitigative measures will be developed in consultation with Texas Department of Transportation (TxDOT) to accommodate building activity traffic. Roadway repairs and improvements (e.g., patching cracks and potholes, and reinforcing shoulders) in the LMGS site vicinity may be necessary to reduce safety risks and restore pavement condition. Any damage to public roads, markings, or signs caused by building activities is repaired to preexisting conditions or better.

In summary, impacts to workers and buildings are minimized with implementation of proper safety training and review of building activities to minimize potential impacts to existing buildings at the SDO. Roadway deterioration that may occur during building activities is repaired to preexisting conditions or better once building activity completes; therefore, physical impacts from building activities on the LMGS site are SMALL.

4.4.1.5 Summary of Physical Impacts

Physical impacts associated with air emissions are SMALL. Impacts of noise from building activities is minimally perceptible to the nearest residence and recreational areas, and noise from building-related traffic is intermittent and temporary. Impacts to workers and structures are SMALL and temporary. Building activities may be visible to nearby residents and recreational users of the Victoria Barge Canal and Guadalupe WMA; however, the visual impacts of building activities are likely integrated into the existing landscape which includes the SDO facility and are screened by existing infrastructure, vegetation, and topography; therefore, physical impacts of building activities are SMALL.

4.4.2 Social and Economic Impacts

This section evaluates the potential demographic, economic, infrastructure, and community impacts associated with building activities. As described in Section 2.5, Socioeconomics, the ROI identified for social and economic impacts, which is the area(s) where the construction workforce and their families reside, spend their income, and use their benefits, consists of Calhoun, Jackson, and Victoria Counties. The following evaluation assesses potential impacts associated with building-related activities and the size of the construction workforce in the ROI.

4.4.2.1 Demographic Impacts

Figure 4.4-1 illustrates the distribution of the construction labor force over the anticipated building period, approximately 44 months. Employment is estimated to peak in month 21 with 1473 construction workers; therefore, the peak construction workforce is used in the following analysis to determine the greatest potential demographic impacts during plant building activities.

4.4.2.1.1 Population

The direct impact to population from building LMGS depends on how many of the 1473 construction workers are available within the ROI. For example, if all construction workers are from this region, there is no change in the ROI's total population; however, if workers are introduced from outside Calhoun, Jackson, and Victoria Counties, there are potential impacts to regional demography in conjunction with the in-migration of the supporting workforce and their families.

Based on a review of U.S. Bureau of Labor Statistics (BLS) construction-sector occupational employment data for the Victoria metropolitan and nonmetropolitan areas (BLS, 2022), approximately 10 percent of the construction workforce could be derived from the ROI's available labor force. Thus, approximately 90 percent, or an estimated 1326 workers, are from outside the ROI to support building activities.

The residential distribution of the in-migrating construction workforce is the same as the residential distribution of the current workforce for the SDO. Sixteen percent of the existing SDO workforce commutes to the facility from outside the ROI. Consistent with these commuting patterns, 16 percent, or 212 of the 1326 construction workers, reside in counties outside of the ROI and commute to the site. Accordingly, the remaining 1114 construction workers will relocate to the ROI, and each worker who relocates may bring a family. The average household size (including single-person households) in Texas is approximately 2.76 (USCB, 2021); therefore, an in-migrating workforce of 1114 increases the ROI's population by approximately 3074 people. The distribution of this new population within the ROI is estimated based on the residential distribution of the SDO workforce and is shown in Table 4.4-2. Based on this analysis, estimated population increases have the greatest impact in Calhoun County, where the new residents increase the population by approximately 3 percent (based on 2025 projections). Victoria and Jackson Counties experience population increases of approximately 2.5 and 0.8 percent, respectively, while the ROI experiences a population increase of approximately 2.4 percent.

The projected population increases associated with the in-migration of construction workers and their families account for less than 5 percent of the total population of the ROI or any of the individual counties. A portion of the workers will likely migrate out of the ROI following completion of building activities. For these reasons, impacts to population associated with building are SMALL.

4.4.2.1.2 Housing

Section 2.5.2.6 and Table 2.5-16 and Table 2.5-17 detail the existing housing stock within the ROI and are used as a basis to estimate the number of housing units that may be available during the building phase. As discussed in Section 4.4.2.1.1, during the building phase, 1114 workers will seek housing within the ROI. Table 4.4-2 delineates the anticipated distribution of those in-migrating construction workers. Assuming the in-migrating construction workers reside in the same pattern as the existing SDO workforce, the construction workers use approximately 64 percent of housing units for rent or for sale in Calhoun County, 12 percent in Jackson County, and 47 percent in Victoria County. Overall, within the three-county ROI, the in-migrating construction workforce uses 45 percent of available housing. As stated in Section 2.5.2.6, the median mortgage payment in the ROI is $1365, and the median rent payment in the ROI is $872. While there is currently enough available housing to accommodate all the in-migrating construction workers, a relatively high increase in demand for housing increases the costs of existing houses and rental rates.

Workers may bring their own housing (recreational vehicle, camper van, or other type of portable housing) or use hotels and motels. This decreases the demand for traditional housing. However, workers' housing decisions depend on several factors, including length of assignment, household size, distance from the family home, market price for housing units, cost of fuel, and other personal factors. In-migrating construction workers may choose to reside in traditional housing or supply their own housing within the ROI.

Impacts to housing availability from the in-migrating construction workforce are noticeable but not destabilizing to the housing market overall; therefore, the potential impacts on housing are MODERATE because almost half of the available housing units within the three-county ROI are used by the in-migrating construction workforce.

4.4.2.1.3 Summary of Demographic Impacts

The projected population increases associated with the in-migration of construction workers and their families account for less than 5 percent of the total population of the ROI or any of the individual counties. However, impacts to housing availability from the in-migrating construction workforce are noticeable but not destabilizing to the housing market overall; therefore, the potential impacts associated with the projected population increase during building activities are SMALL to MODERATE.

4.4.2.2 Economic Impacts to the Community

This section describes the estimated economic impacts to the community which includes local and regional economic impacts and tax impacts.

4.4.2.2.1 Economy

Employment of the construction workforce has socioeconomic impacts on the surrounding region. Counties within the ROI are the most affected counties within the 50 mi (80 km) radius of the LMGS site because they are near the site of the building activities and receive the largest number of relocated employees. Other counties in the region, but not in the ROI, experience the remaining economic and social impacts, which are diffused within the larger populations of these counties.

The economic impacts of building on the local and regional economy due to building activities on the LMGS site is related to the region's current and projected economy and population. The magnitude of economic impacts depends on the size and diversity of the local economy. Diversity of the local economy refers to how fast local expenditures are circulated and depleted from the local economy as various rounds of economic activity occur. The more diverse the structure of the local economy, the longer direct expenditures circulate in the economy, generating a higher multiplier effect and greater total impact on economic output, employment, and income. The economic multiplier models building-related expenditures as well as construction workers' wages and salaries to estimate the gross output, employment, and income effects of the direct local expenditures.

The economic multiplier used in this analysis is from the U.S. Department of Commerce Bureau of Economic Analysis (BEA), Economics and Statistics Divisions called the Regional Input-Output Modeling Systems (RIMS) II. RIMS II calculates multipliers for industry jobs and earning within a specific region. The BEA RIMS II multipliers were obtained for the ROI (Calhoun, Jackson, and Victoria Counties) and used to evaluate impacts on the economic output, employment, and earnings based on the estimated cost of construction.

The total construction expenditure results in an estimated total economic value added of approximately $1.6 billion across all local industries, including goods and services produced in the ROI that are used during the building phase and induced effects related to worker spending. The economic output creates annual earnings of approximately $150 million dollars over a 44-month building phase.

In addition, the multipliers predict that building of the facility leads to the creation of approximately 9112 direct and indirect jobs over the building phase. This includes both direct employment and indirect employment. Indirect jobs created by the additional demand on goods and services are a result of the added construction employment. Most indirect jobs are service-related, and those jobs are filled by the existing workforce in the ROI. Some of these indirect jobs could benefit unemployed or underemployed workers in the ROI. Overall, based on 2021 data, approximately 4.2 percent of the total labor force within the ROI are employed as a result of building-related employment annually (direct construction jobs plus indirect jobs).

Capital expenditures, purchases of goods and services, and payment of wages and salaries to the construction workforce have multiplier effects during the building phase that result in an increase in business activity, particularly in the retail and service industries. Similarly, goods and services purchased as part of the building effort represent income to the recipient who likewise expends payroll monies in conjunction with the procurement of goods and services. In addition to expenditures by the construction workforce, the in-migrating families of the workforce are also expected to spend payroll on goods and services within the ROI. While this spending cannot be accurately quantified because the RIMS II model uses capital building costs, expenditures associated with the increase of an additional 3074 people in the ROI (workers and their families) results in a beneficial impact on the local economy during the building phase.

The employment of the construction workforce over a period of 44 months has a positive economic effect on the ROI and surrounding region. Building activities on the LMGS site introduce millions of dollars into the economy and indirectly creates jobs that help reduce unemployment and provide opportunities for service-related industries. These economic impacts are realized primarily within the ROI; therefore, the impact of building on the economy of the ROI is beneficial and MODERATE.

4.4.2.2.2 Taxes

Building-related activities, purchases, and labor force expenditures generate tax revenues, including corporate franchise taxes, sales and use taxes, and property taxes. Increased taxes collected benefit the state and local jurisdictions. This subsection assesses impacts on tax revenues, including corporate franchise taxes, sales and use taxes, and property taxes generated during building activities.

4.4.2.2.2.1 Personal Income and Franchise Taxes

As noted in Section 2.5.2.3, Texas has no personal income tax. However, Texas does impose a franchise tax on taxable entities actively doing business in the state. The franchise tax is calculated on an entity's margin and calculated in one of the following ways:

- Total revenue times 70 percent
- Total revenue minus cost of goods sold
- Total revenue minus compensation
- Total revenue minus $1 million

Total revenue is determined from revenue amounts reported for federal income tax minus exclusions (TCPA, 2024). However, no franchise taxes are assessed during the building period because no revenue is generated during that time.

As stated above in Section 4.4.2.2.1, building activities have a multiplier effect on spending within the ROI that may result in new business developments; therefore, there may be a minor increase in franchise taxes due to the indirect spending during the building period. Additionally, existing businesses and firms are likely to experience a minor increase in revenue from increased spending within the ROI, resulting in increased franchise taxes; therefore, impacts are positive and SMALL.

4.4.2.2.2.2 Sales and Use Taxes

Taxable goods and services purchased in Texas are subject to the state's sales tax rate of 6.25 percent, with an additional increase up to 2 percent from local taxing jurisdictions for a maximum combined rate of 8.25 percent (Section 2.5.2.3). The in-migrating construction workforce and their families account for a population increase within the ROI of approximately 3074 people (Section 4.4.2.1.1). According to BLS 2022 data, the mean salary of a construction laborer in Texas is $37,600 per year. Construction workers spend most of their salaries on savings, housing, and goods and services. Expenditures by the in-migrating construction workers and their families on items subject to sales and use taxes lead to further increases in sales tax revenues in the ROI. The in-migrating population accounts for an approximately 2.4 percent increase in population within the ROI (Section 4.4.2.1.1). The increased expenditures resulting from this population increase have a beneficial but SMALL impact on sales and use tax.

Sales tax revenues may also result from direct purchases for building materials, equipment, and services. The distribution of these taxes depends on business locations and is evident through the greater 50 mi (80 km) region. As such, the sales taxes collected on building-related expenditures over the 44-month building phase are minor in comparison to sales tax revenues throughout the 50 mi (80 km) region, resulting in a SMALL positive impact in the ROI.

4.4.2.2.2.3 Property Taxes

As described in Section 2.5.2.3, the current landowners of the LMGS site pay approximately $5728 in taxes to the county and various other entities. Additionally, there is currently an abatement agreement in place with Calhoun County for land improvements. The agreement states that the exemption to be abated for each year of the abatement period is 100 percent for 10 years beginning on January 1 of the Start Year. With the Start Year being based on the issuance of a permit to build by the NRC and the date Construction Begins (if the Construction Begins date is on or before July 1 of any year, the Start Year for the abatement is January 1 of the year following the date when Construction Begins. If the date Construction Begins is after July 1 of any year, the Start Date is January 1 of the second year after the date when Construction Begins).

In accordance with the approved tax abatement agreement, Dow has agreed to payments in lieu of taxes (PILT). These payments are made to Calhoun County under the following schedule:

- Two million dollars on January 2 of the Start Year
- Two million dollars on January 2 one year after the Start Year

PILTs are used to offset the losses in property taxes and help local governments carry out vital services such as firefighting, police protection, and public schools and road building (DOI, 2024).

For a period of 10 years, Calhoun County and other entities benefited from the approximately $5728 in taxes paid annually for the property on which the LMGS site will reside; however, the PILT of $4 million greatly exceeds the property taxes that would have been paid on the undeveloped site. In terms of all property tax revenue, Calhoun County had approximately $22.5 million in revenue in fiscal year 2022 (Table 2.5-13); therefore, the increase in $4 million over a 10-year period is relatively minor.

If in-migrating construction workers purchase homes in the ROI, as opposed to renting, they will continue to pay existing property taxes. As described above in Section 4.4.2.1.2, because of the demand for existing housing units, property values are likely to increase, and subsequently, so are property taxes.

While PILT revenues generated by building activities on the LMGS site are notable compared to the existing condition, the impact over a 10-year period is minor compared to annual property tax revenues. Impacts to franchise taxes (generated as a result of indirect spending during the building period) and sales and use taxes are minimal; therefore, the overall impact of the building period on franchise tax, sales and use taxes, and property tax is SMALL.

4.4.2.2.3 Summary of Economic Impacts to the Community

Building activities on the LMGS site introduce millions of dollars into the economy and creates jobs. These positive economic impacts are realized primarily within the ROI. Minor tax revenue impacts on local jurisdictions accrue through sales and use taxes, and indirect franchise taxes generated during building activities; therefore, the economic and tax impact are MODERATE to SMALL and beneficial.

4.4.2.3 Community Infrastructure Impacts

This section provides the estimated impacts on infrastructure and community services, including traffic, recreation, and public services.

4.4.2.3.1 Traffic

The impacts of transportation and traffic from building activities are greatest on roads in the ROI (Victoria, Calhoun, and Jackson Counties) as this is the area where most workers will reside. Impacts of construction workforce on traffic are determined by four elements:

- The number of worker vehicles during the building period
- Number of truck deliveries to the building site
- The projected population growth rate in the ROI
- The capacity of the roadways impacted

As stated above, employment peaks in month 21 with 1473 construction workers. The construction workforce accesses the LMGS site from the local road, Jesse Rigby Road, via SH 35 and SH 185. Potential traffic impacts are also considered within the community of Bloomington along SH 185 as this is the primary travel route from Victoria to the LMGS site.

This analysis assumes that the 1473 workers are divided into two shifts. The day shift includes 60 percent of all workers and the night shift includes the remaining 40 percent of the workforce. During the changeover period between day and night shifts, workers from both shifts will be present at the site at the same time. A common practice for construction workers is to carpool or use employer-provided shared transportation to the building site. However, this traffic analysis conservatively assumes one worker per vehicle because the extent to which shared transportation information may occur cannot be determined at this time. Additionally, it is conservatively assumed that 100 construction truck deliveries are made daily to the building site. This traffic is evenly distributed throughout the work hours of the day.

Qualified backfill for the Reactor Building is obtained from off-site rock quarries in the vicinity of San Antonio, Texas, and delivered to the LMGS site by truck. Temporary laydown and staging areas are topped with crushed stone obtained from off-site rock quarries in the vicinity of San Antonio, Texas. Backfill for site grading is from designated on-site borrow areas (Figure 3.1-3). Lime for soil treatment and stabilization is obtained from commercial sources in the Houston area and is delivered to the site either by road or rail. As noted in Section 4.4.1.4, deliveries made by rail are not expected to result in a notable increase in current rail traffic conditions. Delivery of these materials results in the following truck traffic on area roadways between San Antonio and the LMGS site during building:

- Qualified backfill – 440 truckloads (880 truck trips)

- Gravel/crushed rock – 15,930 truckloads (31,860 truck trips)

Additionally, truck traffic on area roadways between Houston and the LMGS site during building includes:

- Lime for soil stabilization – 3,240 truckloads (6,480 truck trips).

Trucks bringing in borrow/fill material are distributed throughout the 10-hour workday. The analysis considers the workforce traffic during the building phase along with all the truck traffic coming in and out of the site.

As shown on Table 2.5-3, the population in the ROI is projected to grow at a rate of approximately 0.3 percent annually from 2020 through 2040; therefore, any increase in traffic due to population growth is small and is not further considered in this analysis.

As described in Section 2.5.2, the average annual daily traffic (AADT) is the total volume of motorized vehicle traffic on a highway or roadway segment expressed on a daily basis (i.e., total annual volume divided by 365). The estimate of the amount of traffic generated by building activities is based on the assumptions listed above regarding building-related traffic. Traffic operations for existing conditions and conditions during building activities were analyzed using the Highway Capacity Software (HCS) (2024), which uses methodology from the Highway Capacity Manual Seventh Edition (NASEM, 2022) for highway segments and Synchro 11 for intersections. HCS and Synchro are traffic engineering tools that provide quantitative measures of effectiveness related to traffic volume.

Most of the construction workforce is expected to live north of the LMGS site, thus making SH 185 a key roadway for travel to and from the site. The 1473-person workforce traffic is distributed among the existing traffic network with 80 percent of the workforce traveling to/from the site via SH 185 and the remaining 20 percent traveling to/from the site via SH 35. The construction truck deliveries from San Antonio and Houston will use SH 185 to travel to and from the LMGS site. The AADT data was collected from TxDOT Traffic Count Database System (TCDS) (TxDOT, 2024) along roadway segments primarily impacted by construction traffic (SH 185 and SH 35) and at selected intersections along these segments (intersection of SH 185 and Second Street West/ Second Street East, SH 185 and Farm-to-Market (FM) 616, and SH 185 and SH 35). Analyzing these intersections indicated the potential for impacts of building-related traffic traveling to and from the LMGS site through Bloomington, Texas. Peak hour volumes were estimated using TCDS data.

As noted in Section 2.5.2, Level of Service (LOS) is a qualitative measure of operating conditions at a segment or intersection. LOS is given a letter designation ranging from A to F (free flow to heavily congested). Calculated for both the existing conditions and conditions during the building phase, LOS for highway segments is based on density (passenger cars/per mile/per lane), which relates to how many vehicles are traveling along a roadway segment during the peak hour. Another measure related to traffic flow is the volume/capacity ratio, which provides an estimate of traffic flow in comparison to the estimated capacity of the roadway segment or intersection. Three locations along the highway segments described above were analyzed including: SH 185 just north of the city of Bloomington, SH 185 south of Bloomington and SH 35 to the east of the intersection of SH 185 and SH 35. As indicated on Table 4.4-3, LOS at SH 185 south of Bloomington during the building period remains at LOS A in the AM northbound direction, but decreases from LOS A to LOS C in the PM southbound direction. The LOS along this segment decreases from LOS A to LOS D in the AM southbound and PM northbound direction. The LOS at SH 35 remains at LOS A in the AM westbound direction but decreases from LOS A to LOS C in the PM eastbound direction and decreases from LOS A to LOS D in the AM eastbound and PM westbound direction.

The increased number of vehicles resulting from building activities along the analyzed two-lane highway segments produces an increase in density. This increased density causes a drop in LOS from LOS A to LOS C/D, except for the northbound segment of SH 185, south of Bloomington, and the westbound segment of SH 35, east of the SH 35 and SH 185 intersection, where the LOS does not change from existing conditions. The LOS remains at A along the multilane segment of SH 185 north of Bloomington during building.

For the intersection analysis four locations were evaluated: SH 35 & SH 185, SH 35 & Jesse Rigby Rd, SH 185 & FM 616 and SH 185 & 2nd St W/E Second St. Table 4.4-4 summarizes the results of the analysis for non-signalized and signalized intersections during both existing and building period conditions during the AM and PM peak hours. SH 35 and SH 185, SH 35 and Jesse Rigby Road, and SH 185 and FM 616 are non-signalized intersections, while SH 185 and Second Street West/Second Street East, in Bloomington, Texas is a signalized intersection. For all non-signalized intersections, Table 4.4-4 identifies the LOS of the stop control approach. At almost all non-signalized intersections, delays from the increased traffic result in a decrease in the LOS from a LOS A or B to a LOS F, except for the SH 185 northbound traffic at SH 35 and SH 185, where there is no change in LOS. The signalized intersection of SH 185 and Second Street West/Second Street East has a slight increase in delay in the southeast and northwest direction in both AM and PM, with only the southeast approach decreasing from LOS A to LOS B in the AM. The northeast approach decreases from LOS B to LOS D in the AM and LOS C in the PM. The southwest approach decreases from LOS B to LOS C in the AM and PM during building.

The largest impact to LOS at the intersections analyzed indicate that the non-signalized intersections near the LMGS site (SH 35 and SH 185 (north leg) and at SH 35 and Jesse Rigby Road) experience the greatest impact as LOS falls to LOS F at these intersections during building. Intersections within the city of Bloomington (SH 185 and FM 616) are impacted to a lesser degree. The LOS of the worst leg falls from a LOS B to LOS C in the AM and LOS E in the PM during building. For the signalized intersection of SH 185 and Second Street West/Second Street East, the major street remains at LOS A or B, while the minor street falls to LOS C, with only the northeast AM leg falling to LOS D.

Therefore, the overall impacts to transportation due to construction workforce traffic are MODERATE along the segments south of the city of Bloomington, which provide access to the LMGS site from Victoria, TX. The impact is MODERATE due to traffic congestion and delays experienced during building activities along these roadway segments. Overall traffic impacts at the intersections providing access to the LMGS site is LARGE as LOS decreases from A (reasonably free flow) to LOS F (heavily congested) where operating conditions are unstable. These impacts would be experienced during the building period in the AM and PM peak hours. However, mitigative measures developed in conjunction with TxDOT may include altered routes or local improvements such as roadway widening or installing turn lanes to accommodate building activity traffic which may reduce impacts.

4.4.2.3.2 Recreation

As described in Section 2.5.2, several recreational facilities and outdoor activities are located within the site vicinity. Recreators within the vicinity may experience visual discord during building activities because of the presence of large construction equipment, construction lighting, dust associated with clearing and grading the LMGS site, and increased noise levels. Although these building activities change the undeveloped nature of the site, the SDO and associated infrastructure currently exists within the viewshed of recreators within the Guadalupe Delta WMA and along the Victoria Barge Canal; therefore, the introduction of construction equipment, lighting, and noise does not disrupt the existing viewshed nor does it impede use of recreational facilities. The Hatchbend County Club is located approximately 4 mi (6.4 km) northeast of the LMGS site and Polebenders is located approximately 4.6 mi (7.4 km) south of the LMGS site boundary. Both recreation areas are located more than 4 mi (6.38 km) from the LMGS site boundary; therefore, the introduction of construction equipment, lighting, and noise does not disrupt the existing viewshed of recreators within the vicinity, nor does it impede use of recreational facilities.

Recreational areas within the vicinity are impacted by the increase in population associated with the construction workers and their families. Workers who temporarily relocate to the ROI are expected to use recreational areas and outdoor activities at the same rates as the permanent population of the ROI. As noted in Section 4.4.2.1.1, the in-migrating construction workforce and their families increase population by approximately 2.4 percent. Accordingly, the in-migrating population increases usage of recreational areas within the LMGS site vicinity. As noted in Section 2.5.2.5.2, recreational areas within the LMGS site vicinity are outdoor facilities that span large areas.

Building activities on the LMGS site are potentially visible to recreators within the Victoria Barge Canal and the Guadalupe WMA; however, the visual impacts are likely absorbed by the existing SDO facility and screened by existing structures, vegetation, and the effects of terrain. Additionally, because of the sufficient availability for recreation facilities, impacts to recreational areas and outdoor activities from building activities are SMALL.

4.4.2.3.3 Public Services

This section discusses the impacts on existing water supply and wastewater treatment, police and fire protection, healthcare services, and education in the economic region.

4.4.2.3.3.1 Water Supply and Wastewater Treatment

Table 2.5-20 details the current municipal water suppliers within the ROI and their capacities and utilization rates. All of the counties within the ROI have excess water capacity. The impact to the local water supply systems from the in-migrating construction workers and their families is estimated by calculating the amount of water that is required by the total population increase. The average person in the United States uses about 82 gallons of water per day (EPA, 2023). The in-migrating construction workforce and their families account for an approximately 3074 person increase into the ROI (Section 4.4.2.1.1). The total increase in population increases the used capacity by 1 percent in Victoria County and by 1 percent within the ROI as a whole (Table 4.4-5). As noted in Section 2.5.2.7, Victoria County has identified a potential future shortage of municipal water in 2030 through 2070. However, the increase in water use from the in-migrating workforce is approximately 1 percent and not anticipated to disrupt future planning and strategy development for addressing the predicted shortages; therefore, the impact of the in-migrating construction workforce and their families on water supply systems is SMALL.

Table 2.5-21 details the current wastewater systems and their capacities within the ROI. All of the counties within the ROI have excess wastewater treatment capacity. The impact to wastewater treatment systems is calculated by assuming that 100 percent of the water used by the in-migrating population (82 gallons of water per day per person) is disposed of through wastewater treatment facilities. The increase in population from the in-migrating workforce and their families increases use of wastewater treatment facilities by approximately 1 percent within each of the three counties and within the ROI as a whole (Table 4.4-6); therefore, the relatively small increase in use from the in-migrating workforce and their families has a SMALL impact on wastewater systems.

4.4.2.3.3.2 Police and Fire Protection Services

Police services within the ROI are identified in Section 2.5.2.7 and summarized in Table 2.5-22. Services at the county level are compared to the nationwide ratio of 2.4 officers per 1000 citizens. As discussed in Section 4.4.2.1.1, approximately 3074 people are migrating into the ROI during the building period. Table 4.4-7 details the distribution of the in-migrating population and the associated impact on police services within the ROI. The officers per 1000 residents decreases by 0.1 in the ROI. The officer-to-resident ratio in Jackson County is still below the national average; however, the increase in population did not change the officer-to-resident ratio, so the impact is minimal. The three counties within the ROI have sufficient police services to absorb the increased population without hiring more police officers; therefore, the impact from the in-migrating construction workforce and their families on police services is SMALL.

Section 2.5.2.7 and Table 2.5-23 detail the existing fire protection services within the three-county ROI. Fire protection services within the three-county ROI are compared to the national average of one firefighter for every 318.3 residents (Section 2.5.2.7). Table 4.4-8 details the distribution of the in-migrating population and the associated impact on fire protection services within the ROI. The in-migrating construction workforce population decreases the firefighter-to-resident ratio within the three-county ROI by 1.3 people (Jackson County) to 9.2 people (Victoria County), with the ROI as a whole experiencing an increase of 6.8 persons per firefighter for a new ratio of 285.8 persons per firefighter. Although Victoria County's firefighter-to-resident ratio exceeds the national average with a resident-to-firefighter ratio of 366 to 1, the existing ratio without the in-migrating population also exceeds the national average at 357 residents per firefighter; therefore, the in-migrating construction workforce population accounts for a 2.5 percent increase in this ratio, which is minimal compared to the existing population. The firefighter-to-resident ratio within the ROI is below the national average and the three counties within the ROI have adequate fire protection services and can absorb the increase in population without having to hire more firefighters. The impact from the in-migrating construction workforce and their families on fire protection services is SMALL.

4.4.2.3.3.3 Medical Services

Section 2.5.2.7 describes the existing medical services within the three-county ROI. Section 4.4.2.1.1 details the in-migrating population during the building phase. The increase in the number of persons per physician associated with the population increase in the ROI ranges from 13 people (Jackson County) to 34 people (Calhoun County) over the existing condition. The increase in persons per dentist range from 39 people (Jackson County) to 121 people (Calhoun County) over the existing condition (Table 4.4-9). Additionally, the increased population results in an increase in the number of residents per hospital bed, which ranges from 3 (Victoria County) to 24 (Calhoun County) over the existing condition. Within the ROI, demand for medical services increases by 27 persons per physician and 63 persons per dentist. In addition, the increased population raises the demand for hospital bed by an additional 4 persons per hospital bed within the ROI. The increased demand on medical services results in a small increase in the persons per dentist and physician ratios and demand for hospital beds; therefore, the relatively small increase in total population within the ROI has a SMALL impact on medical services.

4.4.2.3.3.4 Education

Schools and existing student enrollment are discussed in Section 2.5.2.8 and in Table 2.5-26. According to 2017-2021 U.S. Census Bureau American Community Survey data, 21.8 percent of the population in Texas is between 5 and 19 (school aged). Using this percentage and applying it to the total in-migrating construction population of 3074 persons, approximately 671 persons are of school age. The increase in student enrollment within the ROI is detailed in Table 4.4-10. Assuming that all in-migrating school aged children attend public school, the increase in student enrollment within the ROI ranges from 26 (Jackson County) to 514 (Victoria County). The associated student-to-teacher ratio increases by 0.1 (Jackson County) to 0.5 (Calhoun and Victoria Counties). Within the ROI, student enrollment increases by 2.9 percent (671 students). However, the student-to-teacher ratio increases by less than one and the number of teachers per student is still beneath the threshold outlined in Section 2.5.2.8; therefore, the impact of the in-migrating population on educational services is SMALL.

4.4.2.3.4 Summary of Impacts to Infrastructure and Community Services

Building-related impacts on all infrastructure and community services would be SMALL for the ROI, with the exception of traffic impacts. Impacts to transportation due to workforce traffic are MODERATE along the segments south of the city of Bloomington, which provide access to the LMGS site. Traffic impacts at the intersections providing access to the LMGS site is LARGE as LOS decreases from A (reasonably free flow) to LOS F (heavily congested) where operating conditions are unstable.

4.4.3 Environmental Justice Impacts

Executive Order 12898 (59 Federal Register 7629) directs federal executive agencies to consider EJ impacts under the National Environmental Policy Act. This executive order ensures that minority and low-income populations do not bear a disproportionate share of adverse health or environmental consequences of a proposed project, which in this instance is building LMGS.

Section 2.5.4 describes the evaluation process used to identify minority and low-income populations living within the ROI that meet the conditions associated with the NRC guidance for EJ evaluation. Table 2.5-30 and Figure 2.5-6 and Figure 2.5-7 illustrate the number and distribution of minority and low-income census block groups (CBGs) within the 50 mi (80 km) region. Among the 189 CBGs within the 50 mi (80 km) region, 90 CBGs have a racial or ethnic minority population or an aggregate minority population that exceeds one of the established criteria and 24 CBGs exceed the low-income criteria. The closest minority CBG is located in Refugio County, approximately 5.3 mi (8.5 km) to the southwest of the LMGS site center point. The closest low-income CBG is located in Port Lavaca, approximately 9.1 mi (14.6 km) to the northeast.

The potential for disproportionate adverse impacts on EJ populations associated with building activities at the LMGS site are addressed in the following subsections. Potentially significant pathways for physical and environmental, socioeconomic, and human-health impacts are considered and analyzed to determine whether the characteristics of the pathway or special circumstances of the minority or low-income population result in a disproportionately high and adverse impact.

4.4.3.1 Physical and Environmental Impacts

Physical and environmental impacts from building activities at the LMGS site are similar to impacts from other large building projects and typically attenuate rapidly with distance. Primary pathways for physical and environmental impacts consist of soil, water, air, and noise.

Building activities involve moving large quantities of soil. However, soil-disturbing activities are localized on the LMGS site, and are sufficiently distant from surrounding populations to prevent any off-site impacts. As described in Section 4.3.1, erosion controls, including site stabilization with native grass species, pavement, and crushed stone, are installed and BMPs are followed to control erosion from disturbed land; therefore, impacts are SMALL.

As described in Section 4.2.1, water-related impacts are primarily limited to those associated with the building of an intake structure on the GBRA Canal, building of bridges across West Coloma Creek and impacts of sedimentation and erosion to on-site streams. Impacts on water quality are minimized using BMPs and implementation of a site-specific SWPPP to reduce pollutant loading and decrease downstream impacts on water quality. The potential for spills of petroleum or industrial chemicals is managed using SPCC plans. As such, the impacts of building to surface water quality are SMALL. As described in Section 4.2.2, impacts to groundwater quality from building activities are SMALL.

Building activities could also cause temporary and localized physical impacts such as odors, vehicle exhaust, fugitive dust emissions, and noise. As described in Section 4.4.1.2, fugitive dust and exhaust emissions from construction equipment result in minor, localized adverse impacts to air quality; however, mitigation is implemented to minimize impacts to local ambient air quality and the public in proximity to the LMGS site. Impacts to air quality from building are short-term and SMALL and primarily confined on-site. Likewise, as described in Section 4.4.1.1, noise impacts from building are localized, temporary, and SMALL.

Physical and environmental impacts to the general population from building activities are SMALL. Off-site soil disturbance, vehicle exhausts, fugitive dust emissions, and noise are minimal, and impacts to groundwater and surface water quality are SMALL. The closest EJ population is located over 5 mi (8 km) from the LMGS site center point, where physical and environmental impacts associated with building are not perceptible; therefore, there are no disproportionately high and adverse impacts to minority or low-income populations in the region via physical and environmental pathways.

4.4.3.2 Socioeconomic Impacts

As described in Section 4.4.2.1.1, the in-migrating construction workforce uses approximately 64 percent of housing units for rent or for sale in Calhoun County, 12 percent in Jackson County, and 47 percent in Victoria County, resulting in MODERATE impacts to housing availability in the ROI. Although there is currently more than enough available housing in the ROI to accommodate the in-migrating construction workers, this relatively high increase in demand for housing could increase the costs of existing houses and rental rates. An increase in housing costs may result in some low-income populations being unable to afford housing in the ROI, particularly in Victoria County where there is a concentration of 10 CBGs with identified low-income populations (Figure 2.5-7). However, a gradual increase in construction employment (Figure 4.4-1) allows time for market forces to accommodate the influx and for housing prices and rental rates to stabilize. The peak demand for housing is short-term, as a portion of the workers will likely migrate out of the ROI following completion of building activities.

As described in Section 4.4.2.1.1, the building phase benefits the economy within the ROI through the reduction of unemployment, increase in capital expenditures, payment of wages and salaries to the construction workforce, and creation of new business opportunities in the retail and service industries. Minority and low-income populations benefit from these MODERATE and positive impacts just as the general population does.

As described in Section 4.4.2.3.3, the existing community infrastructure and public services in the ROI are adequate to support the increased population associated with the construction workforce and their families. However, traffic delays and congestion occur during peak travel times to and from the LMGS site, and traffic impacts at the intersections providing access to the site are LARGE; therefore, the overall impacts to traffic during the building phase are MODERATE to LARGE, temporary, and localized to the roadways near the site. The identified minority and low-income populations are far removed from these temporary and localized roadway impacts; therefore, they are not disproportionately impacted.

Excess capacity of existing water and sewer services is adequate to meet the service demands of the projected population increase (Table 4.4-5 and Table 4.4-6). Police and fire protection services (Table 4.4-7 and Table 4.4-8), medical services (Table 4.4-9), and public education (Table 4.4-10) meet local needs with capacity to absorb the population increase associated with the construction workforce. In addition, and as discussed in Section 4.4.2.2.2, building activities generate tax revenue through franchise, sales and use, and property taxes, all of which may be available to upgrade public services in response to needs of an expanded population should the local government deem necessary; therefore, the level of impact to public services during building is SMALL for the general population as well as for minority or low-income populations.

Adverse socioeconomic impacts of building are generally SMALL, apart from housing and traffic which are MODERATE for housing, and MODERATE to LARGE for traffic. While potential increases in housing and rental costs may be evident within certain areas of Victoria County, such increases are relevant to either minority or low- income populations as well as other populations. Additionally, in-migrating workers with higher earning potential are not likely to compete with potential low-income populations for the same housing. As such, any potential increases in housing costs are not disproportionate to EJ populations. Beneficial impacts to the economy and tax revenues are proportionately spread across the general and EJ populations.

4.4.3.3 Human-Health Effects

As discussed in Section 4.4.4, the impacts of nonradiological health effects for construction workers and the local population from fugitive dust, noise, occupational injuries, and transport of materials and personnel are localized and SMALL.

In addition, as described in Section 4.5, Radiation Exposure to Construction Workers, there are no exposures from direct radiation, gaseous or liquid effluents during construction of LMGS. As such, any dose contributions received by construction workers is from background sources and is less than the limits specified in 10 CFR Part 20.1301 for members of the public. Impacts on workers from radiation sources during construction are SMALL.

Human-health effects to the general population from building activities are SMALL and are largely limited to the areas near the LMGS site. The closest EJ population is located more than 5 mi (8 km) from the LMGS site center point; therefore, no disproportionately high and adverse impacts to minority or low-income populations in the region occur via human health-related pathways.

4.4.3.4 Subsistence, Special Conditions, and Unique Characteristics

Even where environmental impacts are generally SMALL, the resource dependencies, unique cultural practices, or special circumstances of some subpopulations may lead to disproportionate exposure through inhalation or ingestion (e.g., subsistence agriculture, hunting, or fishing). As discussed in Section 2.5.4.2, no stakeholders, community organizations, or members of the public have reported concerns regarding impacts to EJ populations or knowledge of dependencies or practices through which the project could disproportionately adversely affect these populations. Although many people in the Vietnamese community around Port Lavaca and Palacios make their living by catching seafood, the seafood is generally sold commercially rather than for personal sustenance. Thus, this analysis does not identify specific exposure pathways or unique dependencies, cultural practices, or circumstances that indicate the likelihood of any such disproportionate exposures resulting from building LMGS.

4.4.3.5 Summary of Environmental Justice Impacts

Pathways for physical and environmental, socioeconomic, and human health impacts to minority or low-income populations were reviewed. The closest minority or low-income population is located over 5 mi (8 km) from the LMGS site center point. Minority or low-income populations in the vicinity of the LMGS site would not experience disproportionately high and adverse human health, environmental, physical or socioeconomic effects as a result of construction activities.

4.4.4 Nonradiological Health

Nonradiological health impacts on the public and workers from building activities are described in this section, including impacts on public and occupational health and the impacts of transporting building materials and personnel to and from the LMGS site.

4.4.4.1 Public and Occupational Health

Potential public health risks from building activities include exposure to chemical hazards or physical, nonradiological hazards, such as air pollution from engine exhaust and fugitive dust, vibration, and noise. Other potential health hazards include transportation-related impacts associated with an increase in crashes related to the additional vehicular capacity from construction workers traveling to and from the LMGS site and the transport of supplies to and from the site. Exposure to hazards depends on the building activities and their proximity to residences, work locations, schools, recreational sites, or water sources. Evaluations of noise, vibration, dust, and air pollution impacts on surrounding residents and sensitive receptors are provided in Section 4.4.1.1 and Section 4.4.1.2. As noted in these sections, impacts to the public health from building activities are SMALL. Traffic-related impacts to community infrastructure due to building activities are discussed in Section 4.4.2.3.1.

Building activities involve greater risks to workers. These risks include exposure to air-borne contaminants from close contact with welding, exhaust, dust, and other construction-related chemicals (in the form of fumes, fibers, liquids, mists, gases, or vapors), as well as exposure to plant toxins, insects, and other biological hazards. Additionally, health risks include accidents related to struck-by and caught-in/between incidents, slips, trips, and falls, heat or cold stress, burns, frostbite, noise, electric shock, and repetitive motion injuries.

As shown in Table 2.9-1, incidence rates for nonfatal occupational injuries to construction workers were 2.4 nationally and 1.3 annually in Texas. Conversely, the fatal occupational injury rate for construction workers was higher for Texas, with a rate of 10.6, than that of the nation, which has a rate of 9.6. According to the nonfatal injury and illness rates displayed in Table 2.9-1, incidence estimates using monthly employment numbers were calculated for average monthly and peak nonfatal occupational injuries and illnesses over the approximate 44-month period of building activities. These estimates are presented in Table 4.4-11.

To ensure the occupational health and safety of workers and the public, mitigation measures, such as phasing building activities and equipment use, conducting equipment maintenance, and watering and stabilizing roads and soil stockpiles are used. Measures taken to prevent emissions from dust are outlined in Section 4.4.1.2. Impacts associated with chemical, biological, and physical occupational hazards are reduced through strict adherence to NRC, Occupational Safety and Health Administration (OSHA), and state safety standards, practices, and procedures including those set forth in 29 CFR 1910, Occupational Safety and Health Standards and the Texas State Health and Safety Code. Additionally, health impacts associated with exposure to hazardous substances are reduced through compliance with 29 CFR 1926, Safety and Health Regulations for Construction, and the implementation of OSHA permissible exposure limits for gases, vapors, fumes, dusts, and mists. On-site impacts to construction workers would also be mitigated through training and use of personal protective equipment to minimize the risk of potentially harmful exposures. On account of compliance with all state and federal regulations, impacts to occupational health and safety due to the building of the LMGS are SMALL.

4.4.4.2 Transportation of Construction Materials and Personnel to and from the Site

As identified in Section 2.9.3, crash rates (number of accidents per million vehicle miles traveled) are an effective tool to measure the relative safety at a particular location. Additional miles traveled by the workforce and construction vehicles to support building activities could increase the potential number of crashes involving injuries and fatalities. Crash rates were estimated for building-phase conditions for SH 35 and SH 185 as these are the roadways that provide access to the LMGS site. As stated above (Section 4.4.2.3.1), 80 percent of the vehicles associated with building activities use the SH 185 northwest segment and 20 percent use the SH 35 northeast segment to access the LMGS site. One signalized intersection, and three non-signalized intersections along these roadways were also analyzed. These intersections include the signalized intersection for SH 185 and Second Street along with three non-signalized intersections, SH 185 North Approach/SH 35, SH 35/Jesse Rigby Road, and SH 185/FM 616. Table 4.4-12 summarizes the crash rates at these locations.

As detailed in Table 4.4-12 the crash rate per 100 million vehicle miles traveled on the roadways providing access to the LMGS site slightly increases from the existing conditions. However, the crash rate for all roads analyzed are below the Texas statewide crash rate. As such, the impacts to public and occupational health from building on the analyzed roadways is minor.

Likewise, as seen in Table 4.4-12, the four intersections analyzed experience a slight increase in the crash rate during the building phase. However, the crash rate at the intersection of SH 35 and Jesse Rigby Road increases from 0 to 2.41 crashes per million vehicle miles traveled during the building phase because this is a new intersection for construction traffic to enter/exit the LMGS site. While statewide crash rate data is not available for intersections, the increased crash rate at these intersections are minor in the context of total vehicle miles traveled. As such, impacts to public and occupational health from building on the intersections along the roadways is also minor.

As summarized above, the increased number of vehicles on surrounding roadways during the building phase at the LMGS site results in minor increases in crash rates relative to total vehicle miles traveled. However, these rates remain below the Texas statewide crash rate. The intersections analyzed experience a similar minor increase in crash rate. Therefore, the overall impacts to public and occupational health associated with transportation during the building phase are minor.

4.4.4.3 Summary of Impacts to Nonradiological Health

Health and safety of workers and the public during the building phase are minimized through compliance with all applicable state and federal regulations. The increased number of vehicles on surrounding roadways associated with building activities at the LMGS site results in minor increases in traffic crash rates along the roadways and most intersections providing access to the LMGS site. These minor increases in crash rates would be temporary and would not noticeably alter the overall safety of the public and workers during the building phase. Therefore, impacts of building activities on public health are SMALL.

4.4.5 Nonradioactive Waste Management

This section provides descriptions of the potential environmental impacts from the generation, handling, and disposal of nonradioactive waste during building activities at the LMGS site. Section 3.6, Nonradiological Waste Streams, provides descriptions of the LMGS nonradioactive waste systems. The potential types of nonradioactive wastes generated, handled, and disposed of include construction debris, spoils, stormwater runoff, municipal and sanitary waste, dust and air emissions, used oils and lubricants from vehicle maintenance, and other hazardous chemicals. Assessment of potential impacts resulting from these types of wastes is presented below.

4.4.5.1 Impacts to Land

Building related wastes include various fluids from the on-site maintenance of construction vehicles and equipment (e.g., used lubricating oils, hydraulic fluids, glycol-based coolants, and spent lead-acid storage batteries) and incidental chemical wastes from the maintenance of equipment, the application of corrosion-control protective coatings (e.g., solvents, paints, coatings), construction-related debris (e.g., lumber, stone, and brick), and packaging materials (primarily wood and paper). All materials and wastes are accumulated on-site and disposed of or recycled through licensed off-site disposal and treatment facilities. Additionally as noted in Section 4.1.1 licensed disposal facilities, with available capacity to accept solid waste are present in the vicinity. As referenced in Section 3.9.1, excavated soil is stockpiled after removal and considered for backfill. If the soil cannot be reused it is disposed of in accordance with applicable laws, regulations, and Dow policies.

Life-cycle management of chemicals and wastes generated during building and pollution prevention initiatives (such as spill prevention plans) mitigate the impact of wastes; therefore, because solid wastes are managed in accordance with all applicable state and local requirements and standards, the impacts on land from nonradioactive wastes generated during the building activities are SMALL.

4.4.5.2 Impacts to Water

Building activities are described in Section 3.9, Building Activities. Potential impacts related to accidental spills of petroleum products or industrial chemicals necessary for building activities may result in adverse effects on surface water quality. Potential impacts are mitigated through the establishment of designated storage areas for fuel and lubricants that are equipped with appropriate spill containment measures in accordance with SPCC plans.

As noted in Section 3.3.2.3, nonradioactive liquid drainage will be collected in a dedicated system and conveyed to existing Dow process sewers. Sanitary wastes will be collected in a dedicated piping system, stored in a dedicated tank, and manually transferred via truck to the existing Dow wastewater facility.

In Texas, parties with operational control of construction sites in which five or more acres (two or more hectares) are to be disturbed must obtain a TPDES general permit to discharge stormwater associated with construction. A site-specific SWPPP developed as part of the TPDES permit compliance manages stormwater runoff and minimizes pollutant loading within receiving waterbodies. The SWPPP identifies potential sources of stormwater pollution and includes a description of BMPs that minimize pollution in stormwater runoff (TCEQ, 2023c).

Building activities comply with measures outlined in the SPCC plans and regulated practices for managing liquid discharges, including wastewater, as well as the conditions of the TPDES permit with an approved SWPPP; therefore, the impacts to water from nonradioactive effluents during building activities are SMALL.

4.4.5.3 Impacts to Air

Building activities at the LMGS site and off-site area generate temporary air emissions of gaseous pollutants and particulate matter. Potential air emission activities include, but are not limited to, the following:

- Land clearing and material removal
- Material processing and handling
- Building phase machinery operation and maintenance
- Material replacement
- Driving piles and erection of structures
- Vehicular deliveries of supplies and materials
- Soil excavation and grading
- Soil transport and temporary stockpiling
- Workforce commute
- Concrete batch plants

According to NUREG-1555, Section 4.4.1, "Physical impacts to a community from building of a nuclear plant are not markedly different from any other large heavy building project."

NAAQS are established by the EPA in 40 CFR 50.4 - 50.13 and 50.15 - 50.18 for defined criteria pollutants which are sulfur dioxide, carbon monoxide, nitrogen dioxide, particulate matter with a diameter less than 10 microns, particulate matter with a diameter less than 2.5 microns, lead, and ozone. In addition, the EPA has classified areas of the United States where the NAAQS are met (attainment areas); locations for which sufficient data are not available for setting a classification (unclassifiable or undesignated); and locations that do not meet the NAAQS (nonattainment areas). These areas are designated on a pollutant-by-pollutant basis.

The LMGS site is located in Calhoun County, Texas, which is classified as "attainment" for all air pollutants. The nearest county that is not in attainment with one or more NAAQS is Bexar County, Texas, located approximately 120 mi (193 km) from LMGS.

Building-related emissions are typically fugitive dust and equipment engine exhaust are localized to the LMGS site. Additionally, the emissions are intermittent, temporary, and transient (i.e., do not encompass the entire site at all times).

Building activities associated with motor vehicle operation and engines produce temporary gaseous pollutant and particulate matter emissions. The numbers and types of equipment on-site during the building activities have not yet been determined. Preliminary emissions estimates are provided in Table 4.4-13.

Emissions during the building phase are typically near ground level; therefore, air quality impacts are greatest at the receptors nearest these activities. As described in Section 4.4.1.2 and above, emissions are localized to the LMGS site and there are no impacts to off-site sensitive receptors from dust and air pollution.

Building activities, such as operation of on-road construction vehicles, commuter vehicles, nonroad construction equipment, and marine engines, would also result in greenhouse gas (GHG) emissions, principally carbon dioxide (CO_2). GHG emissions for building equipment are derived from NRC Interim Staff Guidance COL/ESP-ISG-026, Interim Staff Guidance on Environmental Issues Associated with New Reactors. This guidance estimates GHG emissions of 39,000 MT CO_2 equivalent (CO_2e) for a reference 1000-MWe reactor with a 7-year building activities duration. The estimates from the 1000-MWe reference reactor is comparable relative to the LMGS site, based on the duration of activities and reactor size. This GHG emission mass translates to an emission rate of about 5570 MT CO_2e annually, averaged over the 7-year period of building activities, which amounts to about 6×10^{-4} percent of the total estimated GHG emissions in Texas (873.1 M MT of gross CO_2e) in 2021 (TCEQ, 2024b). This also equates to about 9×10^{-5} percent of the total U.S. annual emission rate of 6.343 billion MT CO_2e in 2022 (EPA, 2024).

Based on the assessment of the relatively small construction equipment GHG footprint compared to total Texas and U.S. annual GHG emissions, the atmospheric impacts of GHGs from building activities would not be noticeable and additional mitigation would not be warranted.

4.4.5.3.1 Concrete Batch Plants

There are two concrete batch plants operating during building. Particulate matter emissions made up of cement and pozzolan dust, as well as aggregate and sand dust emissions, are the primary pollutants of concern. In addition, there are emissions of some metals that are associated with this particulate matter. The fugitive sources include the transfer of materials, truck loading, mixer loading, vehicle traffic, and wind erosion from storage piles. Types of controls include water sprays, enclosures, hoods, curtains, shrouds, and movable and telescoping chutes.

Emissions from the concrete batch plants are minor and meet the requirements of the TCEQ Standard Permit for Concrete Batch Plants (TCEQ, 2024a).

4.4.5.3.2 Mitigation Measures

A mitigation plan is used to minimize the temporary emissions from building activities. Mitigation measures include:

- Scheduling building activities to minimize running/idling time of inactive and delivery vehicles
- Phasing activities and equipment use

- Ensuring the use of heavy equipment is properly maintained and compliant with applicable federal regulations and operated in accordance with the manufacturer's specifications
- Maintaining low vehicle speeds on unpaved/dirt roads and exposed areas to minimize fugitive emissions
- Applying water to roadways and exposed areas
- Minimizing the quantity and size of soil and debris storage piles
- Minimizing dust generating activities during high wind conditions
- Locating stationary equipment (e.g., generators, compressors) as far from receptors as possible and practical
- Implementing specific contractor procedures regarding fugitive emissions from material handling, vehicular traffic, and wind erosion of storage piles
- Covering haul trucks when loading and unloading

Building activities on-site and off-site generate temporary gaseous pollutants and particulate matter. Air quality effects are minor and minimized by implementing the mitigation plan described above. This plan will be prepared when facility design is complete and will be provided to TCEQ. Mitigation strategies for building activities are summarized in Subsection 4.4.6. Ultimately, air quality impacts are SMALL for the LMGS site and the surrounding communities and residences.

4.4.5.4 Summary of Impacts to Nonradioactive Waste Management

Solid wastes are managed in accordance with all applicable state and local requirements and standards, building activities comply with measures outlined in the SPCC plans and regulated practices for managing liquid discharges, including wastewater, as well as the conditions of the TPDES permit with an approved SWPPP and air emissions are minor and meet the requirements of the TCEQ; therefore, because all solid, liquid, and gaseous wastes generated during building activities will be handled according to county, state, and federal regulations, the impacts on land, water, and air from building activities are SMALL.

Tables

Table 4.4-1: Noise Levels Expected for Operation of Representative Construction Equipment

Equipment	Attenuated Noise Levels (dBA)			
	15 m (50 ft.)	30 m (98 ft.)	60 m (197 ft.)	120 m (394 ft.)
Backhoe	80	74	68	62
Compactor	80	74	68	62
Concrete Batch Plant	83	77	71	65
Crane	85	79	73	67
Dozer	85	79	73	67
Dump Truck	84	78	72	66
Excavator	85	79	73	67
Flat Bed Truck	84	78	72	66
Front End Loader	80	74	68	62
Grader	85	79	73	67
Roller	85	79	73	67
Scraper	85	79	73	67
Tractor	84	78	72	66
All Other Equipment >5 Horsepower	85	79	73	67

Source: FHWA, 2017
Note: Distances shown are distances from the noise source
Abbreviations: dBA = A-weighted decibels; m = meters; ft. = feet

Table 4.4-2: Population Increases in ROI Associated with the Construction Workforce

	Percentage of Existing SDO Workforce by Place of Residence	Distribution of Workers Needed from Outside ROI	Total Number of New Residents	Baseline Population (2025 Projections)	Percent Increase in Population
ROI	84.00%	1,114[a]	3,074[a]	128,336	2.39%
Calhoun County	16.50%	219	604	19,973	3.02%
Jackson County	3.20%	42	117	15,141	0.77%
Victoria County	64.30%	852	2,353	93,222	2.52%
Outside ROI	16.00%	212[b]	N/A	N/A	N/A
Total	**100.00%**	**1,326**	**–**	**–**	**–**

Notes:

a) Expected to relocate to the ROI; estimates are rounded to the nearest whole number, accounting for potential discrepancies between the ROI total and the sum of the five ROI counties

b) Expected to commute from counties outside the ROI; workers and families would continue to reside outside of the ROI and would not impact the ROI population

Abbreviations: ROI = region of influence; SDO = Seadrift Operations

Table 4.4-3: Level of Service for Highway Segments Providing Access to Long Mott Generating Station During Building

Location	Peak Hour	Direction	Existing Condition (2022)				Building Phase			
			Volume (Vehicle /hour)	Volume-to-Capacity Ratio[a]	Density (pc/mi/ln)[b]	LOS	Volume (Vehicle /hour)	Volume-to-Capacity Ratio[a]	Density (pc/mi/ln)[b]	LOS
Multi-Lane Segment										
SH 185 - North of Bloomington	AM	SB	469	0.11	3.8	A	1197	0.29	9.7	A
		NB	192	0.05	1.6	A	212	0.06	1.9	A
	PM	SB	755	0.18	6.1	A	1247	0.31	10.2	A
		NB	441	0.11	3.6	A	1169	0.28	9.5	A
Two-Lane Segments										
SH 185 - South of Bloomington	AM	SB	233	0.14	1	A	1024	0.6	9.6	D
		NB	100	0.06	0.2	A	122	0.07	0.3	A
	PM	SB	266	0.16	1.2	A	801	0.47	6.7	C
		NB	178	0.1	0.7	A	970	0.57	8.8	D
SH 35 - East of SH 35 & SH 185	AM	EB	159	0.09	0.5	A	950	0.56	8.6	D
		WB	168	0.1	0.6	A	190	0.11	0.7	A
	PM	EB	168	0.1	0.6	A	703	0.41	5.6	C
		WB	252	0.15	1.1	A	1043	0.61	9.7	D

Notes:

a) Volume-to-Capacity Ratio (v/c): Performance measure comparing traffic demand to roadway capacity. Range 0.0 to 1.0

b) Density pc/mi/ln: Performance measure referring to the number of passenger vehicles per lane present within a one-mile segment of roadway

Abbreviations: NB = northbound, SB = southbound, WB = westbound, EB = eastbound; LOS = level of service; SH = state highway

Table 4.4-4: Level of Service for Non-Signalized and Signalized Intersections Impacted by Building

Intersection	Approach	Existing Condition (2022)				Building Phase			
		AM		PM		AM		PM	
		Delay (seconds)	LOS	Delay (seconds)	LOS	Delay (seconds)	LOS	Delay (seconds)	LOS
Non-Signalized Intersections (Worst Leg)									
SH 35 & SH 185 (South Approach)	NB	12.1	B	10.6	B	12.1	B	10.6	B
SH 35 & SH 185 (North Approach)	SB	11.2	B	14.2	B	185.4	F	233.3	F
SH 35 & Jesse Rigby Road	NB	0	A	0	A	51.9	F	1595	F
SH 185 & FM 616	SWB	11.1	B	13.5	B	18.9	C	44.5	E
Signalized intersections									
SH 185 & 2nd Street West/2nd Street East	SEB	3.9	A	3.5	A	12.5	B	4.5	A
	NWB	3.6	A	3.7	A	5.9	A	6.4	A
	NEB	13.3	B	13	B	36.8	D	31.5	C
	SWB	12.3	B	12.5	B	33.4	C	30	C

Abbreviations: FM = farm-to-market road; LOS = level of service; NB = northbound; NEB = north-eastbound; NWB = north-westbound; SB = southbound; SEB = south-eastbound; SH = state highway; SWB = south-westbound

Table 4.4-5: Public Water Supply System Demand for Counties in the ROI During Building

Water System	Production Capacity (MGD)	Existing Condition			Building Phase Demand			Difference
		Average Daily Demand (MGD)	Utilized Capacity	Excess Capacity	Increased Average Daily Demand (MGD)	Utilized Capacity	Excess Capacity	
Calhoun County	11.2	2.6	23%	77%	2.6	23%	77%	0%
Jackson County	8.9	1.1	13%	87%	1.1	13%	87%	0%
Victoria County	30.1	8.6	28%	72%	8.7	29%	71%	1%
ROI	50.2	12.2	24%	76%	12.5	25%	75%	1%

Source: Texas Drinking Water Watch, 2023
Abbreviations: MGD = million gallons per day; ROI = region of influence

Table 4.4-6: Public Wastewater Treatment Facility Demand for Counties in the ROI During Building

Water Systems[(a),(c)]	Total Design Flow (MGD)[(b)]	Existing Condition			Building Phase Demand			Difference
		Total Flow (MGD)[(b)]	Flow as Percent of Design	Excess Capacity (MGD)	Total Flow (MGD)	Flow as Percent of Design	Excess Capacity (MGD)	
Calhoun County	5.1	2.6	51%	49%	2.7	52%	48%	1%
Jackson County	1.6	1.4	84%	16%	1.4	85%	15%	1%
Victoria County	16.8	8.4	50%	50%	8.6	51%	49%	1%
ROI	23.6	12.4	53%	47%	12.6	54%	46%	1%

Sources:
a) EPA, 2012
b) GBRA, 2021
c) City of Victoria 2023
Abbreviations: MGD = million gallons per day; ROI = region of influence

Table 4.4-7: Law Enforcement Ratios in the ROI During Building

Geographic Area	Number of Law Enforcement Officers[a]	Officer-to-Resident Ratio		Officers per 1000 Residents	
		Existing Condition[a],[b]	Building Phase	Existing Condition	Building Phase
Calhoun County	52	1:387	1:398	2.6	2.5
Jackson County	25	1:600	1:604	1.7	1.7
Victoria County	260	1:351	1:360	2.8	2.8
ROI	337	1:375	1:384	2.7	2.6

Sources:
a) FBI, 2019
b) USCB, 2020
Note: Estimates are rounded to the nearest whole number, accounting for discrepancies between the totals and the differences
Abbreviations: ROI = region of influence

Table 4.4-8: Fire Protection Services Ratios in the ROI During Building

Geographic Area	Number of Firefighters	Firefighter-to-Resident Ratio	
		Existing Condition	Building Phase
Calhoun County	109	1:184	1:190
Jackson County	88	1:170	1:172
Victoria County	256	1:357	1:366
ROI	453	1:279	1:286

Source: US Fire Administration, 2023
Abbreviation: ROI = region of influence

Table 4.4-9: Physician and Dentist Ratios in the ROI During Building

Geographic Area	No. of Physicians	Ratio of Physicians-to-Residents		No. of Dentists	Ratio of Dentists-to-Residents	
		Existing Condition	Building Phase		Existing Condition	Building Phase
Calhoun County	18	1:1117	1:1151	5	1:4021	1:4142
Jackson County	9	1:1665	1:1678	3	1:4996	1:5035
Victoria County	86	1:1062	1:1089	41	1:2227	1:2285
ROI	113	1:1119	1:1146	49	1:2580	1:2643

Source: Texas Department of State Health Services, 2022
Abbreviations: ROI = region of influence

Table 4.4-10: Population Enrolled in Schools in the ROI During Building

Geographic Area	No. New Residents During Building	Additional School-Aged Children[a]	Student Enrollment			Teachers[b]	Student-to-Teacher Ratio	
			Existing Condition	Building Phase	Percent Increase		Existing Condition	Building Phase
Calhoun County	219	132	3,576	3,708	3.70%	272.7	01:13.1	01:13.6
Jackson County	42	26	3,223	3,249	0.80%	258.3	01:12.5	01:12.6
Victoria County	852	514	16,207	16,721	3.20%	1,102.00	01:14.7	01:15.2
ROI	1,114	671	23,006	23,677	2.90%	1,633.00	01:14.1	01:14.5

Source: NCES, 2023

Notes:

a) Based on percent of TX population of school age

b) Teachers are full-time equivalent employees (part-time workers are reported as a fraction of one full-time worker)

Abbreviations: ROI = region of influence

Table 4.4-11: Estimated Building Phase Occupational Injuries and Illnesses per Month

Time Period	Number of Workers	United States		Texas	
		Incidence Rate (per 100 workers)[(a)]	Estimated Total Recordable Cases	Incidence Rate (per 100 workers)[(b)]	Estimated Total Recordable Cases
Average Monthly	737	0.2	1	0.1	1
Peak	1473		3		2

Source:
a) BLS, 2023a
b) BLS, 2023b
Note: Based on nonfatal injury and illness rates developed by the BLS

Table 4.4-12: Building Phase Traffic Crash Impacts in the Long Mott Generating Station Vicinity

Roadway Segment	2022 AADT	AADT During Building	Existing Crash Rate (100 MVM)[a]	Crash Rate During Building (100 MVM)	2022 Texas Statewide Crash Rate (100 MVM)[b]
SH 185 (N of Bloomington) (Multi-Lane Segment)	7292	10,002	51.44	52.20	57.59
SH 185 (S of Bloomington) (Two-Lane Segment)	3213	5943	68.81	68.81	96.28
SH 35 (Two-Lane Segment)	4244	6974	73.19	73.20	96.28
Intersection	**2022 AADT**	**AADT During Building**	**Existing Crash Rate (per 1 million entering vehicles)**	**Crash Rate During Building (per 1 million entering vehicles)**	**-**
SH 185 & 2nd Street West/2nd Street East (Signalized Intersection)	4068	5433	2.29	2.14	-
SH 185 & FM 616 (Non-signalized Intersection)	2485	3850	1.00	1.05	-
SH 185 & SH 35 North Approach (Non-signalized Intersection)	3729	6459	0.96	1.11	-
SH 35 & Jesse Rigby Road (Non-signalized Intersection)	2122	5147	0.00	2.41	-

Notes:

a) From Table 2.9-3

b) TxDOT, 2022

Abbreviations: AADT = annual average daily traffic; MVM = million vehicle miles; SH = state highway; FM= Farm-to-Market Road

Table 4.4-13: Typical Emissions from Construction Equipment and Light Vehicles Used in Major Construction Projects

Equipment Type	Emissions (lb/hr)					
	CO	NO_X	SO_X	PM	CO_2	CH_4
Cement and Mortar Mixers	0.0414	0.0534	0.0001	0.0021	7.2	0.0008
Concrete/Industrial Saws	0.3706	0.2471	0.0007	0.0093	58.5	0.003
Cranes	0.3738	0.4223	0.0014	0.0143	129	0.0061
Crawler Tractors	0.5065	0.4492	0.0013	0.0227	114	0.0071
Excavators	0.5086	0.2269	0.0013	0.0086	120	0.005
Generator Sets	0.2667	0.2329	0.0007	0.0081	61	0.0026
Graders	0.5696	0.3314	0.0015	0.0147	133	0.0061
Off-Highway Tractors	0.6101	0.7291	0.0017	0.0331	151	0.0102
Off-Highway Trucks	0.5385	0.4769	0.0027	0.0142	260	0.0103
Other Construction Equipment	0.3474	0.2021	0.0013	0.0069	123	0.004
Other Material Handling Equipment	0.4355	0.3844	0.0015	0.0124	141	0.0063
Pressure Washers	0.0531	0.0561	0.0001	0.0019	9.4	0.0006
Rollers	0.3763	0.2501	0.0008	0.0122	67	0.0037
Rubber Tired Dozers	0.662	1.0824	0.0025	0.0419	239	0.0151
Rubber Tired Loaders	0.4311	0.2835	0.0012	0.0121	109	0.005
Scrapers	0.7187	0.8387	0.0027	0.0335	262	0.0135
Skid Steer Loaders	0.2104	0.1354	0.0004	0.0019	30.3	0.0017
Tractors/Loaders/Backhoes	0.3586	0.1857	0.0008	0.0059	66.8	0.003
Trenchers	0.4085	0.3481	0.0007	0.0215	58.7	0.0061
	Emissions (grams/mile)					
	HC	CO	NO_x	CO_2		
Light Duty Vehicles[a]	2.8-3.5	20.9-27.7	1.39-1.81	416-522		

Sources: AQMD, 2024 for construction emissions and EPA, 2000 for vehicles

Notes:

a) Includes cars and light trucks. Lower values for cars

Abbreviations: lb/hr= pounds per hour; CO = carbon monoxide; NO_x = nitrogen oxides; SO_x = sulfur oxides; PM = particulate matter; CO_2 = carbon dioxide; CH_4 = methane; HC = hydrocarbons

Figures

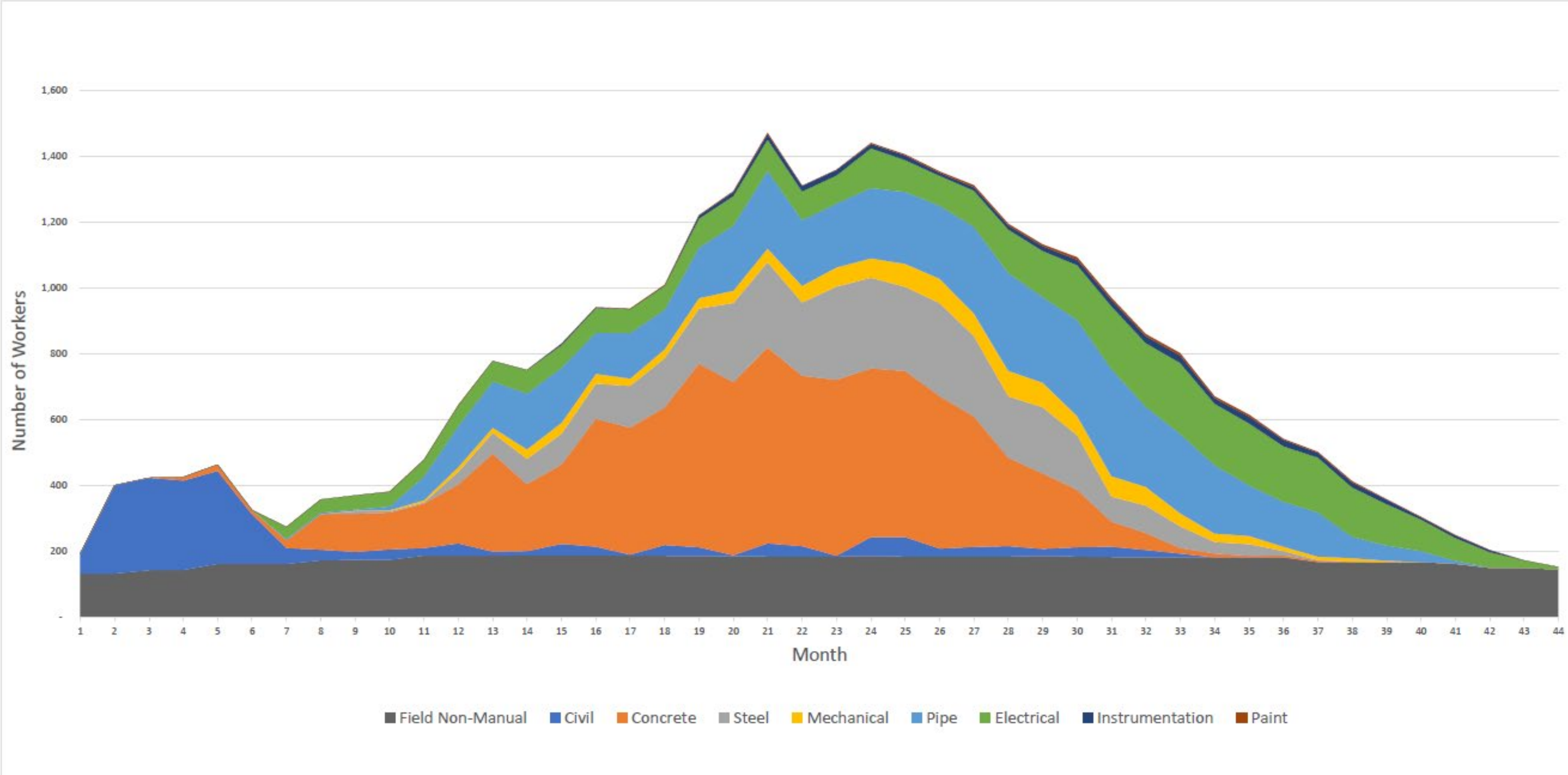

Figure 4.4-1: Construction Workers On-Site by Month

4.5 Radiation Exposure to Construction Workers

The purpose of this section is to estimate annual radiation doses to on-site construction workers. Operation (hot startup) of LMGS is assumed to begin only after all reactor modules have completed construction. Thus, construction workers would only be exposed to background sources. As such, construction workers are considered members of the public and are not subject to monitoring.

As stated in Section 3.1, External Appearance and Plant Layout, the physical location of the new plant is 8 mi. (12.8 km) north-northwest of Seadrift, TX, just east of the intersection of SH 185 and SH 35. The new plant location and layout is shown on the SUPP in Figure 3.1-3.

4.5.1 Direct Radiation Exposure

LMGS is not expected to operate until after construction. During construction, the project would receive, possess, and use specific radioactive material in support of construction. These radioactive materials have very specific uses under controlled conditions (i.e., worker qualification, sealed source requirements); therefore, these sources are expected to result in a negligible contribution to construction worker doses. As such, there will be no dose to construction workers from direct radiation.

4.5.2 Radiation Exposure from Gaseous Effluents

LMGS is not expected to operate until after construction. Additionally, as stated in Section 2.10, Radiological Environment and Radiological Monitoring, any dose contributions due to gaseous effluents from the South Texas Project Nuclear Generating Station are negligible. As such, there will be no dose to construction workers from gaseous effluents.

4.5.3 Radiation Exposure from Liquid Effluents

LMGS is not expected to operate until after construction. As such, there will be no dose to construction workers from liquid effluents.

4.5.4 Total Construction Worker Doses

As discussed in Section 4.5.1 through Section 4.5.3, there are no exposures from direct radiation, gaseous or liquid effluents during construction of LMGS. As such, any dose contributions received by construction workers is from background sources and is less than the limits specified in 10 CFR Part 20.1301 for members of the public. Impacts on workers from radiation sources during construction are SMALL and additional monitoring is not required.

Tables

None

Figures

None

4.6 Measures and Controls to Limit Adverse Impacts During Construction

This section summarizes potential adverse environmental impacts from construction and preconstruction activities (collectively referred to as building activities) discussed in previous sections of this chapter, and the associated measures and controls to limit those impacts.

Construction activities subject to NRC authorization are those that have a reasonable nexus to radiological health and safety or common defense and security (72 Federal Register 57416). Examples of construction activities defined in 10 CFR 50.10(a)(1) include pile driving, subsurface preparation, placement of backfill, concrete, soil stabilization activities or permanent retaining walls within an excavation; installation of foundations; or in-place assembly, erection, fabrication, or testing of specified structures, systems, or components. By comparison, preconstruction includes activities as described in 10 CFR 50.10(a)(2) such as site preparation (e.g., clearing, grading, and installation of erosion control, and other environmental mitigation measures), erection of fences, excavation, erection of support buildings or facilities, building service facilities (e.g., roads, parking lots, rail lines, transmission lines, sanitary-treatment system, potable water system), and procurement or fabrication of components occurring at a location other than the final, in-place location at the site.

4.6.1 Adverse Environmental Impacts

Long Mott Energy, LLC will avoid and minimize adverse environmental impacts wherever evident during building activities. These activities result in adverse environmental impacts that are unavoidable.

Impacts of building activities are analyzed in the previous sections of Chapter 4. A discrete significance level (i.e., SMALL, MODERATE, or LARGE) of potential impact to each resource is assigned consistent with the criteria the NRC established in 10 CFR 51, Subpart A, Appendix B, Table B-1, Footnote 3, which indicates:

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

Table 4.6-1 summarizes the potential adverse impacts attributable to construction with their designated significance levels. In the event there is no impact to a resource from building activities, a “no impact” descriptor is used.

4.6.2 Measures and Controls to Limit Adverse Impacts

Table 4.6-1 lists potential adverse building impacts that require mitigation, along with the corresponding measures and controls to minimize these environmental impacts. The listed measures and controls have been designed such that their implementation can achieve a practical level of mitigation; are clear, specific, and reasonable; and involve methods and techniques that are appropriate, achievable, and can be verified through subsequent field reviews and inspections.

Examples of measures to minimize impacts to the environment include:

- Using BMPs for construction activities
- Implementing plans to manage stormwater and to prevent and appropriately address accidental spills

In addition to the general measures discussed above, the following specific factors limit potential adverse environmental impacts related to construction activities:

- Compliance with federal, state, and local laws, ordinances, and regulations intended to prevent or minimize adverse environmental effects (e.g., solid waste management, erosion and sediment control, air emissions, noise control, stormwater management, discharge prevention and response, and hazardous waste management)
- Compliance with applicable requirements, permits, and licenses required for building LMGS (e.g., land disturbance permit and other applicable construction-related permits as listed in Chapter 1
- Compliance with existing processes and/or procedures that are applicable to environmental compliance activities during construction for the new plant, including solid waste management, hazardous waste management, and discharge prevention and response
- Incorporation of environmental requirements into construction contracts
- Identification of environmental resources and potential effects during development of this ER
- Development of relevant mitigation measures
- The potential mitigation measures and controls will be reviewed and revised as appropriate based on final design, in accordance with appropriate environmental regulations and permits

Tables

Table 4.6-1: Summary of Measures and Controls to Limit Adverse Impacts During Construction (Sheet 1 of 5)

Environmental Resources (Section Reference)	Summary Impact Finding	Impact Description or Activity	Mitigating Measures and Controls
4.1 Land Use Impacts			
4.1.1 The Site and Vicinity	MODERATE	1. Conversion of land (primarily cropland) to an industrial use. 2. Permanent disturbance of 320 ac. (130 ha). 3. Temporary disturbance of 401 ac. (162 ha). 4. Ground-disturbing activities, including clearing, grubbing, excavation, and grading. 5. Generation of hazardous wastes/materials. 6. Increased disposal of debris at existing landfills. 7. Stockpiling of soils on-site. 8. Excavation and use of on-site borrow material. 9. Conversion of prime farmland. 10. Construction in a coastal zone.	1 and 6. No mitigation measure or controls identified. 2. Stabilize and contour permanently disturbed locations in accordance with design specifications. 3. Restore temporarily affected areas after building is complete using native or noninvasive plant species. 2, 3, and 4. Conduct ground-disturbing activities in accordance with regulatory and permit requirements; use adequate erosion control measures to minimize impacts. 5. Manage lifecycle of chemicals and wastes generated during building and pollution prevention initiatives (e.g., SPCC plan) to mitigate the impact (Section 4.4.5). 7. Restrict soil stockpiling and reuse in designated areas on the LMGS site. 8. Upon completion of construction, grade the borrow area to drain, cover it with reserved topsoil and permanently stabilize with vegetation. 9. Further consultation with U.S. Department of Agriculture Natural Resources Conservation Service and incorporate any mitigation requirements as needed. 10. Conduct consistency certification and incorporate any mitigation measures as required.
4.1.2 Transmission Corridors and Off-Site Areas	No impact	1. No off-site transmission corridor or other off-site areas. 2. Disposal of construction -related debris.	1. No mitigation measures or controls needed. 2. Dispose of construction-related debris generated during building activities in an existing licensed facility.
4.1.3 Historic Properties	No Impact	1. No historic properties are present, and no direct or indirect impacts to historic properties will occur.	1. Consult with the SHPO and implement mitigative measures as appropriate, if a potential prehistoric, historic, cultural or paleontological resource is discovered during any building activities. 1. Consult with the SHPO if previously unknown human remains are discovered during building activities. The remains would be treated in accordance with all state and federal laws.

Table 4.6-1: Summary of Measures and Controls to Limit Adverse Impacts During Construction (Continued) (Sheet 2 of 5)

Environmental Resources (Section Reference)	Summary Impact Finding	Impact Description or Activity	Mitigating Measures and Controls
4.2 Water Related Impacts			
4.2.1 Surface Water Impacts			
4.2.1.1 Hydrologic Alterations	SMALL	1. Alteration of local stormwater drainage patterns from building activities, including placement of fill, paved surfaces, buildings, permanent stormwater basin and temporary sediment basin. 2. Alteration of the stream channel associated with building two bridges over the West Coloma Creek channel. 3. Alteration of the stream channel associated with building stormwater outfall structures within the West Coloma Creek channel. 4. Alteration of the stream channel associated with building the water intake pipeline across three intermittent/ephemeral streams. 5. Alterations of the stream channel associated with building a new pumping station on the GBRA Calhoun Canal.	1. Use a stormwater management system that complies with regulatory requirements for site design. 1. Comply with TCEQ Construction Geneal Permit that requires a SWPPP and identification of best management practices BMPs and controls for stormwater pollution. 1 and 2. Comply with TCEQ Multi-Sector General Permit for Industrial Activities and USACE 404 permit at completion of building activities. 2,3, and 5. Use temporary features to facilitate building and/or protect water quality during construction. These features will comply with relevant regulations, agency approvals, and typical standards for construction related to overall channel flow capacity. 4 and 5. Use BMPs to address erosion, sedimentation and scour and implement measures to maintain the stream bank during building. 4 and 5. Use erosion control measures (such as rip rap) placed in proximity to the building area.
4.2.1.2 Water Use Impacts	SMALL	1. Use of surface water for concrete mixing, dust suppression, and other construction-related activities.	1. Specific measures and controls are not needed.
4.2.1.3 Water Quality Impacts	SMALL	1. Sedimentation associated with alteration of surface waters from building activities, including construction of bridges over West Coloma Creek, the intake structure on the GBRA Calhoun Canal, and crossings of three intermittent/perennial streams. 2. Potential erosion and sedimentation into receiving water resources from construction activities and associated stormwater runoff. 3. Release of constituents from potential minor spills of hazardous materials (e.g., fuels, oils,) into receiving water resources.	1 and 2. Use BMPs in addition to TCEQ controls to protect affected water bodies. 1 and 2. Use BMPs to minimize erosion and sedimentation and establish and implement a SWPPP. 1 and 2. Comply with TPDES general permit requirements to discharge stormwater associated with building activities and implement and SWPPP. 3. Use best construction practices to maintain equipment and prevent spills and leaks. 3. Establish and implement a SPCC for construction practices.

Table 4.6-1: Summary of Measures and Controls to Limit Adverse Impacts During Construction (Continued) (Sheet 3 of 5)

Environmental Resources (Section Reference)	Summary Impact Finding	Impact Description or Activity	Mitigating Measures and Controls
4.2.2 Groundwater Impacts			
4.2.2.1 Hydrologic Alteration of Groundwater	SMALL	1. Localized changes in groundwater levels from dewatering during excavation.	1. No mitigation measures or controls needed.
4.2.2.2 Groundwater Use Impacts	SMALL	1. No planned use of groundwater during building activities.	1. No mitigation measures or controls needed.
4.2.2.3 Groundwater Quality Impacts	SMALL	1. Release of water from groundwater dewatering during excavation. 2. Inadvertent spills of fluids may contaminate groundwater resources.	1. Comply with TPDES general permit to discharge water from groundwater dewatering associated with building activities. 2. Establish and implement a SPCC Plan for construction practices.
4.3 Ecological Impacts			
4.3.1 Terrestrial Ecosystems and Wetlands	SMALL	1. Potential direct impacts to terrestrial flora and fauna and habitat loss due to building activities including land clearing, grading, excavation, and filling; displacement of wildlife and loss of less mobile fauna. 2. Opportunities for invasive species to become established during building activities. 3. Potential impacts from bird collisions due to artificial lighting during construction. 4. Disturbance or destruction of 3.7 ac. (1.5 ha) of wetlands. 5. Indirect impacts to wetlands associated with erosion and sedimentation.	1. Use erosion controls are follow BMPs to control erosion from disturbed land and reduce impacts to nearby waters. 2. Restore temporarily affected area with native or non-invasive plant species. Conduct periodic monitoring and control measures in consultation with relevant agencies. 3. Minimize the amount of nighttime light, using downshielding, and full cutoff luminaries. 4. Comply with TCEQs and USACE 404 permit guidelines. 5. Implement BMPs, such as erosion and sedimentation controls that limit the transport of sediment to wetlands via stormwater.
4.3.2 Aquatic Ecosystems	SMALL	1. Potential impacts to aquatic biota and habitats in West Coloma Creek and GBRA Calhoun Canal from direct habitat alteration. 2. Potential impacts related to accidental spills of petroleum products or industrial chemicals. 3. Potential impacts to aquatic habitats from increased sediment deposition and disturbance during construction.	1. To minimize stream disturbance, personnel and equipment will only enter riparian areas when essential to complete work. 2. Designate storage areas for fuel and lubricants on the Long Mott site that are equipped with appropriate spill containment measures in accordance with SPCC plans. 3. Develop and implement a SWPPP for collection, mitigation, and control of stormwater runoff in accordance with state and federal regulations and permit requirements. 1 and 3. Implement erosion and sediment control plans that incorporate recognized BMPs. 1 and 3. Monitor the effectiveness of BMPs in preventing erosion and sediment transport and deposition in aquatic habitats.

Table 4.6-1: Summary of Measures and Controls to Limit Adverse Impacts During Construction (Continued) (Sheet 4 of 5)

Environmental Resources (Section Reference)	Summary Impact Finding	Impact Description or Activity	Mitigating Measures and Controls
4.4 Socioeconomic Impacts			
4.4.1 Physical Impacts (includes noise, odors, dust, air pollution and visual intrusions)	SMALL	1. Increased on-site air and dust emissions from construction equipment. 2. Potential for worker accidents. 3. Deterioration of public roads used during building activities.	1. Comply with Clean Air Act National Ambient Air Quality Standards and regulatory limits and prepare and adhere to the building activities mitigation plan. 1. Use BMPs and properly maintain construction equipment and vehicles to control emissions. 2. Train and appropriately protect employees and construction workers to reduce the risk of potential exposure to noise, dust, and exhaust emissions. 3. Consult with TxDOT to mitigate adverse impacts. 3. Return public roads, signs, and markings to preexisting conditions or better.
4.4.2 Social and Economic Impacts			
4.4.2.1 Demographic Impacts	SMALL to MODERATE	1. Potential effects related to short-term housing availability. 2. Potential for indirect impacts associated with housing costs.	1 and 2. No mitigative measure or controls identified.
4.4.2.2 Economic Impacts to the Community	SMALL to MODERATE (Beneficial)	1. No adverse impacts.	1. No mitigative measures or controls needed.
4.4.2.3 Community Infrastructure			
4.4.2.3 Community Infrastructure Impacts (Recreation, Public Services, and Education)	SMALL	1. Potential impacts on demand for public services from in-migrating individuals.	1. Future shortage of municipal water in 2030 through 2070 is being addressed by Victoria County as part of strategic planning.
4.4.2.3.1 Traffic	MODERATE to LARGE	1. Increased traffic in the vicinity of the Project site due to transport of workforce and materials.	1. Consult with TxDOT to develop mitigative measures that may include altered routes or local improvements such as roadway widening or installing turn lanes to accommodate building activity traffic. 1. Utilize remote parking with shared transportation.
4.4.3 Environmental Justice Impacts	NONE [(a)]	1. No disproportionate adverse impacts on minority or low-income populations.	1. No mitigative measures or controls needed.
4.4.4 Nonradiological Health	SMALL	1. Potential for exposure to chemical hazards or physical non radiological hazards. 2. Potential for increased accident frequency with increased construction traffic.	1. Phase building activities and equipment use; conduct equipment maintenance, and stabilizing roads and soil stockpiles. 1. Adhere to NRC, OSHA, and state safety standards and provisions for worker safety. 1. Train workers on use of personal protective equipment. 2. No significant safety issues identified; therefore, no mitigative measures or controls are needed.

Table 4.6-1: Summary of Measures and Controls to Limit Adverse Impacts During Construction (Continued) (Sheet 5 of 5)

Environmental Resources (Section Reference)	Summary Impact Finding	Impact Description or Activity	Mitigating Measures and Controls
4.4.5 Nonradioactive Waste Management			
4.4.5.1 Impacts to Land	SMALL	1. Increased disposal of debris at existing landfills.	1. No mitigative measures or controls needed.
4.4.5.2 Impacts to Water	SMALL	1. Potential of accidental spills into water resources.	1. Establish designated storage areas and ensure fuel and lubricants are equipped with spill containment measures in accordance with SPCC plans. 1. Adhere to TPDES and SWPPP to minimize impacts from stormwater runoff into receiving waterbodies.
4.4.5.3 Impacts to Air	SMALL	1. Air emissions from building activities including gaseous pollutants and particulate matter.	1. Building-related emissions are typically limited to the vicinity. 1. Emissions from the building phase comply with TCEQ and U.S. Environmental Protection Agency requirements and are managed through the use of a mitigation plan and/or permits.
4.5 Radiation Exposure to Construction Workers			
4.5.4 Total Construction Worker Doses	SMALL	1. Radiological doses to construction workers are maintained below regulatory limits.	1. No mitigative measures or controls needed.

Note:

a) A determination of “NONE” for Environmental Justice analyses does not mean there are no adverse impacts on minority or low-income populations from the project. Instead, an indication of “NONE” means that while adverse impacts do exist, they do not affect minority or low-income populations in any disproportionate manner relative to the general population.

Abbreviations: ac. = acre; ha = hectare; SPCC = Spill Prevention, Control, Countermeasures; LMGS = Long Mott Generating Station; SHPO = State Historic Preservation Office; TCEQ = Texas Commission on Environmental Quality; SWPPP = Storm Water Pollution Prevention Plan; BMP = best management practices; USACE = U.S. Army Corps of Engineers; GBRA = Guadalupe-Blanco River Authority; TPDES = Texas Pollutant Discharge Elimination System; TxDOT = Texas Department of Transportation; NRC = U.S. Nuclear Regulatory Commission; OSHA = Occupational Safety & Health Administration

Figures

None

4.7 References

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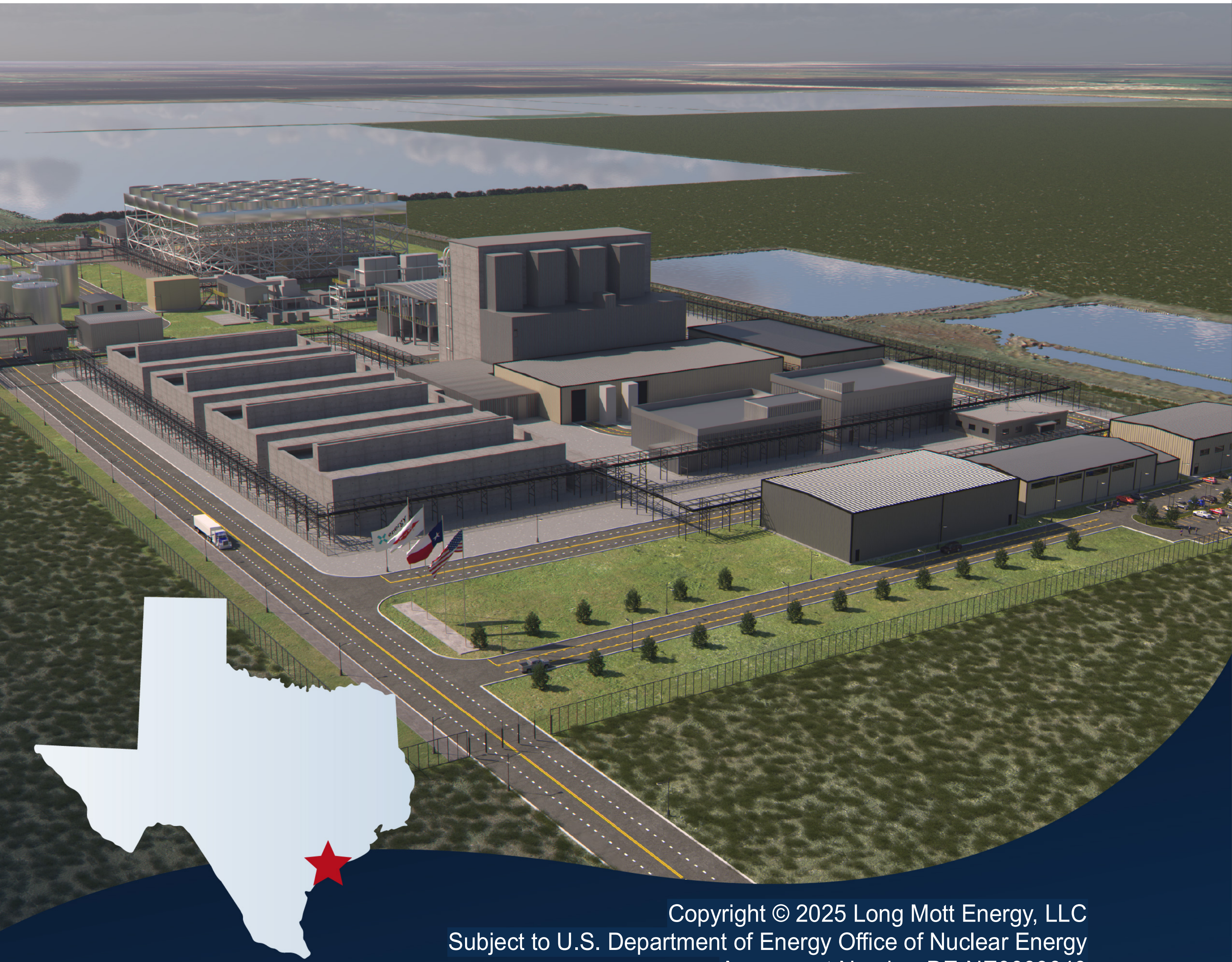
Long Mott Generating Station

Environmental Report
Chapter 5 - Environmental Impacts of Station Operation



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Chapter 5 - Environmental Impacts of Station Operation

5.1 Land Use Impacts

This section describes the impacts of the Long Mott Generating Station (LMGS) on land use during operations. Section 5.1.1 describes the effects on land use at LMGS and in the vicinity. Section 5.1.2 describes effects that could occur along transmission corridors and in off-site areas from operation and maintenance activities. Section 5.1.3 describes potential effects on historic properties at LMGS and in the vicinity.

5.1.1 The Project Site and Vicinity

5.1.1.1 The Project Site

Land use at the LMGS site is summarized in Table 2.2-1 and shown on Figure 2.2-3. The LMGS site primarily comprises cultivated crops, herbaceous land, and developed land. Portions of the existing Seadrift Operations (SDO), the Seadrift, Texas, facility owned and operated by the Union Carbide Corporation, an affiliate of The Dow Chemical Company, are included within the developed land on the LMGS site. As noted in Section 2.2.1, there are no special land uses on the LMGS site.

Impacts to land use at the LMGS site and in the vicinity occur primarily during building. As documented in Section 4.1, Land Use Impacts, once built, the LMGS site permanently occupies approximately 320 acres (ac) (130 hectares [ha]) of land. No new areas are expected to be disturbed after the building phase.

As described in Section 3.4.1.1, LMGS uses a dry cooling system consisting of air-cooled condensers (ACC). Excess heat is dissipated through mechanical fans to move air over a system of finned heat exchanger tubes. As such, there is no impact to land use on the site or in the vicinity from salt deposition from cooling tower operation.

As discussed in Section 2.2.1, the ability of counties in Texas to control land use is largely limited to review of proposals regarding the subdivision of land. The LMGS site is located adjacent to an existing industrial facility (SDO). As such, operation of LMGS is consistent with existing industrial land uses and does not conflict with established land use controls.

Impacts to land use at the LMGS site from plant operations are therefore SMALL.

5.1.1.2 The Vicinity

Land cover data for the 6 miles (mi). (10 kilometers [km]) vicinity is summarized in Table 2.2-2 and shown on Figure 2.2-3. Primary land uses in the vicinity include cultivated crops, developed land, hay/pasture, emergent herbaceous wetlands, and open water. As identified in Section 2.2.1, the Guadalupe Delta Wildlife Management Area (WMA) is the only special land use located within the vicinity of LMGS. No off-site land is disturbed during operations.

As described in Section 2.5, Socioeconomics, it is assumed that the residences of the in-migration operations employees are distributed across the region but are expected to concentrate in the region of influence (ROI) (Calhoun, Victoria, and Jackson counties). The analysis of housing impacts in Section 5.8.2.1.2 indicates sufficient vacant permanent housing is available to accommodate the projected demand from workers who operate the new facility; therefore, any indirect off-site land use changes in the vicinity related to plant operations, such as conversion of land to housing for the operational workforce, are minor.

Impacts to land use associated with the access roads occur during building activities. No additional impacts to land use occur during operation.

Therefore, based on the analysis provided above, operations at the LMGS site result in a SMALL impact on land use.

5.1.2 Transmission Corridors and Other Off-Site Areas

5.1.2.1 Transmission Corridors

As described in Section 3.7, Power Transition System, eight overhead transmission lines are present between the existing substation and the LMGS site. Two new 138 kilovolt (kV) lines provide power to the SDO. These lines are located within the LMGS site. During operation, on-site transmission lines are routinely maintained. Impacts associated with routine maintenance are addressed in Section 5.6, Transmission System Impacts. As identified in Section 2.2.2.1, no new off-site transmission lines are planned.

5.1.2.2 Other Off-Site Areas

LMGS operation generates low-level radioactive waste (LLW) that requires disposal in permitted radioactive waste disposal facilities, which are discussed in Section 3.5, Radioactive Waste Management System. Licensed disposal facilities that could accept non-radioactive waste (hazardous and nonhazardous waste) are identified in Section 3.6.3.1. The nearest off-site landfill, the City of Victoria Landfill, is a municipal solid waste landfill with 22.5 years of remaining capacity, based on 2022 data (TCEQ, 2023); therefore, adequate capacity is available in the vicinity of LMGS to meet the projected demand for solid waste disposal, and construction of a new landfill to dispose of waste generated from LMGS is not needed.

There are no off-site transmission corridors. As described above, no other off-site areas are affected during operations. As such, no additional impacts to land use occur within off-site areas as a result of operations.

5.1.3 Historic and Cultural Resources

As described in Section 2.5.3, a cultural resource survey was conducted to identify the potential occurrence of archaeological and historic resources potentially eligible for the National Register of Historic Places (NRHP) on and near the LMGS site (Appendix IA and

Part VI Supplemental Information). No archaeological sites, cultural material, or historic properties eligible for listing in the NRHP are located within the LMGS site or within the 10 mi (16 km) buffer. Additionally, no historic or cultural resources were identified that were determined not eligible but may be considered important in the context of the National Environmental Policy Act of 1969 (NEPA), as amended (e.g., sacred sites, cemeteries, local gathering areas). In conclusion, no historic properties are present, and no direct or indirect effects to historic properties occur as a result of operation of LMGS. As described above, no other off-site areas are affected during operations.

Tables

None

Figures

None

5.2 Water-Related Impacts

This section identifies impacts to surface and groundwater resources associated with operation of LMGS. As described in Section 3.3, Plant Water Use, LMGS requires water for operational purposes. As described in Section 3.4, Cooling System, ACCs are the primary heat dissipation system for LMGS during normal power/steam operation. Because ACCs are used for cooling, LMGS does not require heat dissipation to an external water body.

5.2.1 Surface Water

This subsection identifies impacts to surface water resources associated with operation of LMGS and transmission corridors.

5.2.1.1 Hydrologic Alterations

Hydrologic alterations are described separately below for LMGS including water supply, water discharge, stormwater, West Coloma Creek floodplain, and Guadalupe-Blanco River Authority (GBRA) Canal systems.

The basins that currently support SDO, as described in Section 2.3.1, are not jurisdictional and not subject to regulation under the Clean Water Act (CWA). Similarly, the GBRA Calhoun Canal is an artificial water distribution system that is not considered to be subject to regulation by the U.S. Army Corps of Engineers (USACE) or Texas Commission on Environmental Quality (TCEQ). It is assumed that analysis of the canal is similar to that of the basin since the basins are off-channel storage facilities with inflow coming from the canal. The use of water from the GBRA Calhoun Canal is, however, subject to authorization by GBRA.

5.2.1.1.1 Hydrologic Alterations Associated with Plant Water Supply

Details on the intake and discharge systems are presented in Section 3.3. Plant Water Use, and Section 3.4, Cooling System. Water withdrawals for the operation of LMGS are described in detail in Section 3.3, Plant Water Use.

As described in Section 4.2.1, the intake structure, including a pump station, installed on the GBRA Calhoun Canal provides water into Basin #5 via a new pipeline. The LMGS intake structure is shown in Figure 3.1-3 and is located near, and slightly downstream (east), of the existing GBRA Relift 1 Pump Station. Water is pumped from the GBRA Calhoun Canal as needed to maintain Basin #5 at the normal water level. Water flow rates and volumes for LMGS are summarized in Table 3.3-1.

Operation of the pump station results in localized changes in water flow patterns and water levels. The pump station is similar to GBRA Relift 1 Pump Station with the intake structure recessed in the canal bank (i.e., no structures projecting into the GBRA Calhoun Canal). Details of the pump station will be determined during final design. The intake structure is conservatively designed to function over the minimum and maximum GBRA Calhoun Canal water levels while limiting flow velocities approaching the intake bay(s). Limiting flow velocities minimizes aquatic life impacts (e.g., entrainment) and sediment scour consistent with general standards for similar water intakes. Additionally, erosion control measures including riprap will be integrated in intake structure design as appropriate, to minimize scour. A traveling water screen is employed to control vegetative debris and other materials and prevent flow of debris into the pump bay(s). Sedimentation in proximity to the GBRA Calhoun Canal intake structure may occur during operations. Such sedimentation is controlled by periodic maintenance activities as required to maintain hydrologic flow within the GBRA Calhoun Canal. Need for sediment maintenance is managed depending on the operational water levels, potential GBRA Calhoun Canal bank erosion, and sediment load in the GBRA Calhoun Canal.

Water levels and flows in the GBRA Calhoun Canal vary based on several factors including the intermittent operation of the GBRA Calhoun Canal Main Pump Station and the nearby GBRA Relift 1 pump station as well as downstream water levels in the GBRA Calhoun Canal. Flow into the intake may be drawn from canal water downstream (east) if the GBRA Calhoun Canal Main Pump Station is not pumping coincidentally; the intake structure design considers such conditions to minimize potential impacts on the GBRA Calhoun Canal and optimize performance of the LMGS pump station.

Water is pumped from the Guadalupe River by the GBRA Main Pump Station as needed to maintain regulated water levels in the GBRA Calhoun Canal. Existing pumping capacity at this location is 36,340 m^3/hr (160,000 GPM) per Section 3.4.2.6. The permitted pumping capacity of this pump station is 63,400 m^3/hr (622 cfs) as shown on Table 5.2-1. The net increase of water diverted from the Guadalupe River to support LMGS operations would not exceed existing SDO water rights or the permitted pumping capacity at the existing pump station (Table 5.2-1). As such, water usage at LMGS will not result in additional impacts to local circulation patterns, erosion, deposition, and sediment transport as these are inherently included as part of the base environmental condition.

Based on the above discussion and analysis, impact of hydrologic alteration on the GBRA Calhoun Canal are minor and localized.

5.2.1.1.2 Hydrologic Alterations Associated with Plant Water Discharge

Nonradiological waste streams from LMGS tie into existing SDO infrastructure for management and treatment prior to their discharge along with other effluents from SDO to the Victoria Barge Canal. The exact tie-in location to the SDO treatment system will be determined during final design. The outfall from SDO to the Victoria Barge Canal is through an existing permitted outfall location. Flow rates and concentrations of effluents are in accordance with Texas Pollutant Discharge Elimination System (TPDES) permit conditions. SDO's existing TPDES permit authorizes discharge of 12 MGD (1893 m^3/hr) as a daily average and 17 MGD (2681 m^3/hr) as a daily maximum. LMGS adds up to 2.3 MGD (368.1 m^3/hr) at the permitted outfall location based on Figure 3.3-1. As the permitted discharge currently averages between 1.4 MGD (221 m^3/hr) and 5.0 MGD (789 m^3/hr), increased discharges as a result of LMGS are within the design daily averages and maximums. Since the increase is within the existing discharge permitted capacity, it is assumed that hydrologic effects of these discharges have been previously assessed and are part of the baseline environmental condition. Consequently, there are no additional hydrologic alterations associated with the discharge of LMGS.

5.2.1.1.3 Hydrologic Alterations Associated with Surface Water

This subsection focuses on the following:

- Hydrologic alterations associated with stormwater runoff
- Hydrologic alterations to West Coloma Creek

5.2.1.1.3.1 Hydrologic Alterations Associated with Stormwater Runoff

Land cover alteration on the LMGS site results in changes in the frequency of both peak runoff rates and runoff volumes from storm events discharged from the LMGS site to West Coloma Creek and downstream areas. Land cover and hydrologic alterations associated with building LMGS are identified in Section 4.1, Land Use Impacts, and Section 4.2, Water-Related Impacts. The natural surficial soil at the LMGS site is Laewest clay, 0 to 1 percent slopes, and is classified by the Natural Resources Conservation Service (NRCS) as Hydrologic Soil Group D (NRCS, 2023), the highest runoff potential soil classification. Soils with high runoff potential reduce the impacts associated with runoff from impervious surfaces (rooftops, pavement) on the LMGS site as compared to environmental settings that have soils characterized by high infiltration and low runoff rates.

Operational phase stormwater management facilities associated with LMGS are illustrated on Figure 3.1-3. As described in Section 4.2, Water-Related Impacts, building in the West Coloma Creek overbank areas includes fill placement, buildings, and other structures that may obstruct or increase resistance to flow through areas that convey out of bank high flows under the pre-development condition. For LMGS, the approximately 34.4 ac (13.9 ha) Nuclear Island/Conventional Island (NI/CI) is filled to raise the area from an average elevation of 27 feet (ft) (8.2 meters [m]) to a grade of 31.5 ft (9.6 m), a grade rise of 4.5 ft (1.4 m). The NI/CI width transverse to the West Coloma Creek flow is approximately 777 ft (237 m). Gravel placed on the 215 ac (87 ha) temporary laydown and staging areas during building activities is removed at the completion of building activities to restore that area to agricultural land use. Based on the planned development area, the total potential flood flow conveyance area lost to NI/CI fill is 3500 square feet (ft^2) (325 square meters [m^2]). Structures (e.g., buildings, other infrastructure) and other potential flow obstructions (e.g., stockpiles, fences) further reduce the flow conveyance or may increase the resistance to flow through the developed NI/CI. The West Coloma Creek channel cross section area within low dikes on either side of the channel is approximately 300 ft^2 (27.9 m^2).

Hydraulic analyses for West Coloma Creek for pre- and post-development conditions demonstrate that the West Coloma Creek 100-year flood water surface elevation is increased at the upstream boundary of the site due to development. Associated flows of flood water are also modified due to post-development conditions. The LMGS design will meet required development standards to provide appropriate flood protection for the site and avoid impacts to off-site properties.

Stormwater runoff alterations are managed by the incorporation of stormwater controls, or stormwater best management practices (BMPs), incorporated in the stormwater management system. Stormwater from the LMGS site is controlled by a permanent stormwater basin established during the building phase that discharges to West Coloma Creek. The stormwater basin is shown on Figure 3.1-3. Size and detention characteristics of the stormwater basin are preliminary and will be determined during final design. However, stormwater management including release rates and volumes comply with regulatory requirements for site design and operation. Local requirements are established in the Calhoun County Regulations of Subdivision and Property Development. Drainage design standards include certain criteria to be met for the 5- and the 25-year storm events calculated using the Rational Method (Calhoun County, Texas, 2007). This Calhoun County regulation also references and requires compliance with the Texas Water Code Chapter 26 and Article 16. As described in Section 4.2.1.1, LMGS requires a Calhoun County floodplain development permit and a stormwater discharge permit for industrial activities under the CWA, the National Pollutant Discharge Elimination System (NPDES) stormwater program. The NPDES stormwater program has been delegated to the TCEQ.

Federal stormwater discharge regulations are established through the CWA NPDES regulations with a primary focus on water quality. However, stormwater runoff rates and water quantity are integral to stormwater quality control. BMPs address both stormwater quantity and quality. The TCEQ Multi Sector General Permit (MSGP) No. TX050000 (TCEQ, 2021) for discharge of stormwater from industrial activities requires a stormwater pollution prevention plan (SWPPP). The plan must provide for implementation of BMPs and controls for stormwater pollution. Among the categories of best management practices identified in the MSGP are BMPs that divert, infiltrate, reuse, contain, or otherwise reduce stormwater runoff to minimize pollutants in discharges (MSGP Part III, Section A.4.(a)(10)). Minimizing increases in stormwater runoff rate and volume from impervious areas through the development of drainage improvements and the establishment of BMPs reduces pollutant loads and stream erosion off-site and downstream of LMGS, which reduces stormwater related impacts.

The applicable regulations address stormwater runoff quantity and quality. Stormwater quality controls and compliance are discussed in Section 5.2.1.3 and are interrelated with stormwater quantity. Based on adherence to regulatory requirements for proper design and operation of stormwater management facilities, impacts of stormwater management on West Coloma Creek are localized and minor.

5.2.1.1.3.2 Hydrologic Alterations to West Coloma Creek

Hydrologic alterations within West Coloma Creek are associated with the following:

- Effects of stormwater drainage from the LMGS site
- Effects of structures in West Coloma Creek

5.2.1.1.3.3 Effects of Stormwater Drainage from the LMGS Site

With respect to the effects of stormwater drainage from the LMGS site, stormwater releases from the permanent stormwater basin identified in Figure 3.1-3 result in localized alterations of current and flow patterns in proximity to the discharge. However, releases from the stormwater basin are managed in accordance with appropriate design standards and requirements of the TCEQ NPDES permit that minimize erosion and scour from stormwater releases. The discharge frequencies for West Coloma Creek downstream of the LMGS site are not measurably impacted by operation because of the implementation of stormwater controls and site design standards (Section 5.2.1.1.3.1); therefore, impacts to the downstream channel of West Coloma Creek caused by erosion from increased flow rates and volumes are avoided.

As such, the effects of stormwater drainage from LMGS on hydrologic alterations of West Coloma Creek are minor.

5.2.1.1.3.4 Effects of Structures in West Coloma Creek

There are two points of surface water inflow to the LMGS site. These include West Coloma Creek at the northern site boundary with a drainage area of approximately 11.8 square miles (30.7 square kilometers) and a lateral drainage ditch from the northeast that discharges to West Coloma Creek along the southern site boundary. The lateral drainage ditch continues to discharge to West Coloma Creek during operational conditions.

As described in Section 4.2.1, in conjunction with building activities, the West Coloma Creek channel within the LMGS site remains in its existing alignment but channel hydraulics are modified as a result of the installation of two vehicle bridge crossings as shown on Figure 3.1-3 and stormwater outfall structures. Hydraulic modifications meet site design standards that provide appropriate flood protection and avoid impacts to off-site properties, including those upstream of the LMGS site. Bridge and outfall structure designs also incorporate appropriate erosion protection to minimize scour. These modifications persist through the operational period in conjunction with final designs. As such, the impacts of structures on the hydrology of West Coloma Creek are minor.

5.2.1.1.4 Summary of Impacts from Hydrologic Alterations

Based on the preceding description of the surface water management system, coupled with managing surface water and stormwater in accordance with applicable regulatory requirements, impacts of stormwater management are minor. Impacts of operation associated with hydrologic alterations to surface waters within the LMGS site and off-site, particularly upstream, and downstream of West Coloma Creek and the GBRA Calhoun Canal, are mitigated using design standards, BMPs, and maintenance practices. Furthermore, there are no hydrologic alterations to surface waters associated with water discharged from LMGS; therefore, hydrologic alterations of surface water from operation of LMGS are SMALL.

5.2.1.2 Water Use Impacts

As described in Section 3.3, Plant Water Use, water required for LMGS operation is obtained from Basin #5 via a new intake structure. The GBRA currently supplies makeup water to the basin through the existing SDO facility intake system. A new intake structure and pipeline are provided from the GBRA Calhoun Canal to Basin #5.

Total facility water use includes that which is used directly by LMGS and that which is conveyed to the SDO for its use. Table 3.3-1 indicates that the estimated total consumptive plant water use is approximately 643 cubic meters per hour (m^3/hr) (6.3 cubic feet per second [cfs]) on average, with an estimated maximum of 680.9 m^3/hr (6.7 cfs). As described in Section 3.3.1, plant consumptive water use includes the water that is conveyed to the SDO and water makeup for the Conventional Island Process Water System and Nuclear Island Process Water System and Service Water System. Average values are those expected for normal plant operation and maximum values are those expected for upset or abnormal conditions.

The GBRA Calhoun Canal is part of the larger GBRA Canal network, which is an artificial water supply system that operates based on permits granted by the State of Texas. The system delivers water from the Guadalupe River near Tivoli into the GBRA diversion for distribution to industrial, municipal, and agricultural customers in Calhoun County through a series of irrigation canals, checks, pump stations, and pipelines (GBRA, 2024).

Water within the GBRA Calhoun Canal is supplied from an existing pump station that withdraws water from the Goff Bayou with water rights granted by the State of Texas, as discussed in Section 2.3, Water. Potential impacts to water availability are evaluated under the assumption that water supplied to LMGS is permitted under existing SDO water rights, as described in Section 3.3, Plant Water Use. Section 2.3, Water, discusses the availability of water under the rights held either jointly or directly by the GBRA and SDO. These water rights are senior in relation to most others on the Guadalupe River and, therefore, allow for higher priority of diversion during periods of low flow. This seniority has the potential to impact junior water rights with water use restrictions depending on the volume diverted by GBRA and SDO for use by LMGS during periods of low river flow. Additionally, diversions into the GBRA Calhoun Canal influence fresh water available 550 ft (168 m) downstream of the diversion at the saltwater barrier.

LMGS surface water use impacts are assessed below by considering the water use rate of LMGS compared to relative flow rates of the Guadalupe River that are diverted by the GBRA pump station. As shown in Table 3.3-1, average water use of LMGS is approximately 1011 m^3/hr (9.92 cfs).

As stated in Section 2.3.1.1.1.1 and shown in Table 2.3.1-3, flow data for the GBRA diversion are available from U.S. Geological Survey (USGS) Station No. 08188590, North end of GBRA Calhoun Canal near Long Mott, TX (May 2016 – present). Additionally, Table 2.3.1-2 presents historical streamflow data within the Guadalupe River downstream of the diversion to the GBRA Canal from USGS Station No. 08188800, Guadalupe River near Tivoli, Texas.

Guadalupe River flow immediately upstream of the GBRA Canal diversion can be estimated by adding the Guadalupe River flow from Station No. 08188800 to the flow diverted to the GBRA Canal at Station No. 08188590.

Annual average estimates of total Guadalupe River flow rates over the seven-year historical period shared by USGS stations 08188800 and 08188590 (2016 to 2023) are provided in Table 5.2-1. The average LMGS water intake rate was analyzed as a percentage of the annual average Guadalupe River flow for the seven-year historic period to account for variability in drought conditions over the period of record. Based on these estimates, the average annual water intake rate required by LMGS ranges from approximately 0.5 to 1.2 percent of the annual average Guadalupe River flow (USGS, 2024). The analysis of LMGS water consumption concludes that LMGS diverts a small percentage of water from the Guadalupe River that would otherwise reach the saltwater barrier and the San Antonio Bay system.

Monthly average estimates of total Guadalupe River flow rates over the seven-year historical period shared by USGS stations 08188800 and 08188590 (2016 to 2023) are provided in Table 5.2-2. The LMGS average water intake flow rate was compared with the monthly and seasonal average Guadalupe River flow volumes over the seven-year historical period to consider seasonal variations in historic Guadalupe River flow. Based on these estimates, the average monthly LMGS water intake rate ranges from approximately 0.5 to 0.8 percent of the monthly average Guadalupe River flow. Historical data shows the Guadalupe River flows at the diversion to the GBRA Canal system are lowest during the summer with the lowest flows typically occurring in July. Consistent with the trend observed in the river flows, the LMGS surface water intake rate as a percentage of the monthly and seasonal flow of the Guadalupe River is typically higher in the summer due to lower overall seasonal flows.

The average 2022 water use at the SDO facility is discussed in Section 2.3.1.2.3. When LMGS is operational, SDO uses steam provided by LMGS to the maximum extent practicable, which reduces SDO's existing water use. Additionally, the replacement of SDO's existing cogeneration plants with LMGS further reduces the water use required by SDO. For this analysis however, a conservative estimate of water use by LMGS is made by assuming that no reuse occurs and that water used by LMGS and SDO is cumulative. Table 5.2-3 provides a comparison of water usage between SDO in 2022, LMGS, and the summation of SDO and LMGS with respect to Guadalupe River flows upstream of the GBRA diversion and existing water rights. SDO water use quantities shown in Table 5.2-3 include all water used by SDO in 2022 and do not include any reductions from reuse or replacement by LMGS. Average water use at SDO is 1.1 percent of the annual average water flow of the Guadalupe River upstream of the GBRA diversion. With the addition of LMGS, water use of both SDO and LMGS represents 1.7 percent of the annual average Guadalupe River flow. Seasonal changes in water use can be taken into consideration by analyzing maximum and minimum water use rates at SDO from May and February, respectively, along with monthly average flow rates in the Guadalupe River during these same months. Based on this analysis, the combined SDO and LMGS water use represents between 1.2 percent of the Guadalupe River flow in February and 1.9 percent of the Guadalupe River flow during May.

As discussed in Section 2.3.1.2, one of the fundamental elements of the South-Central Texas (Region L) regional water planning process is the quantification of surface water supplies reliably available during a repeat of the drought of record (1950 – 1957) and throughout the planning horizon (Black & Veatch, 2020). Firm diversions and water reliability for the Dow/GBRA water rights were obtained from the Region L Regional Water Plan and are shown in Table 2.3.1-10 (Black & Veatch, 2020). Under drought conditions, water reliability drops from 175,501 acre-feet per year (ac-ft/yr) (593,088 cubic meters per day [m^3/day]) to approximately 159,719 ac-ft/yr (539,754 m^3/day) with approximately 53,185 ac-ft/yr (179,733 m^3/day) allotted for industrial water uses. The average combined water use of SDO and LMGS is 10.5 percent of the total water rights allowed by Dow. During drought conditions, the average combined water use of SDO and LMGS is 11.6 percent of the available water rights.

Lower streamflow within the Guadalupe River influences the amount of water available downstream of the GBRA diversion, as well as water availability for junior water rights upstream of the diversion. The operation of LMGS affects only one diversion point downstream of the GBRA diversion as a result of alterations in streamflow to the Guadalupe River. Because water use after the initiation of LMGS requires more water than the existing SDO facility, streamflow for this water user is lower, resulting in less surface water reliability during normal operations and low flow conditions. This decrease in water reliability is also applicable to all junior water right holders that rely on the water not used by senior water right holders for their respective water uses. Additionally, a decrease in streamflow in the Guadalupe River due to LMGS operation affects the amount of fresh water that enters the Guadalupe Bay which plays a role in the salinity gradient within the estuarine system (Section 2.3.1.1).

Overall, water use of LMGS represents a minor percentage of available water flow in the Guadalupe River during normal annual and seasonal conditions as well as during drought conditions. Additionally, the physical locations used for the intake and discharge of water at the LMGS site occur on surface water resources that are currently utilized by SDO and are permitted under existing water rights. While LMGS operations result in less water availability within the Guadalupe River, operations comply with existing surface water rights at SDO and remain only a small portion of available water rights during drought conditions; therefore, impacts to water use and downstream water users are SMALL.

5.2.1.3 Water Quality Impacts

The LMGS cooling system is described in Section 3.4.1. Water consumption and discharge rates described in Section 3.3.1 and the management of stormwater is described in Section 5.2.1.1.1. The facility design integrates ACCs for the cooling system and does not use water for cooling.

Surface water quality impacts occur from the accidental release of chemicals and stormwater discharges. Chemicals are stored in bulk storage with a pump skid to reduce the likelihood of accidental spills. The Spill Prevention, Control and Countermeasures (SPCC) rule (Title 40 of the Code of Federal Regulations [CFR] Part 112) requires pollution prevention and response plans for spills of oil and other hazardous materials. Stormwater discharges are regulated by TCEQ through an TPDES permit.

Accidental spills of materials such as diesel fuel, hydraulic fluid, or lubricants are unlikely during operations; however, LMGS will develop a SPCC Plan to implement the above regulation and minimize the release of constituents associated with accidental spills into receiving waters.

Surface water impacts from normal operations may also include the concentration and discharge of chemicals in plant effluents. These chemicals are residual from water treatment activities used to prevent corrosion and biofouling. A summary of chemicals generally used for water treatment is provided in Table 3.3-2.

As noted in Section 5.2.1.1.2, LMGS nonradiological waste streams to existing SDO infrastructure for management and treatment. The exact tie-in location and treatment system will be determined during final design. The outfall from SDO operations to the Victoria Barge Canal is through an existing permitted outfall location and all effluent concentrations is in accordance with applicable TPDES permit conditions. As such, there is no discrete discharge from LMGS. LMGS would intake an additional 6.4 MGD (1011 m^3/hr) from the GBRA Calhoun Canal and discharge up to an additional 2.3 MGD (368.1 m^3/hr) at the permitted outfall location based on Figure 3.3-1. Concentrations of effluent constituents are in compliance with applicable TPDES permit conditions; therefore, impacts on water quality are localized and minor.

As described in Section 5.2.1.1.3, sedimentation in proximity to the intake structure on the GBRA Calhoun Canal may occur during operations. Such sedimentation is controlled by periodic maintenance activities as required to maintain hydrologic flow within the GBRA Calhoun Canal. Need for sediment maintenance is managed depending on the operational water levels, potential GBRA Calhoun Canal bank erosion, and sediment load in the GBRA Calhoun Canal. Excavated sediment is managed and disposed of in an approved upland location to minimize effects on water quality within the GBRA Calhoun Canal.

In summary, plant design integrates the use of ACCs, and stormwater is managed in accordance with the provisions of the SWPPP and implementation of appropriate BMPs. Additionally, there are no discrete plant effluents from LMGS. Stormwater discharges are monitored and controlled in accordance with the requirements of TCEQ TPDES permits; therefore, impacts to surface water quality from operations are SMALL.

5.2.2 Groundwater

This subsection identifies impacts to groundwater resources associated with operation of LMGS. As described in Section 3.3, Plant Water Use, LMGS does not require groundwater for cooling or operational purposes. Plant water use is summarized in Table 3.3-1.

5.2.2.1 Hydrologic Alterations

There are no hydrologic alterations that affect groundwater availability during operations. Surface hydrologic alterations are described in Section 5.2.1.1. Additionally, there are no site groundwater withdrawals that affect local aquifers; therefore, impacts of hydrologic alteration of groundwater from operations are SMALL.

5.2.2.2 Water Use Impacts

No groundwater from on-site or off-site sources is used during operation of LMGS. Furthermore, no permanent dewatering system is planned for use during operations; therefore, impacts of groundwater use from operations are SMALL.

5.2.2.3 Water Quality Impacts

Accidental releases or spills of materials such as diesel fuel, hydraulic fluid, or lubricants are unlikely during operations; however, if they occur, they will be cleaned up immediately in accordance with the SPCC Plan. Although actions outlined in an SPCC Plan are primarily intended to prevent spilled oil from being released into receiving waters, they also provide mitigative measures to minimize the impact of accidental spills on groundwater. In the unlikely event small amounts of contaminants are released into the environment, they have only a small, localized, temporary impact on the groundwater because of the predominance of heavy clays on the LMGS site. Such heavy clays minimize transport of constituents of accidental releases to aquifers on the site and minimize transport to off-site areas.

A permanent stormwater basin controls stormwater runoff from the LMGS site. Stormwater basins can increase infiltration of stored water within the area of the basin and increase local recharge to groundwater. However, recharge of local groundwater and potential infiltration of constituents from the LMGS permanent stormwater basin are limited based on design requirements, BMPs, and the predominance of heavy clays in the soils on the LMGS site. The permanent stormwater basin is designed to meet the requirements of the TPDES permit for the discharge system. As such, potential effects of the stormwater basin on groundwater quality are minor.

Because the engineering controls described above prevent or minimize the release of harmful effluents, and because concentrations of constituents in surface water are maintained at levels below permitted limits, any impacts to groundwater quality are SMALL and do not warrant mitigation.

5.2.3 Water Monitoring

The operational monitoring programs are described in Section 6.1, Thermal Monitoring; Section 6.3, Hydrologic Monitoring; and Section 6.6, Chemical Monitoring, respectively; however, no thermal monitoring is necessary due to the use of ambient air for cooling at LMGS.

Tables

Table 5.2-1: Estimated Long Mott Generating Station Water Withdrawal as a Percentage of the Annual Average Guadalupe River Flow Upstream of the GBRA Diversion

Year	Guadalupe River Near Tivoli (No. 08188800) Annual Mean Flow (cfs)	Permitted Pumping Rate of GBRA Main Pump Station (cfs)	GBRA Main Pump Station Calhoun Canal (No. 08188590) Annual Mean Flow (cfs)	Additional LMGS Average Annual Flow (cfs)	Total Expected GBRA Main Pump Station Demand (cfs)[(a)]	SDO Total Water Rights Flow Rate (cfs)[(b)]
2016	-	622	-			
2017	1890	622	54			
2018	1721	622	51			
2019	1779	622	51			
2020	1016	622	59			
2021	-	622	64			
2022	725	622	71			
2023	-	622	-			
Annual Average Flow	1426	622	58	9.9	67.9	242

Source: USGS 2024, See Table 2.3.1-2 and Table 2.3.1-3

Notes:

(a) Calculated using Average Long Mott Generating Station water use rate of 1011.1 m^3/hr, or 9.92 cfs

(b) Total water rights flow rate of 175,501 ac-ft/yr, or 242.4 cfs as presented in Chapter 2

Calculation Period from June 1, 2016, to July 31, 2023

Cells containing “-” indicate incomplete datasets.

Abbreviations: GBRA = Guadalupe-Blanco River Authority; LMGS = Long Mott Generating Station; SDO = Seadrift Operations; cfs = cubic feet per second

Table 5.2-2: Estimated Long Mott Generating Station Water Withdrawal as a Percentage of the Monthly Average Guadalupe River Flow Upstream of the GBRA Diversion

Season	Month	GBRA Calhoun Canal (No. 08188590) Monthly Mean Flow (cfs)	Guadalupe River Near Tivoli (No. 08188800) Monthly Mean Flow (cfs)	Combined Monthly Mean Flow (cfs)	Estimated LMGS Water use as a Percentage of Combined Monthly Mean Flow (%)[(a)]	LMGS Water Use Seasonal Percentage (%)
Winter	December	50	1530	1579	0.6	0.6
	January	54	1439	1493	0.7	
	February	49	1477	1526	0.7	
Spring	March	45	1362	1407	0.7	0.6
	April	50	1689	1738	0.6	
	May	61	2032	2093	0.5	
Summer	June	66	1633	1699	0.6	0.7
	July	71	1104	1175	0.8	
	August	71	1115	1186	0.8	
Fall	September	64	1463	1527	0.6	0.7
	October	61	1376	1437	0.7	
	November	65	1412	1477	0.7	

Source: USGS, 2024

Note:

a) Percentage calculated using Average Long Mott Generating Station water use rate of 1011.1 m^3/hr, or 9.92 cfs

Calculation Period from June 1, 2016, to July 31, 2023

Abbreviations: GBRA = Guadalupe-Blanco River Authority; cfs = cubic feet per second; LMGS = Long Mott Generating Station

Table 5.2-3: Long Mott Generating Station Water Use as a Percentage of Guadalupe River Flows and Water Rights

Water Use Descriptions	Flow Rate (cfs)	Water Use as a Percentage of Annual Average Guadalupe River Flow Upstream of GBRA Diversion[a]	Water Use as a Percentage of Monthly Average Guadalupe River Flow Upstream of the GBRA Diversion in May[b]	Water Use as a Percentage of Monthly Average Guadalupe River Flow Upstream of the GBRA Diversion in February[c]	Water Use as a Percentage of Total Water Rights[d]	Water Use as a Percentage of Reliable Water Rights[e]
2022 SDO Min (Feb)	8.6	0.6	-	0.6	3.5	3.9
2022 SDO Average	15.6	1.1	0.7	1	6.4	7.1
2022 SDO Max (May)	30.4	2	1.5	-	12.5	13.8
Proposed Average LMGS	9.9	0.7	0.5	0.6	4.1	4.5
Combined Average LMGS and Min SDO	18.5	1.2	-	1.2	7.6	8.4
Combined Average LMGS and Average SDO	25.5	1.7	1.2	1.7	10.5	11.6
Combined Average LMGS and Max SDO	40.3	2.7	1.9	-	16.6	18.3

Source USGS, 2024; Black & Veatch, 2021

Notes:

a) Percentage calculated using annual average flow rate of 1485 cfs from the Guadalupe River Upstream of the GBRA Diversion as shown in Table 5.2-1

b) Percentage calculated using monthly average flow rate of 2093 cfs from the Guadalupe River Upstream of the GBRA Diversion in the month May, as shown in Table 5.2-2

c) Percentage calculated using monthly average flow rate of 1526 cfs from the Guadalupe River Upstream of the GBRA Diversion in the month February, as shown in Table 5.2-2

d) Percentage calculated using total water rights flow rate of 175,501 ac-ft/yr, or 242.4 cfs as presented in Chapter 2

e) Percentage calculated using reliable water rights flow rate of 159,719 ac-ft/yr, or 220.6 cfs, as presented in Chapter 2

Abbreviations: cfs = cubic feet per second; SDO = Seadrift Operations; LMGS = Long Mott Generating Station; GBRA = Guadalupe-Blanco River Authority; ac-ft/yr = acre-feet per year

Figures

None

5.3 Cooling System Impacts

This section describes potential non-ecological impacts from operation of the LMGS cooling system. The analyses of impacts of the cooling system on ecological resources (terrestrial and aquatic) have been consolidated and incorporated into Section 5.10, Ecological Resources.

As described in Section 3.4, Cooling System, LMGS is designed with a dry cooling system using ACC. The only water in the system is contained in heat exchanger tubes and recirculated. Consequently, there is no water discharged from the system. System heat dissipation is described in Section 5.3.3 with further discussion of the differences between air cooled and water cooled technologies in Section 9.4.1.

5.3.1 Intake System

Cooling is provided via a dry cooling system (Section 3.4, Cooling System): therefore, no cooling water is required as a result of water loss through a wet cooled system. As described in Section 4.2.1, a new pump station and water intake structure on the GBRA Calhoun Canal provide water via Basin #5. This water supports LMGS operations including providing makeup water to its systems.

5.3.1.1 Hydrodynamic Descriptions and Physical Impacts

There is no cooling water intake system for LMGS; therefore, there are no impacts associated with hydrodynamic forces generated by water intake structures.

5.3.1.2 Aquatic Ecosystems

There is no water intake to or discharge from a cooling system other than the makeup water used for recirculated heat exchanger tubes which comes from the demineralized water treatment (DMNT) system. Impacts to the aquatic ecosystem from LMGS are described in Section 5.10.2.

5.3.1.3 Summary of Impacts of the Intake System

Based on the above analysis, impacts from the intake system are eliminated due to the use of dry cooling. As such, there are no impacts associated with the intake system.

5.3.2 Discharge System

The dry cooling system is described in Section 3.4, Cooling System. There is no water discharge from a cooling system and no potential impacts from cooling water discharges.

5.3.2.1 Thermal Description and Physical Impacts

There is no water discharge from a cooling system. Thus, there are no potential impacts from hydrothermal discharges and physical impacts from the plant cooling water discharge.

5.3.2.2 Aquatic Ecosystems

There is no water discharge from a cooling system and no associated effects on aquatic ecosystems. Other impacts to the aquatic ecosystem from LMGS are described in Section 5.10.2.

5.3.2.3 Summary of Impacts of the Discharge System

Based on the above analysis, impacts from the discharge system is eliminated due to the use of dry cooling. As such, there are no impacts associated with the discharge system.

5.3.3 Heat Discharge System

5.3.3.1 Heat Dissipation to the Atmosphere

LMGS uses a dry cooling system consisting of ACCs, which uses mechanical fans to move air over a system of finned heat exchanger tubes. Steam exhausted from the steam-turbine enters the top of an ACC and flows downward through the heat exchanger tubes. The cooling effect of ambient air drawn over the finned surface of the tubes by the fans causes steam to condense inside the tubes. Condensate drains from the fin tube heat exchangers into manifolds and then to a tank and piping that return the water to the condensate system. A more detailed description of the ACC system is provided in Section 3.4.1.

The dry cooling system is closed, retaining steam and condensate in the tubes and piping. Excess heat is dissipated through cooling fins as described above. This system is unlike a wet cooling system, which consists of a conventional steam condenser and mechanical draft cooling tower (MDCT). In MDCTs, cooling water is pumped from the conventional steam condenser to the cooling tower, where it falls through packing (fill) in the upper section of a cell against air blown upward by a fan. Excess heat in cooling water is transferred to the atmosphere by evaporation of cooling water. In addition to evaporative heat losses, water is lost in the form of droplets (drift). The droplets evaporate downwind, leaving dissolved solids as deposits. MDCTs may also affect nearby locations by producing aesthetic impacts, fogging, icing, plume shadowing, and ground-level relative humidity and temperature increases. By comparison, ACCs do not have the environmental impacts associated with MDCTs. Because ACCs do not produce particulate emissions, the impacts of ACCs on ambient air quality are inherently minor.

5.3.3.2 Terrestrial Ecosystems

As stated above, LMGS does not have a wet cooling water system; therefore, there are no impacts to terrestrial ecosystems from cooling tower deposition (e.g., salt, fogging, or icing) or the operation of cooling ponds, evaporation ponds, and other operational water features that may affect adjoining wetlands and other terrestrial habitats. Additionally, because LMGS does not have cooling towers (e.g., large natural draft cooling towers), there is no potential for injury to birds and bats colliding with tall structures associated with a cooling water system. ACC units are smaller in height and as such the risk of injury to birds and bats is minimal compared to natural draft cooling towers. Other impacts to the terrestrial ecosystem from LMGS are described in Section 5.10.1.

5.3.3.3 Summary of Impacts of the Heat Discharge System

Based on the above analysis, impacts of the heat discharge system are minimal due to the use of dry cooling. As such, impacts from the heat discharge system are SMALL.

5.3.4 Impacts to Members of the Public

This subsection describes two issues associated with the cooling system that have the potential to impact human health: propagation of etiologic agents (pathogenic microorganisms) and noise.

5.3.4.1 Impacts from Etiologic Agents (Microorganism)

As discussed in NUREG-1555, etiologic agents, including organisms formerly referred to as thermophilic microorganisms, can increase in frequency of occurrence and population size due to heat in aquatic systems. Etiologic agents can also resist moderately high temperatures long enough to be released into a cooler water body where they can reproduce. When such microorganisms are etiologic agents capable of causing human disease (pathogens), they can pose a risk to workers and the public from exposure. Potential pathways for exposure include thermal cooling system discharge or workers performing cooling tower maintenance.

LMGS does not use cooling towers or a discharge from a cooling system (Section 3.4, Cooling System) that would enhance the presence of thermophilic microorganisms; therefore, there are no associated impacts related to harboring or accelerating growth of etiologic agents.

5.3.4.2 Noise

NUREG-1555 notes that the principal sources of noise from nuclear power facility operations include cooling systems, such as natural draft cooling towers and MDCTs. As described above, a dry system provides cooling for LMGS. The main source of noise associated with this type of cooling system is the operation of the ACC fans.

The maximum noise level for an ACC sized to support a single Xe-100 reactor module is conservatively estimated to be 75 A-weighted decibels (dBA) at a distance of 328 ft. (100 m), including an added margin for uncertainty. Due to the logarithmic nature of the dBA scale, adding two identical sources of noise (doubling the signal) increases the total noise level by 3 dBA. Correspondingly, adding four identical sources of noise (quadrupling the signal) increases the total noise level by 6 dBA. Thus, the noise level for the operation of an ACC sized to support four Xe-100 reactor modules is 81 dBA or less at a distance of 328 ft. (100 m).

As described in Section 2.9.2, the nearest off-site noise-sensitive receptors in proximity to the LMGS site are residences located to the north, next to State Highway (SH) 35. The closest residence is approximately 0.87 mi (1.40 km) north of the NI/CI, which contain the ACCs, as depicted in Figure 3.1-3. The nearest recreational area is the Victoria Barge Canal, which serves as the western boundary of the Mission Lake Unit of the Guadalupe Delta WMA, located approximately 2.26 mi (3.64 km) west of LMGS at its closest point.

Assuming straight line noise attenuation, maximum noise levels from the ACC attenuate to 58.1 dBA at the closest residence. As noted in Section 2.9.2.2, EPA guidelines recommend outdoor noise levels do not exceed a day-night average community noise level (L_{dn}) of 55 dBA. While noise levels from the ACC slightly exceed the EPA's conservative recommendation for outdoor noise levels, they are below the baseline ambient noise levels for this area (represented by noise monitoring location [NM] 8), where the equivalent sound level (L_{eq}) ranged from 62.3 to 74.4 dBA. Table 2.9-2 provides the details of the ambient noise monitoring results for each monitoring location. Thus, ACC noise is minimally perceptible to the nearest residents. Noise from operation of the ACC is negligible at the nearest recreational areas, attenuating to 49.8 dBA or lower at the Victoria Barge Canal.

Noise levels from the ACC are below the existing background noise levels at the nearest sensitive receptors. As reported in NUREG-1437 and referenced in NUREG-1555, noise levels below 60 to 65 dBA are considered of small significance. In addition, as described in Section 2.9.2.2, there are no municipal, county, or state regulations that establish quantitative noise level limits applicable to the LMGS site. Thus, impacts from cooling system noise are SMALL and do not require mitigation or implementation of noise abatement strategies.

5.3.4.3 Summary of Impacts to Members of the Public

Based on the above analysis, impacts from etiologic agents and noise on the public is minimized due to the use of dry cooling and the attenuation of noise levels at potential sensitive receptors. As such, impacts to members of the public are SMALL.

Tables

None

Figures

None

5.4 Radiological Impacts of Normal Operation

This section describes the radiological impacts of normal plant operation on members of the public, plant workers, and biota. Section 5.4.1 describes the exposure pathways by which radiation and radioactive effluents could be transmitted from the LMGS to organisms occupying areas near the plant. Section 5.4.2 estimates the doses to members of the public. Section 5.4.3 evaluates the effects of these doses by comparing them to regulatory limits. Section 5.4.4 considers the effect to nonhuman biota. Section 5.4.5 discusses occupational doses.

5.4.1 Exposure Pathways

A radiological exposure pathway is the vehicle by which a receptor may become exposed to radiological releases from nuclear facilities. The major pathways of concern are those that cause the highest calculated radiological dose. These pathways are determined from the type and amount of radioactivity released, the environmental transport mechanism, and how the station environs are used (e.g., residence, gardens). The environmental transport mechanism includes the historical meteorological characteristics of the area that are defined by wind speed and wind direction. This information is used to evaluate how the radionuclides are distributed within the surrounding area. The most important factor in evaluating the exposure pathway is the use of the environment by the residents in the area around LMGS. Factors such as location of homes, use of cattle for milk, and presence of gardens for vegetable consumption are considerations when evaluating exposure pathways.

Routine radiological effluent releases are a potential source of radiological exposure to humans and biota. Normal effluent releases from LMGS are entirely gaseous with no radioactive effluent released in liquid waste streams. The radioactive gaseous effluent exposure pathways include direct radiation from the NI, deposition on plants and soil, inhalation, and ingestion by humans and biota.

5.4.1.1 Liquid Pathways

LMGS does not release radiological liquid effluents to the environment. Thus, there are no expected liquid pathways by which the public and biota may be exposed.

5.4.1.2 Gaseous Pathways

The GASPAR II module of the NRCDose computer code implements methodology discussed in Regulatory Guide 1.109 to estimate doses from gaseous effluents from LMGS. The code calculates the radiation exposure to people through the following potential pathways:

- External exposure to airborne radioactivity
- External exposure to deposited activity on the ground
- Inhalation of airborne radioactivity
- Ingestion of contaminated agricultural products

Table 5.4-1 presents an overview of the gaseous pathway parameters used by GASPAR II to calculate doses for both the population (Table 5.4-2) and for the LMGS off-site receptor locations (Table 5.4-3). It is conservatively assumed that food production rates within 50 miles (mi) (80 kilometers [km]) of LMGS are equal to the food consumption rates of the population within 50 mi (80 km) of the site (Table 5.4-4). This analysis employs the GASPAR II default food consumption rates and uses the maximum value for each pathway (i.e., type of consumer and food). Because dose contributions from goat milk are higher than those for cow milk, goat milk is used for calculating the total organ dose for the ingestion exposure pathway.

The 2017 through 2021 data from the South Texas Project (STP) meteorological tower, described in Section 2.7.3, along with the Regulatory Guide 1.111 methodology implemented in the XOQDOQ computer code, is used to determine atmospheric dispersion (X/Q) and ground deposition (D/Q) factors for LMGS. The resulting factors presented in Table 5.4-3 and Table 5.4-5 through Table 5.4-13 are used as input to GASPAR II. Additionally, the site boundary is conservatively assumed to be 1312 ft (400 m) from the release point in all sectors.

The gaseous effluent source term is from the combination of tritium (from tritium production and evaporation from the Reactor Cavity Cooling System [RCCS]) and a release fraction (via leakage) of the steady state radionuclide inventory inside the Helium Pressure Boundary (HPB). The associated source term for the gaseous releases from four modules is provided in Table 5.4-14.

5.4.1.3 Direct Radiation

While humans and biota may be exposed to direct radiation from the NI, the direct radiation shine from plant buildings is not considered significant. This is a reasonable assumption considering that the annual direct radiation dose contribution at the site boundary of a typical commercial nuclear pressurized water reactor power plant is in the range of natural background.

Additionally, the Protected Area Boundary (PAB), which is defined based on the dose limit, mitigates impacts of direct radiation from the NI by mandating distance that must separate members of the public and plant buildings that may contribute to direct radiation exposure.

5.4.2 Radiation Doses to Members of the Public

This subsection provides an evaluation of the calculated doses to the maximally exposed individual (MEI) (located at the site boundary), other sensitive receptor locations (Table 5.4-3), and to the overall population from gaseous effluents from LMGS using the methodologies and parameters specified in Section 5.4.1. Figure 5.4-1 shows off-site receptor locations relative to LMGS.

5.4.2.1 Gaseous Pathways Doses

Table 5.4-15 provides the estimated whole body and critical organ doses to the MEI at the site boundary for the identified gaseous effluent pathways. Table 5.4-16 through Table 5.4-21 provide the estimated whole body and critical organ doses to the off-site receptor locations in Table 5.4-3.

The population dose from gaseous effluents to individuals living within a 50 mi (80 km) radius of LMGS is also calculated. For these doses, the population data is projected to the year 2070. The population dose for the various pathways is provided in Table 5.4-22.

5.4.3 Impacts to Members of The Public

The radiological effects on individuals and population groups from gaseous effluents are presented using the methodologies and parameters specified in Section 5.4.1. The MEI and nearest resident doses calculated from the gaseous effluents are compared to 40 CFR 190, the EPA limits on dose to the public, as shown in Table 5.4-24. Additionally, the MEI dose and nearest resident dose calculated from gaseous effluents are compared to 10 CFR 20.1301 criteria as shown in Table 5.4-23. The annual dose to the MEI and nearest resident is estimated by summing the total body external dose and total body internal dose. Table 5.4-23 also shows that LMGS satisfies the 2 millirem (mrem) dose limit in any unrestricted area during any one hour. This dose is obtained by dividing the sum of the annual total body plume dose and total body ground external dose from Table 5.4-15 by the number of hours in a year (i.e., 8760).

Population dose resulting from natural background radiation to individuals living within a 50 mi (80 km) radius of LMGS is presented in Table 5.4-25. Comparing this value to those in Table 5.4-22 demonstrates that the calculated person-roentgen equivalent man (rem)/year (yr) exposure from the plant is much less than the estimated person-rem/yr exposure from natural background radiation.

Based on the above discussion, impacts on radiological health for members of the public from operation of LMGS are SMALL.

5.4.4 Impacts on Biota Other than Members of the Public

Radiation exposure pathways to non-human biota are examined to determine if the pathways could result in doses to biota greater than those predicted for humans. This assessment uses surrogate species that provide representative information on the various dose pathways potentially affecting broader classes of living organisms. Surrogates are typically used for judging doses to biota because important attributes are well defined and accepted. This assessment uses pathway models adopted from Regulatory Guide 1.109.

5.4.4.1 Doses to Nonhuman Biota

5.4.4.1.1 Liquid Effluents

Pathways by which liquid effluents can irradiate biota include:

- Ingestion of water
- Ingestion of aquatic foods including fish, invertebrates, and aquatic plants
- External exposure from water immersion and shoreline sediments

No exposure occurs through these pathways because LMGS does not discharge radiological liquid effluents. Thus, only terrestrial biota requires consideration for gaseous effluents.

5.4.4.1.2 Gaseous Effluents

Biota doses from gaseous effluents are determined using the site boundary doses from Table 5.4-15. This results in the dose to the maximally exposed animal. Surrogates for terrestrial biota include muskrat, raccoon, heron, and duck. Pathways of irradiation include:

- External exposure to immersion in gaseous effluent plumes
- Surface exposure from deposition of iodine and particulates from gaseous effluents
- Inhalation of gaseous effluents
- Ingestion of terrestrial vegetation and organisms

Because doses from immersion in plume and ground deposition are largely independent of organism size, the doses for humans can also be applied to the surrogate terrestrial animals. The human ground plane doses are increased by a factor of two for animals to account for their closer proximity to the ground. This assumption is based on the approach for biota used in NUREG/CR-4013, LADTAP II Technical Reference and User Guide. Inhalation and vegetation ingestion doses are approximated by human doses as well. The total body inhalation dose and total body vegetation ingestion dose, rather than organ specific dose, are used because the biota doses are assessed on a total body basis. Based on these assumptions, all species have the same exposure.

5.4.4.1.3 Biota Doses

Table 5.4-26 presents the calculated maximum biota doses. The total maximum biota dose of 1.60E-01 mrem/yr is below the 25 mrem/yr whole-body limit prescribed by 40 CFR 190.

The International Council of Radiation Protection publication 26 states that "… if man is adequately protected then other living things are also likely to be sufficiently protected," and uses human protection to infer environmental protection from the effects of ionizing radiation (ICRP, 1977). This assumption is appropriate in cases where humans and other biota inhabit the same environment and have common routes of exposure. Species in most ecosystems experience dramatically higher mortality rates from natural cause than humans. From an ecological viewpoint, population stability is considered more important to the survival of the species than the survival of individual organisms.

Additionally, Section 5.4.4 of NUREG-1555 indicates that no other living organisms have been identified that are likely to be significantly more radiosensitive than members of the public. There is no convincing evidence from scientific literature that chronic radiation dose rates below 100 millirad (mrad)/yr harm animal or plant populations. Limiting exposure for humans to 100 mrem/yr leads to dose rates for plants and animals of less than 100 mrad/yr.

Furthermore, because this analysis applies to the maximally exposed animal, the dose to the average animal is expected to be less than the maximum dose. As such, dose impacts to biota are expected to be SMALL.

5.4.5 Occupational Doses to Workers

The annual occupational dose to operational workers, including major maintenance activities, will be provided in the Operating License Application (OLA). This dose will comply with 10 CFR 20.

Tables

Table 5.4-1: Gaseous Pathways Parameters

Description	Value
Population Data	Table 5.4-2
Nearest Resident Data	Table 5.4-3
Milk Production	Table 5.4-4
Vegetable Production	Table 5.4-4
Meat Production	Table 5.4-4
Annual Average (X/Q)	Table 5.4-3, Table 5.4-5, and Table 5.4-7
Annual Average (D/Q)	Table 5.4-3, Table 5.4-5, and Table 5.4-12
Annual Average Decayed (2.26-day) (X/Q)	Table 5.4-3, Table 5.4-5, and Table 5.4-8
Annual Average Depleted and Decayed (8-day) (X/Q)	Table 5.4-3, Table 5.4-5, and Table 5.4-10
Fraction of the year leafy vegetables are grown	1
Fraction of the year milk cows are on pasture	1
Fraction of the milk-cow feed intake from pasture while on pasture	1
Fraction of the maximum individual’s vegetable intake from own garden	0.76
Fraction of the year goats are pasture	1
Fraction of goat-feed intake that is from pasture while on pasture	1
Fraction of the year beef cattle are on pasture	1
Fraction of the beef cattle feed intake from pasture while on pasture	1
Average absolute humidity over the growing season (g/m^3)	8
Abbreviations: X/Q = dispersion factor; D/Q = deposition factor; g/m^3 = grams per cubic meter	

Table 5.4-2: Total Population (50 Mi. Radius) 2070

Compass Direction Sector	Distance (mi)									
	0-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
N	5	10	20	28	35	256	989	3087	3444	1266
NNE	5	12	21	28	35	460	1130	2354	4913	2281
NE	5	11	21	28	521	7305	8317	960	1694	2085
ENE	5	11	20	26	32	2675	1887	525	4459	1078
E	5	10	19	26	32	285	2543	635	343	212
ESE	5	10	16	24	30	186	2812	415	0	0
SE	5	10	15	20	25	143	123	43	0	0
SSE	5	10	15	20	22	1640	217	39	0	0
S	5	10	8	4	4	37	123	161	24	0
SSW	5	364	2	3	4	21	240	615	17,559	16,463
SW	5	3	2	3	4	21	77	200	1334	1544
WSW	5	32	2	3	4	222	77	182	3133	895
W	5	4	2	3	4	97	514	468	363	759
WNW	5	10	8	10	4	57	763	2009	3049	1867
NW	5	10	20	27	81	1162	6861	51,573	6466	4566
NNW	84	10	20	28	35	267	2300	39,570	3228	2962

Note:Total population within 50 miles – 234,680

Abbreviations: mi = mile; E = east; ENE = east-northeast; ESE = east-southeast; N = north; NE = northeast; NNE = north-northeast; NNW = north-northwest; NW = northwest; S = south; SE = southeast; SSE = south-southeast; SSW = south-southwest; SW = southwest; W = west; WNW = west-northwest; WSW = west-southwest

Table 5.4-3: Off-Site Receptor X/Q and D/Q Factors

Location	Sector	Distance (m)	X/Q (s/m^3)			D/Q ($1/m^2$)
			No Decay Undepleted	2.26-day Decay Undepleted	8-day Decay Depleted	
Residence	NNW	1400	6.40E-06	6.20E-06	5.60E-06	3.90E-08
Vegetable Garden	NW	2558	2.20E-06	2.10E-06	1.90E-06	8.80E-09
Cattle Farm 1	NE	5408	4.70E-08	4.20E-08	3.50E-08	1.70E-10
Cattle Farm 2	NW	5310	4.90E-07	4.50E-07	3.70E-07	1.60E-09
Cattle Farm 3	S	5780	2.70E-07	2.30E-07	2.00E-07	6.00E-10
Cattle Farm 4	E	8352	4.10E-08	3.30E-08	2.80E-08	4.10E-11

Abbreviations: X/Q = dispersion factor; D/Q = deposition factor; m = meter; s/m^3 = seconds per cubic meter; m^2 = square meter; NNW = north-northwest; NW = northwest; NE = northeast; S = south; E = east

Table 5.4-4: Long Mott Generating Station Food Production Rates

Food Type		Maximum Individual Consumption Rates	Annual Production Rates[a]
Milk	L/yr	400	9.39E+07
Meat	kg/yr	110	2.58E+07
Total Vegetables	kg/yr	694	1.63E+08
Vegetables	kg/yr	630	
Leafy Vegetables	kg/yr	64	

Note:
a) Annual production rate = individual consumption rate (kg/yr or L/yr) times the population within a 50 mile radius (i.e., 234,680)
Abbreviations: L/yr = liter per year; kg/yr = kilograms per year

Table 5.4-5: Long Mott Generating Station Site Boundary X/Q and D/Q Factors

Sector	Distance(a) (m)	X/Q (s/m^3)			D/Q ($1/m^2$)
		No Decay Undepleted	2.26-day Decay Undepleted	8-day Decay Depleted	
S	400	5.40E-05	5.40E-05	5.10E-05	1.60E-07
SSW	400	8.40E-05	8.30E-05	7.90E-05	1.70E-07
SW	400	**1.00E-04**	**1.00E-04**	**9.70E-05**	1.50E-07
WSW	400	8.80E-05	8.70E-05	8.30E-05	1.30E-07
W	400	7.60E-05	7.60E-05	7.20E-05	1.40E-07
WNW	400	8.60E-05	8.50E-05	8.10E-05	1.90E-07
NW	400	8.70E-05	8.70E-05	8.30E-05	**3.50E-07**
NNW	400	6.10E-05	6.00E-05	5.70E-05	3.30E-07
N	400	3.90E-05	3.90E-05	3.70E-05	2.60E-07
NNE	400	2.00E-05	2.00E-05	1.90E-05	9.70E-08
NE	400	9.30E-06	9.20E-06	8.80E-06	3.90E-08
ENE	400	8.30E-06	8.20E-06	7.90E-06	1.90E-08
E	400	1.60E-05	1.60E-05	1.50E-05	2.50E-08
ESE	400	2.90E-05	2.90E-05	2.80E-05	4.20E-08
SE	400	3.60E-05	3.50E-05	3.40E-05	7.50E-08
SSE	400	4.70E-05	4.60E-05	4.40E-05	1.50E-07

Note: Shaded values are bounding

a) Distance is from the release envelope enclosing the reactor building (RB), helium service building (HSF), and fuel handling annex building (FHAB)

Abbreviations: X/Q = dispersion factor; D/Q = deposition factor; m = meter; s/m^3 = seconds per cubic meter; m^2 = square meter; E = east; ENE = east-northeast; ESE = east-southeast; N = north; NE = northeast; NNE = north-northeast; NNW = north-northwest; NW = northwest; S = south; SE = southeast; SSE = south-southeast; SSW = south-southwest; SW = southwest; W = west; WNW = west-northwest; WSW = west-southwest

Table 5.4-6: Segmented General X/Q Factors for No Decay, No Depletion Case (s/m^3)

Sector	Segmented Distance from Facility (mi)									
	.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	8.703E-06	1.873E-06	5.648E-07	2.862E-07	1.792E-07	8.105E-08	3.031E-08	1.550E-08	1.009E-08	7.349E-09
SSW	1.356E-05	2.937E-06	8.926E-07	4.549E-07	2.859E-07	1.302E-07	4.922E-08	2.537E-08	1.659E-08	1.212E-08
SW	1.680E-05	3.646E-06	1.112E-06	5.679E-07	3.575E-07	1.633E-07	6.203E-08	3.209E-08	2.103E-08	1.539E-08
WSW	1.434E-05	3.107E-06	9.457E-07	4.824E-07	3.034E-07	1.384E-07	5.241E-08	2.706E-08	1.770E-08	1.295E-08
W	1.238E-05	2.678E-06	8.133E-07	4.143E-07	2.603E-07	1.185E-07	4.473E-08	2.303E-08	1.504E-08	1.099E-08
WNW	1.379E-05	2.978E-06	9.027E-07	4.592E-07	2.882E-07	1.310E-07	4.933E-08	2.535E-08	1.654E-08	1.207E-08
NW	1.372E-05	2.933E-06	8.769E-07	4.420E-07	2.756E-07	1.238E-07	4.575E-08	2.317E-08	1.498E-08	1.086E-08
NNW	9.226E-06	1.946E-06	5.707E-07	2.840E-07	1.752E-07	7.733E-08	2.771E-08	1.369E-08	8.709E-09	6.239E-09
N	5.783E-06	1.206E-06	3.499E-07	1.729E-07	1.061E-07	4.646E-08	1.645E-08	8.061E-09	5.106E-09	3.646E-09
NNE	2.926E-06	6.130E-07	1.789E-07	8.873E-08	5.463E-08	2.404E-08	8.590E-09	4.240E-09	2.698E-09	1.933E-09
NE	1.410E-06	2.973E-07	8.754E-08	4.368E-08	2.703E-08	1.199E-08	4.349E-09	2.175E-09	1.396E-09	1.006E-09
ENE	1.303E-06	2.778E-07	8.272E-08	4.158E-08	2.586E-08	1.157E-08	4.250E-09	2.143E-09	1.382E-09	1.000E-09
E	2.546E-06	5.488E-07	1.659E-07	8.424E-08	5.281E-08	2.395E-08	8.995E-09	4.614E-09	3.008E-09	2.194E-09
ESE	4.772E-06	1.033E-06	3.141E-07	1.601E-07	1.006E-07	4.587E-08	1.736E-08	8.963E-09	5.865E-09	4.290E-09
SE	5.779E-06	1.249E-06	3.789E-07	1.929E-07	1.211E-07	5.513E-08	2.081E-08	1.072E-08	7.006E-09	5.119E-09
SSE	7.449E-06	1.601E-06	4.816E-07	2.438E-07	1.524E-07	6.885E-08	2.568E-08	1.311E-08	8.518E-09	6.199E-09

Abbreviations: X/Q = dispersion factor; s/m^3 = seconds per cubic meter; mi = mile; E = east; ENE = east-northeast; ESE = east-southeast; N = north; NE = northeast; NNE = north-northeast; NNW = north-northwest; NW = northwest; S = south; SE = southeast; SSE = south-southeast; SSW = south-southwest; SW = southwest; W = west; WNW = west-northwest; WSW = west-southwest

Table 5.4-7: General X/Q Factors for No Decay, No Depletion Case (s/m^3)

Distance from Facility (mi)	Sector															
	S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE
0.25	5.40E-05	8.29E-05	1.02E-04	8.73E-05	7.57E-05	8.47E-05	8.66E-05	6.01E-05	3.90E-05	1.95E-05	9.24E-06	8.26E-06	1.57E-05	2.92E-05	3.55E-05	4.64E-05
0.5	1.75E-05	2.72E-05	3.37E-05	2.88E-05	2.49E-05	2.77E-05	2.77E-05	1.86E-05	1.18E-05	5.93E-06	2.86E-06	2.63E-06	5.12E-06	9.59E-06	1.16E-05	1.50E-05
0.75	8.77E-06	1.37E-05	1.69E-05	1.45E-05	1.25E-05	1.39E-05	1.38E-05	9.30E-06	5.82E-06	2.95E-06	1.42E-06	1.31E-06	2.57E-06	4.81E-06	5.83E-06	7.51E-06
1	4.25E-06	6.64E-06	8.24E-06	7.02E-06	6.06E-06	6.74E-06	6.68E-06	4.46E-06	2.78E-06	1.41E-06	6.81E-07	6.33E-07	1.24E-06	2.34E-06	2.83E-06	3.63E-06
1.5	1.63E-06	2.56E-06	3.18E-06	2.71E-06	2.33E-06	2.60E-06	2.55E-06	1.68E-06	1.04E-06	5.30E-07	2.58E-07	2.41E-07	4.78E-07	9.01E-07	1.09E-06	1.39E-06
2	8.67E-07	1.37E-06	1.70E-06	1.45E-06	1.25E-06	1.38E-06	1.35E-06	8.84E-07	5.44E-07	2.78E-07	1.35E-07	1.28E-07	2.55E-07	4.81E-07	5.81E-07	7.40E-07
2.5	5.45E-07	8.62E-07	1.08E-06	9.14E-07	7.86E-07	8.72E-07	8.46E-07	5.50E-07	3.37E-07	1.72E-07	8.44E-08	7.98E-08	1.60E-07	3.03E-07	3.66E-07	4.65E-07
3	3.79E-07	6.02E-07	7.50E-07	6.38E-07	5.48E-07	6.08E-07	5.87E-07	3.79E-07	2.31E-07	1.19E-07	5.82E-08	5.53E-08	1.12E-07	2.12E-07	2.55E-07	3.23E-07
3.5	2.82E-07	4.49E-07	5.60E-07	4.76E-07	4.08E-07	4.53E-07	4.36E-07	2.80E-07	1.70E-07	8.74E-08	4.30E-08	4.10E-08	8.30E-08	1.58E-07	1.90E-07	2.40E-07
4	2.20E-07	3.51E-07	4.38E-07	3.72E-07	3.19E-07	3.54E-07	3.39E-07	2.17E-07	1.31E-07	6.76E-08	3.34E-08	3.19E-08	6.48E-08	1.23E-07	1.49E-07	1.87E-07
4.5	1.78E-07	2.84E-07	3.55E-07	3.01E-07	2.58E-07	2.86E-07	2.73E-07	1.74E-07	1.05E-07	5.42E-08	2.68E-08	2.57E-08	5.24E-08	9.99E-08	1.20E-07	1.51E-07
5	1.48E-07	2.36E-07	2.95E-07	2.51E-07	2.15E-07	2.38E-07	2.27E-07	1.44E-07	8.67E-08	4.47E-08	2.22E-08	2.13E-08	4.36E-08	8.31E-08	1.00E-07	1.26E-07
7.5	7.71E-08	1.24E-07	1.56E-07	1.32E-07	1.13E-07	1.25E-07	1.18E-07	7.32E-08	4.39E-08	2.28E-08	1.14E-08	1.10E-08	2.28E-08	4.37E-08	5.25E-08	6.55E-08
10	5.07E-08	8.19E-08	1.03E-07	8.72E-08	7.45E-08	8.23E-08	7.70E-08	4.73E-08	2.82E-08	1.47E-08	7.38E-09	7.17E-09	1.50E-08	2.89E-08	3.47E-08	4.30E-08
15	2.98E-08	4.84E-08	6.10E-08	5.15E-08	4.40E-08	4.85E-08	4.49E-08	2.71E-08	1.61E-08	8.40E-09	4.26E-09	4.17E-09	8.84E-09	1.71E-08	2.05E-08	2.52E-08
20	2.05E-08	3.35E-08	4.23E-08	3.57E-08	3.04E-08	3.35E-08	3.08E-08	1.84E-08	1.08E-08	5.69E-09	2.90E-09	2.85E-09	6.10E-09	1.18E-08	1.42E-08	1.74E-08
25	1.54E-08	2.52E-08	3.19E-08	2.69E-08	2.29E-08	2.52E-08	2.30E-08	1.36E-08	8.00E-09	4.21E-09	2.16E-09	2.13E-09	4.59E-09	8.92E-09	1.07E-08	1.30E-08
30	1.22E-08	2.01E-08	2.54E-08	2.14E-08	1.82E-08	2.00E-08	1.82E-08	1.07E-08	6.26E-09	3.30E-09	1.70E-09	1.68E-09	3.64E-09	7.09E-09	8.48E-09	1.03E-08
35	1.01E-08	1.66E-08	2.10E-08	1.77E-08	1.50E-08	1.65E-08	1.49E-08	8.68E-09	5.09E-09	2.69E-09	1.39E-09	1.38E-09	3.00E-09	5.85E-09	6.99E-09	8.50E-09
40	8.51E-09	1.40E-08	1.78E-08	1.50E-08	1.27E-08	1.40E-08	1.26E-08	7.27E-09	4.26E-09	2.25E-09	1.17E-09	1.16E-09	2.54E-09	4.96E-09	5.92E-09	7.18E-09
45	7.34E-09	1.21E-08	1.54E-08	1.29E-08	1.10E-08	1.21E-08	1.08E-08	6.23E-09	3.64E-09	1.93E-09	1.01E-09	9.99E-10	2.19E-09	4.28E-09	5.11E-09	6.19E-09
50	6.43E-09	1.06E-08	1.35E-08	1.14E-08	9.63E-09	1.06E-08	9.49E-09	5.42E-09	3.16E-09	1.68E-09	8.77E-10	8.73E-10	1.92E-09	3.76E-09	4.49E-09	5.42E-09

Abbreviations: X/Q = dispersion factor; s/m^3 = seconds per cubic meter; mi = mile; E = east; ENE = east-northeast; ESE = east-southeast; N = north; NE = northeast; NNE = north-northeast; NNW = north-northwest; NW = northwest; S = south; SE = southeast; SSE = south-southeast; SSW = south-southwest; SW = southwest; W = west; WNW = west-northwest; WSW = west-southwest

Table 5.4-8: Segmented General X/Q Factors for 2.26-Day Decay, No Depletion Case (s/m^3)

Sector	Segmented Distance from Facility (mi)									
	.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	8.411E-06	1.760E-06	5.090E-07	2.497E-07	1.522E-07	6.568E-08	2.280E-08	1.096E-08	6.777E-09	4.697E-09
SSW	1.313E-05	2.765E-06	8.080E-07	3.992E-07	2.446E-07	1.065E-07	3.748E-08	1.818E-08	1.129E-08	7.851E-09
SW	1.616E-05	3.398E-06	9.897E-07	4.876E-07	2.980E-07	1.293E-07	4.527E-08	2.190E-08	1.356E-08	9.398E-09
WSW	1.383E-05	2.909E-06	8.482E-07	4.182E-07	2.558E-07	1.110E-07	3.882E-08	1.872E-08	1.155E-08	7.982E-09
W	1.200E-05	2.529E-06	7.397E-07	3.658E-07	2.243E-07	9.775E-08	3.437E-08	1.663E-08	1.030E-08	7.141E-09
WNW	1.336E-05	2.811E-06	8.200E-07	4.047E-07	2.478E-07	1.077E-07	3.769E-08	1.817E-08	1.123E-08	7.770E-09
NW	1.342E-05	2.816E-06	8.195E-07	4.044E-07	2.477E-07	1.078E-07	3.779E-08	1.825E-08	1.132E-08	7.883E-09
NNW	9.074E-06	1.887E-06	5.427E-07	2.659E-07	1.620E-07	6.989E-08	2.413E-08	1.153E-08	7.127E-09	4.964E-09
N	5.715E-06	1.179E-06	3.373E-07	1.647E-07	1.001E-07	4.307E-08	1.478E-08	7.029E-09	4.337E-09	3.019E-09
NNE	2.867E-06	5.903E-07	1.680E-07	8.166E-08	4.946E-08	2.115E-08	7.203E-09	3.412E-09	2.097E-09	1.453E-09
NE	1.371E-06	2.822E-07	8.027E-08	3.896E-08	2.356E-08	1.005E-08	3.417E-09	1.621E-09	9.954E-10	6.880E-10
ENE	1.253E-06	2.588E-07	7.355E-08	3.565E-08	2.153E-08	9.160E-09	3.117E-09	1.483E-09	9.117E-10	6.299E-10
E	2.440E-06	5.079E-07	1.460E-07	7.131E-08	4.330E-08	1.860E-08	6.428E-09	3.093E-09	1.912E-09	1.324E-09
ESE	4.599E-06	9.653E-07	2.809E-07	1.383E-07	8.455E-08	3.669E-08	1.286E-08	6.234E-09	3.868E-09	2.686E-09
SE	5.574E-06	1.169E-06	3.398E-07	1.673E-07	1.022E-07	4.435E-08	1.556E-08	7.547E-09	4.690E-09	3.263E-09
SSE	7.220E-06	1.511E-06	4.380E-07	2.152E-07	1.314E-07	5.686E-08	1.982E-08	9.559E-09	5.923E-09	4.115E-09

Abbreviations: X/Q = dispersion factor; s/m3 = seconds per cubic meter; mi = mile; E = east; ENE = east-northeast; ESE = east-southeast; N = north; NE = northeast; NNE = north-northeast; NNW = north-northwest; NW = northwest; S = south; SE = southeast; SSE = south-southeast; SSW = south-southwest; SW = southwest; W = west; WNW = west-northwest; WSW = west-southwest

Table 5.4-9: General X/Q Factors for 2.26-Day Decay, No Depletion Case (s/m^3)

Distance from Facility (mi)	Sector															
	S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE
0.25	5.33E-05	8.19E-05	1.00E-04	8.62E-05	7.49E-05	8.38E-05	8.59E-05	5.97E-05	3.88E-05	1.93E-05	9.14E-06	8.14E-06	1.55E-05	2.88E-05	3.50E-05	4.59E-05
0.5	1.71E-05	2.66E-05	3.28E-05	2.80E-05	2.43E-05	2.71E-05	2.72E-05	1.84E-05	1.17E-05	5.85E-06	2.80E-06	2.55E-06	4.96E-06	9.33E-06	1.13E-05	1.47E-05
0.75	8.45E-06	1.32E-05	1.62E-05	1.39E-05	1.21E-05	1.34E-05	1.35E-05	9.14E-06	5.74E-06	2.88E-06	1.38E-06	1.26E-06	2.45E-06	4.62E-06	5.60E-06	7.26E-06
1	4.05E-06	6.34E-06	7.80E-06	6.68E-06	5.80E-06	6.45E-06	6.47E-06	4.36E-06	2.73E-06	1.37E-06	6.54E-07	5.99E-07	1.17E-06	2.22E-06	2.69E-06	3.48E-06
1.5	1.52E-06	2.40E-06	2.94E-06	2.52E-06	2.19E-06	2.43E-06	2.44E-06	1.63E-06	1.02E-06	5.08E-07	2.43E-07	2.23E-07	4.39E-07	8.35E-07	1.01E-06	1.31E-06
2	7.93E-07	1.26E-06	1.54E-06	1.32E-06	1.15E-06	1.27E-06	1.27E-06	8.47E-07	5.27E-07	2.63E-07	1.26E-07	1.15E-07	2.28E-07	4.37E-07	5.29E-07	6.82E-07
2.5	4.90E-07	7.78E-07	9.53E-07	8.17E-07	7.13E-07	7.90E-07	7.89E-07	5.22E-07	3.24E-07	1.62E-07	7.72E-08	7.07E-08	1.41E-07	2.71E-07	3.27E-07	4.22E-07
3	3.35E-07	5.35E-07	6.54E-07	5.61E-07	4.90E-07	5.42E-07	5.42E-07	3.57E-07	2.22E-07	1.10E-07	5.25E-08	4.81E-08	9.59E-08	1.86E-07	2.24E-07	2.89E-07
3.5	2.46E-07	3.93E-07	4.80E-07	4.12E-07	3.60E-07	3.98E-07	3.98E-07	2.62E-07	1.62E-07	8.03E-08	3.83E-08	3.51E-08	7.01E-08	1.36E-07	1.65E-07	2.12E-07
4	1.89E-07	3.03E-07	3.70E-07	3.17E-07	2.78E-07	3.07E-07	3.07E-07	2.01E-07	1.25E-07	6.16E-08	2.94E-08	2.68E-08	5.39E-08	1.05E-07	1.27E-07	1.63E-07
4.5	1.51E-07	2.43E-07	2.96E-07	2.54E-07	2.22E-07	2.46E-07	2.46E-07	1.61E-07	9.92E-08	4.90E-08	2.34E-08	2.13E-08	4.29E-08	8.38E-08	1.01E-07	1.30E-07
5	1.24E-07	2.00E-07	2.43E-07	2.09E-07	1.83E-07	2.02E-07	2.02E-07	1.32E-07	8.14E-08	4.02E-08	1.91E-08	1.75E-08	3.52E-08	6.89E-08	8.33E-08	1.07E-07
7.5	6.19E-08	1.01E-07	1.22E-07	1.05E-07	9.23E-08	1.02E-07	1.02E-07	6.59E-08	4.06E-08	1.99E-08	9.44E-09	8.60E-09	1.75E-08	3.46E-08	4.18E-08	5.36E-08
10	3.95E-08	6.45E-08	7.80E-08	6.70E-08	5.92E-08	6.51E-08	6.52E-08	4.19E-08	2.58E-08	1.26E-08	5.97E-09	5.44E-09	1.11E-08	2.22E-08	2.68E-08	3.43E-08
15	2.22E-08	3.66E-08	4.42E-08	3.79E-08	3.36E-08	3.68E-08	3.69E-08	2.35E-08	1.44E-08	7.01E-09	3.33E-09	3.03E-09	6.27E-09	1.26E-08	1.52E-08	1.94E-08
20	1.49E-08	2.46E-08	2.97E-08	2.54E-08	2.25E-08	2.47E-08	2.47E-08	1.57E-08	9.57E-09	4.65E-09	2.21E-09	2.02E-09	4.20E-09	8.44E-09	1.02E-08	1.30E-08
25	1.09E-08	1.81E-08	2.18E-08	1.86E-08	1.65E-08	1.81E-08	1.81E-08	1.14E-08	6.97E-09	3.39E-09	1.61E-09	1.47E-09	3.07E-09	6.19E-09	7.50E-09	9.49E-09
30	8.42E-09	1.40E-08	1.68E-08	1.44E-08	1.28E-08	1.40E-08	1.40E-08	8.84E-09	5.38E-09	2.61E-09	1.24E-09	1.13E-09	2.38E-09	4.80E-09	5.81E-09	7.35E-09
35	6.75E-09	1.13E-08	1.35E-08	1.15E-08	1.03E-08	1.12E-08	1.13E-08	7.10E-09	4.32E-09	2.09E-09	9.92E-10	9.08E-10	1.91E-09	3.86E-09	4.68E-09	5.90E-09
40	5.57E-09	9.30E-09	1.12E-08	9.48E-09	8.47E-09	9.22E-09	9.32E-09	5.87E-09	3.57E-09	1.72E-09	8.16E-10	7.48E-10	1.57E-09	3.18E-09	3.86E-09	4.87E-09
45	4.69E-09	7.84E-09	9.38E-09	7.97E-09	7.13E-09	7.75E-09	7.87E-09	4.95E-09	3.01E-09	1.45E-09	6.86E-10	6.28E-10	1.32E-09	2.68E-09	3.26E-09	4.11E-09
50	4.01E-09	6.71E-09	8.02E-09	6.80E-09	6.10E-09	6.63E-09	6.75E-09	4.25E-09	2.59E-09	1.24E-09	5.87E-10	5.37E-10	1.13E-09	2.29E-09	2.79E-09	3.52E-09

Abbreviations: X/Q = dispersion factor; s/m^3 = seconds per cubic meter; mi = mile; E = east; ENE = east-northeast; ESE = east-southeast; N = north; NE = northeast; NNE = north-northeast; NNW = north-northwest; NW = northwest; S = south; SE = southeast; SSE = south-southeast; SSW = south-southwest; SW = southwest; W = west; WNW = west-northwest; WSW = west-southwest

Table 5.4-10: Segmented General X/Q Factors for 8-Day Decay, Depletion Case (s/m^3)

Sector	Segmented Distance from Facility (mi)									
	.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	7.733E-06	1.577E-06	4.438E-07	2.133E-07	1.276E-07	5.275E-08	1.635E-08	6.951E-09	3.965E-09	2.599E-09
SSW	1.206E-05	2.473E-06	7.023E-07	3.397E-07	2.042E-07	8.510E-08	2.676E-08	1.151E-08	6.608E-09	4.352E-09
SW	1.491E-05	3.061E-06	8.701E-07	4.210E-07	2.530E-07	1.053E-07	3.296E-08	1.411E-08	8.079E-09	5.312E-09
WSW	1.273E-05	2.612E-06	7.419E-07	3.588E-07	2.156E-07	8.975E-08	2.811E-08	1.204E-08	6.891E-09	4.526E-09
W	1.101E-05	2.257E-06	6.409E-07	3.101E-07	1.864E-07	7.774E-08	2.447E-08	1.053E-08	6.044E-09	3.976E-09
WNW	1.226E-05	2.510E-06	7.111E-07	3.435E-07	2.063E-07	8.582E-08	2.690E-08	1.153E-08	6.605E-09	4.338E-09
NW	1.224E-05	2.485E-06	6.972E-07	3.349E-07	2.004E-07	8.312E-08	2.602E-08	1.118E-08	6.409E-09	4.211E-09
NNW	8.241E-06	1.654E-06	4.564E-07	2.169E-07	1.288E-07	5.275E-08	1.620E-08	6.864E-09	3.903E-09	2.549E-09
N	5.174E-06	1.028E-06	2.811E-07	1.329E-07	7.859E-08	3.206E-08	9.799E-09	4.146E-09	2.355E-09	1.536E-09
NNE	2.611E-06	5.200E-07	1.425E-07	6.736E-08	3.983E-08	1.621E-08	4.918E-09	2.064E-09	1.167E-09	7.594E-10
NE	1.255E-06	2.511E-07	6.917E-08	3.280E-08	1.943E-08	7.918E-09	2.401E-09	1.006E-09	5.689E-10	3.705E-10
ENE	1.156E-06	2.332E-07	6.471E-08	3.080E-08	1.829E-08	7.459E-09	2.258E-09	9.423E-10	5.321E-10	3.466E-10
E	2.256E-06	4.598E-07	1.294E-07	6.214E-08	3.714E-08	1.531E-08	4.717E-09	1.995E-09	1.135E-09	7.436E-10
ESE	4.236E-06	8.680E-07	2.461E-07	1.189E-07	7.142E-08	2.970E-08	9.300E-09	3.988E-09	2.287E-09	1.505E-09
SE	5.132E-06	1.050E-06	2.972E-07	1.435E-07	8.609E-08	3.577E-08	1.119E-08	4.796E-09	2.750E-09	1.810E-09
SSE	6.625E-06	1.349E-06	3.795E-07	1.824E-07	1.092E-07	4.517E-08	1.405E-08	5.998E-09	3.429E-09	2.251E-09

Abbreviations: X/Q = dispersion factor; s/m^3 = seconds per cubic meter; mi = mile; E = east; ENE = east-northeast; ESE = east-southeast; N = north; NE = northeast; NNE = north-northeast; NNW = north-northwest; NW = northwest; S = south; SE = southeast; SSE = south-southeast; SSW = south-southwest; SW = southwest; W = west; WNW = west-northwest; WSW = west-southwest

Table 5.4-11: General X/Q Factors for 8-Day Decay, Depletion Case (s/m^3)

Distance from Facility (mi)	Sector															
	S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE
0.25	5.09E-05	7.82E-05	9.60E-05	8.23E-05	7.14E-05	7.99E-05	8.17E-05	5.68E-05	3.69E-05	1.84E-05	8.72E-06	7.79E-06	1.48E-05	2.75E-05	3.34E-05	4.38E-05
0.5	1.59E-05	2.47E-05	3.05E-05	2.61E-05	2.26E-05	2.51E-05	2.51E-05	1.70E-05	1.07E-05	5.39E-06	2.59E-06	2.38E-06	4.63E-06	8.69E-06	1.05E-05	1.36E-05
0.75	7.73E-06	1.21E-05	1.49E-05	1.27E-05	1.10E-05	1.23E-05	1.22E-05	8.24E-06	5.17E-06	2.61E-06	1.25E-06	1.16E-06	2.26E-06	4.24E-06	5.13E-06	6.62E-06
1	3.67E-06	5.73E-06	7.09E-06	6.05E-06	5.23E-06	5.82E-06	5.79E-06	3.88E-06	2.42E-06	1.22E-06	5.89E-07	5.45E-07	1.07E-06	2.01E-06	2.44E-06	3.14E-06
1.5	1.36E-06	2.13E-06	2.64E-06	2.25E-06	1.94E-06	2.16E-06	2.13E-06	1.42E-06	8.78E-07	4.44E-07	2.15E-07	2.00E-07	3.95E-07	7.47E-07	9.04E-07	1.16E-06
2	6.98E-07	1.10E-06	1.36E-06	1.16E-06	1.01E-06	1.12E-06	1.10E-06	7.22E-07	4.46E-07	2.26E-07	1.10E-07	1.02E-07	2.04E-07	3.86E-07	4.67E-07	5.97E-07
2.5	4.26E-07	6.75E-07	8.37E-07	7.13E-07	6.16E-07	6.84E-07	6.70E-07	4.38E-07	2.70E-07	1.37E-07	6.64E-08	6.21E-08	1.24E-07	2.37E-07	2.86E-07	3.65E-07
3	2.89E-07	4.59E-07	5.69E-07	4.85E-07	4.19E-07	4.64E-07	4.54E-07	2.95E-07	1.81E-07	9.18E-08	4.46E-08	4.19E-08	8.42E-08	1.61E-07	1.94E-07	2.47E-07
3.5	2.10E-07	3.34E-07	4.14E-07	3.53E-07	3.05E-07	3.38E-07	3.29E-07	2.13E-07	1.31E-07	6.61E-08	3.22E-08	3.03E-08	6.11E-08	1.17E-07	1.41E-07	1.79E-07
4	1.60E-07	2.55E-07	3.16E-07	2.70E-07	2.33E-07	2.58E-07	2.51E-07	1.62E-07	9.89E-08	5.01E-08	2.44E-08	2.30E-08	4.66E-08	8.93E-08	1.08E-07	1.37E-07
4.5	1.26E-07	2.02E-07	2.51E-07	2.14E-07	1.85E-07	2.04E-07	1.99E-07	1.28E-07	7.78E-08	3.94E-08	1.92E-08	1.81E-08	3.68E-08	7.08E-08	8.53E-08	1.08E-07
5	1.03E-07	1.65E-07	2.04E-07	1.74E-07	1.51E-07	1.67E-07	1.62E-07	1.04E-07	6.31E-08	3.20E-08	1.56E-08	1.47E-08	2.99E-08	5.77E-08	6.95E-08	8.80E-08
7.5	4.94E-08	7.99E-08	9.88E-08	8.42E-08	7.30E-08	8.05E-08	7.79E-08	4.93E-08	2.99E-08	1.51E-08	7.39E-09	6.96E-09	1.43E-08	2.79E-08	3.35E-08	4.23E-08
10	3.02E-08	4.91E-08	6.06E-08	5.17E-08	4.49E-08	4.94E-08	4.78E-08	3.00E-08	1.82E-08	9.16E-09	4.47E-09	4.22E-09	8.74E-09	1.71E-08	2.06E-08	2.59E-08
15	1.58E-08	2.58E-08	3.18E-08	2.71E-08	2.36E-08	2.60E-08	2.51E-08	1.56E-08	9.42E-09	4.72E-09	2.31E-09	2.17E-09	4.54E-09	8.97E-09	1.08E-08	1.35E-08
20	9.88E-09	1.63E-08	2.00E-08	1.71E-08	1.49E-08	1.64E-08	1.58E-08	9.76E-09	5.90E-09	2.94E-09	1.44E-09	1.35E-09	2.84E-09	5.65E-09	6.79E-09	8.51E-09
25	6.86E-09	1.14E-08	1.39E-08	1.19E-08	1.04E-08	1.14E-08	1.10E-08	6.77E-09	4.09E-09	2.03E-09	9.92E-10	9.29E-10	1.97E-09	3.94E-09	4.73E-09	5.92E-09
30	5.08E-09	8.45E-09	1.03E-08	8.82E-09	7.73E-09	8.45E-09	8.20E-09	5.01E-09	3.02E-09	1.50E-09	7.32E-10	6.84E-10	1.46E-09	2.92E-09	3.52E-09	4.39E-09
35	3.94E-09	6.56E-09	8.02E-09	6.84E-09	6.00E-09	6.56E-09	6.37E-09	3.88E-09	2.34E-09	1.16E-09	5.65E-10	5.28E-10	1.13E-09	2.27E-09	2.73E-09	3.41E-09
40	3.15E-09	5.27E-09	6.44E-09	5.49E-09	4.82E-09	5.26E-09	5.10E-09	3.10E-09	1.87E-09	9.24E-10	4.51E-10	4.22E-10	9.02E-10	1.82E-09	2.19E-09	2.73E-09
45	2.59E-09	4.33E-09	5.29E-09	4.51E-09	3.96E-09	4.32E-09	4.19E-09	2.54E-09	1.53E-09	7.56E-10	3.69E-10	3.45E-10	7.40E-10	1.50E-09	1.80E-09	2.24E-09
50	2.17E-09	3.63E-09	4.43E-09	3.78E-09	3.32E-09	3.62E-09	3.51E-09	2.12E-09	1.28E-09	6.31E-10	3.08E-10	2.88E-10	6.20E-10	1.26E-09	1.51E-09	1.88E-09

Abbreviations: X/Q = dispersion factor; s/m^3 = seconds per cubic meter; mi = mile; E = east; ENE = east-northeast; ESE = east-southeast; N = north; NE = northeast; NNE = north-northeast; NNW = north-northwest; NW = northwest; S = south; SE = southeast; SSE = south-southeast; SSW = south-southwest; SW = southwest; W = west; WNW = west-northwest; WSW = west-southwest

Table 5.4-12: Segmented General D/Q Factors (1/m^2)

Sector	Segmented Distance from Facility (mi)									
	.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	2.714E-08	5.558E-09	1.451E-09	6.517E-10	3.687E-10	1.418E-10	4.101E-11	1.626E-11	8.681E-12	5.373E-12
SSW	2.860E-08	5.859E-09	1.529E-09	6.869E-10	3.886E-10	1.494E-10	4.323E-11	1.713E-11	9.150E-12	5.663E-12
SW	2.597E-08	5.319E-09	1.389E-09	6.237E-10	3.528E-10	1.357E-10	3.925E-11	1.556E-11	8.308E-12	5.142E-12
WSW	2.190E-08	4.486E-09	1.171E-09	5.260E-10	2.975E-10	1.144E-10	3.310E-11	1.312E-11	7.006E-12	4.337E-12
W	2.397E-08	4.910E-09	1.282E-09	5.756E-10	3.256E-10	1.252E-10	3.623E-11	1.436E-11	7.668E-12	4.746E-12
WNW	3.268E-08	6.694E-09	1.748E-09	7.849E-10	4.440E-10	1.707E-10	4.940E-11	1.958E-11	1.045E-11	6.471E-12
NW	5.808E-08	1.190E-08	3.105E-09	1.395E-09	7.890E-10	3.034E-10	8.778E-11	3.479E-11	1.858E-11	1.150E-11
NNW	5.591E-08	1.145E-08	2.990E-09	1.343E-09	7.597E-10	2.921E-10	8.451E-11	3.350E-11	1.789E-11	1.107E-11
N	4.362E-08	8.935E-09	2.332E-09	1.048E-09	5.926E-10	2.279E-10	6.593E-11	2.613E-11	1.395E-11	8.637E-12
NNE	1.624E-08	3.327E-09	8.685E-10	3.901E-10	2.207E-10	8.486E-11	2.455E-11	9.730E-12	5.196E-12	3.216E-12
NE	6.577E-09	1.347E-09	3.517E-10	1.580E-10	8.935E-11	3.436E-11	9.941E-12	3.940E-12	2.104E-12	1.302E-12
ENE	3.266E-09	6.689E-10	1.746E-10	7.843E-11	4.437E-11	1.706E-11	4.936E-12	1.956E-12	1.045E-12	6.466E-13
E	4.170E-09	8.542E-10	2.230E-10	1.002E-10	5.666E-11	2.179E-11	6.303E-12	2.498E-12	1.334E-12	8.258E-13
ESE	7.046E-09	1.443E-09	3.768E-10	1.692E-10	9.573E-11	3.681E-11	1.065E-11	4.221E-12	2.254E-12	1.395E-12
SE	1.263E-08	2.587E-09	6.754E-10	3.034E-10	1.716E-10	6.599E-11	1.909E-11	7.567E-12	4.041E-12	2.501E-12
SSE	2.525E-08	5.172E-09	1.350E-09	6.064E-10	3.430E-10	1.319E-10	3.816E-11	1.513E-11	8.077E-12	4.999E-12

Abbreviations: D/Q = deposition factor; s/m^2 = seconds per square meter; mi = mile; E = east; ENE = east-northeast; ESE = east-southeast; N = north; NE = northeast; NNE = north-northeast; NNW = north-northwest; NW = northwest; S = south; SE = southeast; SSE = south-southeast; SSW = south-southwest; SW = southwest; W = west; WNW = west-northwest; WSW = west-southwest

Table 5.4-13: General D/Q Factors ($1/m^2$)

Distance from Facility (mi)	Sector															
	S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE
0.25	1.60E-07	1.69E-07	1.53E-07	1.29E-07	1.41E-07	1.93E-07	3.42E-07	3.30E-07	2.57E-07	9.57E-08	3.88E-08	1.92E-08	2.46E-08	4.15E-08	7.44E-08	1.49E-07
0.5	5.41E-08	5.70E-08	5.18E-08	4.36E-08	4.78E-08	6.51E-08	1.16E-07	1.11E-07	8.69E-08	3.24E-08	1.31E-08	6.51E-09	8.31E-09	1.40E-08	2.52E-08	5.03E-08
0.75	2.78E-08	2.93E-08	2.66E-08	2.24E-08	2.45E-08	3.34E-08	5.94E-08	5.72E-08	4.46E-08	1.66E-08	6.73E-09	3.34E-09	4.27E-09	7.21E-09	1.29E-08	2.58E-08
1	1.32E-08	1.39E-08	1.26E-08	1.07E-08	1.17E-08	1.59E-08	2.83E-08	2.72E-08	2.12E-08	7.90E-09	3.20E-09	1.59E-09	2.03E-09	3.43E-09	6.14E-09	1.23E-08
1.5	4.74E-09	5.00E-09	4.54E-09	3.83E-09	4.19E-09	5.71E-09	1.02E-08	9.77E-09	7.62E-09	2.84E-09	1.15E-09	5.71E-10	7.29E-10	1.23E-09	2.21E-09	4.41E-09
2	2.35E-09	2.48E-09	2.25E-09	1.90E-09	2.08E-09	2.83E-09	5.03E-09	4.85E-09	3.78E-09	1.41E-09	5.70E-10	2.83E-10	3.61E-10	6.11E-10	1.09E-09	2.19E-09
2.5	1.38E-09	1.46E-09	1.33E-09	1.12E-09	1.22E-09	1.67E-09	2.96E-09	2.85E-09	2.23E-09	8.29E-10	3.36E-10	1.67E-10	2.13E-10	3.60E-10	6.44E-10	1.29E-09
3	9.07E-10	9.56E-10	8.68E-10	7.32E-10	8.01E-10	1.09E-09	1.94E-09	1.87E-09	1.46E-09	5.43E-10	2.20E-10	1.09E-10	1.39E-10	2.35E-10	4.22E-10	8.44E-10
3.5	6.38E-10	6.72E-10	6.10E-10	5.15E-10	5.63E-10	7.68E-10	1.37E-09	1.31E-09	1.03E-09	3.82E-10	1.55E-10	7.68E-11	9.80E-11	1.66E-10	2.97E-10	5.94E-10
4	4.73E-10	4.98E-10	4.52E-10	3.82E-10	4.18E-10	5.69E-10	1.01E-09	9.74E-10	7.60E-10	2.83E-10	1.15E-10	5.69E-11	7.27E-11	1.23E-10	2.20E-10	4.40E-10
4.5	3.64E-10	3.84E-10	3.49E-10	2.94E-10	3.22E-10	4.39E-10	7.80E-10	7.51E-10	5.86E-10	2.18E-10	8.83E-11	4.38E-11	5.60E-11	9.46E-11	1.70E-10	3.39E-10
5	2.89E-10	3.05E-10	2.77E-10	2.34E-10	2.56E-10	3.49E-10	6.19E-10	5.96E-10	4.65E-10	1.73E-10	7.01E-11	3.48E-11	4.45E-11	7.52E-11	1.35E-10	2.69E-10
7.5	1.29E-10	1.36E-10	1.23E-10	1.04E-10	1.14E-10	1.55E-10	2.75E-10	2.65E-10	2.07E-10	7.70E-11	3.12E-11	1.55E-11	1.98E-11	3.34E-11	5.98E-11	1.20E-10
10	7.79E-11	8.21E-11	7.45E-11	6.29E-11	6.88E-11	9.38E-11	1.67E-10	1.61E-10	1.25E-10	4.66E-11	1.89E-11	9.37E-12	1.20E-11	2.02E-11	3.63E-11	7.25E-11
15	3.94E-11	4.15E-11	3.77E-11	3.18E-11	3.48E-11	4.74E-11	8.42E-11	8.11E-11	6.33E-11	2.36E-11	9.54E-12	4.74E-12	6.05E-12	1.02E-11	1.83E-11	3.66E-11
20	2.38E-11	2.51E-11	2.28E-11	1.92E-11	2.10E-11	2.87E-11	5.10E-11	4.91E-11	3.83E-11	1.43E-11	5.77E-12	2.87E-12	3.66E-12	6.19E-12	1.11E-11	2.22E-11
25	1.60E-11	1.68E-11	1.53E-11	1.29E-11	1.41E-11	1.92E-11	3.42E-11	3.29E-11	2.57E-11	9.56E-12	3.87E-12	1.92E-12	2.46E-12	4.15E-12	7.44E-12	1.49E-11
30	1.15E-11	1.21E-11	1.10E-11	9.24E-12	1.01E-11	1.38E-11	2.45E-11	2.36E-11	1.84E-11	6.85E-12	2.77E-12	1.38E-12	1.76E-12	2.97E-12	5.33E-12	1.07E-11
35	8.59E-12	9.06E-12	8.23E-12	6.94E-12	7.59E-12	1.04E-11	1.84E-11	1.77E-11	1.38E-11	5.14E-12	2.08E-12	1.03E-12	1.32E-12	2.23E-12	4.00E-12	8.00E-12
40	6.68E-12	7.04E-12	6.40E-12	5.39E-12	5.90E-12	8.05E-12	1.43E-11	1.38E-11	1.07E-11	4.00E-12	1.62E-12	8.04E-13	1.03E-12	1.74E-12	3.11E-12	6.22E-12
45	5.34E-12	5.63E-12	5.11E-12	4.31E-12	4.72E-12	6.43E-12	1.14E-11	1.10E-11	8.58E-12	3.20E-12	1.29E-12	6.42E-13	8.20E-13	1.39E-12	2.49E-12	4.97E-12
50	4.36E-12	4.59E-12	4.17E-12	3.52E-12	3.85E-12	5.25E-12	9.33E-12	8.98E-12	7.00E-12	2.61E-12	1.06E-12	5.24E-13	6.70E-13	1.13E-12	2.03E-12	4.05E-12

Abbreviations: D/Q = deposition factor; s/m^2 = seconds per square meter; mi = mile; E = east; ENE = east-northeast; ESE = east-southeast; N = north; NE = northeast; NNE = north-northeast; NNW = north-northwest; NW = northwest; S = south; SE = southeast; SSE = south-southeast; SSW = south-southwest; SW = southwest; W = west; WNW = west-northwest; WSW = west-southwest

Table 5.4-14: Gaseous Effluent Source Term

Radionuclide	LMGS (Ci/yr)
Kr-83m	3.84E-01
Kr-85	6.23E-05
Kr-85m	1.18E+00
Kr-87	1.34E+00
Kr-88	2.85E+00
Kr-89	6.39E-02
Kr-90	1.63E-02
Kr-91	7.93E-03
Xe-131m	2.03E-03
Xe-133	4.97E-01
Xe-133m	5.68E-02
Xe-135	2.32E+00
Xe-135m	1.09E-01
Xe-137	6.35E-02
Xe-138	5.05E-01
Xe-139	2.23E-02
Xe-140	9.86E-03
Ag-110m	7.46E-08
Cs-134	2.48E-06
Cs-137	5.76E-05
Eu-152	1.60E-13
Eu-154	6.98E-13
I-131	5.64E-05
I-132	2.95E-04
I-133	1.45E-04
I-134	2.10E-04
I-135	1.57E-04
I-136	5.48E-05
Sr-90	4.50E-09
Te-132	4.34E-08
Eu-155	3.23E-13
La-140	3.88E-08
H-3	1.83E-01
Abbreviations: LMGS = Long Mott Generating Station; Ci/yr = curies per year; Kr = krypton; Xe = xenon; Ag = silver; m = metastable; Cs = cesium; Eu = europium; I = iodine; Sr = strontium; Te = tellurium; La = lanthanum; H-3 = tritium	

Table 5.4-15: Site Boundary Individual Dose (mrem/yr) (Sheet 1 of 2)

Pathway	Total Body	GI Tract	Bone	Liver	Kidney	Thyroid	Lung	Skin
Plume	1.37E-01	1.37E-01	1.37E-01	1.37E-01	1.37E-01	1.37E-01	1.38E-01	2.51E-01
Ground Exposure	8.53E-03	8.53E-03	8.53E-03	8.53E-03	8.53E-03	8.53E-03	8.53E-03	9.95E-03
Vegetables								
Adult	4.97E-03	9.11E-04	4.60E-03	7.13E-03	3.06E-03	3.55E-02	1.46E-03	7.55E-04
Teen	4.38E-03	1.04E-03	7.30E-03	1.07E-02	4.42E-03	4.45E-02	2.14E-03	8.63E-04
Child	3.96E-03	1.47E-03	1.72E-02	1.80E-02	7.09E-03	8.29E-02	3.26E-03	1.34E-03
Meat								
Adult	5.46E-04	1.24E-04	4.73E-04	7.69E-04	3.39E-04	1.66E-03	1.82E-04	1.09E-04
Teen	2.54E-04	7.38E-05	3.92E-04	5.98E-04	2.51E-04	1.19E-03	1.34E-04	6.47E-05
Child	1.86E-04	8.36E-05	7.21E-04	7.82E-04	3.14E-04	1.77E-03	1.60E-04	7.83E-05
Cow Milk								
Adult	4.02E-03	4.16E-04	4.07E-03	5.95E-03	2.37E-03	4.37E-02	8.80E-04	2.55E-04
Teen	3.93E-03	5.41E-04	7.37E-03	1.04E-02	4.07E-03	6.92E-02	1.62E-03	3.32E-04
Child	3.31E-03	6.85E-04	1.77E-02	1.78E-02	6.71E-03	1.37E-01	2.50E-03	5.25E-04
Infant	3.62E-03	9.52E-04	2.85E-02	3.47E-02	1.08E-02	3.32E-01	4.37E-03	7.97E-04
Goat Milk								
Adult	1.17E-02	8.90E-04	1.20E-02	1.74E-02	6.44E-03	5.27E-02	2.40E-03	5.20E-04
Teen	1.12E-02	1.16E-03	2.18E-02	3.03E-02	1.11E-02	8.33E-02	4.54E-03	6.76E-04
Child	8.99E-03	1.44E-03	5.24E-02	5.23E-02	1.84E-02	1.65E-01	7.00E-03	1.07E-03
Infant	9.29E-03	1.99E-03	8.39E-02	1.02E-01	2.95E-02	4.00E-01	1.23E-02	1.63E-03
Inhalation								
Adult	5.07E-04	4.27E-04	9.91E-05	5.54E-04	4.93E-04	3.83E-03	4.32E-04	4.17E-04
Teen	4.91E-04	4.33E-04	1.39E-04	6.07E-04	5.24E-04	4.79E-03	4.45E-04	4.20E-04
Child	4.08E-04	3.81E-04	1.87E-04	5.52E-04	4.68E-04	5.57E-03	3.92E-04	3.71E-04

Table 5.4-15: Site Boundary Individual Dose (mrem/yr) (Continued) (Sheet 2 of 2)

Pathway	Total Body	GI Tract	Bone	Liver	Kidney	Thyroid	Lung	Skin
Infant	2.31E-04	2.19E-04	1.17E-04	3.52E-04	2.74E-04	4.96E-03	2.28E-04	2.14E-04
Totals								
Adult	1.63E-01	1.48E-01	1.63E-01	1.71E-01	1.56E-01	2.39E-01	1.51E-01	
Teen	1.62E-01	1.48E-01	1.75E-01	1.88E-01	1.62E-01	2.79E-01	1.54E-01	
Child	1.59E-01	1.49E-01	2.16E-01	2.17E-01	1.72E-01	4.01E-01	1.57E-01	
Infant	1.55E-01	1.48E-01	2.30E-01	2.48E-01	1.75E-01	5.50E-01	1.59E-01	
Beta dose in air:		1.11E-01	mrad/yr	Total Body External:		1.46E-01	mrem/yr	
Gamma dose in air:		2.03E-01	mrad/yr	Total Skin External:		2.61E-01	mrem/yr	
Abbreviations: mrem/yr = millirem per year; mrad/yr = millirad per year								

Table 5.4-16: Residence Individual Dose (mrem/yr) (Sheet 1 of 2)

Pathway	Total Body	GI Tract	Bone	Liver	Kidney	Thyroid	Lung	Skin
Plume	4.19E-03	4.19E-03	4.19E-03	4.19E-03	4.19E-03	4.19E-03	4.22E-03	7.26E-03
Ground Exposure	9.50E-04	9.50E-04	9.50E-04	9.50E-04	9.50E-04	9.50E-04	9.50E-04	1.11E-03
Vegetables								
Adult	5.18E-04	6.57E-05	5.13E-04	7.59E-04	3.05E-04	3.89E-03	1.27E-04	4.83E-04
Teen	4.47E-04	7.46E-05	8.14E-04	1.15E-03	4.51E-04	4.87E-03	1.98E-04	5.53E-05
Child	3.77E-04	1.00E-04	1.92E-03	1.94E-03	7.26-E04	9.08E-03	3.00E-04	8.58E-05
Meat								
Adult	5.57E-05	8.69E-06	5.27E-05	8.06E-05	3.26E-05	1.78E-04	1.52E-05	6.95E-06
Teen	2.52E-05	5.16E-06	4.37E-05	6.35E-05	2.49E-05	1.28E-04	1.19E-05	4.14E-06
Child	1.71E-05	5.60E-06	8.04E-05	8.34E-05	3.12E-05	1.92E-04	1.41E-05	5.01E-06
Cow Milk								
Adult	4.36E-04	3.42E-05	4.53E-04	6.50E-04	2.52E-04	4.81E-03	8.60E-05	1.63E-05
Teen	4.22E-04	4.44E-05	8.21E-04	1.14E-03	4.37E-04	7.61E-03	1.65E-04	2.12E-05
Child	3.43E-04	5.13E-05	1.97E-03	1.96E-03	7.22E-04	1.51E-02	2.54E-04	3.36E-05
Infant	3.65E-04	6.82E-05	3.17E-03	3.83E-03	1.17E-03	3.66E-02	4.49E-04	5.10E-05
Goat Milk								
Adult	1.28E-03	7.44E-05	1.34E-03	1.91E-03	6.93E-04	5.79E-03	2.42E-04	3.33E-05
Teen	1.22E-03	9.68E-05	2.43E-03	3.35E-03	1.21E-03	9.15E-03	4.74E-04	4.33E-05
Child	9.51E-04	1.10E-04	5.84E-03	5.77E-03	2.00E-03	1.81E-02	7.29E-04	6.86E-05
Infant	9.57E-04	1.44E-04	9.35E-03	1.12E-02	3.21E-03	4.40E-02	1.30E-03	1.04E-04
Inhalation								
Adult	3.18E-05	2.72E-05	5.71E-06	3.45E-05	3.08E-05	2.22E-04	2.76E-05	2.67E-05
Teen	3.09E-05	2.75E-05	7.99E-06	3.76E-05	3.26E-05	2.76E-04	2.83E-05	2.69E-05
Child	2.58E-05	2.42E-05	1.08E-05	3.41E-05	2.90E-05	3.19E-04	2.50E-05	2.38E-05

Table 5.4-16: Residence Individual Dose (mrem/yr) (Continued) (Sheet 2 of 2)

Pathway	Total Body	GI Tract	Bone	Liver	Kidney	Thyroid	Lung	Skin
Infant	1.46E-05	1.39E-05	6.73E-06	2.15E-05	1.70E-05	2.84E-04	1.45E-05	1.37E-05
Totals								
Adult	7.03E-03	5.32E-03	7.05E-03	7.92E-03	6.20E-03	1.52E-02	5.58E-03	
Teen	6.86E-03	5.34E-03	8.44E-03	9.74E-03	6.86E-03	1.96E-02	5.88E-03	
Child	6.51E-03	5.38E-03	1.30E-02	1.30E-02	7.93E-03	3.28E-02	6.24E-03	
Infant	6.11E-03	5.30E-03	1.45E-02	1.64E-02	8.37E-03	4.94E-02	6.48E-03	
Beta dose in air:		3.06E-03	mrad/yr	Total Body External:		5.14E-03	mrem/yr	
Gamma dose in air:		6.21E-03	mrad/yr	Total Skin External:		8.37E-03	mrem/yr	
Abbreviations: mrem/yr = millirem per year; mrad/yr = millirad per year								

Table 5.4-17: Vegetable Garden Individual Dose (mrem/yr)

Pathway	Total Body	GI Tract	Bone	Liver	Kidney	Thyroid	Lung	Skin
Plume	1.10E-03	1.10E-03	1.10E-03	1.10E-03	1.10E-03	1.10E-03	1.10E-03	1.89E-03
Ground Exposure	2.14E-04	2.14E-04	2.14E-04	2.14E-04	2.14E-04	2.14E-04	2.14E-04	2.50E-04
Vegetables								
Adult	1.23E-04	2.05E-05	1.16E-04	1.77E-04	7.46E-05	8.78E-04	3.44E-05	1.66E-05
Teen	1.07E-04	2.34E-05	1.84E-04	2.67E-04	1.08E-04	1.10E-03	5.11E-05	1.90E-05
Child	9.52E-05	3.27E-05	4.32E-04	4.49E-04	1.74E-04	2.05E-03	7.78E-05	2.95E-05
Meat								
Adult	1.34E-05	2.78E-06	1.19E-05	1.90E-05	8.17E-06	4.08E-05	4.24E-06	2.39E-06
Teen	6.19E-06	1.65E-06	9.86E-06	1.48E-05	6.10E-06	2.92E-05	3.17E-06	1.42E-06
Child	4.44E-06	1.86E-06	1.81E-05	1.94E-05	7.64E-06	4.37E-05	3.78E-06	1.72E-06
Cow Milk								
Adult	1.00E-04	9.64E-06	1.02E-04	1.49E-04	5.87E-05	1.08E-03	2.13E-05	5.61E-06
Teen	9.76E-05	1.25E-05	1.85E-04	2.59E-04	1.01E-04	1.71E-03	3.97E-05	7.30E-06
Child	8.14E-05	1.55E-05	4.45E-04	4.47E-04	1.67E-04	3.39E-03	6.13E-05	1.16E-05
Infant	8.83E-05	2.14E-05	7.16E-04	8.70E-04	2.69E-04	8.23E-03	1.07E-04	1.75E-05
Goat Milk								
Adult	2.92E-04	2.07E-05	3.03E-04	4.35E-04	1.60E-04	1.30E-03	5.86E-05	1.14E-05
Teen	2.80E-04	2.69E-05	5.48E-04	7.60E-04	2.78E-04	2.06E-03	1.12E-04	1.49E-05
Child	2.23E-04	3.28E-05	1.32E-03	1.31E-03	4.58E-04	4.08E-03	1.73E-04	2.36E-05
Infant	2.28E-04	4.48E-05	2.11E-03	2.55E-03	7.36E-04	9.89E-03	3.05E-04	3.58E-05
Inhalation								
Adult	1.09E-05	9.34E-06	1.94E-06	1.18E-05	1.05E-05	7.45E-05	9.47E-06	9.17E-06
Teen	1.06E-05	9.45E-06	2.71E-06	1.28E-05	1.11E-05	9.24E-05	9.73E-06	9.25E-06
Child	8.86E-06	8.29E-06	3.66E-06	1.17E-05	9.92E-06	1.06E-04	8.58E-06	8.17E-06
Infant	5.02E-06	4.75E-06	2.28E-06	7.36E-06	5.80E-06	9.46E-05	4.98E-06	4.70E-06
Totals								
Adult	1.75E-03	1.37E-03	1.75E-03	1.96E-03	1.57E-03	3.61E-03	1.42E-03	
Teen	1.72E-03	1.38E-03	2.06E-03	2.37E-03	1.72E-03	4.60E-03	1.49E-03	
Child	1.65E-03	1.39E-03	3.09E-03	3.10E-03	1.96E-03	7.59E-03	1.58E-03	
Infant	1.55E-03	1.36E-03	3.43E-03	3.87E-03	2.06E-03	1.13E-02	1.62E-03	
Beta dose in air:		8.09E-04	mrad/yr	Total Body External:		1.31E-03	mrem/yr	
Gamma dose in air:		1.63E-03	mrad/yr	Total Skin External:		2.14E-03	mrem/yr	
Abbreviations: mrem/yr = millirem per year; mrad/yr = millirad per year								

Table 5.4-18: Cattle Farm 1 Individual Dose (mrem/yr)
(Sheet 1 of 2)

Pathway	Total Body	GI Tract	Bone	Liver	Kidney	Thyroid	Lung	Skin
Plume	7.92E-06	7.92E-06	7.92E-06	7.92E-06	7.92E-06	7.92E-06	8.00E-06	1.48E-05
Ground Exposure	4.14E-06	4.14E-06	4.14E-06	4.14E-06	4.14E-06	4.14E-06	4.14E-06	4.83E-06
Vegetables								
Adult	2.40E-06	4.30E-07	2.23E-06	3.45E-06	1.47E-06	1.67E-05	6.98E-07	3.55E-07
Teen	2.11E-06	4.90E-07	3.55E-06	5.19E-06	2.13E-06	2.09E-05	1.03E-06	4.06E-07
Child	1.90E-06	6.93E-07	8.35E-06	8.73E-06	3.42E-06	3.89E-05	1.56E-06	6.30E-07
Meat								
Adult	2.64E-07	5.86E-08	2.30E-07	3.72E-07	1.63E-07	7.79E-07	8.69E-08	5.10E-08
Teen	1.22E-07	3.48E-08	1.90E-07	2.89E-07	1.21E-07	5.58E-07	6.42E-08	3.04E-08
Child	8.93E-08	3.94E-08	3.50E-07	3.78E-07	1.51E-07	8.33E-07	7.65E-08	3.68E-08
Cow Milk								
Adult	1.95E-06	1.97E-07	1.97E-06	2.88E-06	1.14E-06	2.05E-05	4.24E-07	1.20E-07
Teen	1.90E-06	2.56E-07	3.57E-06	5.02E-06	1.96E-06	3.24E-05	7.82E-07	1.56E-07
Child	1.59E-06	3.23E-07	8.60E-06	8.65E-06	3.24E-06	6.41E-05	1.21E-06	2.47E-07
Infant	1.74E-06	4.48E-07	1.38E-05	1.68E-05	5.21E-06	1.56E-04	2.11E-06	3.75E-07
Goat Milk								
Adult	5.66E-06	4.23E-07	5.84E-06	8.42E-06	3.12E-06	2.47E-05	1.16E-06	2.44E-07
Teen	5.44E-06	5.50E-07	1.06E-05	1.47E-05	5.39E-06	3.90E-05	2.20E-06	3.18E-07
Child	4.34E-06	6.81E-07	2.55E-05	2.54E-05	8.89E-06	7.71E-05	3.38E-06	5.04E-07
Infant	4.48E-06	9.37E-07	4.08E-05	4.93E-05	1.43E-05	1.87E-04	5.97E-06	7.64E-07
Inhalation								
Adult	2.29E-07	1.99E-07	3.61E-08	2.45E-07	2.21E-07	1.40E-06	2.02E-07	1.96E-07
Teen	2.23E-07	2.01E-07	5.05E-08	2.64E-07	2.31E-07	1.72E-06	2.07E-07	1.98E-07
Child	1.87E-07	1.76E-07	6.81E-08	2.39E-07	2.06E-07	1.96E-06	1.82E-07	1.75E-07

Table 5.4-18: Cattle Farm 1 Individual Dose (mrem/yr) (Continued) (Sheet 2 of 2)

Pathway	Total Body	GI Tract	Bone	Liver	Kidney	Thyroid	Lung	Skin
Infant	1.06E-07	1.01E-07	4.24E-08	1.49E-07	1.20E-07	1.74E-06	1.06E-07	1.00E-07
Totals								
Adult	2.06E-05	1.32E-05	2.04E-05	2.45E-05	1.70E-05	5.56E-05	1.43E-05	
Teen	2.00E-05	1.33E-05	2.65E-05	3.25E-05	1.99E-05	7.42E-05	1.56E-05	
Child	1.86E-05	1.36E-05	4.63E-05	4.68E-05	2.47E-05	1.31E-04	1.73E-05	
Infant	1.66E-05	1.31E-05	5.29E-05	6.15E-05	2.65E-05	2.01E-04	1.82E-05	
Beta dose in air:		7.69E-06	mrad/yr	Total Body External:		1.21E-05	mrem/yr	
Gamma dose in air:		1.18E-05	mrad/yr	Total Skin External:		1.96E-05	mrem/yr	
Abbreviations: mrem/yr = millirem per year; mrad/yr = millirad per year								

Table 5.4-19: Cattle Farm 2 Individual Dose (mrem/yr) (Sheet 1 of 2)

Pathway	Total Body	GI Tract	Bone	Liver	Kidney	Thyroid	Lung	Skin
Plume	1.26E-04	1.26E-04	1.26E-04	1.26E-04	1.26E-04	1.26E-04	1.27E-04	2.25E-04
Ground Exposure	3.90E-05	3.90E-05	3.90E-05	3.90E-05	3.90E-05	3.90E-05	3.90E-05	4.55E-05
Vegetables								
Adult	2.30E-05	4.41E-06	2.10E-05	3.28E-05	1.42E-05	1.59E-04	6.93E-06	3.70E-06
Teen	2.03E-05	5.02E-06	3.34E-05	4.93E-05	2.04E-05	1.99E-04	1.01E-05	4.23E-06
Child	1.85E-05	7.16E-06	7.86E-05	8.28E-05	3.28E-05	3.70E-04	1.54E-05	6.57E-06
Meat								
Adult	2.53E-06	6.03E-07	2.16E-06	3.55E-06	1.58E-06	7.44E-06	8.69E-07	5.32E-07
Teen	1.18E-06	3.59E-07	1.79E-06	2.75E-06	1.17E-06	5.32E-06	6.35E-07	3.17E-07
Child	8.78E-07	4.08E-07	3.30E-06	3.60E-06	1.46E-06	7.94E-06	7.57E-07	3.84E-07
Cow Milk								
Adult	1.84E-05	1.98E-06	1.86E-05	2.72E-05	1.09E-05	1.95E-04	4.11E-06	1.25E-06
Teen	1.80E-05	2.57E-06	3.37E-05	4.74E-05	1.86E-05	3.08E-04	7.51E-06	1.62E-06
Child	1.53E-05	3.29E-06	8.10E-05	8.17E-05	3.07E-05	6.09E-04	1.16E-05	2.57E-06
Infant	1.67E-05	4.60E-06	1.30E-04	1.59E-04	4.95E-05	1.48E-03	2.02E-05	3.91E-06
Goat Milk								
Adult	5.35E-05	4.23E-06	5.50E-05	7.95E-05	2.96E-05	2.35E-04	1.11E-05	2.55E-06
Teen	5.15E-05	5.50E-06	9.96E-05	1.39E-04	5.10E-05	3.71E-04	2.10E-05	3.31E-06
Child	4.14E-05	6.92E-06	2.40E-04	2.39E-04	8.43E-05	7.33E-04	3.24E-05	5.25E-06
Infant	4.29E-05	9.60E-06	3.84E-04	4.64E-04	1.35E-04	1.78E-03	5.69E-05	7.97E-06
Inhalation								
Adult	2.39E-06	2.07E-06	3.80E-07	2.56E-06	2.31E-06	1.51E-05	2.10E-06	2.04E-06
Teen	2.33E-06	2.10E-06	5.32E-07	2.76E-06	2.42E-06	1.86E-05	2.16E-06	2.06E-06
Child	1.95E-06	1.84E-06	7.18E-07	2.50E-06	2.16E-06	2.13E-05	1.90E-06	1.82E-06

Table 5.4-19: Cattle Farm 2 Individual Dose (mrem/yr) (Continued) (Sheet 2 of 2)

Pathway	Total Body	GI Tract	Bone	Liver	Kidney	Thyroid	Lung	Skin
Infant	1.11E-06	1.05E-06	4.47E-07	1.57E-06	1.26E-06	1.88E-05	1.10E-06	1.05E-06
Totals								
Adult	2.46E-04	1.76E-04	2.44E-04	2.83E-04	2.13E-04	5.82E-04	1.87E-04	
Teen	2.40E-04	1.78E-04	3.00E-04	3.59E-04	2.40E-04	7.59E-04	2.00E-04	
Child	2.28E-04	1.81E-04	4.88E-04	4.93E-04	2.86E-04	1.30E-03	2.16E-04	
Infant	2.09E-04	1.76E-04	5.49E-04	6.31E-04	3.01E-04	1.96E-03	2.24E-04	
Beta dose in air:		1.06E-04	mrad/yr	Total Body External:		1.65E-04	mrem/yr	
Gamma dose in air:		1.88E-04	mrad/yr	Total Skin External:		2.71E-04	mrem/yr	
Abbreviations: mrem/yr = millirem per year; mrad/yr = millirad per year								

Table 5.4-20: Cattle Farm 3 Individual Dose (mrem/yr) (Sheet 1 of 2)

Pathway	Total Body	GI Tract	Bone	Liver	Kidney	Thyroid	Lung	Skin
Plume	2.35E-05	2.35E-05	2.35E-05	2.35E-05	2.35E-05	2.35E-05	2.38E-05	4.81E-05
Ground Exposure	1.46E-05	1.46E-05	1.46E-05	1.46E-05	1.46E-05	1.46E-05	1.46E-05	1.70E-05
Vegetables								
Adult	9.26E-06	2.30E-06	7.88E-06	1.30E-05	5.98E-06	5.88E-05	3.25E-06	2.04E-06
Teen	8.35E-06	2.63E-06	1.25E-05	1.92E-05	8.40E-06	7.36E-05	4.52E-06	2.33E-06
Child	8.09E-06	3.84E-06	2.95E-05	3.22E-05	1.34E-05	1.37E-04	6.92E-06	3.62E-06
Meat								
Adult	1.04E-06	3.20E-07	8.10E-07	1.43E-06	6.87E-07	2.83E-06	4.20E-07	2.93E-07
Teen	4.99E-07	1.90E-07	6.72E-07	1.09E-06	4.93E-07	2.01E-06	2.94E-07	1.75E-07
Child	3.97E-07	2.21E-07	1.24E-06	1.42E-06	6.15E-07	2.98E-06	3.52E-07	2.11E-07
Cow Milk								
Adult	7.13E-06	9.59E-07	6.97E-06	1.04E-05	4.29E-06	7.15E-05	1.76E-06	6.88E-07
Teen	7.04E-06	1.25E-06	1.26E-05	1.81E-05	7.26E-06	1.13E-04	3.10E-06	8.95E-07
Child	6.16E-06	1.69E-06	3.03E-05	3.11E-05	1.20E-05	2.23E-04	4.81E-06	1.42E-06
Infant	6.95E-06	2.41E-06	4.88E-05	6.02E-05	1.92E-05	5.42E-04	8.27E-06	2.15E-06
Goat Milk								
Adult	2.05E-05	2.03E-06	2.06E-05	3.02E-05	1.15E-05	8.64E-05	4.62E-06	1.40E-06
Teen	1.99E-05	2.64E-06	3.73E-05	5.26E-05	1.97E-05	1.36E-04	8.45E-06	1.83E-06
Child	1.64E-05	3.52E-06	8.98E-05	9.06E-05	3.25E-05	2.69E-04	1.31E-05	2.89E-06
Infant	1.75E-05	5.00E-06	1.44E-04	1.76E-04	5.20E-05	6.52E-04	2.27E-05	4.39E-06
Inhalation								
Adult	1.31E-06	1.14E-06	2.07E-07	1.40E-06	1.26E-06	7.72E-06	1.16E-06	1.13E-06
Teen	1.28E-06	1.15E-06	2.90E-07	1.52E-06	1.32E-06	9.45E-06	1.19E-06	1.14E-06
Child	1.07E-06	1.01E-06	3.92E-07	1.37E-06	1.18E-06	1.07E-05	1.05E-06	1.00E-06

Table 5.4-20: Cattle Farm 3 Individual Dose (mrem/yr) (Continued) (Sheet 2 of 2)

Pathway	Total Body	GI Tract	Bone	Liver	Kidney	Thyroid	Lung	Skin
Infant	6.08E-07	5.80E-07	2.43E-07	8.57E-07	6.86E-07	9.46E-06	6.08E-07	5.77E-07
Totals								
Adult	7.02E-05	4.39E-05	6.76E-05	8.41E-05	5.75E-05	1.94E-04	4.79E-05	
Teen	6.81E-05	4.47E-05	8.89E-05	1.13E-04	6.80E-05	2.59E-04	5.29E-05	
Child	6.41E-05	4.67E-05	1.59E-04	1.64E-04	8.58E-05	4.58E-04	5.98E-05	
Infant	5.62E-05	4.37E-05	1.82E-04	2.15E-04	9.08E-05	7.00E-04	6.17E-05	
Beta dose in air:		2.98E-05	mrad/yr	Total Body External:		3.81E-05	mrem/yr	
Gamma dose in air:		3.53E-05	mrad/yr	Total Skin External:		6.51E-05	mrem/yr	
Abbreviations: mrem/yr = millirem per year; mrad/yr = millirad per year								

Table 5.4-21: Cattle Farm 4 Individual Dose (mrem/yr) (Sheet 1 of 2)

Pathway	Total Body	GI Tract	Bone	Liver	Kidney	Thyroid	Lung	Skin
Plume	1.87E-06	1.87E-06	1.87E-06	1.87E-06	1.87E-06	1.87E-06	1.90E-06	4.27E-06
Ground Exposure	9.98E-07	9.98E-07	9.98E-07	9.98E-07	9.98E-07	9.98E-07	9.98E-07	1.16E-06
Vegetables								
Adult	8.03E-07	3.28E-07	5.39E-07	1.06E-06	5.78E-07	4.12E-06	3.92E-07	3.10E-07
Teen	7.65E-07	3.74E-07	8.55E-07	1.51E-06	7.68E-07	5.14E-06	5.04E-07	3.54E-07
Child	8.55E-07	5.65E-07	2.01E-06	2.50E-06	1.22E-06	9.51E-06	7.75E-07	5.50E-07
Meat								
Adult	9.58E-08	4.63E-08	5.54E-08	1.22E-07	7.14E-08	2.15E-07	5.31E-08	4.45E-08
Teen	4.87E-08	2.76E-08	4.59E-08	8.89E-08	4.83E-08	1.50E-07	3.47E-08	2.65E-08
Child	4.48E-08	3.27E-08	8.44E-08	1.14E-07	5.96E-08	2.19E-07	4.17E-08	3.21E-08
Cow Milk								
Adult	5.45E-07	1.23E-07	4.76E-07	7.70E-07	3.50E-07	4.86E-06	1.78E-07	1.04E-07
Teen	5.56E-07	1.60E-07	8.62E-07	1.31E-06	5.70E-07	7.66E-06	2.87E-07	1.36E-07
Child	5.39E-07	2.33E-07	2.07E-06	2.24E-06	9.34E-07	1.51E-05	4.47E-07	2.15E-07
Infant	6.54E-07	3.44E-07	3.33E-06	4.29E-06	1.49E-06	3.65E-05	7.45E-07	3.27E-07
Goat Milk								
Adult	1.52E-06	2.56E-07	1.41E-06	2.18E-06	9.05E-07	5.92E-06	4.33E-07	2.13E-07
Teen	1.51E-06	3.33E-07	2.55E-06	3.75E-06	1.50E-06	9.31E-06	7.30E-07	2.77E-07
Child	1.36E-06	4.82E-07	6.14E-06	6.43E-06	2.46E-06	1.83E-05	1.13E-06	4.39E-07
Infant	1.56E-06	7.08E-07	9.82E-06	1.24E-05	3.92E-06	4.41E-05	1.92E-06	6.67E-07
Inhalation								
Adult	1.98E-07	1.73E-07	2.94E-08	2.10E-07	1.90E-07	1.09E-06	1.76E-07	1.71E-07
Teen	1.93E-07	1.74E-07	4.11E-08	2.26E-07	1.99E-07	1.33E-06	1.80E-07	1.72E-07
Child	1.62E-07	1.53E-07	5.55E-08	2.04E-07	1.77E-07	1.50E-06	1.59E-07	1.52E-07

Table 5.4-21: Cattle Farm 4 Individual Dose (mrem/yr) (Continued) (Sheet 2 of 2)

Pathway	Total Body	GI Tract	Bone	Liver	Kidney	Thyroid	Lung	Skin
Infant	9.20E-08	8.80E-08	3.44E-08	1.27E-07	1.03E-07	1.32E-06	9.20E-08	8.76E-08
Totals								
Adult	5.48E-06	3.67E-06	4.90E-06	6.44E-06	4.61E-06	1.42E-05	3.95E-06	
Teen	5.38E-06	3.78E-06	6.36E-06	8.44E-06	5.38E-06	1.88E-05	4.35E-06	
Child	5.29E-06	4.10E-06	1.12E-05	1.21E-05	6.78E-06	3.24E-05	5.00E-06	
Infant	4.52E-06	3.66E-06	1.27E-05	1.54E-05	6.89E-06	4.83E-05	4.91E-06	
Beta dose in air:		3.12E-06	mrad/yr	Total Body External:		2.87E-06	mrem/yr	
Gamma dose in air:		2.83E-06	mrad/yr	Total Skin External:		5.43E-06	mrem/yr	
Abbreviations: mrem/yr = millirem per year; mrad/yr = millirad per year								

Table 5.4-22: Long Mott Generating Station Population Dose Summary

Pathway	Population Dose (person-rem/yr)	
	Total Body	Max Organ
Plume	1.34E-03	1.35E-03
Ground	2.82E-04	2.82E-04
Inhalation	3.19E-05	2.13E-04
Vegetables	5.89E-05	1.11E-04
Milk	4.10E-05	5.42E-04
Meat	1.19E-05	3.60E-05
Total	**1.77E-03**	**2.44E-03**
Abbreviations: rem = roentgen equivalent man; yr = year		

Table 5.4-23: Comparison of Long Mott Generating Station Individual Member of the Public Dose Summary to 10 CFR Part 20 Section 1301 Dose Limits

Exposure Type	Exposure	10 CFR 20.1301 Limits	Percent of Limit
Annual TEDE Dose to Nearest Resident (mrem/yr)	7.03E-03	100	7.03E-03
Annual TEDE Dose to MEI at Site Boundary (mrem/yr) (8760 hr/yr occupancy)	1.63E-01	100	1.63E-01
Dose from External Sources to Site Boundary in 1 Hour (mrem/hr)	1.66E-05	2	8.31E-04
Abbreviations: CFR = Code of Federal Regulations; TEDE = total effective dose equivalent; mrem/yr = millirem per year; MEI = maximally exposed individual; hr = hour			

Table 5.4-24: Comparison of Long Mott Generating Station Annual Dose Estimates to 40 CFR Part 190 Dose Limits

Exposure Type	Exposure	40 CFR 190 Limit	Percent of Limit
Site Boundary (MEI, 8760 hr/yr Occupancy)			
Whole Body Dose (mrem/yr)	1.63E-01	25	6.53E-01
Thyroid Dose (mrem/yr)	5.50E-01	75	7.34E-01
Dose to Any Organ Other than Thyroid (mrem/yr)	2.48E-01	25	9.92E-01
Nearest Resident, 0.87 mi (8760 hr/yr Occupancy)			
Whole Body Dose (mrem/yr)	7.03E-03	25	2.81E-02
Thyroid Dose (mrem/yr)	4.94E-02	75	6.59E-02
Dose to Any Organ Other than Thyroid (mrem/yr)	1.64E-02	25	6.54E-02
Notes: The site boundary doses are from Table 5.4-15 The nearest resident doses are from Table 5.4-16 Abbreviations: CFR = Code of Federal Regulation; MEI = maximally exposed individual; hr/yr = hour per year; mrem/yr = millirem per year; mi = mile			

Table 5.4-25: Natural Background – Estimated Whole Body Dose to the Population within 50 Mi. (80 km) of the Long Mott Generating Station

Source	Annual Individual Dose (mrem/yr)	Annual Population Dose[(a)] (person-rem/yr)
Estimated total background radiation dose	310[(b)]	7.28E+04

Notes:
a) Annual population dose based on projected residential population of 234,680 in year 2070 from Table 5.4-2
b) 310 mrem/yr taken from Section 2.10.1.1
Abbreviations: mi = mile; km = kilometer; mrem/yr = millimrem per year; rem = roentgen equivalent man

Table 5.4-26: Long Mott Generating Station Annual Maximum Biota Dose

Type of Dose	Human Dose[(a)]	Multiplier[(b)]	Biota Dose[(a)]
External Total Body (mrem/yr)			
Plume	1.37E-01	1	1.37E-01
Ground Exposure	8.53E-03	2	1.71E-02
		Total External (mrem/yr)	**1.54E-01**
Internal Total Body (mrem/yr)			
Inhalation	5.07E-04	1	5.07E-04
Vegetation Ingestion	4.97E-03	1	4.97E-03
		Total (External + Internal) (mrem/yr)	**1.60E-01**

Notes:
a) Corresponds to site boundary location (total body)
b) Multiplier that is used to convert a human dose to a corresponding biota dose
Abbreviations: mrem/yr = millirem per year

Figures

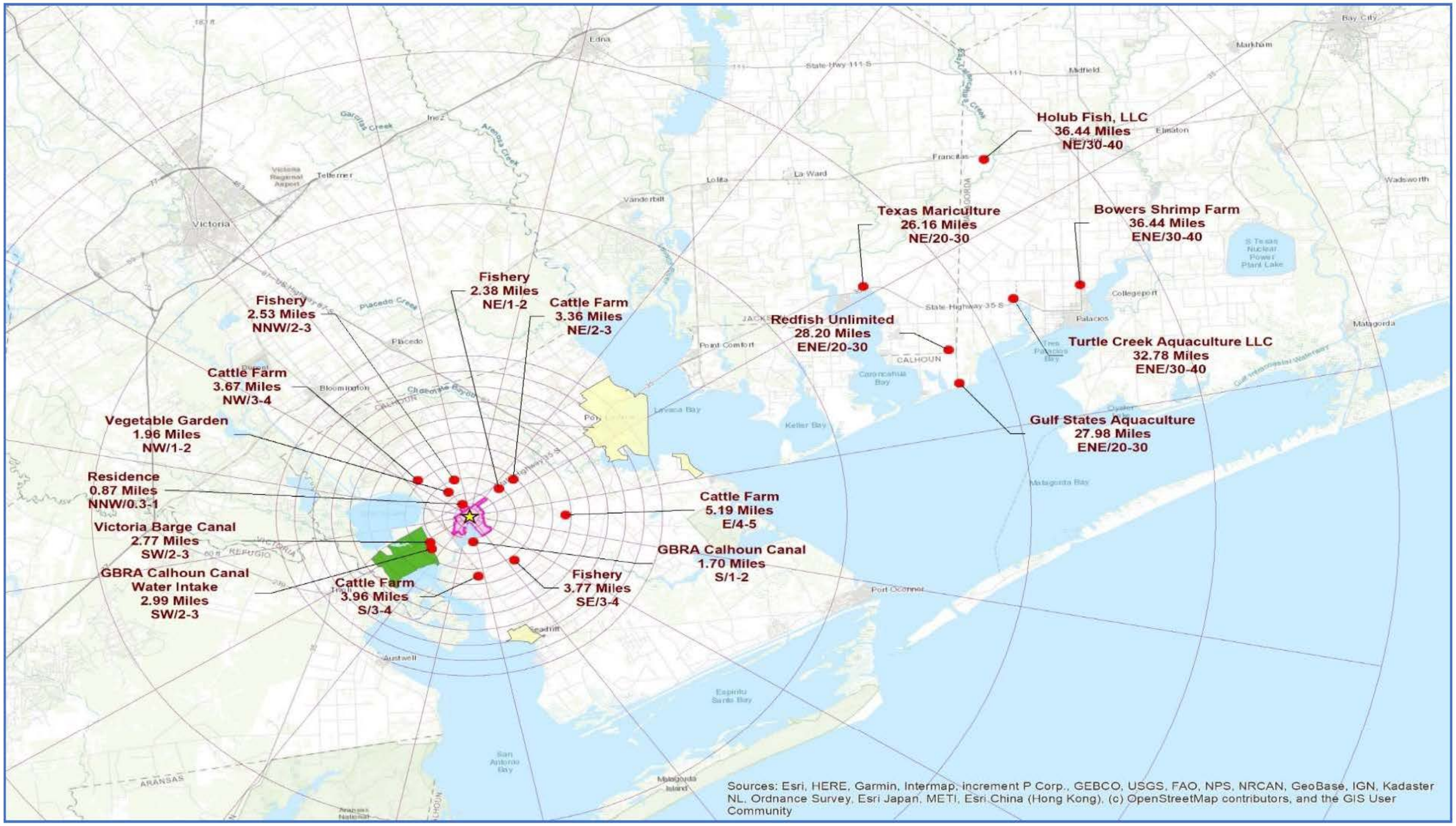

Figure 5.4-1: Long Mott Generating Station Off-Site Receptor Locations Relative to Site Center

5.5 Environmental Impacts of Waste

Operation of LMGS results in the generation of several wastes. These wastes are regulated, as appropriate, during generation, management, handling, treatment, storage, transportation, and disposal.

This section describes the potential environmental impacts associated with these wastes. Section 5.5.1 addresses nonradioactive waste and Section 5.5.2 addresses mixed wastes.

5.5.1 Nonradioactive Waste-Systems Management

Nonradioactive waste can exist in a gaseous, liquid, or solid form. Nonradioactive waste can further be classified as hazardous or nonhazardous. The EPA defines hazardous waste in 40 CFR 261. Hazardous wastes may be wastes that are listed as known hazardous wastes or as wastes that have one or more characteristics of ignitability, corrosivity, reactivity, or toxicity. Nonhazardous waste is waste that is not contaminated with either radionuclides or hazardous chemicals and includes office trash, paper, wood, oils not mixed with hazardous waste or radiological waste, and sewage.

Federal regulations governing generation, management, handling, storage, treatment, disposal, and protection requirements associated with these wastes are contained in 10 CFR (U.S. Nuclear Regulatory Commission [NRC] regulations) and 40 CFR (EPA regulations).

5.5.1.1 Impacts to Land

The SDO waste management program is described in Section 3.6.3. Common waste from the SDO site (e.g., paper, plastic, glass) is segregated and, as much as possible, processed for recycling. It is expected that LMGS will use the same methods employed by SDO for handling solid wastes. Adequate landfill capacity is available in the vicinity of LMGS to meet the projected demand for nonhazardous solid waste disposal for several decades (Section 5.1.2). No additional landfill expansion is expected to be required to accommodate nonhazardous solid waste disposal from LMGS.

Like SDO, solid waste at LMGS is managed in accordance with all applicable federal, state, and local requirements and standards. In addition, LMGS follows effective practices for reusing, recycling, and minimizing waste. As a result, impacts on land from nonradioactive wastes generated during the operation of LMGS are SMALL.

5.5.1.2 Impacts to Water

Nonradioactive facility discharges are limited to sanitary sewer and normal plant discharge. As described in Section 3.6.1, liquid process waste streams with the potential to contain chemicals and/or biocides include the process waste streams from the CI, and the water treatment system. Table 3.3-2 summarizes the chemicals utilized, along with their expected storage capacity and usage. Sanitary effluent disposal is described in Section 3.6.2.

The water balance diagram provided in Figure 3.3-1 identifies the process waste streams and the estimated quantity of waste. Liquid waste discharges are controlled and monitored in accordance with TPDES permit requirements to ensure the maintenance of water quality in the receiving waterbody.

Stormwater discharges are described in Section 3.6.3.3. TCEQ regulates stormwater discharges through a TPDES permit. As described in Section 5.2.1.1, a SWPPP is required for stormwater discharge from industrial activities. The SWPPP provides for implementation of BMPs to control and mitigate stormwater quantity and impacts to surface water quality.

Because the LMGS design integrates the use of an ACC, facility discharges are limited. The impacts of sanitary waste to water are regulated and limited through the required TPDES permit; therefore, environmental impacts to water from nonradioactive waste discharges are SMALL.

5.5.1.3 Impacts to Air

Air quality impacts from waste associated with the operation of LMGS are discussed in Section 5.9, Air Quality.

All waste streams are managed according to federal, state, and local laws and regulations. Control equipment and mitigation measures are applied where appropriate and required to maintain compliance and protect the environment. Per Section 5.9, air quality impacts from the operation of LMGS are SMALL for the surrounding communities and nearest residents.

5.5.2 Mixed Waste

The term “mixed waste” refers to waste that is regulated as both radioactive waste and hazardous waste. The management of mixed waste at nuclear power generating facilities is jointly regulated by the NRC under the Atomic Energy Act of 1954 (AEA) and the EPA or authorized states under the Resource Conservation and Recovery Act (RCRA) (EPA, 2016).

Based on existing design information, mixed waste is not generated during operation of LMGS; therefore, environmental impacts associated with mixed waste are SMALL.

Tables

None

Figures

None

5.6 Transmission System Impacts

The purpose of this section is to evaluate the environmental impacts of electrical transmission system operation, which include transmission corridor maintenance and transmission line use relative to terrestrial and aquatic ecosystems and members of the public. As noted in Section 3.7.2, two 138 kV transmission lines connect LMGS to the SDO substation. The transmission corridor to the SDO substation is contained within the LMGS site. No new transmission line corridors are planned for off-site connections from the LMGS site (Section 2.2.2.1); therefore, impacts associated with transmission assessed in this section are limited to the on-site transmission corridor shown on Figure 3.1-3.

5.6.1 Terrestrial Ecosystems and Wetlands

The terrestrial ecology of the LMGS site was characterized in surveys of Waters of the United States (WOTUS) in May and August 2023 and wildlife and plant surveys in February, May, August, and November 2023 (Section 2.4, Ecology, for more details).

As indicated in Section 2.4.1.4.5, herbaceous landcover within the LMGS site consists entirely of maintained turf, pasture, or ruderal old field, and as discussed in Section 4.3.1.3, the transmission line route crosses a variety of land uses, with medium-intensity development and herbaceous landcover being the most prevalent. Herbaceous vegetation (Bermuda grass) is not expected to grow tall enough to come in contact with overhead transmission lines; however, some shrub/scrub is located in a small portion of the on-site transmission corridor (0.8 ac. [0.3 ha]) that could grow tall enough to come into contact with overhead transmission lines. Consequently, minimal mechanical clearing and/or herbicide application is anticipated as part of the on-site transmission line maintenance activities in the herbaceous areas, but more maintenance could be needed in the small shrub/scrub area.

The impacts of transmission corridor maintenance and/or vegetation management on terrestrial resources were evaluated in the Generic Environmental Impact Statement (GEIS) for License Renewal of Nuclear Plants (NUREG-1437). NUREG-1437 determined that transmission corridor maintenance activities would not lower habitat diversity or result in significant changes in surrounding habitats; therefore, impacts to vegetation on the LMGS site are minor.

As discussed in Section 2.4, Ecology, the only important habitat as defined by NRC guidance within the LMGS site are wetlands, and as described in Section 5.10.1.1, the transmission line corridor crosses over wetlands. BMPs, such as prohibiting herbicide usage around wetlands, limit impacts to wetlands during right-of-way (ROW) maintenance; therefore, the impact of transmission system maintenance to important habitats is minor.

No federally or state-listed species are expected in the transmission corridor area (Section 2.4, Ecology), except for the state-listed white-tailed hawk, which was observed perched on a transmission line tower and as a flyover. Sensitive species that may have suitable habitat within the vegetation types located in the transmission corridor include eastern or western box turtles, American bumblebee, coastal gay-feather, and three flower broomweed. Other "important" species likely to use these corridors include recreationally valuable animals common to this region such as white-tailed deer and eastern cottontail. As noted in NUREG-1437, potential impacts on wildlife species as a result of transmission corridor maintenance activities were determined to be of minor significance for operating nuclear power plants.

Avian mortality involved with transmission lines was evaluated in NUREG-1437. Bird collisions with transmission lines are expected to occur at rates that are unlikely to affect local or migratory populations. Thus, potential impacts on avian species from transmission lines are expected to be minor. Provisions or devices for preventing avian collisions on new transmission lines are similar to those on existing lines and/or as determined by regulatory agencies.

No significant impacts of electromagnetic fields (EMFs) on terrestrial plants and animals have been identified Thus, potential impacts of EMFs on terrestrial flora and fauna are minor.

As noted above, wildlife use established transmission towers as perching or nesting sites. Wildlife management practices applicable to the transmission lines of the project include compliance with the Migratory Bird Treaty Act regarding nest removal for periodic maintenance activities, as applicable.

In summary, impacts to terrestrial ecosystems and wetlands resulting from the operation and maintenance of transmission lines are SMALL and are incorporated into the analysis of impacts to terrestrial ecological resources from operating LMGS as provided in Section 5.10.1.

5.6.2 Aquatic Ecosystems

As described above, two 138 kV transmission lines support LMGS. The location of these transmission lines is indicated in Figure 3.1-3. Impacts of the operation and maintenance of the transmission lines are on aquatic systems are minimized through adherence to applicable federal and state wetland/stream permit conditions and regulations, and the use of BMPs near wetlands and streams; therefore, impacts of the transmission lines to aquatic ecology are SMALL and are incorporated into the analysis of impacts to aquatic ecological resources from operating LMGS as provided in Section 5.10.2.

5.6.3 Impacts to Members of the Public

The possible effects from electrical transmission systems on members of the public include impacts associated with air quality, electrical shock, chronic effect of EMFs; exposure to noise, radio and television interference, and visual effects.

5.6.3.1 Transmission Line Air Quality Impacts

Transmission lines and associated equipment produce small amounts of ozone and even smaller amounts of nitrogen oxides (NO_x). The impacts of existing transmission lines on air quality are addressed in NUREG-1437. Ozone concentrations generated by transmission lines are too low to cause any significant effects. The minute amounts of nitrogen oxide produced are similarly insignificant.

Based on the findings in NUREG-1437, impacts from emissions of ozone and NO_x are determined to be minor without relying on mitigation.

5.6.3.2 Electric Shock Impacts

The NRC indicates that the greatest electrical shock hazard from a transmission line is direct contact with the conductors, and tower designs preclude direct public access to the conductors. However, electrical shocks can occur without physical contact. Secondary shock can occur when humans make contact with either capacitively charged bodies (such as a vehicle parked near a transmission line) or magnetically linked metallic structures (such as fences near transmission lines), and these shocks could be painful. The intensity of the shock would depend on the EMF strength, the size of the object, and the degree of insulation between the object, the person, and the ground.

The National Electrical Safety Code (NESC) has a provision that describes how to establish minimum vertical clearances to the ground for electric lines with voltages exceeding 98 kV. The clearance must limit the induced current due to electrostatic effects to 5 milliamperes if the largest anticipated vehicle or equipment is short-circuited to ground (IEEE, 2006).

As described in Section 3.7.2, the transmission lines are designed to conform with NESC requirements, which include standards related to line clearance to limit shocks from induced currents. Because the on-site transmission lines comply with the NESC standards, impacts associated with potential electrical shock are minor.

5.6.3.3 Chronic Effects of Electromagnetic Fields

As discussed in Section 2.9.4, the scientific evidence regarding the chronic health effects from EMFs, including the potential effects associated with exposure to electrical fields that are associated with electric power usage, does not conclusively link EMF exposure to adverse health impacts. Thus, impacts to the public attributable to EMF exposure from transmission system operations are minor.

5.6.3.4 Noise

High-voltage transmission lines can emit noise when the electric field strength surrounding them is greater than the breakdown threshold of the surrounding air, creating a discharge of energy. This energy loss, known as corona discharge, is affected by ambient weather conditions such as humidity, air density, wind, and precipitation and by irregularities on the energized surfaces. The transmission lines are designed with hardware and conductors that have features to minimize corona discharge. Nevertheless, during wet weather, the potential for corona loss increases, and corona loss could occur if insulators or other hardware have any defects.

Corona-induced noise from existing transmission lines is very low or inaudible, except directly below the line on a quiet, humid day. Such noise does not pose a risk to humans. The Public Utility Commission of Texas (PUCT) monitors complaints on transmission line noise. Examination of the PUCT regulatory compliance services database did not identify any noise complaints associated with the existing transmission lines within the last 10 years (PUCT, 2024). Accordingly, complaints on nuisance noise from the two new transmission line on the LMGS site are not anticipated; therefore, impacts associated with noise from transmission lines are minor.

5.6.3.5 Radio and Television Interference

The presence of corona discharge in high-voltage transmission lines can produce electrical noise in the radio-frequency spectrum that can result in radio and television interference. As described in Section 3.7.2, the transmission lines are designed to conform with NESC requirements and as such, hardware and conductors used would minimize corona discharge. Accordingly, radio and television interference impacts from the two new transmission lines is minor.

5.6.3.6 Visual

Operation and maintenance of the transmission system occurs in an industrial area that, as noted in Section 3.7, Power Transmission System, contains eight existing overhead transmission lines. Operation and maintenance of the new transmission lines is generally indistinguishable from the existing lines and therefore does not result in a visual discord. Consequently, the visual impacts to members of the public from the transmission system are minor.

5.6.3.7 Summary of Impacts to Members of the Public

Impacts to members of the public resulting from the operation and maintenance of transmission lines are SMALL and are incorporated into the analysis of physical impacts of station operation provided in Section 5.8.1.

Tables

None

Figures

None

5.7 Uranium Fuel Cycle Impacts

The purpose of this section is to address the uranium fuel cycle (UFC) environmental and transportation impacts for a four-module Xe-100 plant at LMGS.

Section 5.7.1 contains a discussion regarding the environmental impacts from each stage of the UFC of Tri-structural ISOtropic (TRISO) fuel used for LMGS.

Section 5.7.2 discusses the impacts from the transportation of radioactive materials to and from LMGS.

5.7.1 Uranium Fuel Cycle Impacts

This subsection discusses the effects on the environment from the hazards associated with the UFC. The UFC is defined as the total of those options and processes associated with the provision, utilization, and ultimate disposition of fuel for nuclear power reactors.

The NRC evaluated the environmental impacts that would be associated with operating UFC facilities other than reactors in two documents: WASH-1248, Environmental Survey of the Uranium Fuel Cycle, and NUREG-0116, Environmental Survey of the Reprocessing and Waste Management Portions of the light water reactor (LWR) Fuel Cycle. The stages of the UFC (excluding the power reactor stage) and related types of facilities previously analyzed in NUREG-0116 include:

- Uranium recovery from the following facilities:
  - Uranium Mining: facilities in which the uranium ore is mined
  - Uranium Milling: facilities in which the uranium ore is refined to produce uranium concentrates in the form of triuranium octaoxide (U_3O_8)
- Uranium Hexaflouride Conversion: facilities in which the uranium concentrates are converted to (UF_6)
- Enrichment: these facilities increase the isotopic ratio of the uranium-235 (U-235) isotope in natural uranium to meet the requirements of LWRs
- Fuel Fabrication: facilities in which the enriched UF_6 is converted to uranium dioxide (UO_2) and made into sintered UO_2 pellets. The pellets are subsequently encapsulated in fuel rods, and the rods are assembled into fuel assemblies ready to be inserted into the reactors.
- Reprocessing: facilities that disassemble the spent fuel assemblies, chop up the fuel rods into small sections, chemically dissolve the spent fuel out of sectioned fuel rod pieces, and chemically separate the uranium in spent fuel from the plutonium for reuse and other radionuclides (primarily fission products and actinides)
- Waste Disposal: facilities in which the radioactive wastes generated at all fuel cycle facilities, including the reactors, are buried. Spent nuclear fuel (SNF) that is removed

from the reactors and not reprocessed was also assumed to be disposed of at a geologic repository.

As described in NUREG-1437, Revision 2, Generic Environmental Impact Statement for License Renewal of Nuclear Plants, the environmental impacts specified in Table S-3 represent the bounding estimates for potential releases resulting from the uranium fuel cycles evaluated for LWRs (i.e., uranium-only and no recycle). The assessment of fuel-cycle impacts is based on values in Table S-3 in 10 CFR Section 51.51(b) (10 CFR Part 51-TN250), which represents normalized impact values attributed to the operation of a 1000-megawatt electric (MW(e)) LWR for 1 year at an 80 percent annual capacity factor, resulting in 800 MW of electrical output.

As provided in 10 CFR 51.51(a), the environmental data of Table S-3 only apply to the construction permit (CP), operating license (OL), early site permit (ESP), or combined license (COL) applications for light water-cooled nuclear power reactors considering the above stages of the UFC. However, as required in 10 CFR 51.50(b)(3) and 51.50(c), for other than light water-cooled nuclear power reactors (i.e., non-LWRs), an Environmental Report (ER) for an ESP or a COL shall contain the basis for evaluating the contribution of the environmental effects of fuel cycle activities for the nuclear power reactor. The Xe-100 is a high temperature gas-cooled reactor and not a light water-cooled nuclear power reactor; thus, 10 CFR 51.50(b)(3) and 51.50(c) apply.

5.7.1.1 Uranium Fuel Cycle Technology Evaluation

As stated in NUREG-2226, Environmental Impact Statement for an Early Site Permit at the Clinch River Site, technological and operational advances to nuclear fuel cycle facilities for LWRs have reduced environmental impacts since Table S-3 was published. Newer technologies and their associated environmental impacts as compared to those considered in Table S-3 include the following:

- Uranium Recovery — In situ leach recovery (ISR) has become the preferred method of recovering uranium from underground. The ISR method does not produce mine tailings, reduces release of radon gas, and eliminates a separate milling facility.
- Enrichment — U.S. uranium enrichment technology is transitioning from gaseous diffusion to gas centrifugation, which only uses a fraction of electrical energy per separation unit compared to its predecessor.

In addition, NUREG-2226 also recognizes two other factors that evolved since the 1970s that lower the environmental impacts of the UFC:

- Current reactor technology is more efficiently burning fuel allowing for longer fuel cycles; therefore, leading to a reduction in overall UFC impacts (i.e., uranium recovery/conversion, fuel fabrication, and storage/disposal of irradiated fuel).
- Reduction in reliance on coal plants for electrical generation contributions of UFCs results in reduced environmental impacts from gaseous effluent.

As concluded in NUREG-2226, the newer technologies listed above positively impact the UFC environmental effects considered in WASH-1248 and NUREG-0116; therefore, the analysis in Table S-3 is a conservative estimate of environmental impacts related to the UFC. Additionally, NUREG-1437 stated the following from the 2013 License Renewal (LR) Generic Environmental Impact Statements (GEIS):

"It was concluded that even though certain fuel cycle operations and fuel management practices have changed over the years, the assumptions and methodology used in preparing Table S-3 were conservative enough that the impacts described by the use of Table S-3 would still be bounding. The NRC believes that this conclusion still holds."

Therefore, the information in WASH-1248 and NUREG-0116 remains adequate for use in the bounding approach for each UFC facility in this analysis.

However, the analyses performed in WASH-1248 and NUREG-0116 discuss environmental impacts with respect to LWR technology. The DOE report PNNL-29367, Non-LWR Fuel Cycle Environmental Data, estimated the environmental impacts associated with the UFC for multiple non-LWR technologies. More specifically, PNNL-29367 provides discussion regarding environmental impact estimates for a helium-cooled pebble bed modular reactor (Napier, 2020). Because the Xe-100 relies on uranium oxycarbide/UO_2 fuels, similarly stated in PNNL-29367, and takes advantage of newer technologies in the UFC, Table S-3 can be applied to evaluate the impacts from the dif-ferent UFC facilities. Additionally, the reasoning discussed above results in lower environmental impacts from the UFC because the development of Table S-3 is applicable; therefore, WASH-1248 is expected to bound environmental impacts for UFC facilities that support the Xe-100.

The following discussion of UFC technology improvements further addresses how Table S-3 bounds these changes to the UFC:

<u>Uranium Recovery</u>

NUREG-1910, Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities, addresses common environmental issues associated with the construction, operation, and decommissioning of uranium recovery facilities, as well as the groundwater restoration. As stated in NUREG-1910, in-situ recover has removed many of the causes of harmful uranium recovery impacts in the following ways: (1) it eliminates the impacts associated with the transportation of materials from the mine to the milling facility, (2) there is little surface disturbance, and (3) no mill tails or waste rock are generated in the process. In addition, NUREG-1910 has been supplemented to address six specific ISR facilities. The impacts in these supplements did not identify any LARGE impacts except for historical and cultural resources, which is a site-specific resource area impact. Given the analyses in NUREG-1910 and its supplements, the environmental impacts for in-situ recovery are expected to be less than those listed in WASH-1248 for uranium recovery facilities.

Additionally, while TRISO fuel utilizes high-assay low-enriched uranium (HALEU), which is at least 5 and less than 20 percent enriched by weight of U-235, requiring four times more natural uranium to be recovered, DOE-EIS-0559, Final Environmental Impact Statement for Department of Energy Activities in Support of Commercial Production of High-Assay Low-Enriched Uranium, states that environmental impacts associated with uranium recovery for ISR are SMALL to MODERATE. However, with proper management the environmental impacts may be mitigated (USDOE, 2024).

As such, due to the changes in UFC, Table S-3 values are expected to bound the impacts for Xe-100 fuels. The following assumptions also contributed to the determination that Table S-3 is bounding for the uranium recovery stage:

- Current LWRs are using nuclear fuel more efficiently due to higher levels of fuel burnup. The same is true for advanced reactors (non-LWRs). Advanced reactors have higher burnup than the original LWR fuels that the 10 CFR 51.51 S-3 table was based on, resulting in less demand for mining and milling activities per megawatt electricity generated.
- The Xe-100 will produce superheated steam to operate the turbine. This should generate a higher thermal efficiency for the Xe-100 compared to the original LWRs that the S-3 Table of 10 CFR 51.51 was based on, resulting in less demand for mining and milling activities per megawatt electricity generated.
- Less reliance on coal-fired electrical generation plants resulting in less gaseous effluent releases from electrical generation sources supporting mining and milling activities.

In addition, licensees must satisfy the new and revised regulatory requirements, which collectively contribute to enhancing the safety and security of the uranium recovery stage, thereby reducing the environmental impacts associated with this UFC stage. Examples of the new and revised regulations since WASH-1248 was published include 10 CFR Part 40 Domestic Licensing of Source Material and 10 CFR Part 71, Packaging and Transportation of Radioactive Material.

Uranium Conversion

The only UF6 conversion facility in the United States, the Metropolis Works uranium con-version facility operated by Honeywell International Inc., is in Metropolis, Illinois (NRC, 2020). Based on information in the Environmental Assessment for license renewal for this facility, Honeywell has completed treatment upgrades to the environmental protection facility to provide enhancements to meet new fluoride discharge limits to reduce possible environmental impacts (NRC, 2019). A finding of No Significant Impact was issued as a result of the Environmental Assessment, indicating there would be no significant environmental effects associated with continued operations (84 FR 55339); therefore, the environmental impacts of a uranium conversion facility are bounded by WASH-1248 for LMGS UFCs.

As such, due to the changes in the UFC, Table S-3 values are expected to bound the impacts for Xe-100 fuels. The following assumptions also contributed to the determination that Table S-3 is bounding for the uranium conversion stage:

- Current LWRs are using nuclear fuel more efficiently due to higher levels of fuel burnup. The same is true for advanced reactors (non-LWRs). Advanced reactors have higher burnup than the original LWR fuels that the 10 CFR 51.51 S-3 table was based on, resulting in less demand for conversion activities per megawatt electricity generated.
- The Xe-100 will produce superheated steam to operate the turbine. This should generate a higher thermal efficiency for the Xe-100 compared to the original LWRs that the S-3 Table of 10 CFR 51.51 was based on, resulting in less demand for conversion activities per megawatt electricity generated.
- Less reliance on coal-fired electrical generation plants resulting in fewer gaseous effluent releases from electrical generation sources supporting conversion activities.

In addition, licensees must satisfy the new and revised regulatory requirements, which collectively contribute to enhancing the safety and security of the uranium conversion stage, thereby reducing the environmental impacts associated with this UFC stage. Examples of new and revised regulations since WASH-1248 was published include 10 CFR Part 40 Domestic Licensing of Source Material, 10 CFR Part 71, Packaging and Transportation of Radioactive Material, and 10 CFR Part 73, Physical Protection of Plants and Materials.

Enrichment

A separative work unit, or SWU, is the standard measure of the effort required to separate isotopes of uranium (uranium-235 and uranium-238) during an enrichment process and is independent of the enrichment process (either gaseous or centrifuge. To obtain 1000 kg (2200 pounds [lb.]) of uranium enriched to 4 percent, assuming the tails are 0.25 percent U-235 by weight, requires 5832 SWUs. To obtain the same amount of 20 percent enriched uranium (the maximum for TRISO fuel), requires 41,576 SWUs (UXC, 2024). The gaseous-diffusion process consumes about 2500 kWh per SWU, while modern gas centrifuge plants require only about 50 kWh per SWU (WNA, 2020).

The assessment in WASH-1248 used a gaseous diffusion plant to obtain four percent by weight enriched uranium. Based on the above, a gaseous diffusion plant would need approximately 14,600,000 kWh to reach the four percent enriched uranium. Alternatively, a centrifuge enrichment facility would consume approximately 2,100,000 kWh to less than 20 percent by weight enriched uranium; therefore, the environmental impacts due to the increased enrichment and usage of different technology is bounded by WASH-1248.

As such, due to the changes in the UFC, Table S-3 values are expected to bound the impacts for the fuel used by the Xe-100. The following assumptions also contributed to the determination that Table S-3 is bounding for the enrichment stage:

- Transitioning of U.S. uranium enrichment technology from gaseous diffusion to gas centrifugation requires less electrical usage per SWU.
- Current LWRs are using nuclear fuel more efficiently due to higher levels of fuel burnup. The same is true for advanced reactors (non-LWRs). Advanced reactors have higher burnup than the original LWR fuels that the 10 CFR 51.51 S-3 table was based on, resulting in less demand for enrichment activities per megawatt electricity generated.
- The Xe-100 will produce superheated steam to operate the turbine. This should generate a higher thermal efficiency for the Xe-100 compared to the original LWRs that the S-3 Table of 10 CFR 51.51 was based on resulting, in less demand for enrichment activities per megawatt electricity generated.
- Less reliance on coal-fired electrical generation plants resulting in fewer gaseous effluent releases from electrical generation sources supporting enrichment activities.

In addition, licensees must satisfy the new and revised regulatory requirements, which collectively contribute to enhancing the safety and security of the enrichment stage, thereby reducing the environmental impacts associated with this UFC stage. Examples of the new and revised regulations since WASH-1248 was published include 10 CFR Part 40 Domestic Licensing of Source Material, 10 CFR Part 70, Domestic Licensing of Special Nuclear Material, 10 CFR Part 71, Packaging and Transportation of Radioactive Material, and 10 CFR Part 73, Physical protection of Plants and Materials.

Fuel Fabrication

WASH-1248 is expected to bound the impacts for Xe-100 fuels, which rely on uranium oxycarbide/UO_2 fuels. If such fuel fabrication is applying the existing processes of the NRC-licensed fuel fabrication facilities, the resulting impacts are SMALL. If not, the impacts from the TRISO-X fuel fabrication facility would need to be bounded by the values provided in Appendix E of WASH-1248. Table 5.7.1-1 provides a comparison of the TRISO-X fuel fabrication facility process and the values provided in Appendix E of WASH-1248. The TRISO-X fuel fabrication facility will produce 16 metric tons of uranium (MTU) of fuel per year (TRISO-X, 2022). The Xe-100 requires 1.785 MTU of fuel per year.

The values provided in Appendix E of WASH-1248 bound the values in Table 5.7.1-1 except the annual water consumption, power required, annual solid waste volume, and the annual solid activity for disposal. Comparing the annual water consumption for the fuel fabrication for LMGS against that required for fuel fabrication for the model LWR evaluated in WASH-1248, the annual water consumption for an Xe-100 plant is less than 0.11 percent of the total water used by the model LWR in WASH-1248.

Similarly, the power required for the annual fuel requirement of an Xe-100 plant at LMGS is less than ten percent of the total power required for the annual fuel requirement of the model LWR analyzed in WASH-1248. Additionally, the model plant is assumed to use power generated from coal. The TRISO fuel fabrication facility is located in Oak Ridge, Tennessee. In Tennessee, nearly half of the electric power generated is from nuclear plants and only approximately 20 percent from coal; therefore, the environmental impacts of power generation to support the fuel fabrication facility are lower than those for the model plant because of the lower impact of the plants generating electricity.

The solid waste volume and the solid radioactive waste activity for disposal generated for the annual fuel requirement of an Xe-100 plant at LMGS exceeds the values deter-mined for the annual fuel requirement of the model LWR plant analyzed in WASH-1248. However, Table 2.1-5 of the TRISO-X Fuel Fabrication Facility ER shows that the extent of impact from waste management is SMALL (TRISO-X, 2022). Section 4.2, of the TRISO-X Fuel Fabrication Facility ER states that shipments of radiological waste meet the surface dose rate limit of 10 CFR 71.47(a) and 49 CFR 173.441(a) and the group of containers meet the 1 m (3.3 ft) dose rate limits of 49 CFR 173.441(d). Additionally, environmental impacts from transporting radioactive materials are identified as SMALL (TRISO-X, 2022).

As such, due to the changes in the UFC, the values in WASH-1248 are expected to bound the impacts for Xe-100 fuels and where impacts are in question, the impacts are small for the fuel fabrication stage.

Reprocessing

The Nuclear Non-proliferation Act of 1978 effectively banned any reprocessing or recycling of spent fuel from United States commercial nuclear power. The ban on reprocessing spent fuel was lifted in 1981, but the combination of economics, uranium ore stockpiles, and nuclear industry stagnation provided little incentive for the industry to pursue reprocessing. The Energy Policy Act of 2005 authorized U.S. Department of Energy to research and develop proliferation-resistant fuel recycling and transmutation technologies that minimize environmental or public health and safety effects.

However, as stated in SECY-21-0026, discontinuation of Rulemaking—Spent Fuel Reprocessing, the NRC staff determined that a continued rulemaking effort necessary to license a reprocessing facility is not currently justified, as there is limited interest expressed or expected from any potential applicant for reprocessing facilities within the next 10 to 20 years; therefore, there are no reprocessing environmental impacts to consider, and WASH-1248 can be considered bounding for impacts of reprocessing.

Storage and Disposal of Radiological Wastes

TRISO fuel utilizes HALEU, which is enriched from 5 percent to less than 20 percent weight of U-235, compared to typical LWR fuel, which is commonly enriched to five percent weight of U-235. NUREG-2157, Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel, states that burnup is a measure of how much energy is extracted from nuclear fuel before it is removed from the core. This is typically based on the enrichment of the fuel to sustain reactivity. WASH-1248 was based on lower burnup levels compared to HALEU fuels. TRISO fuel is able to obtain a higher burnup that allows longer use of the fuel and greater efficiency in extracting energy from the fuel, which results in less SNF.

DOE/EIS-0559 (USDOE, 2024) addresses HALEU spent nuclear fuel storage and disposition. Based on DOE/EIS-0559, at-reactor storage of spent nuclear fuel, which would be used for the Xe-100, would have SMALL impacts for most resource areas, but may have site-specific MODERATE to LARGE impacts related to ecology, historic and cultural re-sources, and from nonradioactive waste management. However, impacts related to these resource areas would have SMALL impacts for LMGS. In addition, DOE/EIS-0559 states that production of HALEU would generate about 290 MT of HALEU spent nuclear fuel and that “This is 0.4% of the 86,584 MT of heavy metal SNF in inventory in the United States in 2021. Therefore, the HALEU SNF generated by the activities related to the Proposed Action would not substantially add to the overall impacts of managing the nation's inventory of SNF.” Waste and spent fuel inventories, as well as their associated certified spent fuel shipping and storage containers, are not significantly different from what has been considered for LWR evaluations in NUREG-2157, which addresses the environmental impacts of the storage of spent fuel. The environmental impacts of at-reactor spent nuclear fuel storage identified in NUREG-2157 are SMALL, except for indefinite at-reactor storage having SMALL to MODERATE impacts, and historic and cultural resources having SMALL to LARGE impacts. Historic and cultural resources is a site-specific issue and cannot be considered on a broad basis.

In addition, the following regulatory requirements of 10 CFR Part 40, “Domestic Licensing of Source Material,” 10 CFR Part 50, “Domestic Licensing of Production and Utilization Facilities,” 10 CFR Part 70, “Domestic Licensing of Special Nuclear Material,” 10 CFR Part 71, “Packaging and Transportation of Radioactive Material,” 10 CFR Part 72, “Licensing Requirements for the Independent Storage of Spent Fuel, High-Level Radioactive Waste, and Reactor—Related Greater Than Class C Waste,” and 10 CFR Part 73, “Physical Protection of Plants and Materials” must be satisfied.

Therefore, Table S-3 values are expected to bound the impacts for HALEU fuels. The following assumptions also contributed to the determination that Table S-3 is bounding for the storage and disposal of radiological waste:

- Current LWRs are using nuclear fuel more efficiently due to higher levels of fuel burnup. The same is true for advanced reactors (non-LWRs). Advanced reactors have higher burnup than the original LWR fuels that the 10 CFR 51.51 S-3 table was based on, resulting in fewer discharged fuel assemblies to be stored and disposed of per megawatt electricity generated.
- The Xe-100 will produce superheated steam to operate the turbine. This should result in a higher thermal efficiency for the Xe-100 compared to the original LWRs that the S-3 Table of 10 CFR 51.51 was based on, resulting in fewer discharged fuel assemblies to be stored and disposed of per megawatt electricity generated.
- Less reliance on coal-fired electrical generation plants resulting in less gaseous effluent releases from electrical generation sources supporting storage and disposal.

- Waste and spent fuel inventories, as well as their associated certified spent fuel shipping and storage containers, are not significantly different from what has been considered for LWR evaluations in NUREG-2157.

5.7.1.2 UFC Environmental Impacts by Environmental Resource Area

Table S-3 of 10 CFR 51.51 provides estimates of the environmental effects from the UFC collectively. The effects are calculated for a reference 1000 megawatt electric (MWe) LWR operating at an annual capacity factor of 80 percent for an effective electric output of 800 MWe. Data are calculated and presented in tables for land use, water consumption, thermal effluents, radioactive releases, waste burial, and radiation doses. Assuming all thermal power from LMGS is used to generate electricity, the electricity produced at LMGS is 80 MWe per reactor module and 320 MWe for a four-module Xe-100 plant. An assumed capacity factor of 95 percent is applied. Four Xe-100 modules operating at 320 MWe, with an annual capacity factor of 95 percent, yields an effective electric output of 304 MWe. A ratio of the generation values of 304 MWe and 800 MWe provides a scaling factor of 0.38 to convert the reference reactor values to a four-module Xe-100 plant specific value. Details are provided in Table 5.7.1-2. The environmental effects of the UFC as a result of the operation of an 320 MWe four-module Xe-100 plant can be assessed by applying the Xe-100 scaling factor to the values presented in Table S-3. Based on Table 5.7.1-2 and the information discussed above, the environmental impacts due to the Xe- 100 fuel cycles are expected to be SMALL.

5.7.1.2.1 Land Use

The total annual land requirement for the UFC supporting an operating four-module Xe-100 plant at LMGS is presented in Table 5.7.1-2. This table includes values for both permanently and temporarily committed land. NUREG-1555, Standard Review Plans for Environmental Reviews for Nuclear Power Plants: Environmental Standard Review Plan, states that a “temporary” land commitment is a commitment for the life of the specific UFC plant (for example, a mill, enrichment plant, or succeeding plants). Following completion of decommissioning, such land can be released for unrestricted use. “Permanent” commitments represent land that may not be released for use after plant shutdown or decommissioning. This is because decommissioning activities on the pertinent land cannot remove sufficient radioactive material to meet the limits in 10 CFR 20, Subpart E, for release of land for unrestricted use. As stated in NUREG-1437, the LWR fuel cycle requires only 10 percent of the temporarily committed land and 9. 5 percent of the permanently committed land that would be required by replacement with coal-fired capacity. If the quality and opportunity cost of the land were equivalent, then it would be reasonable to assume that land requirements for the UFC (at 20 to 30 percent of those for the coal fuel cycle) are relatively small. The division of temporarily committed land into undisturbed and disturbed land is presented in Table 5.7.1-2. These values are compared to those that provide fuel for a coal-fired power plant using strip-mined coal whose power generation is equivalent to the four-module Xe-100 plant value. The impact on land use to support the four-module Xe-100 plant from the UFC is minor.

5.7.1.2.2 Water Use

Power stations supply electrical energy to the enrichment stage of the UFC. The primary water requirement of the UFC is waste heat removal from these power stations. For the UFC supporting the proposed project, over 97 percent of the annual water requirement is used in this manner. Values for the various water uses required are presented in Table 5.7.1-2.

Water requirements for the UFC are compared to the annual requirements for an LWR. The amount of water withdrawn from surface and groundwater and discharged to air by activities within the fuel cycle represents only two percent of the annual discharges to air of an LWR with cooling towers. The fuel cycle discharges are spread among facilities involved in the various stages of the fuel cycle; thus, the water discharge to air from any one of these facilities will be less than the two percent calculated. Water withdrawal, use, and discharge from LWRs with cooling towers are found to have only small, or in special, but unusual circumstances, moderate environmental impacts. Given that the water discharged to the air from other fuel cycle facilities for a reference reactor year is only a small fraction of the discharge from an LWR, the environmental consequences are even smaller.

The amount of water withdrawn from surface and groundwater and discharged to water bodies and to the ground represents only four percent of the annual discharges to water bodies and the ground of an LWR with once-through cooling. The fuel cycle discharges are spread among facilities involved in the various stages of the fuel cycle; thus, the water discharges from any one of these facilities is less than the four percent. Water withdrawal and discharge from LWRs with once-through cooling are found to have small environmental impacts. Given that the water discharged to water bodies and to the ground from other fuel cycle facilities for a reference reactor year is only a small fraction of the discharge from an LWR, the environmental consequences will be even smaller.

The expected thermal effluent values for a four-module Xe-100 plant are presented in Table 5.7.1-2. It is concluded that the impact on water use for these combinations of thermal loadings and water consumption is minor for the UFC relative to the water use and thermal discharges of the reference reactor.

5.7.1.2.3 Fossil Fuel Effects

Electrical energy and process heat are required during various phases of the UFC process. The electrical energy is usually produced by combustion of fossil fuels at power plants. Electrical energy needs for an operating four-module Xe-100 plant associated with the UFC are presented in Table 5.7.1-2.

Electrical energy needs associated with the UFC represents about five percent of the annual electrical power production of the reference reactor. Process heat is primarily generated by the combustion of natural gas. This gas consumption, if used to generate electricity, would be less than 0.4 percent of the electrical output from the reference reactor. The fossil fuel (coal and natural gas) consumed to produce electrical energy and process heat during the various phases of the UFC results in a considerable net savings in the use of resources and chemical effluents over the use that would occur if the electrical output from the LWR were supplied by a coal-fired plant. The use of coal and natural gas in the UFC allows the production of electricity with nuclear fuel, which results in a substantial reduction in the requirements for coal and natural gas as fuels to produce electricity. The fossil fuel requirements are not only small per reference reactor year, but there is a net savings in the use of fossil fuel compared to replacing the nuclear-generating capacity with coal-fired capacity.

Attachment 1 of ISG-026, Interim Staff Guidance on Environmental Issues Associated with New Reactor, provides NRC guidance for considering greenhouse gas (GHG) emissions and climate change impacts from the UFC of new reactors. In Appendix A of ISG-026, Attachment 1, fossil fuel use information presented in Table S-3 was used to estimate that the GHG footprint to the fuel cycle to support the reference reactor for a 40-year operational period is on the order of 10,100,000 metric tons of carbon dioxide equivalent (MT CO_2e). This estimate can be scaled to LMGS using the same scaling factor used in Table 5.7.2-1 of 0.348, resulting in an estimate of 3,514,800 MT CO_2e produced over the 40-year life of the plant, or 87,870 MT CO_2e annually. This is approximately 0.01% of Texas' annual GHG (EPA, 2023) and 0.0014% of the total U.S. annual GHG emissions (EPA, 2024).

Therefore, the fossil fuel effects, including GHG emissions, from the consumption of electrical energy for UFC operations are minor relative to the net power production of LMGS.

5.7.1.2.4 Chemical Impacts

The quantities of chemical, gaseous, and particulate effluents from UFC processes needed to support a four-module Xe-100 plant are presented in Table 5.7.1-2.

The gaseous effluents sulfur oxides (SO_x), NO_x, hydrocarbons, carbon monoxide (CO), and particulates listed in Table S-3 are the consequence of the coal-fired electrical energy used in the UFC. The volume of effluent is equivalent to that of a small (45 MWe) coal-fired plant; thus, the contribution to the degradation of air quality is small. The generation of electricity with nuclear rather than coal-fired power results in a net improvement in air quality. According to information presented in NUREG-1555, Supplement 1, Revision 2, Table 4-1, these emissions constitute a small additional atmospheric loading in comparison with emissions from the stationary fuel combustion and transportation sectors in the United States (that is, about 0.02 percent of the annual national releases for each of these constituents).

Liquid chemical effluents produced in UFC processes are related to fuel enrichment and fabrication and may be released to receiving waters. These effluents are usually present in such small concentrations that only small amounts of dilution water are required to reach levels of concentration that are within established standards. Table 5.7.1-2 presents the amount of dilution water required for specific constituents. Additionally, any liquid discharges into the navigable waters of the United States from plants associated with UFC operations are subject to requirements and limitations set in a NPDES permit issued by an appropriate federal, state, regional, local, or affected Native American tribal regulatory agency. Due to compliance with these requirements, impacts are expected to be minor. Tailings solutions and solids are generated during the milling process. These materials are not released in quantities sufficient to have a significant effect on the environment. The impacts of these chemical effluents are minor.

5.7.1.2.5 Radiological Effluents

The estimates of radioactive effluent releases to the environment are presented in Table 5.7.1-2. These are from waste management activities and certain other phases of the UFC process.

The estimated releases for the four-module Xe-100 plant are close to those for the reference reactor, therefore, the environmental impact of radioactive effluents from the UFC is minor.

5.7.1.2.6 Radiological Wastes

The quantities of buried radioactive waste material (low-level radioactive waste (LLW), high-level radioactive waste (HLW), and transuranic (TRU) wastes) are specified in Table 5.7.1-2. For LLW disposal at land burial facilities, the NRC notes in the reference reactor data presented in Table S-3 that there will be no significant radioactive releases to the environment. For HLW and TRU waste, the NRC notes in Table S-3 that these wastes are expected to be buried at a repository, and that no release to the environment is expected to be associated with such disposal. The gaseous and volatile radionuclides contained in the spent fuel would have been released and monitored before disposal. The NRC is one of three federal agencies under the AEA with a role in the disposal of SNF and other HLW. Responsibility among the three agencies is described as follows:

- The U.S. Department of Energy (DOE) is responsible for developing permanent disposal capacity for spent fuel and other high-level radioactive waste
- The EPA is responsible for developing environmental standards to evaluate the safety of a geologic repository
- The NRC is responsible for developing regulations to implement the EPA safety standards and for licensing the repository

The NRC regulations for geologic disposal of HLW in 10 CFR 60 limit the releases of radioactive material to the accessible environment. In addition to satisfying an overall performance objective to be established by EPA, the basic requirements are that containment of HLW within the waste packages will be substantially complete for a period between 300 and 1,000 years (to be determined by the NRC) after permanent closure of the geologic repository, and that the annual releases from the engineered barrier system thereafter should not exceed one part in 100,000 of the total inventory of each radionuclide calculated to be present 1,000 years following permanent closure of the repository. For HLW, 10 CFR 60.111 requires compliance with 10 CFR 20 and with EPA general environmental standards in 40 CFR 191. For HLW and spent fuel disposal component of the fuel cycle, there are no current regulatory limits for off-site releases of radionuclides. If it is assumed that limits are developed along the lines of the 1995 National Academy of Sciences (NAS) report, Technical Bases for Yucca Mountain Standards, and that in accordance with the 2010 update of the

NRC's Waste Confidence Decision, 10 CFR 51.23, Environmental impacts of continued storage of SNF beyond the licensed life for operation of a reactor, a repository can, and likely will be, developed at some site that will comply with such limits; peak doses to virtually all individuals will be 100 mrem/yr (1 mSv/ yr) or less. NUREG-2157 presented an NRC analysis of the environmental impacts of at-reactor storage, away-from-reactor storage, and cumulative impacts of cumulative storage. Most impacts were found to be SMALL and SMALL to MODERATE. The analyses of NUREG-2157 were codified in 10 CFR 51.23. Based on the discussion presented above, the environmental impact of radioactive waste disposal from the UFC is expected to be minor.

5.7.1.2.7 Occupational Dose

In the review and evaluation of the environmental effects of the UFC, the annual occupational dose attributable to all phases of the UFC for a four-module Xe-100 plant is presented in Table 5.7.1-2. Occupational doses would be maintained to meet the dose limits in 10 CFR 20, which is 5 rem/yr (0.05 Sv/yr). On this basis, it is concluded that environmental impacts from this occupational dose are anticipated to be minor.

5.7.1.2.8 Transportation Dose

The transportation dose to workers and the public is presented in Table 5.7.1-2 for a four-module Xe-100 plant. For comparative purposes, it is estimated that the average annual dose from natural background radiation is approximately 310 mrem/yr (3.10 mSv/yr) as shown in Section 2.10, Radiological Environment and Radiological Monitoring. Doses from natural radioactive sources would significantly exceed any doses from transportation of radioactive materials. On this basis, the environmental impacts of transportation are anticipated to be minor.

5.7.1.2.9 Summary of UFC Impacts

Based on the above discussion, environmental impacts from the UFC for LMGS are SMALL.

5.7.2 Transportation of Fuel and Wastes

In 10 CFR 51.52, “Environmental Effects of Transportation of Fuel and Waste – Table S-4” (CFR, 2021) the requirement to address transportation impacts in nuclear power station ERs is codified. Generic transportation analyses were performed in WASH-1238, “Environmental Survey of Transportation of Radioactive Materials to and from Nuclear Power Plants” (AEC, 1972), and NUREG-75/038, “Environmental Survey of Transportation of Radioactive Materials to and from Nuclear Power Plants – Supplement 1,” and the regulation precludes detailed transportation analysis if the proposed plant meets the criteria in the regulation. As a novel, non-light water reactor design, the Xe-100 does not meet the criteria of the regulation and the generic analysis cannot be used for this plant. When generic analysis cannot be used, a detailed analysis must be performed.

The detailed transportation dose analysis determines the dose consequences due to the radiological incident-free transportation of nuclear materials to and from LMGS. Guidance from Regulatory Guide (RG) 4.2 and NUREG-1555 was implemented. LMGS stores all irradiated fuel on-site for future disposition; however, the analysis assumes transportation of irradiated fuel to an off-site location; therefore, the transportation dose analysis considers shipments of fresh fuel, irradiated fuel, and radwaste. Per RG 4.2 and NUREG-1555 guidance, the TRAGIS and RADTRAN computer codes are used to perform the analysis.

TRAGIS is used to determine the truck highway route distance traveled for a shipment to and from LMGS. TRAGIS also provides the density of the popluation potentially exposed along the route using 2010 U.S. Census data (USCB, 2010), which is required for calculating the dose to a member of the public. However, during the time of this analysis, TRAGIS did not have the capability to provide population density data; therefore, the population density used is from NUREG/CR-6672, Table 3.5.

Using the TRAGIS output, the regions that contain segments of each transportation route are classified as rural, suburban, or urban population zones. In TRAGIS, a population density of less than 139 people per square mile is considered a rural population. A population density of 139 and up to 3326 people per square mile is considered a suburban population. A population density greater than 3326 people per square mile is considered an urban population. The distance traveled for each population zone in a region is given in the TRAGIS output.

TRAGIS provides a population count of the total exposed population within 800 m (2625 ft) of the route using 2010 USCB data.

RADTRAN is used to determine the population doses due to transportation of radioactive materials from a single shipment given the routes defined by WebTRAGIS. Information about the nature of the shipment, packaging, dose rate from the shipment, characteristics of the truck, population density, and other shipment details are used as input for the RADTRAN analysis.

Shipments of fresh fuel, irradiated fuel, and radwaste are transported by a 12 m (39.37 ft) long truck traveling 88.5 kilometers per hour (kph) (55 miles per hour [mph]). Shipment packages are expected to be compliant with 10 CFR 71, and the expected dose rates for transportation of fresh fuel and radwaste is assumed to be 1 mrem/hr (0.01 mSv/hr) at 1 m (3.28 ft) from the shipment. The dose rate for transportation of irradiated fuel is assumed to be 14 mrem/hr (0.14 mSv/hr) at 1 m (3.28 ft).

Two transportation workers are expected to be transporting the nuclear material. The nuclear material is expected to be 4 m (13.12 ft) away from the workers and is not expected to contain additional shielding. Additionally, vehicle density along the routes is estimated based on guidance in SAND2013-8095, RADTRAN 6/RadCat 6 User Guide (SNL, 2013). Adjacent vehicles are assumed to contain 1.5 people per vehicle.

TRAGIS estimates the number and duration of fueling stops for the shipment. A population density of 30,000 people per square kilometer is assumed for each transit-related stops within a 10 m (32.81 ft) radius. In addition to transit-related stops, loading and handling of nuclear material for each shipment involves an exposure of five workers to the shipment, lasting 30 minutes.

A scaling factor for each route is created based on the calculated exposed population and the population count provided by TRAGIS within 800 m (2625 ft) of the route using 2010 USCB data. The population densities and the distance traveled for each population zone in a region can be used to determine the exposed population for the given route. The population densities, distance traveled, calculated exposed population, population count provided by TRAGIS, and the scaling factor can be found in Table 5.7.2-1 through Table 5.7.2-4 for the different transportation routes.

Because the population count from TRAGIS uses 2010 U.S. Census data, the dose determined after applying the exposed population scaling factor must be adjusted for the 2020 U.S. Census data. The 2020 U.S. Census data shows that the United States population has increased by 7.4 percent (USCB, 2020). A scale factor of 1.074 is applied to the population dose to account for the increase in population.

The detailed transportation dose analysis considers four shipment routes: one fresh fuel route, two possible radwaste routes, and one irradiated fuel route. Fresh fuel shipments originate from the TRISO-X Fuel Fabrication Facility in Oak Ridge, TN. LMGS is estimated to receive 20 annual shipments of fresh fuel for a four-module Xe-100 plant. An estimated 11 annual shipments of irradiated fuel are assumed to be sent via truck from LMGS to the proposed geological repository at the Yucca Mountain site in Nye County, NV.

It is estimated that there are 129 annual shipments of solid and liquid radwaste off-site. Radwaste shipments are analyzed for two possible disposal sites: The Texas Compact Waste Facility operated by Waste Control Specialists in Andrews, TX and the EnergySolutions facility in Clive, UT. Of the 129 shipments, 58 shipments are expected to be solid radwaste, as described in Section 3.5, Radioactive Waste Management System. LMGS is estimated to generate approximately 9900 gallons of liquid radwaste per month. Liquid radwaste is assumed to be shipped off-site using 4000-gallon tankers five times every two months (30 shipments per year). An additional 41 shipments per year are added for conservatism and includes any unplanned shipments of radioactive waste.

Table 5.7.2-5 through Table 5.7.2-8 present the annual dose contributions to workers and the public from the transportation of fresh fuel, radwaste (both options), and irradiated fuel for LMGS. Table 5.7.2-9 presents a summary of the transportation dose to workers and the general public from LMGS.

Fresh fuel transportation results in an incident-free transportation dose to workers of 4.44E-01 person-rem/yr (4.44E-03 person-Sv/yr) and to the population along the route of 6.10E-01 person-rem/yr (6.01E-03 person-Sv/yr). Based on data shown in Table 5.7.2-9, shipments of radwaste to the EnergySolutions facility in Clive, UT, represent the bounding aggregate incident-free transportation dose to workers and the public for radwaste. The bounding dose to the workers and public is 3.41E+00 person-rem/yr (3.41E-02 person-Sv/yr) and 5.06E+00 person-rem/yr (5.06E-02 person-Sv/yr), respectively. Additionally, transportation of irradiated fuel to the Yucca Mountain site results in an incident-free transportation dose to workers of 4.08E+00 person-rem/yr (4.08E-02 person-Sv/yr) and to the public of 7.27E+00 person-rem/yr (7.27E-02 person-Sv/yr).

The annual doses discussed above and displayed in Table 5.7.2-9 are similar to the expected transportation doses presented in Table S-4 of 10 CFR 51.52 (four person-rem/reactor-yr [40 person-Sv/reactor-yr] for transportation workers and three person-rem/reactor-yr [30 person-Sv/reactor-yr] for members of the public). It should be noted that the dose to the public for transportation of irradiated fuel is more than double the expected transportation dose in Table S-4 of 10 CFR 51.52. However, the environmental risk from the transportation of nuclear material to and from LMGS is still considered SMALL.

Tables

Table 5.7.1-1: WASH-1248 Fuel Fabrication Environmental Impacts Compared to the TRISO-X Fuel Fabrication Impacts

Environmental Impact	WASH-1248 Value	WASH-1248 Comments	TRISO Value for Fuel Fabricated for a 4-Module Plant
Site Size (ac.)	A few acres up to a few thousand acres	Less than 5% of that committed by the rest of the fuel cycle	110
Building Size (ft^2)	100,000	-	73,607
Annual Water Consumption (gal)	5,200,000[a,b]	About 0.05% of that used by the model LWR evaluated by WASH-1248	12,718,125
Power Required:			
For Entire Facility (MWe)	6[a,b]	About 0.5% of the electricity of the enrichment plant evaluated by WASH-1248	39.1[b]
For Annual Fuel Requirement of Model LWR (MWe-hr)	1700[a,b]		31,407[b]
Annual Natural Gas Usage for Process Heat (ft^3)	3,600,000	About 4% of that consumed by the total nuclear fuel cycle	79,270
Liquid Waste Stream Volume (gpd)	25,000	Combined with about 425,000 gpd of process cooling water in the holding ponds prior to release off-site	11,156
Annual Solid Waste Volume (MT)	680 (for model facility) 26 (for annual fuel requirement of model LWR[a])	Calcium fluoride precipitate from the liquid waste stream for retaining on-site (11 yd^3 [8.4 m^3])	920 (for TRISO-X fuel fabrication facility) 103 (annual fuel requirement for four-module Xe-100)
Annual Gaseous Airborne Activity Released (Ci)	0.005 (for model facility) 0.000192 (for annual fuel requirement of model LWR[a])	Less than 0.1% of the applicable 10 CFR Part 20	0.0000452 (for facility) 0.00000504 (for annual fuel requirement)
Annual Liquid Activity Released (mCi)	40	Less than 10% of 10 CFR Part 20 limits for release to an unrestricted area	0
Annual Solid Activity for Disposal (mCi)	25	Activity shipped per annual fuel requirement	99

Source: TRISO-X, 2022

Note:

a) 10 CFR 51.51 Table S-3, states that there are 26 annual fuel requirements produced by the model LWR fuel fabrication facility (the fuel fabrication facility produces the annual fuel requirements for 26 reference reactors (1000 MW LWR)). The annual gaseous airborne activity release per annual fuel requirement of the model LWR was determined by dividing the model facility release by 26. This assumption was also used to determine the MWe-hr required to produce the annual fuel requirement for the reference reactor, the annual water consumption to produce the annual fuel requirement for the reference reactor, the annual solid waste volume for the reference reactor.

b) Appendix E of WASH-1248 assumed that the model fuel fabrication plant had a capacity of 3 MTU per day (900 MTU per year) and operated 300 days per year. It has also been assumed that the TRISO-X fuel fabrication facility operates for 300 days. This assumption was used to determine the MWe-hr required to produce the annual fuel requirement for the model LWR and for the four-module Xe-100 plant.

Abbreviations: ac. = acre; gal = gallon; Ci = curies; ft^2 = square feet; ft^3 = cubic feet; gpd = gallons per day; mCi = millicuries; MWe = megawatts electric; MWe-hr = megawatt-hour; MT = metric ton; LWR = light water reactor; CFR = Code of Federal Regulations; yd^3 = cubic yard; m^3 = cubic meter; MTU = metric ton of uranium

Table 5.7.1-2: 10 CFR 51.51 Table S-3 of Uranium Fuel Cycle Environmental Data (Sheet 1 of 3)

Environmental Considerations	Total	Maximum Effect per Annual Fuel Requirement or Reference Reactor Year of Model 1000 MWe LWR	LMGS Plant Data (Reference Reactor Data Scaled to LMGS [i.e., RRY*Scaling Factor of 0.38])
NATURAL RESOURCE USE			
Land (acres):			
Temporarily committed[(a)]	100		38
Undisturbed area	79		30
Disturbed area	22	Equivalent to a 110 MWe coal-fired power plant	8.4
Permanently committed	13		4.9
Overburden moved in MT	3.1	Equivalent to 95 MWe coal-fired power plant	1.2
Water (millions of gallons):			
Discharged to air	160	= 2% of model 1000 MWe LWR with cooling tower	61
Discharged to water bodies	11,090		4214
Discharged to ground	127		48
Total	**11,377**	**<4% of model 1000 MWe LWR with once through cooling**	**4323**
Fossil Fuel:			
Electrical energy (thousands of MW-hour)	323	<5% of model 1000 MWe output	123
Equivalent coal in thousands of metric tons	118	Equivalent to the consumption of a 45 MWe coal-fired power plant	45
Natural gas in millions of (ft^3)	135	<0.4% of model 1000 MWe energy output	51
EFFLUENTS — CHEMICAL (MT)			
Gases (including entrainment)[(b)]			
SO_x	4400		1672
NO_x[(c)]	1190	Equivalent to emissions from 45 MWe coal-fired plant for a year	452
Hydrocarbons	14		5
CO	29.6		11.2
Particulates	1154		439
Other Gases:			
F	0.67	Principally from UF_6, production, enrichment, and reprocessing. Concentration within range of state standards-below level that has effects on human health	0.25

Table 5.7.1-2: 10 CFR 51.51 Table S-3 of Uranium Fuel Cycle Environmental Data (Continued) (Sheet 2 of 3)

Environmental Considerations	Total	Maximum Effect per Annual Fuel Requirement or Reference Reactor Year of Model 1000 MWe LWR	LMGS Plant Data (Reference Reactor Data Scaled to LMGS [i.e., RRY*Scaling Factor of 0.38])
HCl	0.014		0.005
Liquids:			
SO_4^-	9.9	From enrichment, fuel fabrication, and reprocessing steps. Components that constitute a potential for adverse environmental effect are present in dilute concentrations and receive additional dilution by receiving bodies of water to levels below permissible standards. NH_3 – 17 m^3/s(600 ft^3/sec), NO_3 – 0.56 m^3/s (20 ft^3/sec),(600 ft^3/sec), NO_3 – 0.56 m^3/s (20 ft^3/sec),	3.8
NO_3^-	25.8		9.91
Fluoride	12.9		4.9
Ca^{+2}	5.4		2.1
Cl^-	8.5		3.2
Na^+	12.1		4.6
NH_3	10		3.8
Fe	0.4		0.15
Tailings Solutions (thousands of MT)	240	From mills only—no significant effluents to environment	91
Solids	91,000	Principally from mills—no significant effluents to environment	34,580
EFFLUENTS—RADIOLOGICAL (curies)			
Gases (including entrainment):			
Rn-222		Presently under reconsideration by the Commission	
Ra-226	0.02		0.01
Th-230	0.02		0.01
Uranium	0.034		0.013
Tritium (thousands)	18.1		6.9
C-14	24		9.1
Kr-85 (thousands)	400		152
Ru-106	0.14	Principally from fuel reprocessing plants	0.05
I-129	1.3		0.5
I-131	0.83		0.32
Tc-99		Presently under consideration by the Commission	
Fission products and transuranics	0.203		0.077
Liquids:			
Uranium and daughters	2.1	Principally from milling—included tailings liquor and returned to ground—no effluents; therefore, no effect on the environment	0.8
Ra-226	0.0034	From UF_6 production	0.0013
Th-230	0.0015		0.0006

Table 5.7.1-2: 10 CFR 51.51 Table S-3 of Uranium Fuel Cycle Environmental Data (Continued) (Sheet 3 of 3)

Environmental Considerations	Total	Maximum Effect per Annual Fuel Requirement or Reference Reactor Year of Model 1000 MWe LWR	LMGS Plant Data (Reference Reactor Data Scaled to LMGS [i.e., RRY*Scaling Factor of 0.38])
Th-234	0.01	From fuel fabrication plants—concentration 10 percent of 10 CFR 20 for total processing 26 annual fuel requirements for model LWR	0.004
Fission and activation products	5.90E-06		2.24E-06
Solids (buried on-site):			
Other than high level (shallow)	11,300	9,100 Ci comes from low level reactor wastes and 1,500 Ci comes from reactor decontamination and decommissioning—buried at land burial facilities. 600 Ci comes from mills—included in tailings returned to ground. Approximately 60 Ci comes from conversion and spent fuel storage. No significant effluent to the environment	4294
TRU and HLW (deep)	1.10E+07	Buried at Federal Repository	4.18E+06
Effluents – thermal (billions of British thermal units)	4063	<5% of model 1,000 MWe LWR	1544
Transportation (person-rem):			
Exposure of workers and general public	2.5		1
Occupational exposure	22.6	From reprocessing and waste management	8.6

Notes:

In some cases, where no entry appears, it is clear from the background documents that the matter was addressed and that, in effect, the table should be read as if a specific zero entry had been made. However, there are other areas that are not addressed at all in the table. Table S-3 does not include health effects from the effluents described in the table or estimates of releases of Radon-222 from the UFC or estimates of Technetium-99 released from waste management or reprocessing activities.

Data supporting this table are given in the “Environmental Survey of the Uranium Fuel Cycle” WASH-1248, April 1974; the “Environmental Survey of the Reprocessing and Waste Management Portion of the LWR Fuel Cycle” NUREG-0116 (Supp.1 to WASH-1248); the “Public Comments and Task Force Responses Regarding the Environmental Survey of the Reprocessing and Waste Management Portions of the LWR Fuel Cycle” NUREG-0216 (Supp. 2 to WASH-1248); and in the record of the final rulemaking pertaining to Uranium Fuel Cycle Impacts from Spent Fuel Reprocessing and Radioactive Waste Management, Docket RM-50-3. The contributions from reprocessing, waste management, and transportation of wastes are maximized for either of the two fuel cycles (uranium-only and no-recycle). The contribution from transportation excludes transportation of cold fuel to a reactor and of irradiated fuel and radioactive wastes from a reactor which are considered in Table S-4 of §51.20(g). The contributions from the other steps of the fuel cycle are given in Columns A-E of Table S-3A of WASH-1248.

a) The contributions to temporarily committed land from reprocessing are not prorated over 30 years because the complete temporary impact accrues regardless of whether the plant services one reactor for 1 year or 57 reactors for 30 years

b) Estimated effluents based on combustion of equivalent coal for power generation

c) About 1.2% from natural gas use and process

Abbreviations: MWe = megawatt electric; LWR = light-water reactor; LMGS = Long Mott Generating Station; RRY = reference reactor year; MT = metric ton; MW = megawatt; ft^3 = cubic foot; SO_x = sulphur oxide; NO_x = nitrogen oxide; CO = carbon monoxide; F = fluorine; UF_6 = uranium hexafluoride; HCl = hydrogen chloride; SO^-_4 = sulfate; NO^-_3 = nitrate; Ca^+ = calcium; Cl^- = chloride; Na^+ = sodium; NH_3 = ammonia; Fe = iron; m^3 = cubic meter; ft^3/sec = cubic foot per second; m^3/s = cubic meter per second; Rn-222 = radon-222; Ra-226 = radium-226; Th-230 = thorium-230; C-14 = carbon-14; Kr-85 = krypton-85; Ru-106 = ruthenium-106; I-129 = iodine-129; I-131 = iodine-131; Tc-99 = technetium-99; Th-234 = thorium-234; CFR = Code of Federal Regulations; Ci = curie; TRU = transuranic; HLW = high-level waste; UFC = uranium fuel cycle

Table 5.7.2-1: Population Density, Exposed Population, and the Adjustment Factor for Transportation Route from Oak Ridge, Tennessee

State	Zone	Distance Traveled (mi.)	Distance Traveled (km)	Population Density (persons/km^2)	Population Along Route Segment
AL	Rural	169.5	272.7	66	28,800
	Suburban	67.8	109.1	1670	291,489
	Urban	3.6	5.8	3861	35,783
GA	Rural	16.5	26.5	66	2804
	Suburban	6.2	10.0	1670	26,655
	Urban	0	0.0	3861	0
LA	Rural	137.3	220.9	66	23,329
	Suburban	112.4	180.9	1670	483,235
	Urban	8.3	13.4	3861	82,500
MS	Rural	136.9	220.3	66	23,261
	Suburban	31.4	50.5	1670	134,996
	Urban	3.3	5.3	3861	32,801
TN	Rural	54.2	87.2	66	9209
	Suburban	49.4	79.5	1670	212,383
	Urban	2.2	3.5	3861	21,867
TX	Rural	135.2	217.5	66	22,972
	Suburban	82.7	133.1	1670	355,548
	Urban	33.9	54.5	3861	336,958
				Total Population	**2,124,590**
				Population from TRAGIS	**2,402,242**
				Adjustment Factor	**1.131**

Abbreviations: mi. = mile; km = kilometer; km^2 = kilometer squared; AL = Alabama; GA = Georgia; LA = Louisiana; MS = Mississippi; TN = Tennessee; TX = Texas; TRAGIS = Transportation Routing Analysis Geographic Information System

Table 5.7.2-2: Population Density, Exposed Population, and the Adjustment Factor for Transportation Route to Andrews, Texas

State	Zone	Distance Traveled (mi.)	Distance Traveled (km)	Population Density (persons/km^2)	Population Along Route Segment
TX	Rural	396.1	637.3	66	67,302
	Suburban	113	181.8	1670	485,815
	Urban	28.6	46.0	3861	284,277
				Total Population	**837,394**
				Population from TRAGIS	**686,941**
				Adjustment Factor	**0.820**
Abbreviations: mi. = mile; km = kilometer; km^2 = kilometer squared; TX = Texas; TRAGIS = Transportation Routing Analysis Geographic Information System					

Table 5.7.2-3: Population Density, Exposed Population, and the Adjustment Factor for Transportation Route to Clive, Utah

State	Zone	Distance Traveled (mi.)	Distance Traveled (km)	Population Density (persons/km^2)	Population Along Route Segment
CO	Rural	61.2	98.5	66	10,399
	Suburban	7.4	11.9	1670	31,814
	Urban	0.4	0.6	3861	3976
NM	Rural	352.6	567.3	66	59,910
	Suburban	84.5	136	1670	363,286
	Urban	14.9	24	3861	148,102
TX	Rural	460.9	741.6	66	78,312
	Suburban	131.6	211.7	1670	565,781
	Urban	29.6	47.6	3861	294,217
UT	Rural	288.3	463.9	66	48,985
	Suburban	54	86.9	1670	232,159
	Urban	30.2	48.6	3861	300,181
				Total Population	**2,137,122**
				Population from TRAGIS	**2,000,455**
				Adjustment Factor	**0.936**
Abbreviations: mi. = mile; km = kilometer; km^2 = kilometer squared; CO = Colorado; NM = New Mexico; TX = Texas; UT = Utah; TRAGIS = Transportation Routing Analysis Geographic Information System					

Table 5.7.2-4: Population Density, Exposed Population, and the Adjustment Factor for Transportation Route to Nye County, Nevada

State	Zone	Distance Traveled (mi.)	Distance Traveled (km)	Population Density (persons/km^2)	Population Along Route Segment
AZ	Rural	379.5	610.6	66	64,481
	Suburban	89.5	144	1670	384,783
	Urban	36.5	58.7	3861	362,801
NV	Rural	83.8	134.8	66	14,238
	Suburban	13.1	21.1	1670	56,320
	Urban	30	48.3	3861	298,193
NM	Rural	142.4	229.1	66	24,195
	Suburban	19.9	32	1670	85,555
	Urban	2.2	3.5	3861	21,867
TX	Rural	571.7	919.9	66	97,138
	Suburban	105.8	170.2	1670	454,860
	Urban	40.9	65.8	3861	406,536
				Total Population	**2,270,967**
				Population from TRAGIS	**3,144,269**
				Adjustment Factor	**1.385**

Abbreviations: mi. = mile; km = kilometer; km^2 = kilometer squared; AZ = Arizona; NV = Nevada; NM = New Mexico; TX = Texas; TRAGIS = Transportation Routing Analysis Geographic Information System

Table 5.7.2-5: Fresh TRISO-X Fuel – Oak Ridge, TN Annual Transportation Dose

Exposed Population	Dose per Shipment (person-rem)	Shipments per Year	LMGS Dose per Year (person-rem)
Crew Dose	9.62E-03	20	1.92E-01
Handling	1.26E-02	20	2.52E-01
General Public			
Off Link	6.44E-03	20	1.29E-01
On Link	7.62E-03	20	1.52E-01
Stops	1.62E-02	20	3.29E-01
General Public Total	**3.05E-02**	**20**	**6.10E-01**

Note:

NUREG-2266 states that On Link refers to individuals in traffic traveling on the same transportation route as the shipment and Off Link refers to persons residing along the transportation route to or from the project site

Abbreviations: LMGS = Long Mott Generating Station; rem = roentgen equivalent man

Table 5.7.2-6: Radwaste – Andrews, TX Annual Transportation Dose

Exposed Population	Dose per Shipment (person-rem)	Shipments per Year	LMGS Dose per Year (person-rem)
Crew Dose	4.92E-03	129	6.35E-01
Handling	1.26E-02	129	1.62E+00
General Public			
Off Link	1.97E-03	129	2.55E-01
On Link	2.44E-03	129	3.16E-01
Stops	1.10E-02	129	1.42E+00
General Public Total	**1.54E-02**	**129**	**1.99E+00**

Note:
NUREG-2266 states that On Link refers to individuals in traffic traveling on the same transportation route as the shipment and Off Link refers to persons residing along the transportation route to or from the project site
Abbreviations: LMGS = Long Mott Generating Station; rem = roentgen equivalent man

Table 5.7.2-7: Radwaste – Clive, UT Annual Transportation Dose

Exposed Population	Dose per Shipment (person-rem)	Shipments per Year	LMGS Dose per Year (person-rem)
Crew Dose	1.39E-02	129	1.79E+00
Handling	1.26E-02	129	1.62E+00
General Public			
Off Link	4.98E-03	129	6.43E-01
On Link	6.81E-03	129	8.78E-01
Stops	2.74E-02	129	3.53E+00
General Public Total	**3.92E-02**	**129**	**5.06E+00**

Note:
NUREG-2266 states that On Link refers to individuals in traffic traveling on the same transportation route as the shipment and Off Link refers to persons residing along the transportation route to or from the project site
Abbreviations: LMGS = Long Mott Generating Station; rem = roentgen equivalent man

Table 5.7.2-8: Irradiated Fuel – Nye County, NV Annual Transportation Dose

Exposed Population	Dose per Shipment (person-rem)	Shipments per Year	LMGS Dose per Year (person-rem)
Crew Dose	1.94E-01	11	2.14E+00
Handling	1.76E-01	11	1.94E+00
General Public			
Off Link	8.29E-02	11	9.11E-01
On Link	1.94E-01	11	2.13E+00
Stops	3.84E-01	11	4.22E+00
General Public Total	**6.60E-01**	**11**	**7.27E+00**

Note:
NUREG-2266 states that On Link refers to individuals in traffic traveling on the same transportation route as the shipment and Off Link refers to persons residing along the transportation route to or from the project site
Abbreviations: LMGS = Long Mott Generating Station; rem = roentgen equivalent man

Table 5.7.2-9: Long Mott Generating Station Annual Incident-Free Transportation Dose Summary

Exposed Population	Fuel (person-rem)	Radwaste (person-rem)		Irradiated Fuel (person-rem)
	Oak Ridge, TN	Andrews, TX	Clive, UT	Nye County, NV
Crew	1.92E-01	6.35E-01	1.79E+00	2.14E+00
Handling	2.52E-01	1.62E+00	1.62E+00	1.94E+00
Total Worker	4.44E-01	2.26E+00	3.41E+00	4.08E+00
General Public	6.10E-01	1.99E+00	5.06E+00	7.27E+00
Abbreviation: rem = roentgen equivalent man				

Figures

None

5.8 Socioeconomic Impacts

This section describes the potential socioeconomic impacts from operating LMGS. The discussion is divided into three subsections:

- Section 5.8.1 describes physical impacts of LMGS operation on the community
- Section 5.8.2 describes the social and economic impacts of LMGS operation on the ROI and surrounding region
- Section 5.8.3 describes environmental justice (EJ) impacts within the region

5.8.1 Physical Impacts of Station Operation

This subsection assesses the potential physical impacts of operating LMGS on nearby communities or residents. The impacts evaluated include the effects from noise, odors, exhausts, thermal emissions, and visual intrusions. The locations of surrounding communities within the vicinity are described in Section 2.1, Station Location. Population distribution is described in Section 2.5.1. The plant layout is shown on Figure 3.1-3.

5.8.1.1 Noise and Vibration

Section 2.9.2 provides information and data related to background noise levels at the LMGS site. As described in Section 2.9.2.2, there are no municipal, county, or state-level regulations that establish quantitative noise level limits applicable to the LMGS site. At the federal level, the EPA has a broad-ranging set of guidelines for environmental noise levels that recommend outdoor noise levels do not exceed a L_{dn} of 55 dBA. However, this level is not a regulatory goal, and it is intentionally conservative to protect the most sensitive portion of the population with an additional margin of safety.

Noise levels associated with operation of LMGS are bounded by the noise produced by the ACC. As detailed in Section 5.3.4.2, the maximum noise level for an ACC sized to support a single Xe-100 reactor module is conservatively estimated to be 75 dBA at a distance of 328 ft (100 m), resulting in an ACC noise level of 81 dBA or less at a distance of 328 ft (100 m) for all four units. Assuming straight line noise attenuation, maximum noise levels from the ACC attenuate to 58.3 dBA at the closest residence and 49.7 dBA or lower at the Victoria Barge Canal, the nearest recreational area, which serves as the western boundary of the Mission Lake Unit of the Guadalupe Delta WMA.

Operational noise levels attenuate to levels below the baseline ambient noise levels for the nearest residences (NM 8, in Table 2.9-2), where the L_{eq} ranged from 62.3 to 74.4 dBA. Ambient noise monitoring results from each monitoring location are provided in Table 2.9-2. Thus, noise from plant operation is minimally perceptible to the nearest residents. Noise from operation is negligible at the nearest recreational area, falling below the EPA's conservative recommendation for outdoor noise levels of 55 dBA.

Traffic associated with workforce and truck deliveries also contributes to increased noise during operation. As detailed in Section 5.8.2.3.1, the maximum on-site workforce during operation occurs during outages, where it is conservatively assumed that approximately 96 full-time workers and 250 temporary outage workers are on-site during a single shift, resulting in a total of 346 vehicles arriving from and leaving the LMGS site daily. Additionally, about 20 truck deliveries per day (a conservative estimate) are made to the LMGS site. These traffic numbers are notably less than those during building activities. Vehicles primarily access the LMGS site from SH 185 and Jesse Rigby Road, where adjacent land uses are largely agricultural or industrial; therefore, less sensitive to increased noise levels. Thus, impacts from noise during plant operation are minor and do not require mitigation or implementation of noise abatement strategies.

5.8.1.2 Air Quality

Operation-related air quality impacts are addressed in Section 5.9, Air Quality Impacts, which discusses the National Ambient Air Quality Standards (NAAQS) and principal air emission sources associated with operation of LMGS and from operation-related traffic that may result in increased vehicular emissions associated with the cars, trucks, and delivery vehicles traveling to and from the LMGS site. As noted in Section 5.9, impacts to regional air quality are SMALL. As such, impacts to air quality from operation of LMGS on nearby residences, recreation areas, and facilities are bounded by this analysis and are considered minor.

5.8.1.3 Thermal Emissions

LMGS uses a dry cooling system consisting of ACCs (Section 3.4, Cooling System). Excess heat is dissipated through mechanical fans to move air over a system of finned heat exchanger tubes; therefore, there is no impact to structures associated with salt deposition from cooling tower drift. Heat dissipation to the atmosphere is further described in Section 5.3.3.1.

5.8.1.4 Aesthetics

Visual resources of the LMGS site and in the vicinity are described in Section 2.5.2. Similar to the discussion in Section 4.4.1.3, direct visibility of the LMGS site is primarily limited to on-site workers, residents living along SH 35, and motorists on Jesse Rigby Road, SH 35, and SH 185.

LMGS creates visual intrusions by introducing industrial facilities and structures into the landscape. Table 3.1-1 provides details of building and exterior equipment footprints and heights. The tallest structure, the Reactor Building (RB), rises to approximately 129 ft (40 m). Additionally, nighttime light nuisances may result from security lighting and potential night delivery vehicles. However, operation of LMGS does not disrupt the existing viewshed of the residences along SH 35 or travelers along surrounding roadways because the existing SDO facility and railway minimize the visual discord associated with structures present during operation of LMGS. As described in Section 2.5.2.5, the SDO represents an existing industrially developed viewshed that includes manufacturing facilities and associated infrastructure. As such, the operation of LMGS is consistent with adjacent visual elements of the SDO and does not disrupt the existing viewscape.

Other sensitive visual receptors in the LMGS vicinity include recreators on the Guadalupe Delta WMA and the Victoria Barge Canal (Section 2.5.2). Recreators in these areas do not have a clear view of the LMGS site because visibility of the LMGS site is blocked by terrain and the existing structures of the SDO. The LMGS site could be visible to recreators within portions of the WMA and Victoria Barge Canal that are not directly obstructed by the SDO. However, the viewshed of LMGS is absorbed into the existing industrial viewshed and thus represents only a minimal additional visual nuance in the existing landscape. As such, the LMGS site does not noticeably disrupt the existing viewshed of on-site workers, residents, motorist, or recreators; therefore, impacts from visual intrusions associated with operation of LMGS are minor.

5.8.1.5 Other Physical Impacts

The transportation network in the region is illustrated in Figure 2.5-3, and the primary roadways within the project vicinity are illustrated in Figure 2.5-4. Jesse Rigby Road provides direct access to the LMGS site and is connected to SH 35 and SH 185. Commuting workers, deliveries, and the temporary outage workforce contribute to the physical deterioration of roadway surfaces. However, given the much smaller volume of traffic on the roads during operation compared to during building activities, the overall impact on roadway quality is less than the impacts associated with building activities. Any damage to public roads, markings, or signage caused by operational activities is repaired to preexisting conditions or better, as appropriate.

As stated in Section 2.5.2.2, the nearest operating rail line is situated to the north adjacent to the northern part of the LMGS site. Additionally, an internal industrial railroad system is located within the SDO that supports SDO operations. It is not anticipated that rail traffic is utilized during LMGS operations; therefore, no significant deterioration to the transportation infrastructure occurs from operation of LMGS, and physical impacts to roads are minor and do not warrant mitigation.

5.8.1.6 Summary of Physical Impacts of Station Operation

Operational noise levels decrease to below the baseline ambient noise levels for the nearest residences. The workforce and truck deliveries primarily access the LMGS site from SH 185 and Jesse Rigby Road, where adjacent land uses are largely agricultural or industrial and therefore, less sensitive to increased noise levels. Operations do not impact regional air quality and LMGS utilizes a dry cooling system that does not result in salt deposition from cooling tower drift that could impact structures. The viewshed of LMGS is screened by existing infrastructure, vegetation, and topography and is absorbed into the existing industrial viewshed; therefore, LMGS only contributes minimal additional visual discord in the existing landscape. No significant deterioration to the transportation infrastructure is anticipated from operation of LMGS; therefore, physical impacts associated with operation are SMALL.

5.8.2 Social and Economic Impacts of Station Operation

This subsection evaluates the potential demographic, economic, infrastructure, and community impacts associated with operation of LMGS. The assessment evaluates the effects from routine and ongoing capital expenditures needed to support operations and the size of the operational workforce. As described in Section 2.5, Socioeconomics, the ROI identified for social and economic impacts, which is defined by the areas where the operational workforce and their families reside, spend their income, and use their benefits, consists of Calhoun, Jackson, and Victoria Counties.

5.8.2.1 Demographic Impacts

The total operations staff once all units are operational is 96 full-time employees. An additional 250 temporary workers are needed during major maintenance activities. However, because these activities are infrequent and short-term, workers needed from outside the ROI are assumed to relocate to the area temporarily without their families. In-migrating outage workers primarily use temporary housing such as hotels, motels, or short-term rentals, and do not have a notable impact on local demographics or community services. Thus, the following analysis focuses on the full-time operations staff (96 employees) to determine the long-term demographic impacts to the ROI associated with operation of LMGS.

5.8.2.1.1 Population

The direct impact to population from operation of LMGS depends on how many of the approximately 96 full-time operations staff are hired from within the ROI. For example, if all operations staff are hired from within this region, total population in the ROI does not change; however, if workers are introduced from outside these three counties, potential impacts to regional demography in conjunction with the in-migration of the supporting workforce and their families could occur.

LMGS initiated high-level discussions with higher education partners at Victoria College and the University of Houston Victoria to identify relevant training programs to create and foster a pathway by which local students can obtain operations jobs associated with LMGS. However, because of the specialized nature of many of the positions and the current lack of nuclear industry occupations in the region, it is conservatively assumed that all 96 workers are hired from outside the ROI to support the operation of LMGS.

The residential distribution of the in-migrating operations workforce is assumed to be the same as the residential distribution of the current workforce for the SDO. Sixteen percent of the existing SDO workforce commutes to the facility from outside the ROI. Consistent with these commuting patterns, 16 percent, or 15 of the 96 full-time operations staff reside in counties outside the ROI and commute to the LMGS site. Accordingly, the remaining 81 operations staff relocate to the ROI and are assumed to bring a family. The average household size (including single-person households) in Texas is approximately 2.76 (USCB, 2021); therefore, an in-migrating workforce of 81 increases the ROI's population by approximately 223. The distribution of this new population within the ROI is estimated based on the residential distribution of the SDO workforce and is shown in Table 5.8-1. The estimated population increases have the greatest impact in Calhoun County, where the new residents increase the county's population by approximately 0.2 percent (based on 2029 projections). Victoria and Jackson counties experience population increases of approximately 0.18 percent and 0.06 percent, respectively, while the ROI as a whole experiences a population increase of approximately 0.2 percent.

Because the projected population increases associated with the in-migration of operations workers and their families account for less than one percent of the total population of the ROI or any of the individual counties, impacts to population associated with operation of LMGS are minor.

5.8.2.1.2 Housing

Section 2.5.2.6 and Table 2.5-16 summarize the available housing units in the ROI in 2021. This information is used as a basis for estimating the number of housing units available for the operations workforce. As noted in Section 2.5.2.6, current projections show that an additional 2270 housing units may be built in the ROI between 2020 and 2029.

As noted in Section 5.8.2.1.1, operation of LMGS results in approximately 81 operations workers relocating to the ROI. Table 5.8-1 details the distribution of these in migrating workers. Using this distribution pattern, in-migrating operations workers use 4.7 percent of the available housing units for rent or sale in Calhoun County, 0.8 percent of available housing units for rent or sale in Jackson County, and 3.5 percent of available housing units for rent or sale in Victoria County. The in-migrating operations workforce uses 3.2 percent of the available housing units for rent or sale within the ROI as a whole. As such, adequate housing is available within the ROI when the operations workforce relocates to the ROI. Alternatively, some of the in-migrating workforce may not seek to rent or buy from the current inventory of housing units and instead may choose to construct new homes. However, due to the relatively small increase in population associated with the in-migrating workforce (approximately 0.2 percent increase in overall population of the ROI [Section 5.8.2.1]), construction of new homes does not affect the existing housing market or established residential development within the ROI; therefore, impacts associated with the operations workforce have a minor impact on housing.

5.8.2.2 Summary of Demographic Impacts

The projected population increases associated with the in-migration of operations workers and their families account for less than one percent of the total population of the ROI of any of the individual counties. Because the in-migrating operations workers, including outage workers would be fewer than the number of in-migrating construction workers, the increased population would not noticeably affect the demographic character of the ROI or any of its counties; therefore, the impact is SMALL.

5.8.2.3 Economic Impacts to the Community

5.8.2.3.1 Economy

Impacts on the local and regional economy resulting from the operation of LMGS are directly related to the region's current and projected economy and population. The magnitude of economic impacts depends on the size and diversity of the local economy and is determined using an economic multiplier during operations, which includes outages or unit replacement activities. The economic multiplier models operation-related expenditures (payroll) to estimate the gross output, employment, and income effects of direct local expenditures. Diversity of the local economy refers to how fast local expenditures escape from the economy during successive rounds of economic activity. The more diverse the structure of the local economy, the longer direct expenditures circulate in the economy, generating a higher multiplier effect and greater total impact on output, employment, and income.

Economic multipliers for the ROI were obtained from the U.S. Department of Commerce Bureau of Economic Analysis, Economics and Statistics Divisions Regional Input-Output Modeling Systems (RIMS II). The RIMS II direct effect employment multiplier for jobs in the electric power generation industry is 3.0, resulting in 289 jobs created in the ROI for every newly created operations job at the LMGS site. Operation of LMGS creates 96 direct jobs, and based on the RIMS II multiplier, approximately 193 indirect jobs are created within the ROI. Most of the indirect jobs are service related, and the existing workforce in the ROI fills those jobs. Indirect jobs have a positive impact on the local economy and on unemployment rates of the existing labor force in the ROI.

Capital expenditures, the purchase of goods and services, and payment of wages and salaries to the operations workforce have a multiplier effect through an increase in business activity, particularly in retail and service industries. The in-migrating operations workforce and their families purchase goods and services from within the ROI, thereby creating an expanded economic effect that results in an increase in business activity. The RIMS II multiplier for earnings in the electric power generation industry sector of 1.9 was applied to the estimated total wages earned per year by the LMGS operations workforce. The total impact of the operations workforce earnings, assuming it is all spent within the ROI, is $46.5 million per year. Of this, $22.1 million is indirect earnings spent within the ROI, however, this could be less if expenditures occur outside the region. The remaining $24.3 million is annual payroll for the operations workforce. As such, impacts to the economy from operation of LMGS are beneficial and minor in the context of the larger economy of the ROI.

5.8.2.3.2 Taxes

The tax structure of the ROI is described in Section 2.5.2.3. Primary tax revenues associated with LMGS operations arise from the following sources:

- Sales and use taxes on worker expenditures
- Sales and use taxes on the purchases of materials and supplies
- Revenues from property tax payments

Tax revenues associated with LMGS include a franchise tax on taxable income from operations, sales and use taxes on purchases made to support operations and the operations workforce, property taxes related to the upgraded LMGS site, and property taxes on newly owned residential properties from the in-migrating workforce. Additional tax revenues are generated by economic activity resulting from the multiplier effect. Increased taxes collected are viewed as a benefit to the state and the ROI.

5.8.2.3.2.1 Personal Income and Corporate Franchise Taxes

As noted in Section 4.4.2.2.2, Texas has no personal income tax, and the franchise tax is calculated based on an entity's margin and total revenue minus exclusions. Section 1.1.1 identifies the purpose and need of the proposed project as providing electrical power and steam to support the steam and power demands for the SDO. Because electrical power and steam generated at LMGS support existing operations at SDO and are not a sellable utility, no franchise taxes are paid on operation of LMGS, although SDO continues to pay any franchise tax applicable to its operations. Additionally, existing businesses are likely to experience a minor increase in revenue from increased spending in the ROI resulting in increased franchise tax revenue. As such, the impact from operations of LMGS on personal income and franchise taxes is beneficial and minor.

5.8.2.3.2.2 Sales Taxes

Sales and use taxes are generated by purchases supporting the operation of LMGS. While the exact amount of local operational expenditures is not known, over the course of the 60 year operational life of the plant a beneficial and SMALL impact occurs throughout the ROI and region.

An increase in sales and use taxes collected in the three counties in the ROI occurs from the in-migrating operations workforce and their families and from the operations workforce who reside outside the ROI but travel into the ROI for work at the LMGS site. While the state collects 6.25 percent state sales and use tax (Section 2.5.2.3), counties, special purpose districts, and transit authorities levy and collect additional sales and use taxes, up to two percent (Section 2.5.2.3 and Table 2.5-14). The average operations worker salary is approximately $253,000 per year, which is saved or spent on goods and services. Over the course of the 40-year licensing period of LMGS, sales and use tax revenues are collected from spending by the operations workforce and their families; however, due to the small workforce size (96 full-time employees), the annual return on sales and use tax revenue is beneficial and minor.

5.8.2.3.2.3 Property Taxes

Members of the in-migrating operations workforce pay property taxes within the ROI counties where they reside. Residential patterns are illustrated in Table 5.8-1, with an estimated majority of the operations workers residing in Victoria County. While many of these in-migrating operations workers buy existing homes and pay property tax, some operations workers may choose to build their own homes and thus generate a minor increase in property tax revenues within the ROI.

The Dow Union Carbide Corporation pays property taxes to Calhoun County, Calhoun Independent School District (ISD), and other special taxing districts. As noted in Section 4.4.2.2.2, Dow Union Carbide Corporation entered into a Tax Abatement Agreement with Calhoun County for land improvements at the LMGS site. The agreement is for 100 percent abatement for 10 years beginning on January 1 of the Start Year (based on the issuance of a CP by the NRC and the date construction begins). While the Start Year is unknown, it is likely that the Tax Abatement Agreement term will be 10 years, extending through the approximate 44-month building phase and into a portion of the 40-year operating period. During the overlap of the Tax Abatement Agreement and operation of LMGS, no property tax payments are made to the applicable taxing entities. Once the abatement period is over, property taxes are paid in accordance with state and local rates. Improvements to the LMGS site increase the appraised value of the property, thus increasing the property tax revenue. The estimated appraised value of the LMGS site is bounded by the cost of construction at the LMGS site (Section 4.4.2). Using tax rates from 2023, estimated annual property taxes on the LMGS site during operation are approximately $16 million. As shown in Table 2.5-13, Calhoun County collected approximately $26 million in total tax revenues in 2022. The addition of approximately $16 million in property tax revenue from the LMGS site improvements accounts for 61 percent of the total tax revenue for Calhoun County. However, within the three county ROI, the additional property tax revenue accounts for 20 percent of the total tax revenue.

As detailed in Section 2.5.2.3, the total taxable property value of all property in each school district can affect a school district's state funding. School districts having a lower taxable property value per student receive more state dollars for each pupil than school districts with a higher property value per student. Table 2.5-15 details the total taxable property in Calhoun County. The improvements to the LMGS site account for approximately 24 percent of the total taxable property for Calhoun County ISD; therefore, given the increase in revenue associated with increased property taxes, the Calhoun County ISD realizes a decrease in state funding. However, the increases in property taxes paid by Dow Union Carbide Corporation at the end of the Tax Abatement Agreement likely outweigh the decrease in state funding.

Sales and use taxes, along with residential property taxes, are distributed across the ROI. However, the property taxes generated from improvements to the LMGS site are collected within Calhoun County, where LMGS is located. As a result, beneficial impacts associated with operations are notable within Calhoun County, but are minor in the context of the larger economy of the ROI.

5.8.2.3.3 Summary of Economic Impacts on the Community

Operation of LMGS creates direct and indirect jobs that have a positive impact on the local economy and on unemployment rates in the ROI. The in-migrating operations workforce and their families purchase goods and services from within the ROI, creating economic multiplier effects that result in an increase in business activity. In addition, revenue from sales and use taxes, and residential property taxes associated with operations are spread throughout the ROI. As such, impacts to the economy from operation of LMGS are beneficial and MODERATE, but SMALL in the context of the larger economy of the ROI.

5.8.2.4 Infrastructure and Community Services Impacts

5.8.2.4.1 Traffic

The impacts on transportation and traffic from operation of the LMGS are greatest on the roads in the ROI (Victoria, Calhoun, and Jackson counties) because the majority of workers reside in these areas. The operations workforce typically access the LMGS site via SH 35 and SH 185. Impacts of operations workforce to traffic are determined by three elements:

- The number of operation workers and their vehicles on the roads
- The projected population growth rate in the ROI
- The capacity of the impacted roadways

Operation of LMGS requires a workforce of approximately 96 full-time employees and an additional 250 temporary workers commuting to and from the LMGS site during outages. This transportation and traffic analysis conservatively assumes one worker per vehicle.

For this analysis, it is conservatively assumed that the 96-person operation workforce and the 250-person temporary outage workforce all arrive and depart the LMGS site at the same time when major maintenance outages occur, yielding a total of 346 vehicles arriving the LMGS site. Notably, this conservative condition only occurs infrequently during major maintenance activities.

As shown on Table 2.5-3, the projected population in the ROI from 2020 through 2040 is estimated to have an average annual growth rate of 0.32 percent. Any increase in traffic due to population growth is small and therefore is not considered further in this analysis. Additionally, it is assumed that a small amount of delivery vehicles access the LMGS site. Truck deliveries to the site are expected to be scheduled at different times to avoid conflicts with operation and outage workforce traffic; therefore, the increase in traffic resulting from truck deliveries is not analyzed further.

As described in Section 2.5.2, average annual daily traffic (AADT) is the total volume of motorized vehicle traffic on a highway or roadway segment for one year divided by 365 days. Following the same procedure as described in Section 4.4, Socioeconomic Impacts, the estimate of traffic generated by outage activities is based on the worst-case condition in that the 96-person operation workforce and the 250-person temporary outage workforce all arrive and depart the LMGS site at the same time during operations. Notably, this conservative condition only occurs infrequently during outages. Traffic operations for existing and operating conditions are analyzed using the Highway Safety Software (University of Florida Transportation Institute, 2024), which uses methodology from the Highway Capacity Manual

Seventh Edition (National Academies of Sciences, Engineering, and Medicine, 2022) for highway segments. Intersections are analyzed using Synchro 11.

This analysis examines the traffic impacts along Jesse Rigby Road, SH 185, and SH 35; which provide direct access to the LMGS site from surrounding feeder roads. The effects on these feeder roads—U.S. Highways 77, 87, and 59, SH 238 and SH 239, and Farm-to-Market (FM) 616—are minimal. Traffic from operation and outage activities is spread across these roads, reducing the overall effects. The roadway network in the LMGS region is shown on Figure 2.5-3 with details of each road listed on Table 2.5-12,. As shown in Table 5.8-1, most of the operations workforce is expected to live in Victoria County, north of the LMGS site, thus making SH 185 a key roadway for travel to and from the LMGS site. The 346 operations-related vehicles (including the daily workforce and the outage workforce) are distributed across the existing traffic network with 80 percent of the vehicles traveling to/from the site via SH 185 and the remaining 20 percent traveling to/from the site via SH 35. AADT data are from the Texas Department of Transportation (TxDOT) Traffic Count Database System (TCDS) (TxDOT, 2024) along roadway segments primarily impacted by traffic (SH 185 and SH 35) and at selected intersections along those segments (intersection of SH 185 and Second Street West/Second Street East, SH 185 and FM 616, and SH 185 and SH 35). Peak hour volumes are estimated using TCDS data.

As noted in Section 2.5.2, Level of Service (LOS) is a qualitative measure of operating conditions at a segment or intersection. LOS is given a letter designation ranging from A (free flow) to F (heavily congested) and is calculated for both the existing conditions and operating conditions. LOS for highway segments is based on density (passenger cars/per mile/per lane), which relates to how many vehicles are traveling along a roadway segment during the peak hour. Another measure related to traffic flow is the volume/capacity ratio, which provides an estimate of traffic flow in comparison to the estimated capacity of the roadway segment or intersection. Three locations along the highway segments providing access to the LMGS site are analyzed:

- SH 185 just north of the city of Bloomington
- SH 185 south of Bloomington
- SH 35 to the east of the intersection of SH 185 and SH 35

As shown in Table 5.8-2, as a result of operations activities there is a slight decrease from LOS A to LOS B in the two-lane segments analyzed. The LOS decreases along the route coming into the site (SH 185 southbound and SH 35 eastbound) in the AM peak hour and for the route going out of the site in the PM peak hour (SH 185 northbound and SH 35 westbound). There is a minimal effect in the opposite direction as there is a minimal impact from the operations workforce on the existing traffic conditions. There is no noticeable impact on LOS at the SH185 segment north of Bloomington.

LOS for intersections ranges from A (free flow) to F (heavily congested) and is based on the average vehicle control delay (seconds) which relates to on average how long a vehicle waits at an intersection until it passes through. One signalized intersection and three non-signalized intersections along the segments providing access to the LMGS site are also analyzed:

- SH 185 and Second Street West/Second Street East (Signalized) (in Bloomington)
- SH 185 and FM 616
- SH 15 and SH 35
- SH 35 and Jesse Rigby Rd

Table 5.8-3 summarizes the results of the analysis for signalized and non-signalized intersections during both existing and operating conditions during the AM and PM peak hours. For the signalized intersection the table shows the LOS of all the approaches. For the non-signalized intersections the table identifies the LOS of the worst approach leg.

For the signalized intersection of SH 185 and Second Street West/Second Street East, the LOS of the major street (southeast and northwest approaches) remain at a LOS A, with the delay slightly decreasing. The LOS of the minor street (southwest and northeast approaches) decreases from LOS B in the existing condition to LOS C during operations except for the AM northeast approach which falls to LOS D. Traffic signals are set to prioritize the major street to give more time under the green light signal, allowing vehicles to clear through the major street more efficiently; therefore, it is generally expected that the vehicles on the minor street will see an increase in delay due to the increase in traffic along SH 185.

At all the non-signalized intersections listed above, delays are expected to slightly increase with the maximum increase occurring at SH 35 & Jesse Rigby Road for the northbound leg during the PM conditions, decreasing from LOS A to LOS D (an increase of 26.3 seconds). During existing conditions, it is assumed there are no vehicles on the northbound approach as all the traffic on Jesse Rigby Road enters and leaves through the SH 185 intersection. All vehicles on the northbound approach occur due to the operations workforce leaving the site in the PM peak hour. No vehicles are assumed to leave the site in the AM. All other intersections expect an increase in delay of at most eight seconds, lowering the LOS from LOS B to LOS C during peak hours.

All the non-signalized intersections listed above are three legged intersections (SH 185 and SH 35 can be divided into two as there is a north and south approach for SH 185), which have one leg stop-controlled and the other legs as free flow. The worst leg analyzed is the left turn coming out of the stop-controlled street onto the major street; therefore, the delay increases in all the scenarios due to the additional left turn vehicles that are entering/leaving the site.

Although LMGS operation results in some delay along portions of the roadway segments providing access to the LMGS site, these impacts are minor as minor delays are only realized during peak hours. The LOS for the minor street approaches at SH 185 and Second Street West/Second Street East falls to a LOS D in the peak hour, however, the overall intersection functions at a LOS A during operations. All other intersections experience a slight increase in delay and therefore the impacts to traffic at intersections analyzed are minor. Additionally, during normal operating conditions when the outage workforce is not present the delays are less than the worst-case condition analyzed.

5.8.2.4.2 Recreation

The existing recreational opportunities located within the vicinity are described in Section 2.5.2.5 and include the Victoria Barge Canal and the Guadalupe Delta WMA, which support aquatic recreation, fishing, and hunting. The increase in population attributed to operations workers and their families affects recreational areas in the LMGS vicinity. The in-migrating population is expected to use recreational areas and facilities to a similar degree as the existing permanent population in the ROI. As noted above, many of the recreational areas span large areas and support outdoor activities. As a result, the relatively small number of in-migrating persons, estimated at 223, does not disrupt normal visitation and activities associated with these recreational opportunities.

Operations may impact the visual landscape and the existing noise conditions. Visual impacts experienced at a given location due to the operation of LMGS are influenced by distance to the site, topography, and the presence of existing structures and vegetation. Recreators within the vicinity currently have views of the SDO and associated infrastructures; therefore, operation of LMGS is likely absorbed into the existing industrial viewshed. Visual impacts associated with operations at the LMGS site do not disrupt recreators because the LMGS site is generally blocked by the existing industrial facilities. Likewise, noise from operations at the LMGS site is in accordance with applicable local, state, and federal laws and is absorbed by existing noise emissions from the SDO and associated railway. Impacts from noise are further discussed in Section 5.8.1.1. As such, impacts to recreation from operation of LMGS are minor.

5.8.2.4.3 Public Services

This subsection discusses the impacts on the existing water supply, wastewater treatment, police, fire protection, healthcare services, and education in the economic region.

5.8.2.4.3.1 Water Supply and Wastewater Treatment

Section 2.5.2.7.2 and Table 2.5-20 describe the public water supply systems in the ROI, their production capacity, and average daily usage. The impact to public water supplies from the in migrating operations population is estimated by adding the estimated water usage from the in migrating operations workforce and their families to the existing public water supplies. As noted in Section 4.4.2, the estimated water usage of the in-migrating operations workforce is determined by applying the average daily use of water (82 gallons per day) by the number of in-migrating people. This analysis conservatively assumes that all in-migrating workforce and their families live in the ROI and in areas serviced by public water supplies. Due to the relatively small number of in-migrating individuals to the ROI, the overall increase in water usage in millions of gallons per day (MGD) is less than 0.01 within each of the individual counties and is approximately 0.02 within the ROI as a whole. Under the most conservative assumption that the entire in-migrating population live in areas within the ROI serviced by the public supply systems, there is no measurable increase in demand and the capacity of these systems is not affected. As discussed in Section 2.5.2.7, the Texas State Water Plan concluded that without strategic supplies (water management strategies recommended to address potential shortages), Victoria County will not have enough water to meet demand for all users in 2030 through 2070. However, Victoria County is addressing future shortages of municipal water as part of planning and strategy efforts. Because the in-migrating operations workforce and their families have a negligible impact on public water supply systems, the associated negligible increase in demand from the LMGS site operations population does not disrupt planning and strategies developed to address the predicted shortages. As such, the impact to public water supply from in-migrating operational population is minor.

Section 2.5.2.7.2 and Table 2.5-21 identify the public wastewater treatment systems in the ROI and their total design flow and existing total flow. The impact to public wastewater treatment systems from operations-related population increases is determined by calculating the amount of water that these individuals use and dispose. For this analysis, the assumption is that the entirety of the average daily water usage previously mentioned (82 gallons per day) is discharged into wastewater treatment systems. As noted above, the daily water usage and thus daily wastewater produced by the in-migrating populations is less than 0.01 MGD within each of the three counties in the ROI and is approximately 0.02 MGD in the ROI as a whole. Assuming that all in-migrating populations live in areas serviced by wastewater systems, the increase in wastewater produced is nominal, and the change in excess capacity percentage throughout the ROI is approximately 0.1 percent. Based on the remaining excess capacity of the wastewater treatment facilities and the small increase in utilization of these systems, the impact to wastewater treatment facilities from the operational workforce and their families is minor.

5.8.2.4.3.2 Police and Fire Protection Services

The number of sworn law enforcement officers and the resident-to-officer ratio within the three county ROI are addressed in Section 2.5.2.7.3 and summarized in Table 2.5-22. The national average of law enforcement officers to residents is 2.4 per 1000 citizens. As noted in Section 2.5.2.7.3, the ratio of law enforcement officers to residents in the ROI exceeds that ratio, except in Jackson County. The addition of the operations-related population results in an increase of 0.2 percent, or less than one person, and the overall ratio of law enforcement officers per 1000 residents within the ROI remains the same at 2.7 officers per 1000 residents; therefore, the counties within the ROI absorb the additional residents without the need to hire more law enforcement officers; therefore, the impact of the in-migrating operations-related population to police services is minor.

The existing levels of fire protection services in the ROI and the ratio of firefighters to residents are detailed in Section 2.5.2.7.3 and Table 2.5-23. As stated in Section 2.5.2.7.3, the national average firefighter-to-citizen ratio is 1 to 318. The in-migrating population decreases the firefighter-to-citizen ratio, and the ratios in Calhoun and Jackson counties remain under the national average ratio. Although the firefighter-to-citizen ratio in Victoria County remains above the national ratio (1 firefighter to 357 residents); the in-migrating population results in an increase of 0.2 percent, or less than one person, and there is no change to the current firefighter-to-citizen ratio. Similarly, the in-migrating population decreases the firefighter-to-resident ratio slightly, from 1:279 to 1:280 throughout the ROI. Due to the relatively small increase in population and the resulting decrease in firefighter-to-resident ratio within the ROI, the impact of the in-migrating operational workforce and their families to fire services is minor.

5.8.2.4.3.3 Medical Services

Information on medical services in the ROI is provided in Section 2.5.2.7.3.4, including the number of licensed hospital beds (Table 2.5-24) and the number of physicians and dentists per county (Table 2.5-25). As detailed in Section 5.8.2.1, the in-migrating operations workforce and their families account for an increase of 223 people in the ROI. Within the three counties, the increase in the persons per physician ratio ranges from 0.9 (Jackson County) to 2.0 (Calhoun County); with an overall increase of 2.0 persons per physician in the ROI. The pattern for the increase in demand for dentists is similar in the ROI; the increase in persons per dentist ratio ranges from 2.7 (Jackson County) to 8.8 (Calhoun County) with the ROI seeing an overall increase of 4.6 persons, representing a 0.2 percent increase. The in-migrating operations workforce and their families also place additional demand on hospitals; however, the in-migrating population accounts for an approximately 0.2 percent increase to the existing population of the ROI; therefore, hospitals can absorb this increase in population without the need for additional resources. As such, impacts to medical services from the in-migrating population are minor.

5.8.2.4.3.4 Education

Schools and student populations in the ROI are discussed in Section 2.5.2.8. The 2017-2021 U.S. Census Bureau American Community Survey estimates that 21.8 percent of the population of Texas is between the ages of 5 and 19 (i.e., school age). As stated in Section 5.8.2.1.1, 81 of the 96 operations workers migrate into the ROI, resulting in a population increase of 223 people. Using the statewide percentage of school aged population, approximately 49 of the 223 in-migrating people are school aged. Due to the relatively small in-migrating operations workforce, the increase in overall enrollment is less than 0.3 percent. None of the counties in the ROI experience a change in the student to teacher ratio; therefore, impacts to education from operation of the LMGS site are minor.

5.8.2.5 Public and Occupational Health

Occupational health risks for nuclear power plant workers engaged in operational maintenance, testing, or plant modifications generally include those associated with exposure to toxic nonradioactive materials or other industrial safety and health hazards such as falls, confined space, and equipment energization hazards (OSHA and NRC, 2013). Public and occupational health impacts may result from exposure to noise, hazardous materials, emissions, EMFs, and infectious diseases.

As shown in Table 2.9-1, the national average incidence rate of nonfatal occupational injuries in 2022 for electric power generation facilities, which includes nuclear power plants, was lower than the average rate across all private industries and the incidence rates for nonfatal occupational injuries to construction workers. Occupational injury and fatality risks are minimized through strict adherence to NRC requirements and Occupational Safety and Health Administration (OSHA) safety standards (29 CFR 1910) practices and procedures during operations.

As noted in Section 5.2.1.3, nonradiological waste streams from LMGS tie into existing SDO infrastructure for management and treatment. The outfall from SDO operations to the Victoria Barge Canal will be through an existing permitted outfall location, and all effluent concentrations will be in accordance with applicable TPDES permit conditions. Adherence to applicable permit requirements ensures that waste streams and their constituents are properly managed and treated such that the risk to workers at SDO and the public are minimized. As such, nonradiological health impacts of waste streams on SDO workers and the public are minor.

Health impacts to workers and the public from nonradiological emissions, noise, and electric shock hazards are monitored and controlled as needed in accordance with applicable federal and state regulations. Also, as discussed in Section 2.9.4, the scientific evidence regarding the chronic health effects from EMFs, including the potential effects associated with exposure to electrical fields that are associated with electric power usage, does not conclusively link EMF exposure to adverse health impacts; therefore, impacts from nonradiological occupational hazards are minor. Radiologic health impacts to workers are analyzed in Section 5.4, Radiological Impacts of Normal Operation.

5.8.2.6 Human Health Impacts from Transportation

The operations and outage workforce increases traffic on SH 35 and SH 185 segments that provide access to LMGS. Traffic crashes that include property damage, injury, and fatalities may occur as a result of increased traffic volumes on those segments. Estimates of increased traffic crashes resulting in injuries and fatalities are based on additional traffic generated under the conservative scenario in which the operation and outage workforce arrive/leave LMGS at the same time. As indicated in Section 4.4.4.2, crash rates (number of accidents per million vehicle miles traveled) are an effective tool to measure the relative safety at a particular location.

As determined in Section 5.8.2.4, it is conservatively assumed that the 96-person operations workforce and the 250-person temporary outage workforce all arrive and depart LMGS at the same time when major maintenance outages occur, yielding a total of 346 vehicles. Notably, this conservative condition only occurs infrequently during major maintenance activities. Additionally, it is assumed that 80 percent of the operation and outage workforce use the SH 185 northwest segment and 20 percent use the SH 35 northeast segment to access LMGS. Additional travel along these roadways could increase the potential for additional crashes involving damage and injuries.

As detailed in Table 5.8-4 a majority of the crash rates on roadways and intersections along the roadways that provide access to the LMGS do not notably increase over existing conditions, with the exception at the non-signalized intersection of SH 35 and Jesse Rigby Road where the crash rate increases from 0 crashes to 1.56 crashes per million entering vehicles, as this is a new intersection for traffic to enter LMGS.

The increase in vehicles on surrounding roadways resulting from operations and outage activities at LMGS result in minor increases to the current crash rates; overall crash rates on surrounding roadways remain below the Texas statewide average. Similarly, the increase in vehicles results in minor increases to the current traffic crashes at the intersections along these roadways; therefore, the overall impacts on human health from transportation during operations is minor.

5.8.2.7 Summary of Impacts to Infrastructure and Community Services

Infrastructure and community services impacts span issues associated with traffic, recreation, public services, public and occupational health, and human health impacts from transportation. Although operations-related traffic results in increases in delays along portions of the roadways providing access to the LMGS site and at some intersections along these roadways, these delays are only experienced during peak hours and do not noticeably disrupt the overall function of the intersection. Additionally, during normal operating conditions when the outage workforce is not present the delays are less than the worst-case condition analyzed. Similarly, the increased traffic associated with the operations workforce does not notably increase the crash rates on surrounding roadways. The increase in operations-related workforce does not result in a noticeable impact to occupational injury, and fatality risks are minimized through strict adherence to NRC requirements and OSHA safety standards. Given the overall population increase associated with the in-migration of the operational workforce and their families, impacts to public services are minimal; therefore, impacts to infrastructure and community services are SMALL.

5.8.3 Environmental Justice Impacts

Section 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 for EJ evaluation. Table 2.5-30 and Figure 2.5-6 and Figure 2.5-7 illustrate the number and distribution of minority and low-income census block groups (CBGs) within the 50 mi (80 km) region. Among the 189 CBGs within the 50 mi (80 km) region, 90 CBGs have a racial or ethnic minority population or an aggregate minority population that exceeds one of the established criteria, and 24 CBGs exceed the low-income criteria. The closest minority CBG is located in Refugio County, approximately 5.3 mi (8.5 km) to the southwest of the LMGS site center point, and the closest low-income CBG is located in Port Lavaca, approximately 9.1 mi (14.6 km) to the northeast.

The potential for disproportionate adverse impacts on EJ populations associated with operation of LMGS is addressed in the following subsections. Potentially significant pathways for physical and environmental, socioeconomic, and human health impacts are considered and analyzed to determine whether the characteristics of the pathway or special circumstances of the minority or low-income populations result in a disproportionately high and adverse impact.

5.8.3.1 Physical and Environmental Impacts

Physical and environmental impacts of plant operations are concentrated near the LMGS site and attenuate rapidly with distance. Primary pathways for physical and environmental impacts consist of soil, water, air, and noise.

Operations activities have minimal impacts on soils at the LMGS site and in the vicinity. As described in Section 5.4, Radiological Impacts of Normal Operation, doses to nearby residents from the ground or through ingestion of vegetables are below 10 CFR 50, Appendix I criteria. Low-level, radioactive waste, as well as nonradioactive waste, is generated on-site, but this waste is disposed in permitted facilities (Section 3.5, Radioactive Waste Management System, Section 3.6, Nonradioactive Waste Management System, and Section 5.5, Environmental Impacts of Waste); therefore, impacts from soils to the general population, as well as any minority or low-income populations are minor.

As described in Section 5.2, Water-Related Impacts, the plant design integrates the use of ACCs and does not use water for the cooling system. Stormwater is managed in accordance with the provisions of a SWPPP and implementation of appropriate BMPs. Additionally, effluents are monitored and controlled in accordance with the requirements of TCEQ TPDES permits; therefore, impacts to surface water quality from operations are SMALL. No groundwater from on-site or off-site sources is used during operation of LMGS. The permanent stormwater basin may increase stormwater infiltration over its area and increase local recharge to groundwater. Recharge of local groundwater and potential infiltration of constituents from this basin is limited based on the design requirements and the predominance of dense clays on the LMGS site. Impacts to water from operation of LMGS are minor for the general population and for any minority or low-income populations.

As described in Section 5.9, Air Quality Impacts, gaseous and particulate matter may be emitted from process equipment and intermittent engine-driven emergency operations equipment during operation of LMGS. Ventilation systems are designed and operated to ensure adequate control of radioactive dust and particulate material from process equipment, and emissions control systems are provided where necessary to treat effluents before their discharge to the atmosphere to mitigate atmospheric emissions. As such, impacts from air emissions from operation of LMGS are localized and SMALL. Likewise, as described in Section 5.8.1.1, noise impacts from operation are localized and minor, attenuating to levels below the existing ambient noise levels at the closest sensitive receptors.

Physical and environmental impacts to the general population from operation activities are SMALL. The closest EJ population is located more than 5 mi (8 km) from the LMGS site center point, where physical and environmental impacts associated with operation are not perceptible; therefore, no disproportionately high and adverse impacts to minority or low-income populations in the region occur via physical and environmental pathways.

5.8.3.2 Socioeconomic Impacts

As described in Section 5.8.2.1, the total operations staff for LMGS is 96 full-time employees. The in-migrating operations workforce is expected to use approximately 3.2 percent of the available housing units for rent or sale within the ROI, resulting in minor impacts to housing. Due to the relatively small housing needs of the operations staff, more than enough vacancies remain to meet demand without creating a competitive shortage of housing. Thus, impacts to housing are not disproportionately high and adverse for minority and low-income populations.

As described in Section 5.8.2.2, operation of LMGS benefits the economy within the ROI through the increase in capital expenditures, payment of wages and salaries to the operations workforce, and creation of new business opportunities in the retail and service industries. Minority and low-income populations benefit from these minor and positive impacts just as the general population does.

As described in Section 5.8.2.4, the existing community infrastructure and public services in the ROI are adequate to support the operation of LMGS and the increase in population associated with the in-migrating workforce and their families. Overall impacts to traffic as a result of operations at LMGS are minor and localized to the roadways close to the LMGS site. Excess capacity of existing water and sewer services is adequate to meet the service demands of the projected population increase. Police and fire protection services, medical services, and public education meet local needs with capacity to absorb the population increase associated with the operations workforce. In addition, as discussed in Section 5.8.2.3.2, operation of LMGS generates tax revenue through sales and use and property taxes, which are available to upgrade public services in response to the needs of an expanded population if the local government deems necessary; therefore, the level of impact to public services during operation is minor for the general population as well as for minority or low-income populations.

Adverse socioeconomic impacts of operation are SMALL and do not disproportionately affect minority or low-income populations. Beneficial impacts to the economy and tax revenues are proportionately spread across the general, minority, and low-income populations.

5.8.3.3 Human Health Effects

As discussed in Section 5.3.4, impacts to human health associated with operation of the cooling system, including propagation of etiologic agents and noise, are localized and SMALL. In addition, the nonradiological health effects for construction workers and the local population from occupational injuries and transport of materials and personnel are localized and minor (Section 5.8.2.4 and Section 5.8.2.5).

As described in Section 5.4, Radiological Impacts of Normal Operation, the annual doses from the liquid, gaseous, and direct radiation exposure pathways meet the public dose criteria and design objectives. In addition, the LMGS site is monitored continually, and appropriate actions are taken, as necessary, to ensure that workers and the public are protected from radiation. Radiological impacts to members of the public are SMALL.

Human health effects to the general population from operation of LMGS are SMALL and are largely limited to the areas close to the LMGS site. The closest EJ population is located more than 5 mi (8.0 km) from the LMGS site center point; therefore, no disproportionately high and adverse impacts to minority or low-income populations in the region occur via human health-related pathways.

5.8.3.4 Subsistence, Special Conditions, and Unique Characteristics

Even where environmental impacts are generally SMALL, the resource dependencies, unique cultural practices, or special circumstances of some subpopulations may lead to disproportionate exposure through inhalation or ingestion (e.g., subsistence agriculture, hunting, or fishing). As discussed in Section 2.5.4.2, no stakeholders, community organizations, or members of the public have reported concerns regarding impacts to EJ populations or knowledge of dependencies or practices through which LMGS could disproportionately adversely affect these populations. While many in the Vietnamese community around Port Lavaca and Palacios make their living by catching seafood, the seafood is generally sold commercially rather than for personal sustenance. As such, these communities are not considered subsistence communities. Thus, this analysis does not identify specific exposure pathways or unique dependencies, cultural practices, or circumstances that indicate the likelihood of any such disproportionate exposures resulting from operation of LMGS.

5.8.3.5 Summary of Environmental Justice Impacts

Minority or low-income populations in the vicinity of the project LMGS site would not experience disproportionately high and adverse human health, environmental, physical or socioeconomic effects as a result of operation of LMGS.

Tables

Table 5.8-1: Population Increases in the Region of Influence Associated with Operations Workforce

	Percentage of Existing SDO Workforce by Place of Residence	Distribution of Workers Needed from Outside ROI	Total Number of New Residents	Baseline Population (2029 Projections)	Percent Increase in Population
ROI	84.00%	81[(a)]	223[(a)]	129,905	0.17%
Calhoun County	16.50%	16	44	19,867	0.22%
Jackson County	3.20%	3	8	15,265	0.06%
Victoria County	64.30%	62	170	94,773	0.18%
Outside ROI	16.00%	15[(b)]	N/A	N/A	N/A
Total	**100.00%**	**96**	-	-	-

Notes:

(a) Expected to relocate to the ROI; estimates are rounded to the nearest whole number, accounting for potential discrepancies between the ROI total and the sum of the five ROI counties

(b) Expected to commute from counties outside the ROI; workers and families would continue to reside outside of the ROI and would not impact the ROI population

Abbreviations: ROI = region of influence; SDO = Seadrift Operations

Table 5.8-2: Level of Service for Highway Segments Providing Access to Long Mott Generating Station During Operations

Location	Peak Hour	Direction	Existing Condition (2022)				Operations Phase			
			Volume (Vehicle /hour)	Volume-to-Capacity Ratio[a]	Density pc/mi/ln[b]	LOS	Volume (Vehicle /hour)	Volume-to-Capacity Ratio[a]	Density pc/mi/ln[b]	LOS
Multi-Lane Segment										
SH 185 - North of Bloomington	AM	SB	469	0.11	3.8	A	746	0.18	6	A
		NB	192	0.05	1.6	A	192	0.05	1.6	A
	PM	SB	755	0.18	6.1	A	755	0.18	6.1	A
		NB	441	0.11	3.6	A	718	0.17	5.8	A
Two-Lane Segments										
SH 185 - South of Bloomington	AM	SB	233	0.14	1	A	534	0.31	3.7	B
		NB	100	0.06	0.2	A	100	0.06	0.2	A
	PM	SB	266	0.16	1.2	A	266	0.16	1.2	A
		NB	178	0.1	0.7	A	479	0.28	3.1	B
SH 35 - East of SH 35 & SH 185	AM	EB	159	0.09	0.5	A	460	0.27	2.9	B
		WB	168	0.1	0.6	A	168	0.1	0.6	A
	PM	EB	168	0.1	0.6	A	168	0.1	0.6	A
		WB	252	0.15	1.1	A	553	0.33	3.8	B

Note:
a) Volume-to-Capacity Ratio (v/c): Performance measure comparing traffic demand to roadway capacity. Range 0.0 to 1.0
b) Density pc/mi/ln: Performance measure referring to the number of passenger vehicles per lane present within a one-mile segment of roadway
Abbreviations: NB = northbound; SB = southbound; WB = westbound; EB = eastbound; LOS = Level of Service; SH = State Highway

Table 5.8-3: Level of Service for Non-Signalized and Signalized Intersections Providing Access to Long Mott Generating Station During Operations

Intersection	Approach	Existing Condition (2022)				Operations Phase			
		AM		PM		AM		PM	
		Delay (seconds)	LOS	Delay (seconds)	LOS	Delay (seconds)	LOS	Delay (seconds)	LOS
Non-Signalized Intersections (Worst Leg)									
SH 35 & SH 185 (South Approach)	**NB**	**12.1**	**B**	**10.6**	**B**	**12.1**	**B**	**10.6**	**B**
SH 35 & SH 185 (North Approach)	**SB**	**11.2**	**B**	**14.2**	**B**	**17.8**	**C**	**14.7**	**B**
SH 35 & Jesse Rigby Road	**NB**	**0**	**A**	**0**	**A**	**0**	**A**	**26.3**	**D**
SH 185 & FM 616	**SWB**	**11.1**	**B**	**13.5**	**B**	**13**	**B**	**17.4**	**C**
Signalized Intersections									
SH 185 & 2nd Street West / 2nd St East	SEB	3.9	A	3.5	A	3.6	A	2.1	A
	NWB	3.6	A	3.7	A	2.9	A	2.9	A
	NEB	13.3	B	13	B	36.8	D	28.7	C
	SWB	12.3	B	12.5	B	33.4	C	27.5	C
Abbreviations: NB = northbound; SB = southbound; SWB = southwest-bound; SEB = southeast-bound; NEB = northeast-bound; NWB = northwest-bound; LOS = Level of Service; SH = State Highway									

Table 5.8-4: Operations Phase Traffic Crash Rates in the Long Mott Generating Station Vicinity

Roadway Segment	2022 AADT	AADT During Operations	Existing Crash Rate (100 MVM)[(a)]	Crash Rate During Operations (100 MVM)	2022 Texas Statewide Crash Rate (100 MVM) [(b)]
SH 185 (N of Bloomington) (Multi-Lane Segment)	7292	7846	51.44	51.62	57.59
SH 185 (S of Bloomington) (Two-Lane Segment)	3213	3767	68.81	68.80	96.28
SH 35 (Two-Lane Segment)	4244	4798	73.19	73.19	96.28
Intersection	**2022 AADT**	**AADT During Operations**	**Existing Crash Rate (per 1 million entering vehicles)**	**Crash Rate During Operations (per 1 million entering vehicles)**	**-**
SH 185 & 2nd Street West/ 2nd Street East (Signalized Intersection)	4068	4345	2.29	2.26	-
SH 185 & FM 616 (Non-signalized Intersection)	2485	2762	1.00	1.02	-
SH 185 & SH 35 North Approach (Non-signalized Intersection)	3729	4283	0.96	0.99	-
SH 35 & Jesse Rigby Road (Non-signalized Intersection)	2122	2746	0.00	1.56	-

Notes:
a) From Table 2.9-3
b) TxDOT, 2022
Abbreviations: AADT = annual average daily traffic; MVM = million vehicle miles; SH = state highway; FM= Farm- to-Market Road

Figures

None

5.9 Air Quality Impacts

Gaseous and particulate matter may be emitted from process equipment and intermittent engine-driven emergency operations equipment at LMGS. Ventilation systems are designed and operated to assure adequate control of radioactive dust and particulate material from process equipment. Emissions control systems are provided where necessary to treat effluents before their discharge to the atmosphere, mitigating atmospheric emissions.

Air emission sources during operation of LMGS are managed in accordance with federal, state, and local air quality control laws and regulations. LMGS complies with the applicable regulatory requirements of the Clean Air Act (CAA) and the TCEQ requirements to minimize impacts on state and regional air quality.

During operation, additional traffic, and equipment movement around LMGS may generate fugitive dust. These emissions are transient and localized near LMGS. To mitigate fugitive dust emissions BMPs are used to prevent particulate matter and/or suspended particulate matter from becoming airborne. These practices include the following, as applicable:

- Open-bodied trucks transporting materials likely to give rise to airborne dust are covered when in motion
- Proper maintenance practices for gas- and diesel-powered equipment that may generate transient smoke are implemented to mitigate smoke emissions

Traffic related to operations results in vehicular air emissions. Nominal localized increases in emissions occur due to the increased numbers of cars, trucks, and delivery vehicles traveling to and from LMGS. Most of the increased traffic is associated with employees driving to and from LMGS. Vehicle emissions may be mitigated by measures that include requiring delivery vehicles to shut down engines while off-loading, restricting idling times of on-site vehicles, and using electric and hybrid vehicles.

5.9.1 Air Quality Impacts

This subsection describes air quality characteristics of LMGS and potential impacts on air quality.

5.9.1.1 Regional Air Quality

The air quality in the region of LMGS is described in Section 2.7, Meteorology and Air Quality. The CAA requires the EPA to set NAAQS for pollutants considered harmful to public health and the environment. The EPA has specified NAAQS for six principal pollutants, called criteria air pollutants. These include particulate matter with a diameter less than or equal to 10 micrometers (PM_{10}) and particulate matter with a diameter less than or equal to 2.5 micrometers ($PM_{2.5}$), photochemical oxidants including ozone (O_3), CO, SO_X, NO_X, and lead (Pb).

Calhoun County, where LMGS is located, is currently in attainment for all criteria pollutants (EPA, 2024).

5.9.1.2 Atmospheric Dispersion Characteristics

Atmospheric dispersion consists of two components: atmospheric transport due to organized or mean wind flow in the atmosphere, and atmospheric diffusion due to disorganized or random air motion. The magnitude of atmospheric dispersion is a function of wind speed, wind direction, and atmospheric stability class.

The use of air emissions control systems and the implementation of other planned mitigation measures for the on-site sources serve to minimize air emissions released to the atmosphere.

5.9.1.3 Air Quality Impacts of Station Operations

Air emission sources at LMGS fall under the scope of air pollution regulations promulgated under the Texas Clean Air Act, the Federal CAA, and numerous associated amendments. The purpose of these regulations is to protect air resources from pollution by controlling or abating air pollution and harmful emissions. LMGS expects to qualify under TCEQ Permit by Rule (PBR) based on de minimis facility emissions. This PBR registration grants the station the authority to operate identified emission sources in accordance with applicable permit and regulatory requirements.

At the preliminary design phase, regulated emission sources identified for LMGS includes four diesel-fueled emergency generators, one diesel driven fire pump, and reactor process dust.

Gaseous radwaste typically originates from the clean-up of primary gas-containing products and operational processes. These wastes are handled by the heating, ventilation, and air conditioning (HVAC) and Helium Purification System (HPS) and are described in Section 3.5.3.

Nonradiological releases from the NI are evaluated based on estimated dust generation in the HPB. The dust is considered particulate matter. No other criteria pollutants from the NI other than those from diesel engine exhaust are expected. Estimated particulate matter for these reactor processes are provided in Table 5.9-1. These estimates are conservatively presented as uncontrolled releases. However, HEPA filtration is expected to have a 99.99 percent removal efficiency.

Emissions from the diesel generators and diesel fire pump are estimated using a combination of vendor specification sheets and AP-42 factors applicable to the preliminary design criteria. The greatest potential emission factors are chosen for bounding purposes. Emissions are estimated for 100 hours of operation per year based on 40 CFR 60.4211 operating limits. Estimated emissions from diesel equipment are provided in Table 5.9-1.

Table 5.9-2 outlines the general requirements that must be met to qualify for TCEQ PBR (30 TAC 106.4). The information in Table 5.9-1 demonstrates that air emissions from operations do not surpass the TCEQ thresholds, would not result in a NAAQS exceedance, and do not result in noticeable emissions from LMGS equipment. Thus, Table 5.9-1 demonstrates that LMGS is a *de minimis* contributor to air emissions, as expected for a clean energy source. More detailed facility-wide assessments will be prepared during the facility's air permitting phases with the TCEQ after final design; therefore, impacts on air quality are SMALL.

Major sources and major modifications in an attainment area are subject to Prevention of Significant Deterioration (PSD). Effective July 24, 1992, the TCEQ has full approval of PSD permitting in Texas. The federal PSD rules are in 40 CFR 51.166 and 52.21. Monitoring, modeling, and Best Available Control Technology (BACT) requirements vary with the magnitude, location, and type of emissions of a new major source. As the emissions in Table 5.9-1 are low, TCEQ may not require air dispersion modeling.

5.9.1.4 Greenhouse Gas Emissions

The impact of estimated GHG emissions resulting from station operations, including workforce transportation, on air quality is compared to state and national GHG emissions. There is a net reduction in GHG emission from operating LMGS due to replacing the gas fired boilers.

Emissions from generic 1000 MWe reactor lifetime GHG footprint is 10.5 million MT CO_2e. (Table A-3, Nuclear Power Plant Lifetime GHG Footprint NRC, 2014). Using the emissions from the generic 1000 MWe reactor provides a conservative estimate because LMGS produces only 320 MWe from the facility.

LMGS is expected to operate 24 hours per day, seven days per week, with a total of 96 full-time equivalent (FTE) workers. The impact of workers on air quality applies the assumption that all staff will arrive at the same time. Conservatively assuming an operational workforce of 100, the total GHG emitted from workforce transportation is 136,000 MT CO_2e (Table A-2, Workforce GHG Footprint Estimates, NRC, 2014). Combining the 1000 MWe reactor GHG emissions with the workforce GHG emissions amounts to an estimated lifetime 10.636 million MT CO_2e emitted.

GHG are emitted from plant workforce transportation and intermittent operation of standby diesel generators. However, no GHG emissions are generated from the fuel source used to produce steam and power to the SDO. This project replaces the existing natural gas boilers used by the SDO plant to provide a source of steam and power. A natural gas plant of similar size to LMGS would have a thermal power of 800 megawatt thermal (MWt). The gross heating value of natural gas is approximately 1,020 British thermal units (Btu)/standard cubic foot (scf). Thus, the amount of fuel burned to produce 800 MWt is 2.68×10^6 scf/hr and the resulting CO_2 emissions over an equivalent 40-year life of the plant is approximately 51 million MT of CO_2e. Replacing the natural gas boilers results in a net reduction of approximately 51 million MT of CO_2e.

Considering the net reduction from replacing the gas fired boilers (-51 million MT) and factoring in the emissions from the generic 1000 MWe plant and the workforce GHG emissions (10.636 million MT CO_2e emitted) over a 40-yr operating lifetime amounts to an estimated 40.36 million MT, or 1.01 million MT annual, CO_2e reduction from present day levels.

In 2021, the State of Texas emitted 663.5 million MT CO_2e. That same year the total carbon equivalent emissions in the U.S. were 4,911.2 million MT CO_2e (EIA, 2024).

The estimated reduction in annual GHG emissions (CO_2e) in the State of Texas, taking into account both emissions from LMGS, including workforce transportation, and the retirement of the natural gas fired boilers, is 0.15 percent. The estimated reduction in annual emissions in the U.S. is 0.02 percent; therefore, the impacts of GHG emissions are SMALL and beneficial.

The use of emission-free nuclear power is a significant contributor to Dow's emission reduction objectives and to the preservation of the community's clean air resources.

5.9.1.5 Transmission Line Impacts

Impacts of existing electrical transmission lines on air quality are addressed using the guidance in NUREG-1437, GEIS for License Renewal of Nuclear Plants, Revision 2. Small amounts of O_3 and substantially smaller amounts of NO_X are produced by transmission lines during corona discharge, a phenomenon that occurs when air ionizes near isolated irregularities on the conductor surface such as abrasions, dust particles, raindrops, and insects.

NUREG-1437, quantified the impacts of existing transmission lines on air quality resulting from corona discharge. Specifically, the amount of O_3 generated from even the largest lines in operation (765 kV) is insignificant. Further, monitoring of O_3 levels for two years near a Bonneville Power Administration 1,200 kV prototype line revealed no increase in ambient O_3 concentrations caused by the line. NUREG-1437 concluded that O_3 concentrations generated by transmission lines are too low to cause any significant effects to air quality. Additionally, the small amounts of NO_X produced are similarly insignificant; therefore the impacts of transmission lines on air quality are SMALL.

Tables

Table 5.9-1: Estimated Air Emissions

Emission Unit	Capacity (HP)	NO_X (lb/hr)	NO_X (tpy)	CO (lb/hr)	CO (tpy)	SO_X[(a)] (lb/hr)	SO_X (tpy)	PM (lb/hr)	PM (tpy)	VOCs[(a)] (lb/hr)	VOCs (tpy)	HAPs (lb/hr)	HAPs (tpy)
Diesel Generator Building HVAC System[(b,c,e,f,g)] (1 of 4)	4355	67.5	3.4	5.2	0.26	0.005	0.00026	0.029	0.014	3.1	0.15	0.053	0.003
Diesel Generator Building HVAC System[(b,c,e,f,g)] (2 of 4)	4355	67.5	3.4	5.2	0.26	0.005	0.00026	0.029	0.014	3.1	0.15	0.053	0.003
Diesel Generator Building HVAC System[(b,c,e,f,g)] (3 of 4)	4355	67.5	3.4	5.2	0.26	0.005	0.00026	0.029	0.014	3.1	0.15	0.053	0.003
Diesel Generator Building HVAC System[(b,c,e,f,g)] (4 of 4)	4355	67.5	3.4	5.2	0.26	0.005	0.00026	0.029	0.014	3.1	0.15	0.053	0.003
Diesel Fire Pump[(c,d,e,f)]	345	2.9	0.146	0.57	0.03	0.707	0.0354	0.07	0.003	0.87	0.04	0.01	0.0005
Reactor Processes	N/A	-	-	-	-	-	-	0.0011	0.0048	-	-	-	-
Total Annual Emissions (tpy)			**13.746**		**1.07**		**0.0634**		**0.064**		**0.64**		**0.0125**

Notes:

a) Calculated based on AP 42, Tables 3.4-1 (diesel generators) and 3.3-1 (diesel fire pump)

b) NO_x, CO, PM emission factors from Caterpillar C175-16 Generator Sets

c) HAP emission factor from NCDENR Large Diesel and All Dual-Fuel Engines Emissions Calculator LGD2012 Revision J – 6/22/2015

d) NO_x, CO, PM emission factors from Cummins CFP11E-F20 Fire Pump

e) Emissions based on 100 hours operating time.

f) Assume all TOC = VOC AP42 Table 3.4-1 (diesel generators) and 3.3-1 (diesel fire pump)

g) SO_x emission factor updated for ULSD

Abbreviations: HP = horsepower; lb/hr = pounds per hour; tpy = tons per year; NO_x = nitrogen oxide; CO = carbon monoxide; SO_x = sulfur oxide; PM = particulate matter; VOCs = volatile organic compounds; HAPs = hazardous air pollutants; HVAC = heating ventilation air conditioning; N/A = not applicable; NCDENR = North Carolina Department of Environmental and Natural Resources; TOC = total organic carbons; ULSD = ultra low sulfur diesel

Table 5.9-2: Emissions Thresholds Authorized Under TCEQ Permits by Rule

Pollutant	Limit (tpy)
CO or NO_X	250
VOC, SO_2, or PM	25
PM_{10}	15
$PM_{2.5}$	10
Any other air contaminants[(a)] except H_2O, N, Ethane, H, O	100

Source: 30 TAC §106.4 Requirements for Permitting by Rule. The provisions of this §106.4 adopted to be effective November 15, 1996, 21 TexReg 10881; amended to be effective April 7, 1998, 23 TexReg 3502; amended to be effective September 4, 2000, 25 TexReg 8653; amended to be effective March 29, 2001, 26 TexReg 2396; amended to be effective May 15, 2011, 36 TexReg 2852; amended to be effective April 17, 2014, 39 TexReg 2891

Note:

a) Notwithstanding any provision in any specific permit by rule to the contrary, greenhouse gases as defined in §101.1 of this title

Abbreviations: TCEQ = Texas Commission on Environmental Quality; tpy = tons per year; CO = carbon monoxide; NO_x = nitrogen oxide; VOC = volatile organic compounds; SO_2 = sulfur dioxide; PM = particulate matter; PM_{10} = particulate matter 10 micrometers or less; $PM_{2.5}$ = particulate matter 2.5 micrometers or less; H_20 = water; N = nitrogen; H = hydrogen; O = oxygen; TAC = Texas Administrative Code

Figures

None

5.10 Ecological Resources

The terrestrial and aquatic ecosystems of LMGS are described in detail in Section 2.4.1 and Section 2.4.2, respectively. These subsections include information about upland, wetland, and aquatic habitats, associated ecological communities, and important species they support. This section describes the potential impacts on terrestrial and aquatic ecological resources from the operation of LMGS. The discussion is divided into two subsections. Section 5.10.1 describes terrestrial and wetland impacts, and Section 5.10.2 describes impacts to aquatic resources.

5.10.1 Terrestrial and Wetland Impacts

5.10.1.1 Plant Communities and Wetland Impacts

Impacts to plant communities and wetlands primarily consist of landscape maintenance activities such as pesticide/herbicide use, mowing, and disturbance of habitats by heavy equipment. BMPs, such as following the label-recommended pesticide/herbicide usage and application method and rates, prohibiting herbicide usage around wetlands, and avoiding mowing and other heavy equipment operation within wetlands, limit impacts to wetlands and other plant communities during landscape maintenance.

As discussed in Section 4.3.1.1.1, disturbance associated with building activities creates conditions for opportunistic invasive species to become established in different areas of the LMGS site. As described in Section 6.5, Ecological Monitoring, ongoing maintenance to reduce the spread of invasive species during operation may include monitoring disturbed lands to identify and control areas that are dominated by invasive plant species. Control methods may include using pesticides/herbicides, hand pulling, or mechanical treatment as applicable to the species and situation.

As discussed in Section 5.6.1, impacts to plant communities and wetlands from transmission line operation and maintenance are minor because on-site transmission corridors are established within previously disturbed habitats. Additionally, impacts of operation on terrestrial resources within transmission corridors are minor because maintenance activities do not substantially change habitat diversity, and the use of appropriate BMPs around wetlands and other plant communities during right-of-way maintenance limits impacts.

Inadvertent spills or stormwater runoff has the potential to affect wetlands that may be downgradient of such releases. However, impacts to wetlands from such releases are minor and are mitigated as described in Section 5.2.1.3.

As described in Section 3.4, Cooling System, LMGS uses a dry cooling system consisting of ACCs. Excess heat is dissipated through mechanical fans to move air over a system of finned heat exchanger tubes. As such, there is no impact to land use or terrestrial resources on the LMGS site or in the vicinity from salt deposition from cooling tower operation. Additionally, because the use of ACCs eliminates liquid discharges, potential thermal impacts to plant communities and wetlands are not concerns for LMGS.

As discussed in Section 5.2.2, LMGS does not require groundwater for cooling or operational purposes; thus, no impacts are expected to terrestrial ecosystems and wetlands from groundwater usage or withdrawal that may indirectly alter wetland hydrology by dewatering.

Overall, impacts of the operation of LMGS on plant communities and wetlands are minimized through the use of BMPs near wetlands and other plant communities and adherence to applicable wetland permit conditions and regulations; therefore, impacts are minor.

5.10.1.2 Wildlife

Operation of LMGS increases levels of noise from activities and equipment such as ACCs, that potentially affect wildlife. As discussed in Section 2.9.2, existing sound levels on the LMGS site range from those consistent with normal suburban areas (53 to 57 dBA) in less developed areas, to levels exceeding those of noisy urban areas (68 to 72 dBA) in proximity to more industrial or high activity areas; therefore, wildlife traveling through or near the LMGS site may be acclimated to higher noise levels already. The maximum noise emissions during operation of LMGS are associated with ACC operation. ACCs generate noise levels slightly higher than the highest levels measured at the existing site, 75 dBA at a distance of 328 ft (100 m). As discussed in Section 4.3.1.1.3, birds and small mammals are startled or frightened at 80 to 85 dBA and thus would not be expected to be startled unless in close proximity to the ACC during operation. With the prevalence of agricultural habitat and the industrial developed lands of the SDO that surround the ACC, upland habitats, including wildlife travel corridors, are limited. Any wildlife occurring in proximity to active areas of the LMGS site are expected to avoid areas characterized by excessive noise levels.

As described in Section 2.4.1.8, the LMGS site is located in the center of the Central Flyway migration route. As described in Section 2.4.1.3, basins on the SDO provide resting and foraging habitat for waterfowl and shorebirds, and waterfowl and water-dependent bird species use vicinity wetland complexes near Green Lake and Mission Lake. Waterfowl and other birds crossing the LMGS site may occasionally collide with tall structures such as the RB at approximately 129 ft. (40 m) (Table 3.1-1). However, as discussed in Section 4.3.1, bird collisions with nuclear power plant structures occur at rates that are unlikely to affect local or migratory bird populations.

As discussed in Section 5.6.1, impacts to wildlife from transmission line operation and maintenance are minor because the transmission line corridors are substantially previously disturbed and of low quality. Additionally, impacts are minor due to the limited frequency (intermittent) of transmission corridor maintenance activities, as well as the low incidence of bird collisions with electrical transmission lines. Potential impacts to nesting birds associated with transmission line maintenance are also minimized through compliance with the Migratory Bird Treaty Act. Furthermore, based on the Generic Environmental Impact Statement for License Renewal of Nuclear Plants (NUREG-1437), impacts from EMFs on wildlife are considered minor.

Overall, impacts of LMGS operations on wildlife are minimal because lands adjacent to developed areas of the LMGS site are of low quality, wildlife presence is limited in areas of high noise emissions, nesting birds are protected through adherence to the Migratory Bird Treaty Act, and regional populations of wildlife populations are not affected. Additionally, as described in Section 5.10.1.1, BMPs limit impacts to wetlands and other plant communities during landscape maintenance; therefore, impacts are minor.

5.10.1.3 Important Species and Habitats

As discussed in Section 2.4.1.6, the only important habitat on the LMGS site is wetlands. Wetland distribution and extent on the LMGS site is very limited. Discussion of station operation effects to wetlands is found in Section 5.10.1.1 and impacts were determined to be minor.

As discussed in Section 2.4.1.5.1, no federally listed threatened or endangered species were observed on the LMGS site or have suitable habitat present on the LMGS site. Only one state-listed species was observed on the LMGS site: the white-tailed hawk (*Geranoaetus albicaudatus*). This hawk was observed perched on a transmission line tower and as a flyover to the LMGS site. No raptor nests of any species were observed on the LMGS site. Thus, operational impacts to this species are limited to behavioral effects associated with avoidance of developed, high activity areas, and infrequent bird collisions with structures. Based on the low frequency of such collisions, no notable effects to local or regional populations of this species are expected.

As discussed in Section 2.4.1.5.2, state-listed plant species include the sensitive Indianola beakrush (*Rhynchospora indianolensis*) that was observed on the LMGS site. This species was observed in low, wet areas of two heavily to moderately grazed upland livestock pastures in the southeastern portion of the LMGS site. These pastures are outside of the LMGS disturbance footprint. As such, impacts to this plant species during operations are not expected.

Because much of the LMGS site is either agricultural or developed, potential suitable habitat is limited on-site for other state-listed species. These include the Texas scarlet snake (*Cemophora lineri*) and black-spotted newt (*Notophthalmus meridionalis*), a federal candidate species (monarch butterfly [*Danaus Plexippus*]), and species state-listed as sensitive (Sprague's pipit [*Anthus spragueii*], eastern box turtle [*Terrapene Carolina*], western box turtle [*Terrapene ornate*], American bumblebee [*Bombus pensylvanicus*], long-tailed weasel [*Mustela frenata*], eastern spotted skunk [*Spilogale putorius*], coastal gay-feather [*Liatris bracteate*], and threeflower broomweed [*Thurovia trifloral*]). While suitable habitat exists for these species on-site, limited suitable habitat exists within the project disturbance footprint. None of these species were observed on-site, and habitat impacted by project activities during operation is not unique within the vicinity of LMGS. Thus, impacts to these species are minor.

Other important species on the LMGS site include recreationally valuable species, such as northern bobwhite (*Colinus virginianus*), mourning dove (*Zenaida macroura*), white-tailed deer (*Odocoileus virginianus*), coyote (*Canis latrans*), eastern cottontail (*Sylvilagus floridanus*), opossum (*Didelphis virginiana*), nutria (*Myocastor coypus*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), feral hog (*Sus scrofa*), alligator (*Alligator mississippiensis*), snapping turtle (*Chelydra serpentina*), bullfrog (*Lithobates catesbeianus*), and other migratory and upland game bird species. As discussed in Section 5.10.1.1, BMPs limit impacts to these species' habitats.

Overall, impacts of LMGS operation on important species and habitats are minor due to limited distribution and impact to important habitats, limited impact to important species' habitat, and lack of notable effects to regional populations of important species.

5.10.1.4 Summary of Impacts to Terrestrial Ecosystems and Wetlands

X-energy and Dow have initiated discussions with state, local, and tribal natural resource agencies related to the LMGS site. Agencies include U.S. Fish and Wildlife Service (USFWS) and Texas Parks and Wildlife Department (TPWD). TPWD provided construction and operation recommendations in their February 16, 2024, letter to Dow. These recommendations have been incorporated into operation activities described in this section where appropriate. Correspondence and related discussions with the agencies are located in Appendix 1A.

Operational impacts of LMGS on terrestrial ecosystems and wetlands result from site maintenance activities, transmission line operation and maintenance, increased noise levels, and the presence of vertical structures that represent a potential for collisions by birds. These impacts are minimized by the predominance of low-quality habitats in lands potentially affected by plant operations, expected wildlife avoidance of areas on-site characterized by elevated noise levels, and the use of BMPs in conjunction with maintenance activities. Based on the above assessments of environmental impacts, the impacts of LMGS operation on terrestrial ecosystems and wetlands are SMALL.

5.10.2 Aquatic Impacts

This subsection describes the potential impacts of operations of LMGS on aquatic communities within the LMGS site and vicinity. The ecological characteristics of the aquatic systems for LMGS area are described in Section 2.4.2.

5.10.2.1 Intake System Operation

As described in Section 3.3, Plant Water Use, raw water is supplied from the existing Basin #5 to the LMGS site via a dedicated, newly constructed intake structure and supply pipeline. Water to maintain the Basin #5 water level is withdrawn from the GBRA Calhoun Canal via a new intake structure as shown on Figure 3.1-3. As described in Section 2.3, Water, the GBRA Calhoun Canal is not expected to be a jurisdictional waterbody subject to regulation pursuant to the CWA. It is, however, subject to regulation by the GBRA. As this intake is not located in a jurisdictional waterbody, it is not subject to CWA Section 316(b) compliance. Similar pump stations on the GBRA Calhoun Canal provide water to the SDO basins and to other water users via the GBRA water pipeline system. While the GBRA Calhoun Canal is not a water resource regulated under the CWA, operation of the intake structure results in incidental effects to aquatic biota from pumping operations. Specifically, larval fish and eggs occurring in the GBRA Calhoun Canal are damaged or killed as a result of being entrained by the pumping system. Similarly, fish occurring in the GBRA Calhoun Canal may be impinged on the intake screens.

However, while not required, the LMGS intake structure on the GBRA Calhoun Canal is designed to integrate design and operational measures consistent with those in CWA Section 316(b) requirements to minimize adverse environmental impacts from impingement that are associated with operation of the intake structure. Maximum through-screen velocity of the intake structure is 0.5 ft/sec or less to reduce potential impacts related to the impingement of aquatic species. As described in Table 3.3-1, maximum plant intake flow is 46,686 ft^3/hr (1322 m^3/hr). Additionally, the design of the intake structure incorporates traveling screens with fish-friendly returns and external trash racks to minimize debris loading and impingement mortality of aquatic species during operation.

Water flow rates and volumes for the intake structure are summarized in Table 3.3-1. Based on plant water demand, the average intake flow is 35,707 ft^3/hr (1011 m^3/hr). As described in Section 5.2.1.1.1, water levels in the GBRA Calhoun Canal rely on intermittent operation of the GBRA Calhoun Canal Main Pump Station and the GBRA Relift 1 pump station. Because of this reliance, water levels in the GBRA Calhoun Canal are unlikely to change as a result of intake operations, thereby minimizing impacts to aquatic organisms as a result of plant water use that may result in large fluctuations in water levels.

Impacts of the intake system on aquatic ecosystems are minimized through maintenance of water levels within the GBRA Calhoun Canal and designs that are consistent with those associated with CWA Section 316(b) regulations; therefore, impacts are minor.

5.10.2.2 Heat Discharge System Operation and Plant Discharge

Operational impacts to aquatic ecosystems occur as a result of discharge activities from LMGS. Water quality impacts of discharge are described in Section 5.2.1.3. As noted in Section 5.2.1.1.2, nonradiological waste streams from LMGS tie into existing SDO infrastructure for management and treatment. The exact tie-in location and treatment system will be determined during final design. The outfall from SDO to the Victoria Barge Canal will be through an existing permitted outfall location, and all effluent concentrations will be in accordance with applicable TPDES permit conditions. As described in Section 5.2.1.3, LMGS would intake an additional 6.4 MGD (1011 m^3/hr) from the GBRA Calhoun Canal and discharge up to an additional 2.3 MGD (368.1 m^3/hr) at the permitted outfall location based on Figure 3.3-1. Concentrations of effluent constituents are in compliance with applicable TPDES permit conditions; therefore, impacts on water quality and the resultant impacts to aquatic ecosystems are localized and minor.

The impacts of the cooling system associated with LMGS are described in Section 5.3, Cooling System Impacts. Because the primary means for heat dissipation to the environment for LMGS is directly to the atmosphere through ACCs, there is no discharge to aquatic ecosystems from heat dissipation systems; therefore, thermal impacts to aquatic systems from the cooling water system are minor.

5.10.2.3 Stormwater Discharge

Impacts to aquatic ecosystems from accidental spills or stormwater runoff are mitigated as described in Section 5.2.1.3. Chemicals are stored in bulk storage with a pump skid to reduce the likelihood of accidental spills. Stormwater discharges are regulated by the TCEQ through an NPDES permit. A SPCC Plan will be in place to mitigate potential oil and chemical spills.

Stormwater from the LMGS site is controlled by the permanent stormwater basin and discharged to West Coloma Creek. Stormwater management, including release rates and volumes, will comply with regulatory requirements for site design and operation. The applicable regulations address stormwater runoff quantity and quality. Based on adherence to regulatory requirements, such as TPDES permitting for proper design and operation of stormwater management facilities, impacts of stormwater on West Coloma Creek are localized and are not expected to adversely affect aquatic biota; therefore, impacts of plant discharge to aquatic ecosystems are minor.

5.10.2.4 Maintenance Measures

Impacts of electrical transmission line maintenance are described in Section 5.6, Transmission System Impacts. Impacts of the operation of LMGS on aquatic systems are minimized through adherence to applicable federal and state wetland/stream permit conditions and regulations, and the use of BMPs near wetlands and streams such as:

- Label-recommended pesticide/herbicide usage, application method and rates
- Prohibiting herbicide usage around wetlands and streams
- Avoiding mowing and other heavy equipment operation within wetlands or streams

Therefore, impacts of transmission line maintenance on aquatic ecosystems are minor.

5.10.2.5 Summary of Impacts to Aquatic Ecosystems

X-energy and Dow have initiated discussions with state, local, and tribal natural resource agencies related to the LMGS site. Agencies include USFWS, National Marine Fisheries Service, and TPWD. TPWD provided construction and operation recommendations in their February 16, 2024, letter to Dow. These recommendations have been incorporated into operation activities described in this section where appropriate.

Impacts to aquatic ecology from operations are limited to the intake system on the GBRA Calhoun Canal, operational discharge to the Victoria Barge Canal, and stormwater discharges to West Coloma Creek. Impacts of the water intake system on aquatic ecology are minimized through maintenance of water levels within the GBRA Calhoun Canal and integration of design and operational measures consistent with those in CWA Section 316(b) requirements. Nonradiological waste streams tie into existing SDO infrastructure for management and treatment through an existing permitted outfall location, and all effluent concentrations will be in accordance with applicable TPDES permit conditions. Stormwater discharges to West Coloma Creek comply with the TPDES permit. Impacts to aquatic ecosystems associated with transmission line systems are minimized through the use of BMPs; therefore, overall impacts of LMGS operation on aquatic ecosystems are SMALL.

Tables

None

Figures

None

5.11 Decommissioning

The objective of decommissioning is to reduce the residual radioactivity to a level that allows release of the property and termination of the license without significant impact to the environment. Licensees are required to notify the NRC within 30 days of making the decision to permanently conclude the operational phase of a nuclear facility. Certification to the NRC that all fuel is removed from the reactor is also required prior to performing major decommissioning activities as defined in 10 CFR 50.2. Within two years of permanently ceasing operations, Long Mott Energy, LLC shall submit a post-shutdown decommissioning activities report (PSDAR). The process, from permanent conclusion of operation through fuel removal, PSDAR, and decommissioning, to license termination is expected to be complete in 60 years or less.

NUREG-0586, “Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities, Supplement 1” (decommissioning GEIS) provides the NRC's generic analysis of the environmental impacts of decommissioning a nuclear power plant. As stated in NRC Regulatory Guide 4.2, Revision 3, September 2018, “Preparation of Environmental Reports for Nuclear Power Stations,” site-specific analysis is not required for environmental impacts associated with decommissioning activities provided the activities fall within the bounds of the decommissioning GEIS.

5.11.1 Environmental Impacts of Decommissioning

The decommissioning process and associated environmental impacts are described in the decommissioning GEIS along with the regulatory requirements. Supplement 1 to the decommissioning GEIS predominantly focuses on decommissioning related impacts for LWR but also includes two high-temperature gas-cooled reactor (HTGR) sites, Peach Bottom Unit 1 (PBU1) and Fort Saint Vrain (FSV). The decommissioning GEIS states that decommissioning activities at HTGRs are not expected to result in environmental impacts different from those at LWR facilities. The Xe-100 reactor module is a HTGR; therefore, the decommissioning GEIS is applicable to decommissioning at LMGS. Like PBU1 and FSV, the Xe-100 uses helium as the thermal transfer medium from the reactor core to produce steam. The rated thermal generation capacity of FSV was 842 MWt, and PBU1 was 200 MWt. Each Xe-100 reactor module produces 200 MWt; LMGS, with four Xe-100 reactor modules, has a rated thermal generation capacity of 800 MWt. Based on the technological and thermal capacity similarities of the Xe-100 to the HTGR units discussed in the decommissioning GEIS, it is reasonable to assert that the decommissioning of the LMGS would have similar environmental impacts to those described in the decommissioning GEIS. Significant impacts beyond those evaluated in the decommissioning GEIS have not been identified during studies of social and environmental effects of decommissioning large commercial power generating units, according to the decommissioning GEIS, Section 5.9, Appendix A.

Within the scope of the decommissioning GEIS, the NRC evaluates decommissioning activities and impacts including:

- Activities performed in preparation of removing the facility from service, such as removal of fuel from the reactor and organizational changes, beginning when the licensee certifies that the facility has permanently ceased operations.
- Activities (and the resulting impacts) performed in support of radiological decommissioning, including decontamination and dismantlement (D&D) of radioactive structures, systems, and components (SSCs) and any activities required to support the D&D process, such as isolation of spent fuel, which reduces the extent of measures necessary to safeguard and secure the spent fuel from impacts associated with the D&D in the remainder of the facility.
- Activities performed in support of dismantlement of nonradiological SSCs required for the operation of the reactor, such as the control room and backup generator buildings.
- Activities performed up to license termination and their resulting impacts as provided in the definition of decommissioning, such as removal of radioactive waste.
- Nonradiological impacts occurring after license termination from activities conducted during decommissioning, such as noise, dust, and land disturbance.
- Activities related to release of the facility, such as any necessary site boundary modifications or ongoing surveillance.
- Human health impacts from radiological and nonradiological decommissioning activities, such as occupational injuries.
- Activities related to preparing the facility for entombment, if selected as part of the decommissioning strategy.

Decommissioning approach alternatives and their associated environmental impacts evaluated in the decommissioning GEIS include:

- DECON: Equipment, SSCs, and any portions of the site that contain radioactive contaminants are promptly removed or decontaminated to a level that permits termination of the license shortly after cessation of operations.
- SAFSTOR: The facility is placed in a safe, stable condition and maintained in safe storage until D&D can be completed to levels that permit license termination. SAFSTOR includes activities necessary in advance of the final facility D&D. During SAFSTOR, the facility is generally left intact, fuel removed from the reactor, as well as radioactive liquids removed and processed. Radioactive decay occurs during the SAFSTOR period, thus reducing the quantity of contaminated and radioactive material that must be disposed of during D&D. At the end of the storage period, D&D of the facility is performed.
- ENTOMB: Concrete or other structurally long-lived substance is used to encase radioactive SSCs. Until the radioactivity decays to a level that permits license

termination, continued surveillance, and appropriate maintenance of the entombed SSCs is required.

Selection of a decommissioning approach is not required until a decision is made to permanently cease operations per 10 CFR 50.82. Until decommissioning plans are formalized, environmental impacts of decommissioning can be generally evaluated and predicted based on currently available information. Impacts are reassessed prior to commencing decommissioning activities.

It is believed that decommissioning of a nuclear facility that has reached the end of its useful life has a positive environmental impact, as stated in NUREG-1555. The NRC concludes in the decommissioning GEIS that impacts of the decommissioning activities are either not detectable or are so minor that they do not discernibly alter or destabilize important properties of the on-site land use, water use, water quality, air quality, aquatic and terrestrial ecology within the operational area, radiological occupational dose to worker and dose to the public, radiological accidents, occupational issues, socioeconomics, cultural and historic resource impacts within the operational area, aesthetic issues, noise, transportation, and irretrievable resources. Impacts of decommissioning on the aquatic and terrestrial ecology, as well as air and water quality, are smaller than during building activities and operation because the level of land disturbance is no greater. The decommissioning impact for these issues is generic and classified as SMALL. Additional impact analysis for generic issues is not required provided the impacts resulting from the activity are within the range of impacts described in the decommissioning GEIS, the NRC has received certification of the fuel removal from the reactor, and it has been at least 90 days since the PSDAR was submitted to the NRC.

Several issues are considered site-specific rather than generic in determining environmental impacts of decommissioning. Site-specific issues include off-site land use, aquatic and terrestrial ecology beyond the operational area, threatened and endangered species, environmental justice, and cultural and historic resources beyond the operational area. Site-specific environmental impacts are not assessed in the decommissioning GEIS and require additional analysis.

Figure 3.1-3 shows the site utilization plot plan, including the area used for building activities laydown. It is expected that decommissioning D&D activities will be confined to an area no greater than that needed for building activities. While the decommissioning GEIS does not contain information specific to HTGRs with regard to volume of land required for the disposal of waste, it is anticipated that this volume is small in comparison to the land available for potential reuse following license termination, regardless of decommissioning approach selected. Water use during building activities is discussed in Section 3.9, Building Activities, and expected rates of water use are presented in Table 3.9-1. Decommissioning would have similar water needs to building for uses such as dust control. Some water uses during building activities, such as concrete batch plant operation, would not be applicable during decommissioning; therefore, it is not anticipated that decommissioning water use would exceed the rates presented for building activities. Because decommissioning activities do not require a greater area or more water than the building phase of the project, impacts to off-site land use, aquatic and terrestrial ecology beyond the operational area, threatened and endangered species, and cultural and historical resources beyond the operational boundaries are not anticipated to be greater than during the building and operational phases. An updated evaluation of possible impacts shall be completed once the decision is made to permanently cease operations.

Environmental justice considerations for decommissioning of a nuclear facility, as for building and operation, are site-specific because they are a function of the population demographics in the region surrounding the nuclear facility. The decommissioning GEIS suggests HTGR decommissioning is not expected to result in environmental justice considerations that are qualitatively different from those found at other nuclear facilities; that is, environmental justice considerations are a function of regional population demographics and not dependent on a specific technology. Environmental justice impacts for decommissioning at LMGS are expected to be similar to impacts during building and operation. As described above, decommissioning activities are expected to be limited to an area no greater than that needed for building activities. Section 4.4.3 concludes that there are no disproportionate socioeconomic impacts to environmental justice populations from building activities. Section 5.8.3 concludes that socioeconomic impacts from operation of LMGS are SMALL and do not disproportionately impact minority or low-income populations. It is not anticipated that impacts to minority and/or low-income groups would be greater during decommissioning than for building or operation.

Regulatory Guide 4.2, Revision 3, notes that in the environmental report, an applicant shall address GHG emissions associated with plant decommissioning. Estimates of GHG emissions (expressed in units of carbon dioxide equivalents) over the decommissioning period, including GHG emissions associated with decommissioning equipment and workforce commuting were generically evaluated by the NRC. This evaluation was published in the Combined License and Early Site Permit COL/ESP-ISG-026 (ISG-026) Environmental Issues Associated with New Reactors Interim Staff Guidance, Appendix A of Attachment 1, in August 2014 (NRC, 2014). According to ISG-026, applicants may provide either site-specific estimates or refer to the generic GHG footprint described in the document. Estimates for GHG emissions in ISG-026 are based on LWRs and are expected to be an overestimation for advanced reactors such as the Xe-100. Although specific data for equipment emissions for decommissioning are not available, ISG-026 suggests the emissions are equivalent to approximately half of building-related emissions because decommissioning requires less earth work and fewer labor hours. Section 4.4.5.3 describes building related air quality impacts, including estimates of emissions including carbon dioxide, and concludes that building related air quality impacts are SMALL; therefore, it is reasonable to assert that decommissioning related GHG emissions also have no greater than a minor impact.

Based on the analysis of decommissioning activities deemed as generic in the decommissioning GEIS and the preceding site-specific issues discussion, the impact of decommissioning is anticipated to be SMALL.

5.11.2 Financial Assurance

Federal regulations dictate that applicants for a combined or operating license provide financial assurance that funds, in an amount no less than determined necessary by 10 CFR 50.75(c)(1), will be available for decommissioning. The funding assurance requirement does not apply to ESP and CP applicants, according to 10 CFR 50.33(k)(1).

Tables

None

Figures

None

5.12 Measures and Controls to Limit Adverse Impacts During Operation

5.12.1 Adverse Environmental Impacts

Section 5.1 through Section 5.11 identify adverse impacts resulting from the operation of LMGS and the measures and controls to avoid, minimize, or mitigate those impacts. Table 5.12-1 summarizes the adverse impacts due to operation of LMGS and the possible mitigation measures that were identified in previous sections.

Based on a review of the operational impacts described in this chapter, general feasible and adequate measures, and controls for reducing adverse impacts at the LMGS site include complying with:

- Applicable local, state, and federal ordinances, laws, and regulations
- Requirements of environmental permits and licenses
- Corporate and site policy, plans, programs, and procedures

The assignment of impact levels of SMALL, MODERATE, or LARGE assumes that for each impact, corresponding feasible and adequate measures, and controls (or equivalents) are implemented. If a determination of SMALL is made without the implementation of measures and controls, then no additional measures and controls are identified in Table 5.12-1. If there is no impact to a resource from operational activities, a “no impact” descriptor indicates such. Each “Impact Description or Activity” attribute is assigned a number and each “Mitigating Measures and Control” attribute is assigned a number corresponding to the respective “Impact Description or Activity.

Tables

Table 5.12-1: Summary of Measures and Controls to Limit Adverse Operational Impacts (Sheet 1 of 5)

Environmental Resources (Section Reference)	Summary Impact Finding	Impact Description or Activity	Mitigating Measures and Controls
5.1 Land Use Impacts			
5.1.1 The Site and Vicinity	SMALL	1. Permanent alteration of 320 acres (ac.) (130 hectares [ha]).	1. No mitigation measures and controls are needed.
5.1.2 Transmission Corridors and Off-Site Areas	SMALL	1. No off-site transmission lines are planned for operation of LMGS. 2. Routine maintenance of on-site transmission lines. 3. Disposal of low-level radioactive waste in off-site landfill.	1. Specific mitigation measures and controls are not needed. 2. Addressed in Section 5.10, Ecological Resources. 3. Specific mitigation measures and controls are not needed as adequate capacity available in existing permitted off-site landfills.
5.1.3 Historic Properties and Cultural Resources	No Impact	1. No historic properties are present, and no direct or indirect effects to historic properties occur because of operation of LMGS.	1. Specific mitigation measures and controls are not needed.
5.2 Water-Related Impacts			
5.2.1 Surface Water Impacts			
5.2.1.1 Hydrologic Alterations	SMALL	1. Periodic maintenance excavation of sediment in proximity to the intake structure on the GBRA Calhoun Canal. 2. Operation of the pump station results in localized changes in water flow patterns and water levels in the GBRA Calhoun Canal. 3. Changes in the frequency of both peak runoff rates and runoff volumes from storm events discharge to West Coloma Creek and downstream areas. 4. Localized changes in water surface elevations and flow patterns within West Coloma Creek and downstream areas. 5. Hydraulic modifications associated with operation of two vehicle bridge crossings across West Coloma Creek. 6. Modification of the West Coloma Creek 100-year flood water surface elevation.	1. Specific mitigation measures and controls are not needed. 2. The intake is designed to limit flow velocities, which then minimizes sediment scour. 3 and 4 Adherence to regulatory requirements for proper design and operation of stormwater management facilities. 5. Hydraulic modifications meet site design standards, which provide appropriate flood protection and minimize impacts to off-site properties including those upstream of the LMGS site. 6. No mitigation measures or controls identified.
5.2.1.2 Water Use	SMALL	1. SDO water use in combination with the estimated average water use of LMGS conservatively results in an overall increase in water use, accounting for approximately 10.5 percent of total water rights allowed by SDO and accounts for 1.7 percent of the annual Guadalupe River flow. 2. Combined operational water use during drought conditions, accounts for approximately 11.6 percent of the available water rights	1 and 2 Specific mitigation measures and controls are not needed.
5.2.1.3 Water Quality	SMALL	1. Accidental release of chemicals may degrade water quality. 2. Stormwater discharges may degrade water quality. 3. Localized effects in proximity to the intake structure on the GBRA Calhoun Canal resulting from periodic maintenance activities to remove sediment.	1. Chemicals are stored in bulk storage with a pump skid to reduce likelihood of accidental spills; BMPs and implementation of a SPCC Plan minimizes impacts to water quality. 2. Stormwater discharges are regulated by TCEQ through a TPDES permit. 3. Water quality effects controlled by BMPs as required. Excavated sediment is managed and disposed of in an approved upland location.

Table 5.12-1: Summary of Measures and Controls to Limit Adverse Operational Impacts (Continued) (Sheet 2 of 5)

Environmental Resources (Section Reference)	Summary Impact Finding	Impact Description or Activity	Mitigating Measures and Controls
5.2.2 Groundwater			
5.2.2.1 Hydrologic Alterations	SMALL	1. Groundwater is not used during operations.	1. Specific mitigation measures and controls are not needed.
5.2.2.2 Water Use	SMALL	1. Groundwater is not used during operations.	1. Specific mitigation measures and controls are not needed.
5.2.2.3 Water Quality	SMALL	1. Accidental release of chemicals may degrade water quality. 2. Potential infiltration from permanent stormwater basin.	1. Implementation of the SPCC Plan minimizes impacts to water quality. 2. Potential infiltration is limited by design of a stormwater basin that minimizes infiltration and the predominance of subsurface dense clay soils on the LMGS site.
5.3 Cooling System Impacts			
5.3.1 Intake System	No Impacts	1. LMGS uses a dry cooling system using ACCs; therefore, there is no water intake for the cooling system other than the makeup water used for recirculated heat exchanger tubes which comes from the demineralized water treatment (DMNT) system.	1. Specific mitigation measures and controls are not needed.
5.3.2 Discharge System	No Impacts	1. LMGS uses a dry cooling system using ACCs; therefore, there is no water discharge from a cooling system.	1. Specific mitigation measures and controls are not needed.
5.3.3 Heat Discharge System	SMALL	1. LMGS uses a dry cooling system using ACCs; therefore, no particulate emissions are produced from the heat discharge system.	1. Specific mitigation measures and controls are not needed.
5.3.4 Impacts to Members of the Public	SMALL	1. LMGS uses a dry cooling system using ACCs; therefore, there is no potential to enhance the presence of thermophilic microorganisms (pathogenic microorganisms). 2. Noise impacts from operation of the ACC.	1. Specific mitigation measures and controls are not needed. 2. Noise attenuates to below ambient levels at nearest receptor due to distance. Specific mitigation measures and controls are not needed.
5.4 Radiologic Impacts of Normal Operation			
5.4.1 Exposure Pathways	SMALL	1. LMGS has committed to not releasing liquid radiological effluents to the environment. 2. Direct radiation impact is assumed to be small as direct shine dose is not considered significant.	1 and 2 Specific mitigation measures and controls are not needed.
5.4.2 Radiation Doses to Members of the Public	SMALL	1. Potential impacts to the public within 50 miles (80 kilometers) of the LMGS site.	1. Specific mitigation measures and controls are not needed.
5.4.3 Impacts to Members of the Public	SMALL	1. Exposure to radiological releases from gaseous effluents.	1. Specific mitigation measures and controls are not needed.
5.4.4 Impacts to Biota Other than Members of the Public	SMALL	1. Impacts to terrestrial and aquatic ecosystems from chronic radiation exposure caused by discharges of radioactive gases from the operation of LMGS.	1. No applicable mitigating measures; total maximum biota dose from LMGS operation is below the 25 millirem per year whole-body limit prescribed by Title 40 of the Code of Federal Regulations Part 190.
5.4.5 Occupational Doses to Workers	SMALL	1. Exposure of operational workforce to radiation.	1. Develop administrative programs and procedures governing Radiation Protection and Health Physics in conjunction with the radiation protection design features with the intent to maintain occupational radiation exposures to as low as (is) reasonably achievable (ALARA) levels.

Table 5.12-1: Summary of Measures and Controls to Limit Adverse Operational Impacts (Continued) (Sheet 3 of 5)

Environmental Resources (Section Reference)	Summary Impact Finding	Impact Description or Activity	Mitigating Measures and Controls
5.5 Environmental Impacts of Waste			
5.5.1 Nonradioactive Waste-Systems Management			
5.5.1.1 Impacts to Land	SMALL	1. Disposal of normal nonhazardous solid waste.	1. Solid waste is managed in accordance with all applicable federal, state, and local requirements and standards, and disposed of within landfills having sufficient capacity.
5.5.1.2 Impacts to Water	SMALL	1. Discharge of sanitary wastewater. 2. Discharge of nonradioactive liquid process waste. 3. Discharge of stormwater runoff.	1 and 2 Discharges associated with all liquid discharges (sanitary waste and liquid process waste) are controlled and monitored in accordance with TPDES permit requirements. 3. Stormwater discharges are managed in accordance TPDES permit requirements.
5.5.1.3 Impacts to Air	SMALL	1. Section 5.9, Air Quality.	1. Section 5.9, Air Quality.
5.5.2 Mixed Waste Impacts	SMALL	1. Mixed waste is not generated during operation of LMGS.	1. Specific mitigation measures and controls are not needed.
5.6 Transmission System Impacts			
5.6.1 Terrestrial Ecosystems and Wetlands	SMALL	1. Impacts to terrestrial resources associated with transmission corridor maintenance. 2. Impacts to important habitat (wetlands) from maintenance of the on-site transmission line ROW. 3. Impacts to wildlife perching or nesting on transmission towers during periodic maintenance activities.	1. No mitigation measures identified. 2. Implement BMPs such as prohibiting herbicide usage around wetlands limit impacts to wetlands during ROW maintenance. 3. Compliance with provisions of the Migratory Bird Treaty Act regarding nest removal for periodic maintenance activities.
5.6.2 Aquatic Ecosystems	SMALL	1. On-site transmission lines do not cross jurisdictional waters that include aquatic ecosystems.	1. Specific mitigation measures and controls are not needed.
5.6.3 Impacts to Members of the Public	SMALL	1. On-site transmission lines produce minimal amounts of ozone and nitrogen oxides during operation. 2. Potential effects on humans from electric shock, exposure to electromagnetic fields, corona-induced noise and radio and television interference.	1. No mitigation measures identified. 2. Transmission lines are designed to conform to the National Electrical Safety Code which include standards related to line clearance to limit shocks.
5.7 Uranium Fuel Cycle and Transportation Impacts			
5.7.1 Uranium Fuel Cycle Impacts	SMALL	1. Increase in off-site energy requirements, land use, erosion, emissions and water use, and associated impacts to land use, water use, air and water quality, aquatic and terrestrial ecosystems, the public, construction workforce, and socioeconomic resources due to LMGS fuel consumption.	1. Specific mitigation measures and controls are not needed.
5.7.2 Transportation of Fuel and Wastes Impacts	SMALL	1. Occupational and public exposures to radioactive materials from incident-free transportation.	1. Specific mitigation measures and controls are not needed.
5.8 Socioeconomic Impacts			
5.8.1 Physical Impacts of Station Operation	SMALL	1. Air quality impact discussed in Section 5.9. 2. LMGS uses a dry cooling system using ACCs; therefore, there is no impact to structures associated with salt deposition. 3. Deterioration of public roads used during operation.	1. Section 5.9, Air Quality. 2. Specific measures and controls are not needed. 3. Return public roads, signs, and markings to preexisting conditions or better.

Table 5.12-1: Summary of Measures and Controls to Limit Adverse Operational Impacts (Continued) (Sheet 4 of 5)

Environmental Resources (Section Reference)	Summary Impact Finding	Impact Description or Activity	Mitigating Measures and Controls
5.8.2 Social and Economic Impacts of Station Operation			
5.8.2.1 Demographic Impacts	SMALL	1. No adverse impacts.	1. Specific mitigation measures and controls are not needed.
5.8.2.3 Economic Impacts to the Community	SMALL to MODERATE (beneficial)	1. No adverse impacts.	1. Specific mitigation measures and controls are not needed.
5.8.2.4 Infrastructure and Community Service Impacts	SMALL	1. Impacts to operating conditions along roadways and selected intersections along roadways providing access to the LMGS site. 2. Increase in demand for public services within the region of influence (water supply, wastewater treatment, police, fire protection, healthcare services, and education).	1. Specific mitigation measures and controls are not needed. 2. Identified future shortage of municipal water in 2030 through 2070 is being addressed by Victoria County as part of planning and strategy.
5.8.3 Environmental Justice Impacts	None[a]	1. No disproportionately high or adverse impacts.	1. Specific mitigation measures and controls are not needed.
5.9 Air Quality Impacts			
5.9.1 Air Quality Impacts	SMALL	1. Emissions from process equipment, intermittent operations of emergency engine-driven components, and vehicular traffic. 2. Fugitive dust due to equipment and vehicular traffic.	1 and 2. Air emissions will comply with federal and state air quality control laws and regulations. LMGS complies with all regulatory requirements of the Clean Air Act and the TCEQ requirements to minimize impacts on state and regional air quality. 1. Ventilation systems are designed and operated to assure adequate control of radioactive dust and particulate material from process equipment. Emissions control systems are provided where necessary to treat effluents before their discharge to the atmosphere. Vehicle emissions may be mitigated by measures that include requiring delivery vehicles to shut down engines while off-loading, restricting idling times of on-site vehicles, and using electric and hybrid vehicles. 2. Fugitive dust emissions are mitigated through implementation of BMPs to prevent particulate matter and/or suspended particulate matter from becoming airborne.
5.9.1.4 Greenhouse Gases and Climate Change	SMALL (beneficial)	1. The impact of estimated GHG emissions resulting from station operations including workforce transportation on air quality	1. Specific mitigation measures and controls are not needed.
5.9.1.5 Transmission Line Impacts	SMALL	1. Impacts of existing transmission lines on air quality are addressed using the guidance in NUREG-1437, GEIS for License Renewal of Nuclear Plants, Revision 1.	1. Specific mitigation measures and controls are not needed

Table 5.12-1: Summary of Measures and Controls to Limit Adverse Operational Impacts (Continued) (Sheet 5 of 5)

Environmental Resources (Section Reference)	Summary Impact Finding	Impact Description or Activity	Mitigating Measures and Controls
5.10 Ecological Resources			
5.10.1 Terrestrial and Wetland Resources	SMALL	1. Impacts to plant communities and wetlands (important habitat) from landscape maintenance activities associated with transmission lines such as pesticide/herbicide use, mowing, and trampling by heavy equipment. 2. Potential establishment and spread of invasive plant species. 3. Impacts to terrestrial ecosystems and wetlands from accidental spills or stormwater runoff. 4. Impacts to wildlife from operational noise and presence of structures. 5. Section 5.6.1 for impacts to terrestrial and wetland resources in transmission corridors.	1. Use of BMPs including following the label-recommended pesticide/herbicide usage and application method and rates, prohibiting herbicide usage around wetlands, and avoiding mowing and other heavy equipment operation within wetlands. 2. Use of control methods and monitoring of disturbed lands to identify and manage areas that are dominated by invasive species. 3. SPCC Plan implemented to minimize the release of constituents associated with accidental spills into receiving waters. 4. No mitigation measures identified. 5. Section 5.6.1.
5.10.2 Aquatic Impacts	SMALL	1. Impingement and entrainment of organisms by the intake structure on the GBRA Calhoun Canal. 2. Water quality impacts associated with operational liquid discharges and stormwater runoff activities on aquatic habitat. 3. Water quality effects from accidental spills runoff during operations.	1. Intake structure is designed to include features that are consistent with Section 316(b) of the Clean Water Act requirements to minimize impingement associated with operation of water intake structure. 2. Liquid discharges are regulated through TPDES permit requirements and the SPCC Plan. 3. Chemicals are stored in bulk storage with a pump skid to reduce accidental spills. Additionally, a SPCC plan is implemented to minimize the release and effects of accidental spills.
5.11 Decommissioning Impacts	SMALL	1. Occupational exposure to radiation during decommissioning, including transportation of materials to disposal sites; small radiological releases to the environment, and ingestion and inhalation of these by the public and biota. 2. Air quality, ecological, and water quality impacts due to land disturbance during decommissioning. 3. GHG emissions associated with plant decommissioning. 4. EJ impacts for decommissioning, as for construction and operation, are site specific because they are a function of the population demographics in the region surrounding the nuclear facility	1. Appropriate decommissioning methods will be chosen when decommissioning is authorized, as will appropriate mitigations and controls. Decommissioning activities at HTGRs are not expected to result in environmental impacts different from those at LWR facilities. 2. Environmental impacts are substantially less during decommissioning because land disturbance is less during decommissioning than during construction and operation. Radiological releases are also less during decommissioning than during construction and operation. Mitigating measures used during construction for air quality and dust control would also be used during decommissioning. 3. Specific mitigation measures and controls are not needed. 4. Specific mitigation measures and controls are not needed.

Note:

a) Impacts do not disproportionately affect minority or low-income populations

Abbreviations:

ac. = acre; ha = hectare; LMGS = Long Mott Generating Station; GBRA = Guadalupe Blanco River Authority; SDO = Seadrift Operations; BMP = best management practice; SPCC = Spill Prevention and Control Countermeasures; TCEQ = Texas Commission on Environmental Quality; TPDES = Texas Pollutant Discharge Elimination System; ACC = air-cooled condensers; ROW = right-of-way; GHG = greenhouse gases; GEIS = Generic Environmental Impact Statement; EJ = Environmental Justice

Figures

None

5.13 Environmental Impacts of Postulated Accidents Involving Radioactive Materials

5.13.1 Design Basis Accidents

In accordance with the guidance contained in NUREG-1555, Standard Review Plans for Environmental Reviews for Nuclear Power Plants, Environmental Standard Review Plan, Section 7.1, Design Basis Accidents, (ESRP 7.1), and NRC RG 4.2, Preparation of Environmental Reports for Nuclear Power Stations, Rev 3, Section 5.11.1, Design Basis Accidents, the environmental report should include a list of design basis accidents (DBAs) with the potential for release of radioactivity to the environment. While ESRP 7.1, Appendix A contains a list of design basis accidents to be considered, the accidents listed are in some cases, specific to LWR designs.

Given that the Xe-100 is a high-temperature gas reactor, some of the accidents listed in ESRP 7.1, Appendix A are not explicitly applicable to the Xe-100 design. An appropriate spectrum of accidents applicable to the Xe-100 design is selected for analysis based on application of the Nuclear Energy Institute (NEI) NEI 18-04 (NEI, 2019) methodology.

The NEI 18-04 methodology is applied to characterize potential design basis events based on assessment of their frequency of occurrence and potential consequences. Assessing the frequency of occurrence and potential consequence of each postulated event classifies these events into the following categories:

- Anticipated Operational Occurrences (AOOs)
- Design Basis Events (DBEs)
- Design Basis Accidents (DBAs)
- Beyond Design Basis Events (BDBEs)

Those postulated events that fall into the NEI 18-04 frequency-consequence region for the various figures of merit associated with design basis accidents are evaluated in this subsection.

Table 5.13.1-1 identifies the accidents considered, and those selected for presentation in this subsection. Further details concerning the description of the accident sequences are provided in Chapter 3 of the LMGS Preliminary Safety Analysis Report (PSAR).

5.13.1.1 Evaluation Methodology

Doses for selected DBA involving possible radionuclide release are evaluated at the exclusion area boundary (EAB) and at the outer boundary of the low population zone (LPZ) to demonstrate the new plant's capabilities to mitigate the radiological consequences of an accident. As discussed in Section 3.1.2, the EAB and LPZ for the plant are established at a distance of 400 m (1312 ft.) from the radiological release envelope, defined as a rectangle circumscribing the RB, the Fuel Handling Auxiliary Building, and the Helium Service Facility.

The EAB is shown in Figure 3.1-8. Although protective features provided in the design are expected to mitigate the radioactivity release, time dependent radioisotope releases are quantified for the bounding event in each DBA category and presented in Table 5.13.1-2 through Table 5.13.1-11. The doses for the bounding event in each DBA category are provided in Table 5.13.1-12. None of these DBA events are expected to approach the 10 CFR 50.34, Contents of Applications; Technical Information, or 10 CFR 100, Reactor Site Criteria limits.

The dose to an individual located on the EAB or the outer boundary of the LPZ is calculated based on the amount of activity released to the environment through pathways specific to each event, the atmospheric dispersion of the activity during transport from the release point to the dose point, the breathing rate of the individual at the dose point location and the activity-to-dose conversion factors.

A suite of codes, including Flownex and GOTHIC, are used for the system-level thermal hydraulics portion of the analysis and X-energy's proprietary code XSTERM is used for the radionuclide production, transport, dispersion, and ultimate off-site release characterization.

Because DBA doses at the EAB and LPZ for the Xe-100 are low in comparison to LWR DBA doses, X-energy has developed generic atmospheric dispersion factors that in most cases are expected to be bounding for any Xe-100 location. A description of the methodology used to develop the generic X/Qs is provided in X-energy licensing topical report, “Atmospheric Dispersion and Dose Calculation Methodology,” Revision 2 (XE, 2023). As the generic X/Q calculated for use in assessing the consequences of non-DBA events (i.e., AOOs, DBEs, and BDBEs) is equivalent to a “best-estimate” methodology, the stated value in this topical report for these non-DBAs (1.89E-04 s/m^3) is appropriate for, and is used for assessing the DBA consequences at the EAB/LPZ for the environmental report.

NRC RG 4.2 states that calculated doses for each DBA should be provided for the EAB and LPZ for the following post-accident intervals and that time dependent isotopic release be provided for each DBA:

EAB	LPZ
0 to 2 hr	0 to 8 hr
	8 to 24 hr
	24 to 96 hr
	96 to 720 hr

However, because the Xe-100 DBA doses are significantly lower than those of LWRs, a single dose value is calculated at the EAB/LPZ for the bounding DBAs in each category. These doses represent the cumulative dose at the EAB/LPZ for the entire 0 - 720 hour period.

5.13.1.2 Source Terms

Dose estimates are calculated using time dependent radioisotope activities released to the environment determined using X-energy's suite of codes discussed above. Table 5.13.1-2 through Table 5.13.1-11 identify the time dependent inventories released for each DBA analyzed (or bounding DBA in a given category).

5.13.1.3 Dose Consequences

The dose consequences for the bounding DBA in each category are provided in Table 5.13.1-12. As discussed in NRC RG 4.2, Rev 3, Section 5.11.1, “Design Basis Accidents,” for the environmental report, it is appropriate to evaluate the DBAs using the accident release assumptions in conjunction with realistic atmospheric transport assumptions. Doing so provides better estimates of the actual doses released to the environment during plant events when compared to the conservative modeling and assumptions used in plant safety analyses.

Thus, for the purpose of identifying doses to the environment, X-energy uses the dispersion factor presented in X-energy's licensing topical report discussed above (X-Energy, 2023), developed to evaluate non-DBA Licensing Basis Events in the safety analyses (1.89E-04 s/m^3). This value was developed using best-estimate analytical methods and credits additional phenomena.

As discussed above, a single, cumulative 30-day dose is provided for each DBA at the EPZ/LPZ using a best-estimate atmospheric dispersion factor. As the calculated doses are significantly below the non-seismic dose criteria specified in 10 CFR 100.21 and 10 CFR 50.34(a)(1), the impact of the postulated radiological releases on the environment during a DBA would be SMALL.

5.13.2 Severe Accidents

This subsection describes the methodology used to evaluate the potential environmental impacts of severe accidents at LMGS. The computer code MELCOR Accident Consequence Code System (MACCS2) is used to implement the methodology, which evaluates the various ingestions pathways and estimates the potential health risks.

5.13.2.1 Methodology

The LMGS Probabilistic Risk Assessment (PRA), with appropriate conservatisms, is used to evaluate a bounding severe accident. Specifically, a large depressurization (LD) beyond design basis event, with a release frequency of 1.85E-05 per plant year, is used to characterize the severe accident progression. Only safety-related systems are available for mitigation and conservative values for key safety analysis parameters, which include but are not limited to, atmospheric dispersion and initial fuel failure fraction, are used to provide a conservative source term for the MACCS2 calculation (see LD-DBA from Table 5.13.1-11.)

After the final design and associated safety analyses and PRA are complete to support the Operating License Application (OLA), the severe accident methodology described in Section 5.13.2 will be used to update the results of this bounding severe accident and/or consider alternative severe accident progressions.

5.13.2.2 MACCS2 Code

The MACCS2 computer code (Version 4.2, with the WinMACCS graphical user interface) models the environmental consequences of the severe accidents. MACCS2 is developed specifically for the U.S. Nuclear Regulatory Commission (NRC) to evaluate severe accidents at nuclear power plants (SNL, 2021).The radiation exposure pathways modeled include external exposure from the passing plume, external exposure from material deposited on the ground, inhalation of material in the passing plume or re-suspended from the ground, and ingestion of contaminated food and surface water. The MACCS2 code primarily addresses radiation dose from the air pathway, but also calculates dose from surface runoff and deposition on surface water. The code evaluates the extent of contamination. The analysis uses site representative meteorology and site-specific population data and includes the ingestion pathway over the entire life cycle of the accident.

To assess human health impacts, the assessment includes the collective dose, risk of early fatalities, and the risk of latent cancer fatalities from a severe accident for the population within a 50 mi (80 km) radius. Economic costs are also determined, including the costs associated with short-term relocation of people, decontamination of property and equipment, and interdiction of food supplies.

Five files provide input to a MACCS2 analysis: ATMOS, EARLY, CHRONC, a meteorological file, and a site characteristics file. ATMOS provides data to calculate the amount of material released to the atmosphere that is dispersed and deposited. The calculation uses a Gaussian plume model. Important reactor and site-specific inputs in this file include the core inventory, release fractions, and geometry of the RB. EARLY provides inputs to calculations regarding exposure in the time period immediately following the release. CHRONC provides data for calculating long-term impacts and economic costs and includes region-specific data on agriculture and economic factors. These files access and use input from a meteorological file and a site characteristics file. The meteorological file provides meteorological monitoring data (hourly data that include wind speed and direction, stability class, and rainfall) representative of the site for one year. Because LMGS does not currently have an on-site meteorological tower, another data source is used. There are several airports near LMGS that are potential data sources (Figure 2.7-1). For air dispersion modeling performed for project sites in Calhoun County, the TCEQ requires use of surface data from the Rockport–Aransas County airport; therefore, it is the primary source of hourly meteorological data. In air dispersion modeling using a single year of input meteorological data, the year selected for analysis should represent typical conditions at a site. TCEQ determined that meteorological data collected at the Rockport–Aransas County airport and the Victoria airport during 2020 represent conditions of a typical year; therefore, it is used to create the meteorological data input file. The site-specific file generated by SecPop 4.3.0 (NRC, 2019) provides site-specific population data, land usage, watershed index, and economic data for the region. For this analysis, the weighted transient population projected to 2070 in addition to the resident population projected to 2070 is used.

The MACCS2 calculation results and the release frequency are used to determine risk. Risk is the product of the release frequency of an accident multiplied by the consequences of the accident. The consequence can be radiation dose, fatalities, economic cost, or farmland that needs to be decontaminated. Dose-risk is the product of the collective dose times the accident frequency. The same process is applied to estimating the risk of fatalities (fatalities per reactor per year), the economic cost-risk (dollars per reactor per year), and the risk of farmland decontamination (hectares per reactor per year).

Chapter 5 of NUREG-1437, Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Rev. 0 (NRC, 1996), assesses the impacts of postulated accidents at nuclear power plants on the environment. NUREG-1437 was updated to Rev. 1 in 2013 and Rev 2. in 2024. Appendix E of NUREG-1437, Rev. 2, provides an update on postulated accident risk. Both Rev. 1 and Rev. 2 consider how more recent information on postulated accidents would affect the conclusions of Rev. 0 and provides comparative data where appropriate. However, Rev. 1 and Rev. 2 do not provide new information necessary for the evaluation of postulated accidents for all dose pathways and is not used in this evaluation.

5.13.2.3 Consequences to Population Groups

This subsection evaluates impacts of severe accidents from air, surface water, and groundwater pathways. The MACCS2 code is used to evaluate the doses from the air pathway and from water ingestion with site-specific data. MACCS2 does not model other surface water and groundwater dose pathways. These are analyzed qualitatively based on a comparison of doses from the atmospheric (air) pathway for LMGS to those of the existing fleet of United States nuclear reactors.

5.13.2.4 Air Pathways

The LD-DBA accident is analyzed in MACCS2 to estimate population dose, number of early and latent fatalities, cost, and farmland requiring decontamination. The analysis assumed that no emergency evacuation of the 50 mi (80 km) population occurred after the start of the accident. The total dose-risk to the 50 mi (80 km) population, risk of fatalities, economic cost, and farmland decontamination are provided in Table 5.13.2-1.

5.13.2.5 Surface Water Pathways

People are exposed to radiation when airborne radioactivity is deposited onto the ground and washed into surface water or directly deposited into the surface water. The exposure pathway can be from drinking the water, submersion in the water, activities taking place near the shoreline, or ingestion of fish. For the surface water pathway, MACCS2 only calculates the dose from ingestion of water. The water ingestion dose-risk to the 50 mi (80 km) population is provided in Table 5.13.2-1.

Surface waters located near LMGS are discussed in Section 2.3.1 and include several major streams and rivers, GBRA Calhoun Canal, Victoria Barge Canal, Matagorda Bay, and the Lavaca-Colorado Estuary system. In NUREG-1437, the NRC evaluates doses from the aquatic food pathway (fishing) for the current nuclear fleet of reactors. For sites discharging to small rivers, the NRC evaluation estimates the uninterdicted population exposure including the aquatic food pathway dose risk as 0.4 person-rem (4E-03 person-Sv) per reactor year. For sites near large water bodies, values range from 270 person-rem (2.7 person-Sv) per reactor year (Hope Creek on Delaware Bay) to 5500 person-rem (55 person-Sv) per reactor year (Calvert Cliffs on Chesapeake Bay). The NRC evaluation concludes that with interdiction, the risk associated with the aquatic food pathway is found to be small relative to the atmospheric pathway for most sites. For estuarine sites with large annual aquatic food harvests, dose reduction of a factor of 2 to 10 through interdiction provides essentially the same population exposure estimates as the atmospheric pathway (NRC, 1996); therefore, the dose from other surface water pathways is expected to be the same or less than the LMGS atmospheric pathway dose.

5.13.2.6 Groundwater Pathways

People can also receive a dose from groundwater pathways. Radioactivity released during a severe accident can enter groundwater or can move through an aquifer that eventually discharges to surface water.

NUREG-1437 also evaluates the groundwater pathway dose, based on the analysis in NUREG-0440, the Liquid Pathway Generic Study (LPGS) (NRC, 1978). NUREG-0440 analyzes a core meltdown that contaminated groundwater that subsequently contaminated surface water. However, NUREG-0440 does not analyze direct drinking of groundwater because of the limited number of potable groundwater wells and limited accessibility. The LPGS results provide conservative, uninterdicted population dose estimates for six generic categories of plants: those near small rivers, large rivers, the Great Lakes, oceans, estuaries, and “dry” sites (located a considerable distance from surface water or where groundwater flow is away from surface water). These dose estimates are one or more orders of magnitude less than those attributed to the atmospheric pathway. Because the LPGS values are less than the atmospheric pathway, it is reasonable to conclude that the atmospheric pathway dominates the groundwater pathway; therefore, the dose from the LMGS groundwater pathway is expected to be less than the dose from the atmospheric pathway.

5.13.2.7 Health Risks

The MACCS2 analysis evaluates the early and latent fatality risks and compares the risks to the NRC Safety Goals. The risk to an average individual in the vicinity of a nuclear power plant of experiencing a prompt fatality resulting from a severe reactor accident should not exceed one-tenth of one percent (0.1%) of the sum of “prompt fatality risks” resulting from other accidents to which members of the U.S. population are generally exposed. As noted in the Safety Goals Policy Statement (FR, 1985), “vicinity” is defined as the area within one mile of the plant site boundary. “Prompt Fatality Risks” are defined as the sum of risks which the average individual residing in the vicinity of the plant is exposed to as a result of normal daily activities (driving, household, chores, occupational activities, etc.). For this evaluation, the sum of prompt fatality risks is taken as the U.S. accidental death risk value of 57.6 deaths per 100,000 people per year (CDC, 2023).

The risk to the population in the area near a nuclear power plant of latent cancer fatalities that might result from nuclear power plant operation should not exceed one-tenth of one percent (0.1%) of the sum of the cancer fatality risks resulting from all other causes. As noted in the Safety Goal Policy Statement (FR, 1985) “near” is defined as within 10 miles of the plant. The cancer fatality risk is taken as an average of 148.0 deaths per 100,000 people per year for 2017 to 2020 (CDC, 2023).

5.13.2.8 Conclusions

The total calculated dose risk to the 50 mi (80 km) population from the LD-DBA is 3.76E-02 person-rem (3.76E-04 person-Sv) per plant year. This value is less than the dose risk from the five reactors analyzed in NUREG-1150 (Table 5.13.2-2) and less than the maximum, mean, median, and minimum dose risks for current generation reactors that have undergone or are undergoing license renewal (Table 5.13.2-3).

The early and latent cancer fatality risks from a severe accident are provided in Table 5.13.2-2. The prompt cancer fatality risk is zero and the latent cancer fatality risk is below the NRC Safety Goal.

As previously described, dose-risk is a product of dose and frequency. Normal operation has a frequency of one. For comparison, the total collective population dose from LMGS normal operation due to gaseous effluent is provided in Table 5.13.2-4. The dose risk of 3.76E-02 person-rem (3.76E-04 person-Sv) per plant year for the LD-DBA is higher than the dose risk of 1.77E-03 person-rem (1.77E-05 person-Sv) per plant year for LMGS normal operation. However, the dose risk for the LD-DBA is lower than the dose risk of 6.59E+01 person-rem (6.59E-01 person-Sv) per reactor year during normal operation of a U.S. Advanced Pressurized Water Reactor (US-APWR) at a PSEG Power, LLC site.

The MACCS2 analysis calculates the estimated number of people within 50 mi (80 km) of LMGS who receive acute or lifetime doses exceeding a threshold. The estimated number of people exceeding the dose limits of 25 rem (0.25 Sv) and 200 rem (2 Sv) is zero.

5.13.3 Severe Accident Mitigation Alternatives

In accordance with Regulatory Guide 4.2, an evaluation of severe accident mitigation alternatives (SAMAs) and severe accident mitigation design alternatives (SAMDAs) is required. SAMAs and SAMDAs can reduce risk by preventing substantial core damage or by limiting radiological releases from containment in the event of substantial core damage.

This subsection evaluates SAMAs that could limit activity releases to the environment, thereby significantly reducing the environmental risks from severe accidents including procedures, training activities, and plant design alternatives (SAMDAs). The methodology outlined in NEI 05-01 (NEI, 2005) is utilized to perform the SAMA analysis. Although NEI 05-01 is intended to be used for license renewal applications, the guidance presented therein utilizes the generic methodology from NUREG/BR-0184. The primary parameter pertaining to license renewal in the NEI document is the evaluation period of 20 years, which is extended to 60 years in this application. The methodology involves identifying SAMA and SAMDA candidates that have the potential to reduce plant risk (frequency, consequence, or both, of a severe accident) and evaluating whether the implementation of those candidates is potentially beneficial from a cost-risk reduction perspective.

NEI 05-01 presents the following steps for evaluating SAMAs:

- Step 1—Determine Severe Accident Risk—Determine off-site dose and economic impacts of severe accidents using PRA models and analyzing the radiological consequences.
- Step 2—Determine Cost of Severe Accident Risk and Maximum Benefit—Calculate the monetary values of severe accident risks due to off-site and on-site exposure cost and off-site and on-site economic costs. The sum of these costs represents the maximum benefit.
- Step 3—SAMA and SAMDA Identification—Develop a list of potential SAMAs and SAMDAs by reviewing the dominant plant specific risk contributors and potentially relevant industry generic SAMAs and SAMDAs.
- Step 4—Preliminary Screening (Phase I SAMA and SAMDA Analysis)—Perform screening of the SAMA and SAMDA candidates identified in Step 3 based on their applicability and relevance to the plant's design and their estimated costs compared to the maximum benefit from Step 2. PRA insights may be used to screen out candidates that do not address significant contributors to risk.
- Step 5—Final Screening (Phase II SAMA and SAMDA Analysis)—For those SAMA and SAMDA candidates that are retained from Step 4, calculate the risk reduction from the implementation of the candidates and compare the result to the estimated cost of implementation to identify the net cost-benefit. PRA insights may be used to screen out candidates that do not address significant contributors to the risk.
- Step 6—Sensitivity Analysis—Evaluate how changes in the SAMA and SAMDA analysis assumptions and uncertainties might impact the cost-benefit evaluations for the SAMA and SAMDA candidates identified in Step 5.
- Step 7—Conclusions and Recommendations—Summarize the results of the analysis and identify potentially cost-beneficial SAMA and SAMDA candidates.

At the CP stage, only the first step is implemented. The remaining steps will be implemented at the operating license application stage after detailed design has progressed to the point where an effective SAMA/SAMDA analysis can be performed. Table 5.13.2-1 summarizes the off-site dose and economic cost risks from Step 1.

5.13.4 Transportation Accidents

The NRC performed a generic analysis of the environmental effects of the transportation of fuel and waste to and from LWRs in the Environmental Survey of Transportation of Radioactive Materials to and From Nuclear Power Plants, WASH-1238, and in a supplement to WASH-1238, NUREG-75/038, and found the impact to be small. These documents provided the basis for Table S-4 in 10 CFR 51.52 that summarizes the environmental impacts of transportation of fuel and waste to and from one 3000 to 5000 MWt (1000 to 1500 MWe) LWR. Impacts are provided for normal conditions of transport and accidents in transport for a reference 1100 MWe LWR.

5.13.4.1 Table S-4

Table S-4 applies to LWRs using UO_2 fuel that meets specific criteria laid out in 10 CFR 51.52(a). These criteria include:

- The reactor has a core power level that does not exceed 3,800 MWt
- Fuel is in the form of sintered uranium oxide pellets having a U-235 enrichment not exceeding four percent by weight; and pellets are encapsulated in zirconium alloy-clad fuel rods
- The average level of irradiation of fuel from the reactor does not exceed 33,000 megawatt day (MWd)/MTU and no irradiated fuel assembly is shipped until at least 90 days after it is discharged from the reactor
- With the exception of irradiated fuel, all radioactive waste shipped from the reactor is packaged and in solid form
- Unirradiated fuel is shipped to the reactor by truck; irradiated (spent) fuel is shipped from the reactor by truck, railcar, or barge; and radioactive waste other than irradiated fuel is shipped from the reactor by truck or railcar

While the original analysis used to develop Table S-4 assumed a maximum fuel enrichment of four percent and a maximum burnup of 33,000 MWd/MTU, subsequent studies (Addendum 1 to NUREG-1437, NUREG/CR-6703, Environmental Effects of Extending Fuel Burnup Above 60 gigawatt day (GWd)/MTU, and NUREG-2266, Environmental Evaluation of Accident Tolerant Fuels with Increased Enrichment and Higher Burnup Levels) have found that Table S-4 bounds the potential environmental impacts for fuel enriched up to five percent and with a burnup up to 75,000 MWd/MTU, provided the fuel is cooled for at least five years before shipment.

5.13.4.2 Xe-100 Plant and Table S-4

LMGS consists of four 80 MWe Xe-100 reactor modules that are combined into a 320 MWe plant. The Xe-100 is a high-temperature gas-cooled reactor using TRISO-X fuel. The expected annual number of shipments of fresh fuel and LLW for LMGS is presented in Table 5.13.4-1.

Spent fuel is expected to be stored on-site for future disposition; therefore, no shipment numbers are presented for spent fuel.

The core power level of LMGS is bounded by the criteria for using Table S-4. Spent fuel is stored on-site for future disposition to a geologic repository, and therefore not shipped within 90 days of being discharged from the reactor module. Unirradiated fuel is shipped to the plant by truck, spent fuel (when it is eventually moved from the site to an interim or long-term storage facility) is shipped by truck, railcar, or barge, and radioactive waste is shipped by truck or railcar.

The Xe-100 is an advanced nuclear reactor (ANR) that uses TRISO-X, fuel pebbles that are fabricated from high-assay low-enriched uranium, which is enriched up to 20 percent, and that have an estimated burnup of 163 GWd/MTU. This does not meet the Table S-4 criteria for fuel type, enrichment, cladding, or burnup. While subsequent studies suggest Table S-4 is bounding for higher enrichment and burnup than the original analysis, these studies have not investigated TRISO-X fuel or other fuels with similar enrichment or burnup.

As stated in Section 5.7.2, the number of radioactive waste shipments from LMGS is estimated at 129 annual shipments per year. Of those 129 shipments, roughly 30 shipments are expected to be liquid radioactive waste. Therefore, the condition requiring shipment of all radioactive waste being shipped as a solid in 10 CFR 51.52 is not met.

The analysis described below shows that Table S-4 can be used to estimate impacts of transportation accidents for ANRs, including the Xe-100 and others that use TRISO-X fuel, as well as transportation of liquid radioactive waste, and how Table S-4 can be considered bounding for transportation accident impacts for LMGS.

5.13.4.3 Transportation Accidents

Accident risks are a combination of accident frequency and consequence and may have both radiological and nonradiological impacts. In general, present day accident frequencies for transportation of radioactive materials are expected to be lower than those used in the analysis in WASH-1238 based on improvements in highway safety and security and an overall reduction in traffic accident, injury, and fatality rates since WASH-1238 was published. Table S-4 presents radiological and nonradiological impacts of transportation accidents for LWRs scaled to an 1100 MWe reference reactor. Given the reduction in traffic accident rates described above, values for accident impacts, including radiological exposure, injuries, and fatalities, given in Table S-4 are conservative when applied to LWRs. Section 5.13.4.3.1 and Section 5.13.4.3.2 discuss radiological and nonradiological impacts of accidents for ANRs, including the Xe-100 and others that use TRISO-X fuel and shipment of liquid radioactive waste.

5.13.4.3.1 Radiological Impacts of Accidents

The amount of radioactive material released to the environment in an accident depends upon the severity of the accident and package capabilities. Table S-4 does not quantify a radiological impact from accidents for shipments of radioactive materials to and from large LWRs but assesses it qualitatively as “small.” Several NRC analyses have found that current NRC regulations and packaging standards provide a high degree of protection of public health and safety against releases of radioactive material in transportation accidents involving impacts and severe fires (NUREG-0170, Final Environmental Statement on the Transportation of Radioactive Material by Air and Other Modes, the Modal Study [1987], Sprung et al. 2000, and NUREG-2125, Spent Fuel Transportation Risk Assessment). These studies used actual accident statistics, modeling, and data from severe truck and rail accidents to conclude that risk from shipment of radioactive materials was small compared to naturally occurring background radiation.

Packages for all types of ANR unirradiated and irradiated fuels have not been designed or certified by the NRC. All transportation containers or casks designed for unirradiated or spent fuel from ANRs must satisfy the regulatory requirements of 10 CFR Part 71, 10 CFR Part 72, and 10 CFR Part 73. These include10 CFR Part 71 Subpart E, “Package Approval Standards,” 10 CFR 72.236, “Specific Requirements for Spent Fuel Storage Cask Approval and Fabrication,” and 10 CFR Part 72 Subpart L, “Approval of Spent Fuel Storage Casks.” These requirements are intended to:

- Confine fuel to a known volume
- Ensure compliance with criticality safety
- Meet specific structural testing requirements

The application of these requirements to future packaging designs for ANRs means that probabilities of radioactive release during transportation accidents associated with these reactors are comparable to those demonstrated for LWRs. NUREG-2125 concluded that both rail and truck packages currently in use for the shipment of spent fuel have a very low probability of radioactive release, with an approximately one in a billion chance that an accident would result in a release of radioactive material.

Low-level waste generated at operating nuclear reactors includes items that have become contaminated with radioactive material or have become radioactive through exposure to neutron radiation. This waste typically consists of contaminated protective shoe covers and clothing, wiping rags, mops, filters, reactor water treatment residues, equipment and tools, luminous dials, medical tubes, swabs, injection needles, syringes, and laboratory animal carcasses and tissues. Low-level waste is typically stored on-site by licensees, either until it has decayed such that it can be disposed of as ordinary trash, or until amounts are large enough for shipment to a low-level waste disposal site in containers approved by the Department of Transportation. ANRs are expected to generate LLW in the same ways as currently operating LWRs. LLW generated at an ANR site is assumed to be stored on-site, as is the case for LMGS, either until it has decayed such that it can be disposed of as ordinary trash or until amounts are large enough for shipment to a LLW disposal site in packages authorized by the U.S. Department of Transportation (e.g., Type A packages) or approved by the NRC (e.g., Type B transport packages). The NRC has concluded in NUREG-0170 that the radiological risk from accidents in transportation of LLW is small.

The discussion above demonstrates that shipments of LLW from ANRs do not meaningfully differ from those from large LWRs. In addition, current packaging requirements for unirradiated and spent LWR fuel have been shown to reduce risk of radiological release during accidents to levels that are very small compared to natural background radiation, and these same packaging requirements apply to unirradiated and spent fuel shipments from ANRs. Thus, despite differences in fuel form, enrichment, and burnup, there are no meaningful differences in risk of radiological release between reactor types.

As described above, accident risk is a combination of accident frequency and accident consequence. The previous discussion indicates that accident consequences do not meaningfully differ between ANRs and LWRs. While frequency of shipments may differ between ANRs and LWRs, radiological impacts of transportation accidents can scale to total annual shipment distance analogous to LWRs; therefore, Table S-4 can be utilized to assess radiological impacts of transportation accidents from ANRs provided they meet the other criteria for use.

LMGS meets criteria for Table S-4 except for fuel form, enrichment, and burnup. Thus, based on the discussion above, Table S-4 can be considered bounding for the four Xe-100 modules with regard to radiological impacts of transportation accidents. Table S-4 states that radiological impacts of transportation accidents are small. Furthermore, the smaller power output and higher fuel burnup of LMGS result in fewer shipments of fuel required compared to the large LWR used to construct Table S-4. Because accident frequency is necessarily dependent on shipment frequency, reduced shipment numbers for a reactor compared to the reference reactor mean that impacts from Table S-4 are conservative.

5.13.4.3.2 Nonradiological Impacts of Accidents

Nonradiological impacts of accidents are the human health impacts projected to result from traffic accidents involving shipments of radioactive materials to and from the project site, without considering the radiological or hazardous characteristics of the cargo (i.e., accident impacts apart from any radioactive release). Nonradiological impacts include the projected number of traffic accidents, injuries, and fatalities that could result from shipments of unirradiated fuel to the site and return shipments of empty containers from the site. The methodology for determining the nonradiological impacts was developed in Appendix C of WASH-1238 and used to develop Table S-4. This method uses published statistics for rates of accidents, injuries, and fatalities adjusted by the estimated total number of miles traveled annually for shipments of radioactive materials associated with the plant. This approach is described in the Clinch River ESP Final Environmental Impact Statement as:

Impacts = (unit rate) × (round-trip shipping distance) × (annual number of shipments)

Because shipment methods for ANRs would not differ from LWRs, this methodology is valid for ANRs. Nonradiological accident impacts for ANRs depend entirely on the number of shipments and the distance traveled and not on any technology specific characteristics; therefore, nonradiological accident impacts in Table S-4 can be used to estimate impacts from transportation to and from advanced reactors.

As described above, LMGS meets criteria for use of Table S-4 with the exception of fuel form, enrichment, and burnup. These criteria have no direct bearing on nonradiological accident impacts, although the fuel characteristics may reduce shipment numbers compared to large LWRs, thus reducing risk; therefore, Table S-4 can be considered bounding for the Xe-100 four-pack with regard to nonradiological accident impacts. Nonradiological impacts of transportation accidents for the 1100 MWe reference reactor are given in Table S-4 as one fatal injury in 100 reference reactor-years and one nonfatal injury in ten reference reactor-years. Moreover, as described above, overall improvements in transportation safety have occurred since Table S-4 was developed.

Tables

Table 5.13.1-1: Design Basis Accidents

DBA Sequence No.	Initiating Event	Remarks
CRW-DBA	Control Rod Group Withdrawal	DBA analysis results presented
SGTL-DBA[a]	10mm Leak in one Steam Generator Tube	DBA analysis results presented
SGTR-DBA	Double Ended Guillotine Break of one Steam Generator Tube Rupture (25 mm)	DBA analysis results presented
LOFW-DBA	Loss of Feedwater Flow	DBA analysis results presented
MFLB-DBA	Main Feed Line Break	DBA analysis results presented
LOPF-DBA	Loss of Primary Flow	DBA analysis results presented
MSLB-DBA	Main Steam Line Break	DBA analysis results presented
SD-DBA[a]	Small HPB Depressurization	DBA analysis results presented
MD-DBA[a]	Medium HPB Depressurization	DBA analysis results presented
LD-DBA	Large HPB Depressurization	DBA analysis results presented
TT-DBA	Turbine Trip	DBA analysis results not presented; bounded by LOPF-DBA
RT-DBA	Reactor Trip	DBA analysis results not presented; bounded by LOPF-DBA
LOOP-DBA	Loss of Off-Site Power	DBA analysis results not presented; Plant response identical to the LOPF-DBA
LOACB-DBA	Loss of Vital AC Bus	DBA analysis results not presented; covered by LOPF - DBA
LOCHS-DBA	Loss of Condenser Heat Sink	DBA analysis results not presented; covered by total loss of feedwater DBA (LFW - DBA)
LODCB-DBA	Loss of Vital DC Bus	DBA analysis results not presented; covered by LOPF - DBA
Seismic Event	N/A	As discussed in PSAR Section 2.5, a seismic event is not a credible initiating event for the LMGS site

Notes:

a) For these DBAs, several different sequences were analyzed using varying assumptions regarding the postulated HPB breach sizes, locations, and/or subsequent plant system availability

Abbreviations: DBA = design basis accident; mm = millimeter; HPB = Helium Pressure Boundary; AC = alternating current; DC = direct current; N/A = not applicable; PSAR = Preliminary Safety Analysis Report; LMGS = Long Mott Generating Station

Table 5.13.1-2: Time Dependent Released Activity During Control Rod Group Withdrawal DBA (CRW-DBA) (Bq)

Isotope	Total 0 – 720 hr.
Kr-83m	2.96E+10
Kr-85	3.71E+09
Kr-85m	4.38E+10
Kr-87	1.28E+11
Kr-88	1.40E+11
Kr-89	2.84E+11
Xe-131m	4.69E+08
Xe-133	3.87E+10
Xe-133m	1.61E+09
Xe-135	6.53E+10
Xe-135m	7.70E+10
Xe-137	2.32E+11
Xe-138	3.86E+11
I-131	1.71E+10
I-132	3.23E+11
I-133	5.84E+10
I-134	3.61E+11
I-135	1.12E+11
Cs-137	1.19E+11
Cs-134	3.83E+10
Ag-110m	1.30E+11
Sr-90	8.12E+08
Eu-152	1.50E+06
Eu-154	1.21E+07
Eu-155	9.78E+06
Te-132	3.62E+11
La-140	2.81E+11
Abbreviations: DBA = design basis accident; Bq = becquerel; hr = hour; Kr = krypton; Xe = xenon; m = metastable; I = iodine; Cs = cesium; Ag = silver; Sr = strontium; Eu = europium; Te = tellurium; La = lanthanum	

Table 5.13.1-3: Time Dependent Released Activity During Steam Generator Tube Leak DBA (SGTL-DBA) (Bq)

Isotope	Total 0 – 720 hr.
Kr-83m	1.22E+11
Kr-85	4.23E+09
Kr-85m	2.83E+11
Kr-87	5.65E+11
Kr-88	7.88E+11
Kr-89	3.90E+11
Xe-131m	3.57E+09
Xe-133	6.02E+11
Xe-133m	2.89E+10
Xe-135	8.35E+11
Xe-135m	2.53E+11
Xe-137	3.73E+11
Xe-138	1.35E+12
I-131	1.29E+11
I-132	2.70E+11
I-133	3.53E+11
I-134	4.14E+11
I-135	3.55E+11
Cs-137	1.86E+11
Cs-134	5.30E+10
Ag-110m	9.36E+10
Sr-90	3.52E+10
Eu-152	8.01E+04
Eu-154	6.09E+05
Eu-155	4.86E+05
Te-132	3.67E+11
La-140	2.27E+11
Abbreviations: DBA = design basis accident; Bq = Becquerel; hr = hour; Kr = Krypton; Xe = Xenon; m = metastable; I = Iodine; Cs = Cesium; Ag = Silver; Sr = Strontium; Eu = Europium; Te = Tellurium; La = Lanthanum	

Table 5.13.1-4: Time Dependent Released Activity During Steam Generator Tube Rupture DBA (SGTR-DBA) (Bq)

Isotope	Total 0 – 720 hr.
Kr-83m	1.22E+11
Kr-85	4.23E+09
Kr-85m	2.83E+11
Kr-87	5.65E+11
Kr-88	7.88E+11
Kr-89	3.90E+11
Xe-131m	3.57E+09
Xe-133	6.02E+11
Xe-133m	2.89E+10
Xe-135	8.35E+11
Xe-135m	2.53E+11
Xe-137	3.73E+11
Xe-138	1.35E+12
I-131	1.29E+11
I-132	2.70E+11
I-133	3.53E+11
I-134	4.14E+11
I-135	3.55E+11
Cs-137	1.86E+11
Cs-134	5.30E+10
Ag-110m	9.36E+10
Sr-90	3.52E+10
Eu-152	8.01E+04
Eu-154	6.09E+05
Eu-155	4.86E+05
Te-132	3.67E+11
La-140	2.27E+11
Abbreviations: DBA = design basis accident; Bq = becquerel; hr = hour; Kr = krypton; Xe = xenon; m = metastable; I = iodine; Cs = cesium; Ag = silver; Sr = strontium; Eu = europium; Te = yellurium; La = lanthanum	

Table 5.13.1-5: Time Dependent Released Activity During Loss of Feedwater DBA (LOFW-DBA) (Bq)

Isotope	Total 0 – 720 hr.
Kr-83m	3.10E+09
Kr-85	3.43E+09
Kr-85m	1.15E+10
Kr-87	1.12E+10
Kr-88	2.41E+10
Kr-89	9.89E+08
Xe-131m	4.28E+08
Xe-133	3.07E+10
Xe-133m	9.15E+08
Xe-135	1.18E+10
Xe-135m	1.32E+09
Xe-137	9.33E+08
Xe-138	6.01E+09
I-131	1.42E+10
I-132	2.78E+10
I-133	1.45E+10
I-134	1.65E+10
I-135	1.51E+10
Cs-137	1.18E+11
Cs-134	3.82E+10
Ag-110m	1.30E+11
Sr-90	8.10E+08
Eu-152	1.50E+06
Eu-154	1.21E+07
Eu-155	9.77E+06
Te-132	3.60E+11
La-140	2.79E+11
Abbreviations: DBA = design basis accident; Bq = becquerel; hr = hour; Kr = krypton; Xe = xenon; m = metastable; I = iodine; Cs = cesium; Ag = silver; Sr = strontium; Eu = europium; Te = tellurium; La = lanthanum	

Table 5.13.1-6: Time Dependent Released Activity During Main Feedwater Line Break DBA (MFLB-DBA) (Bq)

Isotope	Total 0 – 720 hr.
Kr-83m	3.10E+09
Kr-85	3.43E+09
Kr-85m	1.15E+10
Kr-87	1.12E+10
Kr-88	2.41E+10
Kr-89	9.89E+08
Xe-131m	4.28E+08
Xe-133	3.07E+10
Xe-133m	9.15E+08
Xe-135	1.18E+10
Xe-135m	1.32E+09
Xe-137	9.33E+08
Xe-138	6.01E+09
I-131	1.42E+10
I-132	2.78E+10
I-133	1.45E+10
I-134	1.65E+10
I-135	1.51E+10
Cs-137	1.18E+11
Cs-134	3.82E+10
Ag-110m	1.30E+11
Sr-90	8.10E+08
Eu-152	1.50E+06
Eu-154	1.21E+07
Eu-155	9.77E+06
Te-132	3.60E+11
La-140	2.79E+11
Abbreviations: DBA = design basis accident; Bq = becquerel; hr = hour; Kr = krypton; Xe = xenon; m = metastable; I = iodine; Cs = cesium; Ag = silver; Sr = strontium; Eu = europium; Te = tellurium; La = lanthanum	

Table 5.13.1-7: Time Dependent Released Activity During Loss of Primary Flow DBA (LOPF-DBA) (Bq)

Isotope	Total 0 – 720 hr.
Kr-83m	1.24E+10
Kr-85	1.37E+10
Kr-85m	4.61E+10
Kr-87	4.48E+10
Kr-88	9.65E+10
Kr-89	3.96E+09
Xe-131m	1.71E+09
Xe-133	1.23E+11
Xe-133m	3.66E+09
Xe-135	4.71E+10
Xe-135m	5.28E+09
Xe-137	3.73E+09
Xe-138	2.40E+10
I-131	5.67E+10
I-132	1.11E+11
I-133	5.81E+10
I-134	6.58E+10
I-135	6.03E+10
Cs-137	4.73E+11
Cs-134	1.53E+11
Ag-110m	5.20E+11
Sr-90	3.24E+09
Eu-152	6.00E+06
Eu-154	4.84E+07
Eu-155	3.91E+07
Te-132	1.44E+12
La-140	1.11E+12
Abbreviations: DBA = design basis accident; Bq =becquerel; hr = hour; Kr = krypton; Xe = xenon; m = metastable; I = iodine; Cs = cesium; Ag = silver; Sr = strontium; Eu = europium; Te = tellurium; La = lanthanum	

Table 5.13.1-8: Time Dependent Released Activity During Main Steam Line Break DBA (MSLB-DBA) (Bq)

Isotope	Total 0 – 720 hr.
Kr-83m	3.10E+09
Kr-85	3.43E+09
Kr-85m	1.15E+10
Kr-87	1.12E+10
Kr-88	2.41E+10
Kr-89	9.89E+08
Xe-131m	4.28E+08
Xe-133	3.07E+10
Xe-133m	9.15E+08
Xe-135	1.18E+10
Xe-135m	1.32E+09
Xe-137	9.33E+08
Xe-138	6.01E+09
I-131	1.42E+10
I-132	2.78E+10
I-133	1.45E+10
I-134	1.65E+10
I-135	1.51E+10
Cs-137	1.18E+11
Cs-134	3.82E+10
Ag-110m	1.30E+11
Sr-90	8.10E+08
Eu-152	1.50E+06
Eu-154	1.21E+07
Eu-155	9.77E+06
Te-132	3.60E+11
La-140	2.79E+11
Abbreviations: DBA = design basis accident; Bq =becquerel; hr = hour; Kr = krypton; Xe = xenon; m = metastable; I = iodine; Cs = cesium; Ag = silver; Sr = strontium; Eu = europium; Te = tellurium; La = lanthanum	

Table 5.13.1-9: Time Dependent Released Activity During Small HPB Depressurization DBA (SD-DBA) (Bq)

Isotope	Total 0 – 720 hr.
Kr-83m	9.27E+10
Kr-85	4.34E+10
Kr-85m	3.46E+11
Kr-87	2.87E+11
Kr-88	7.21E+11
Kr-89	1.14E+11
Xe-131m	9.09E+09
Xe-133	9.03E+11
Xe-133m	3.60E+10
Xe-135	2.62E+11
Xe-135m	4.41E+10
Xe-137	1.07E+11
Xe-138	2.15E+11
I-131	4.45E+11
I-132	6.39E+11
I-133	6.76E+11
I-134	3.96E+11
I-135	4.91E+11
Cs-137	6.10E+12
Cs-134	7.05E+12
Ag-110m	6.38E+12
Sr-90	3.58E+12
Eu-152	1.94E+09
Eu-154	2.30E+10
Eu-155	1.79E+10
Te-132	3.23E+13
La-140	3.07E+13
Note: Limiting case of several analytical runs performed using varying assumptions regarding the postulated HPB breach sizes Abbreviations: HPB = helium pressure boundary; DBA = design basis accident; Bq = becquerel; hr = hour; Kr = krypton; Xe = xenon; m = metastable; I = iodine; Cs = cesium; Ag = silver; Sr = strontium; Eu = europium; Te = tellurium; La = lanthanum	

Table 5.13.1-10: Time Dependent Released Activity During Medium HPB Breach DBA (MD-DBA) (Bq)

Isotope	Total 0 – 720 hr.
Kr-83m	4.04E+10
Kr-85	5.23E+09
Kr-85m	7.29E+10
Kr-87	1.42E+11
Kr-88	2.39E+11
Kr-89	1.07E+11
Xe-131m	1.26E+09
Xe-133	1.20E+11
Xe-133m	5.41E+09
Xe-135	1.46E+11
Xe-135m	3.89E+10
Xe-137	9.96E+10
Xe-138	1.93E+11
I-131	9.53E+10
I-132	4.31E+11
I-133	1.88E+11
I-134	3.32E+11
I-135	2.05E+11
Cs-137	4.33E+12
Cs-134	1.38E+12
Ag-110m	4.56E+11
Sr-90	2.62E+12
Eu-152	6.53E+09
Eu-154	5.28E+10
Eu-155	4.28E+10
Te-132	3.96E+13
La-140	3.80E+13

Note: For this DBA, several analytical runs were performed using varying assumptions regarding the postulated HPB breach sizes. The released activities and doses are identical for each case

Abbreviations: HPB = helium pressure boundary; DBA = design basis accident; Bq = becquerel; hr = hour; Kr = krypton; Xe = xenon; m = metastable; I = iodine; Cs = cesium; Ag = silver; Sr = strontium; Eu = europium; Te = tellurium; La = lanthanum

Table 5.13.1-11: Time Dependent Released Activity During Large HPB Breach DBA (LD-DBA) (Bq)

Isotope	Total 0 – 720 hr.
Kr-83m	3.14E+10
Kr-85	5.23E+09
Kr-85m	4.51E+10
Kr-87	1.11E+11
Kr-88	1.72E+11
Kr-89	1.05E+11
Xe-131m	1.21E+09
Xe-133	1.08E+11
Xe-133m	4.03E+09
Xe-135	9.10E+10
Xe-135m	3.64E+10
Xe-137	9.81E+10
Xe-138	1.81E+11
I-131	5.60E+10
I-132	3.84E+11
I-133	1.15E+11
I-134	3.19E+11
I-135	1.55E+11
Cs-137	4.31E+12
Cs-134	1.38E+12
Ag-110m	4.56E+11
Sr-90	2.62E+12
Eu-152	6.53E+09
Eu-154	5.28E+10
Eu-155	4.28E+10
Te-132	3.96E+13
La-140	3.80E+13
Abbreviations: HPB = helium pressure boundary; DBA = design basis accident; hr = hour; Kr = krypton; Xe = xenon; m = metastable; I = iodine; Cs = cesium; Ag = silver; Sr = strontium; Eu = europium; Te = tellurium; La = lanthanum	

Table 5.13.1-12: Summary of Design Basis Accident Best Estimate Doses

DBA Sequence No.	Accident	EAB/LPZ[(a)] Doses (mrem)
CRW-DBA	Control Rod Group Withdrawal	3.23E+00
SGTL-DBA	10 mm Leak in one Steam Generator Tube	0.00E+00
SGTR-DBA	Double Ended Guillotine Break of one Steam Generator Tube Rupture (25 mm)	0.00E+00
LOFW-DBA	Loss of Feedwater Flow	0.00E+00
MFLB-DBA	Main Feed Line Break	0.00E+00
LOPF-DBA	Loss of Primary Flow	1.49E+01
MSLB-DBA	Main Steam Line Break	0.00E+00
SD-DBA	Small HPB Depressurization	3.29E+02
MD-DBA	Medium HPB Depressurization	3.77E+00
LD-DBA	Large HPB Depressurization	3.74E+00

Notes:

a) The Long Mott Generating Station EAB and LPZ are congruent with the site boundary, which is established at a distance of 400 m (1312 ft.) from the edge of the Reactor Building, the Fuel Handling Auxiliary Building, and the Helium Service Facility

Abbreviations: DBA = design basis accident; No. = number; EAB = Exclusion Area Boundary; LPZ = Low Population Zone; mrem = millirem; mm = millimeter; HPB = Helium Pressure Boundary; m = meter; ft. = feet

Table 5.13.2-1: Environmental Impacts within a 50 mi. Radius for Severe Accidents

Accident	Population Dose Risk (person-rem per plant year)		Fatalities (per plant year)		Economic Cost (dollars per plant year)	Farmland Decontamination (hectares per plant year)
	Water Ingestion	Total	Prompt	Latent Cancer		
LD-DBA	6.48E-04	3.76E-02	0.00E+00	2.04E-05	1.05E+01	5.01E-04

Abbreviations: DBA = Design basis accident; rem = roentgen equivalent man

Table 5.13.2-2: Comparison of Site Environmental Risks with Current-Generation Reactors at Five Sites Evaluated in NUREG-1150

Reactor Facility	Severe Accident Frequency (per reactor year)	50 mi. Population Dose Risk (person-rem per reactor year)	Fatalities (per reactor year)		Average Individual Fatality Risk (per reactor year)	
			Prompt	Latent Cancer	Prompt	Latent Cancer
Grand Gulf[(a)]	4.0E-06	5E+01	8E-09	9E-04	3E-11	3E-10
Peach Bottom[(a)]	4.5E-06	7E+02	2E-08	5E-03	5E-11	4E-10
Sequoyah[(a)]	5.7E-05	1E+03	3E-05	1E-02	1E-08	1E-08
Surry[(a)]	4.0E-05	5E+02	2E-06	5E-03	2E-08	2E-09
Zion[(a)]	3.4E-04	5E+03	4E-05	2E-02	9E-09	1E-08
LMGS[(b)]	1.9E-05[(d)]	4E-02[(d)]	0E+00	2E-05[(d)]	0E+00[(e)]	3E-10[(d,e)]
NRC Safety Goals[(c)]	N/A	N/A	N/A	N/A	6E-07[(d)]	1E-06[(d)]

Notes:

a) Risks were calculated using the MACCS2 code and presented in NUREG-1150

b) Risks were calculated with MACCS2 code using LMGS site-specific and site representative input. Values are the 99.5 percentile estimates with the exception of the average individual prompt and latent fatalities. The per plant year and person-rem per plant year units used in the LMGS values from Table 5.13.2-1 are assumed to be equivalent to the per reactor year and person-rem per reactor year units used for the other reactor facilities in this table

c) Discussed in the NRC Safety Goal Policy Statement (51 FR 30028). Values are 0.1 percent of the risks discussed in Section 5.13.2.7

d) These values were rounded to align significant digits for comparison against source material

e) Per the NRC Safety Goal Policy Statement (51 FR 30028), mean estimates are used for implementing the policy. Average individual prompt and latent fatality risks are calculated for 0-1 mile and 0-10 mile ranges respectively

Abbreviations: mi. = mile; LMGS = Long Mott Generating Station; NRC = U.S Nuclear Regulatory Commission; N/A = not applicable; FR = Federal Register

Table 5.13.2-3: Comparison of Site Environmental Risks with Risks for Current Nuclear Power Plants Undergoing License Renewal Review

	Severe Accident Frequency (per reactor year)	50 mi. Population Dose Risk (person-rem per reactor year)
Current Reactor Maximum[(a)]	2.4E-04	6.9E+01
Current Reactor Mean[(a)]	3.1E-05	1.5E+01
Current Reactor Median[(a)]	2.5E-05	1.3E+01
Current Reactor Minimum[(a)]	1.9E-06	5.5E-01
LMGS[(b)]	1.9E-05[(c)]	3.8E-02[(c)]

Notes:

a) Based on MACCS calculations for over 70 current plants at over 40 sites (NUREG-2168)

b) The 99.5 percentile dose risk was calculated with MACCS2 code using site-specific input. The per plant year and person-rem per plant year units used in the LMGS values from Table 5.13.2-1 are assumed to be equivalent to the per reactor year and person-rem per reactor year units used for the other values in this table

c) These values were rounded to align significant digits for comparison against source material

Abbreviations: mi. = mile; rem = roentgen equivalent man; LMGS = Long Mott Generating Station

Table 5.13.2-4: Comparison of Population Dose Risk within a 50 Mi. Radius for Severe Accidents and Normal Operation

LMGS LD-DBA Population Dose Risk (person-rem per plant year)	LMGS Normal Operation Dose Risk (person-rem per plant year)		US-APWR Normal Operation at a PSEG Site (person-rem per reactor year)
Total	**Four Modules**	**Per Module**	**Total**
3.76E-02	1.77E-03	4.41E-04	6.59E+01[(a)]

Note:

a) Based on NUREG-2168. The person-rem per plant year unit used for the LMGS values in this table is assumed to be equivalent to the person-rem per reactor year unit used for the US-APWR Normal Operation value in this table.

Abbreviations: LMGS = Long Mott Generating Station; DBA = design basis accident; rem = roentgen equivalent man; US-APWR = U.S. Advanced Pressurized Water Reactor; PSEG = PSEG Power, LLC/PSEG Nuclear, LLC

Table 5.13.4-1: Annual Shipments of Radioactive Materials to and from Long Mott Generating Station

Shipment	Number of Shipments per Year[(a)]	Normalized Shipments per Year[(b)]
Fresh Fuel	20	58
LLW	88	255
Total	**108**	**313[(c)]**

Notes:

a) Values taken from Section 5.7.2

b) 320 MWe Xe-100 at 95% capacity normalized to 1100 MWe Reference reactor at 80% capacity for 10 CFR 51.52 Table S-4 comparison

c) The reference reactor on which Table S-4 is based requires less than 1 truck shipment per day.

Abbreviations: LLW = Low-level Radioactive Waste; MWe = megawatt electric; CFR = Code of Federal Regulations

Figures

None

5.14 References

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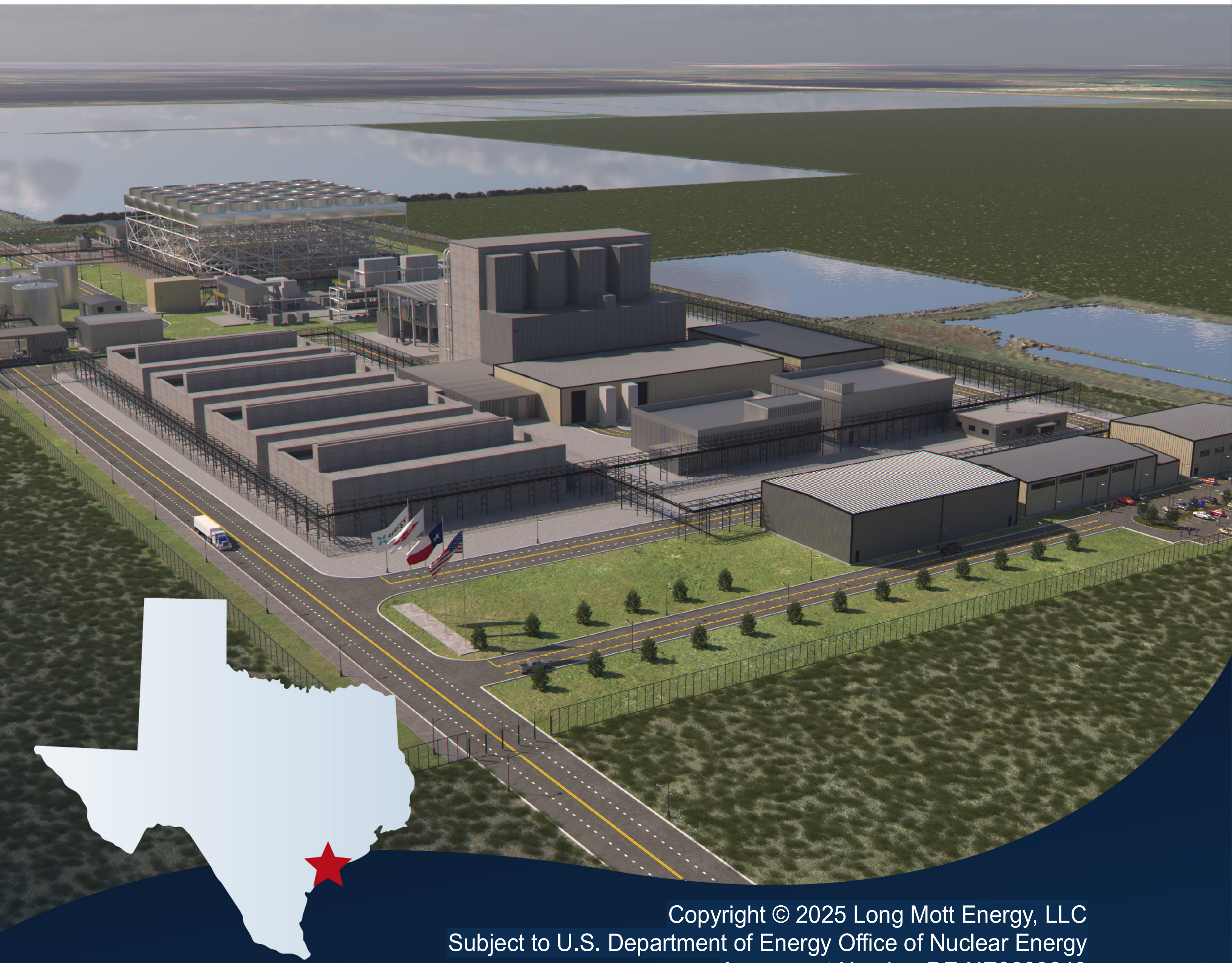
Long Mott Generating Station

Environmental Report
Chapter 6 - Environmental Measurements and Monitoring Programs



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6.1 Thermal Monitoring

The following section describes the thermal monitoring programs for surface water, which include preapplication monitoring to establish baseline conditions in water bodies potentially affected by facility construction and operation and will include operational monitoring of water body temperatures to identify potential impacts from Long Mott Generating Station (LMGS) operation.

6.1.1 Preapplication Monitoring

Preapplication thermal monitoring was conducted in association with the water quality characterization program for this application. This program, described in Section 2.3.1.3, includes quarterly sampling of on-site water bodies at the following general sample locations in conjunction with the collection of water samples for a variety of radiological and chemical analyses:

- West Coloma Creek (four unique sample locations)
- Guadalupe-Blanco River Authority (GBRA) Calhoun Canal (four unique sample locations)
- Dow Drainage Canal (two unique sample locations)

These water bodies are shown in Figure 2.3.2-2 and Figure 2.3.2-14. Figure 2.3.2-14 shows the ten representative surface water sample points at which quarterly temperature values were measured along with other water quality variables discussed in Section 2.3.1.3. Temperature measurements were taken in situ via a Horiba U-52 monitoring probe. The probe was field calibrated via a 100-4 Horiba calibration standard between each unique sample location. A minimum of three readings from the field probe were recorded in a surface water sampling log for each sample location. Consistent with NUREG-1555, the quarterly sampling program provided sufficient data to characterize seasonal temperature variations within representative surface waters throughout an annual cycle.

6.1.2 Preoperational Monitoring

A Texas Pollutant Discharge Elimination System (TPDES) permit will be required to discharge to surface water during construction. Monitoring would be conducted in accordance with the permit, as applicable.

Additional sampling of representative surface waters associated with LMGS will be conducted as part of a construction phase monitoring program. This program will include temperature monitoring at locations consistent with the preapplication monitoring program.

6.1.3 Operational Monitoring

As described in Section 3.4, Cooling System, LMGS consists of an air-cooled condenser (ACC) and a closed-loop water filled reactor cavity cooling system (RCCS). The ACC exchanges heat through the ambient air and not through water. The RCCS utilizes air-cooled heat exchangers to exchange heat from the cooling water to ambient air. Because the RCCS is a closed-loop system, it does not discharge cooling water during normal operations; therefore, there are no thermal discharges to regulated water bodies during normal operations as detailed within Section 5.2.1.3 and Section 5.3, Cooling System Impacts.

An operational monitoring program will be implemented to identify any changes in water quality that may result from the operation of LMGS and to assess the effectiveness of the related effluent treatment systems. The specific elements of an operational monitoring program, including thermal monitoring of water bodies, will be developed in consultation with the Texas Commission on Environmental Quality (TCEQ) in the course of applying for a TPDES permit. No specific operational thermal monitoring is required for the cooling systems as the design of the plant does not utilize water as its cooling source.

Tables

None

Figures

None

6.2 Radiological Monitoring

The Radiological Environmental Monitoring Program (REMP) is designed to adequately characterize the radiological environment of the biosphere in the vicinity of LMGS. The REMP provides data on measurable levels of radiation and radioactive materials in the site environs and baseline data from surveillance of principal pathways of exposure to the public.

The primary objective of the REMP is to monitor for potential radiological exposures to operations and construction workers, the public, and the surrounding environment prior to and during building and active facility operations.

The REMP includes:

- Number and location of sample collection points and measuring devices, and the pathway sampled or measured
- Sample collection frequency
- Type and frequency of analysis
- General types of sample collection and measuring equipment

Sampling locations have been selected based on their relative location to LMGS and prevailing wind direction. Sampling locations were selected in accordance with the requirements of Table 6.2-2 of NUREG-1555.

The LMGS radioactive waste management systems are discussed in Section 3.5, Radioactive Waste Management System.

6.2.1 LMGS Radiological Environmental Monitoring Program

The REMP is implemented in accordance with Title 10 of the Code of Federal Regulations (CFR), Section 20.1501 and Criterion 64 of 10 CFR Part 50, Appendix A. The program is developed using the following guidance published by the U.S. Nuclear Regulatory Commission (NRC):

- Regulatory Guide (RG) 4.1, Revision 2, “Radiological Environmental Monitoring for Nuclear Power Plants”
- RG 4.13, Revision 2, “Environmental Dosimetry – Performance Specifications, Testing, and Data Analysis”
- RG 4.15, Revision 2, “Quality Assurance for Radiological Monitoring Programs (Inception Through Normal Operations to License Termination) – Effluent Streams and the Environment”
- Radiological Assessment Branch Technical Position, Revision 1 to Radiological Environmental Monitoring Program Requirements (Generic Letter 79-65)

The REMP has the following objectives:

- Identify, measure, and evaluate existing radionuclides in the environs surrounding LMGS and fluctuations in radioactivity levels that may occur
- Evaluate the measurements to determine the effects of operations relative to the local radiological environment
- Collect data needed to refine environmental radiation transport models used in off-site dose calculations
- Verify that radioactive material containment systems are functioning to minimize environmental releases to levels as low as (is) reasonably achievable (ALARA)
- Demonstrate compliance with regulations

Implicit in these objectives are the requirements to analyze trends and assess radiation exposure rates and radioactivity concentrations in the environment that may contribute to radiation exposure to plant personnel and the general public. The program consists of two phases: preoperational and operational.

- Preoperational radiological environmental monitoring: The preoperational REMP is used to establish the baseline for the local radiation environment. The preoperational REMP measures background levels and their variations along the anticipated critical pathways in the area surrounding LMGS, trains personnel, and evaluates procedures, equipment, and techniques. The preoperational monitoring program, which is implemented two years before scheduled fuel load, monitors the radiological environment around LMGS. The duration of the preoperational program for specific media is presented in Table 6.2-1.
- Operational radiological environmental monitoring: The operational REMP includes measures to document the effectiveness of procedures and processes that restrict or control releases of radioactive materials to the environment.

The elements (sampling media and analysis type) for both the preoperational and operational REMP phases are essentially the same. Sampling media for both the preoperational and the operational REMP and the duration of the preoperational monitoring period for each medium are identified in Table 6.2-1. Sampling locations are chosen based on LMGS design parameters.

The REMP monitors the environment by sampling air, water, soil, and food products, as well as measuring radiation directly. Milk samples are generally not monitored unless it is determined that milk-producing animals are present within 5 mi (8 km) of a nuclear power facility. Milk samples will not be collected and analyzed because there are currently no milk-producing animals (cows or goats) within 5 mi (8 km) and no dairy operations within 50 mi (80 km) of LMGS.

6.2.2 Indicator and Control Locations

The REMP includes sampling indicator and control locations. Indicator locations near and around LMGS are used to show any increase or buildup of radioactivity that might occur from station operation, while control locations farther away from the site are used to indicate the background radiation levels. Indicator results are compared with control and preoperational results to assess any impact that LMGS's operation might have on the surrounding environment.

Pathways are monitored at sampling indicator and control locations. REMP indicator locations chosen for LMGS are based on meteorological factors, preoperational monitoring requirements, and results of the land use surveys. A number of locations have been selected as controls.

Samples from these control locations provide a basis for measuring background fluctuations in radioactivity at indicator locations caused by natural phenomena and fallout. By comparing radioactive material concentrations at indicator locations to these control locations, increases resulting, in part, from commercial operation are distinguishable.

A description of LMGS's monitoring, sampling, and control locations to be used to monitor the exposure pathways is provided in Table 6.2-2 and approximate locations are shown in Figure 6.2-1 and Figure 6.2-2. Monitoring locations consist of an inner ring of thermoluminescent dosimeters (TLDs) in each 22.5-degree direction sector in the vicinity of the site boundary, with a TLD in each compass direction (T-1 through T-16), and an outer ring of TLDs ranging from 4 to 5 mi (8 km) from the center of LMGS (T-17 though T-32). In addition, particulate and airborne iodine are monitored close to the site boundary in the direction that has the highest calculated annual average ground level deposition. Monitoring is also provided at eight special interest locations identified in Table 6.2-2 (T-33 through T-40).

6.2.2.1 Pathways Monitored

Radiological exposure pathways are ways by which people might become exposed to radioactive material. The major pathways monitored are those that could cause the highest calculated radiological dose. The projected pathways are determined from the type and amount of radioactive material that might be released, the environmental transport mechanism, and the use of the environment. Environmental transport mechanisms include, but are not limited to, local hydrology and meteorology.

The release of radioactive gaseous effluents can affect the public via pathways such as external whole-body exposure, deposition on plants and soils, and human inhalation/ingestion. The release of radioactive constituents in liquid effluents can affect the public via pathways such as drinking water, fish consumption, direct exposure from shoreline sediments, and submersion dose while swimming. LMGS is designed to divert possible radiologically contaminated liquid effluents to storage until transported off-site for treatment and disposal.

The following radiological exposure pathways are monitored for LMGS:

- Direct (dosimeters)
- Airborne (iodine and particulates)
- Ingestion (vegetation, fish, and invertebrates)
- Waterborne (surface water and sediment from shoreline)

6.2.3 Sample Analysis

Concentrations of radioactivity present in the environment vary as a result of factors such as radioactive decay, weather conditions, location, and geology.

Several types of measurements are performed to provide information about the types of radiation and radionuclides present. Environmental samples are analyzed for the following:

- Gross beta
- Gamma
- Tritium
- Iodine-131

Table 6.2-3 summarizes the sampling frequency and analysis method of each sample type. The Offsite Dose Calculation Manual (ODCM) provides a detailed description of the monitoring program including the general types of sample collection and measuring equipment and lower limit of detection for each analysis. Sample media and sample size are defined in environmental monitoring and laboratory standard operating procedures.

6.2.3.1 Direct Radiation Monitoring

Radionuclides can expose humans through immersion in the atmosphere or deposition on the ground. The TLDs are used to measure the ambient gamma radiation levels at many locations surrounding LMGS. The TLDs are crystalline devices that store energy when exposed to radiation.

The TLDs can be processed months after exposure with minimal loss of information, which makes them well suited for quarterly environmental radiation measurements. During TLD processing, stored energy is released as light and measured by a TLD reader. The light intensity is proportional to the radiation dose to which the TLD was exposed.

6.2.3.2 Airborne Monitoring

The inhalation of radionuclides in the air is a direct exposure pathway to humans and animals. A network of active air samplers is used to monitor this pathway from the effluent release points. Air sampling stations are strategically located in areas most likely to reveal any measurable doses resulting from the release of radioactive effluents from LMGS.

Mechanical air samplers are used to draw a continuous volume of air through a filter and a charcoal cartridge, collecting any particulates and radioiodines that might be present in the atmosphere. These samplers are typically equipped with a pressure-sensing flow regulator to maintain a constant sampling rate of air flow. The total volume is calculated from the amount of time the air sampler was in operation and the flow rate.

6.2.3.3 Ingestion Monitoring

In addition to direct radiation, radionuclides present in the atmosphere expose receptors when deposited on soil and plants which are subsequently consumed. To monitor this food pathway, samples of vegetation and soil from control and indicator locations are analyzed.

6.2.3.4 Waterborne Monitoring

Waterborne samples (surface water and sediment from shoreline) from control and indicator locations are monitored to detect the presence of any radioisotopes from operation of LMGS. Composite samplers are utilized to collect surface water samples from the Victoria Barge Canal.

6.2.4 Reporting Requirements

An Annual Radiological Environmental Operating Report is submitted to the NRC. The report includes summaries, interpretations, and an analysis of the radiological environmental surveillance activities for the report period. These reports include a comparison of preoperational studies with operational controls (as appropriate), previous environmental surveillance reports, and an assessment of the observed impacts of the plant operation on the environment.

A land use census is conducted annually to identify changes at and beyond the site boundary to make modifications to the REMP, if required. This census satisfies the requirements of Section IV.B.3 of 10 CFR 50, Appendix I, Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion “As Low as is Reasonably Achievable” for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents. Land use census results are included in the Annual Radiological Environmental Operating Report.

6.2.5 Quality Assurance Program

The standards for the quality assurance (QA) program are established in the NRC RG 4.15, “Quality Assurance for Radiological Monitoring Programs.” The purpose of the QA program is “to ensure the quality of the results of measurements of radioactive materials in the effluents from, and environment outside of, facilities.”

QA is made up of all those planned and systematic actions that are necessary to provide adequate confidence in the assessment of monitoring results. Quality control (QC) is made up of those QA actions that provide a means to measure and control the characteristics of measurement equipment and processes to meet established standards; QA includes QC.

QA is necessary to ensure that all radiological and nonradiological (flowrate, run time, etc.) measurements that support the radiological monitoring program are reasonably valid and of a defined quality. These programs are needed (1) to identify deficiencies in the sampling and measurement processes and report them to those responsible for these operations so that licensees may take corrective action and (2) to obtain some measure of confidence in the results of the monitoring programs to assure the regulatory agencies and the public that the results are valid. All steps of the monitoring process should involve QA (for example, sampling, shipment of samples, receipt of samples in the laboratory, preparation of samples, radiological measurements, data reduction, data evaluation, and reporting of the measurement and monitoring results).

Examples of QA activities for a radiological monitoring program include the following:

- Perform duplicate analysis of the samples to check laboratory precision
- Perform regular review of sample collection and records
- Perform regular review of laboratory procedures and methods
- Count quality indicator and control samples routinely
- Review analytical results provided by the laboratory monthly to validate that the required minimum sensitivities have been achieved, and the correct analyses have been performed
- Verify known concentrations of radioactivity are used by the laboratory in test samples to ensure consistent quality results on an ongoing basis
- Verify laboratory participation in intercomparison programs

The REMP uses QA programs and processes to accomplish the following tasks:

- Confirm personnel are trained and qualified to perform radiological monitoring
- Confirm laboratory processes are documented (that is, maintenance, storage, and use of radioactivity reference standards), and calibration and checks of radiation radioactivity measurement systems and sample tracking and control are performed
- Confirm the processes and procedures of the REMP are documented
- Confirm periodic audits of analysis laboratory functions and their facilities are conducted

Tables

Table 6.2-1: Duration of Preoperational Monitoring Program for Specific Media

Six Months	One Year	Two Years
• Airborne iodine • Iodine in milk[a] (while animals are in pasture)	• Airborne particulates • Milk[a] (remaining analyses) • Surface water	• Direct radiation • Fish and invertebrates • Food products • Sediment from shoreline
Note: a) There are currently no milk cows or milk goats located within 5 mi (8 km) of LMGS. Monitoring for radionuclide activity in milk will not be performed unless milk cows or milk goats are introduced to this vicinity.		

Table 6.2-2: Radiological Environmental Monitoring Program Sample Station Locations (Sheet 1 of 2)

Location	Description	Approx. Distance	Direction Sector
Direct Radiation			
T-1	TLDs	Vicinity of the Site Boundary	N
T-2			NNW
T-3			NW
T-4			WNW
T-5			W
T-6			WSW
T-7			SW
T-8			SSW
T-9			S
T-10			SSE
T-11			SE
T-12			ESE
T-13			E
T-14			ENE
T-15			NE
T-16			NNE
T-17		4.0 to 5.0 mi (8 km) from center of LMGS	N
T-18			NNW
T-19			NW
T-20			WNW
T-21			W
T-22			WSW
T-23			SW
T-24			SSW
T-25			S
T-26			SSE
T-27			SE
T-28			ESE
T-29			E
T-30			ENE

Table 6.2-2: Radiological Environmental Monitoring Program Sample Station Locations (Continued) (Sheet 2 of 2)

Location	Description	Approx. Distance	Direction Sector
T-31	TLDs	4.0 to 5.0 mi (8 km) from center of LMGS	NE
T-32			NNE
T-33[a]		0.87 mi (1.4 km) (near a residence)	NNW
T-34[a]		11 mi (17 km) (City of Port Lavaca)	NE
T-35[a]		8 mi (13 km) (City of Seadrift)	SSE
T-36[a]		14.55 mi (23.4 km) (Indianola Beach)	E
T-37[a]		4.86 mi (7.8km) (Sweetwater RV Campground)	NE
T-38[a]		1.12 mi (1.8 km) (L&W Frazier RV Park)	NNW
T-39[a]		7.94 mi (12.8 km) (Seadrift School)	SSE
T-40[a]		20.74 mi (33.4 km) (control location)	NW
Airborne			
A-1	Airborne: Radioiodine and Particulates	Three samples from close to the three site boundary locations, in different sectors of the highest calculated annual average ground level D/Q.	NW
A-2			NNW
A-3			N
A-4		One sample from the vicinity of a community having the highest calculated annual average ground level D/Q. (Bloomington, 11 mi (17 km) from LMGS)	NW
A-5		One sample from a control location, as for example 9 to 19 mi (15 to 30 km) from the site boundary, and in the least prevalent wind direction. Austwell-Tivoli 9.22 mi (14.8 km)	WSW
Waterborne			
W-1	Sediment from Shoreline	One sample from a downstream area with existing or potential recreational value; Victoria Barge Canal	TBD
W-2	Surface Water	One sample upstream and one sample downstream from the Victoria Barge Canal	TBD
W-3			
Ingestion			
FP-1	Food Products	Samples of three different kinds of broad leaf vegetation grown nearest each of two different off-site locations of highest predicted annual average ground level D/Q, since milk sampling is not performed. Vegetation sampled during growing season (~0.8 mi and ~1.5 mi) (~1.3 and ~2.4 km).	NW
FP-2			NNW
FP-3		One sample of each of the similar broad leaf vegetation grown 9 to 19 mi (15 to 30 km) distant in the least prevalent wind direction since milk sampling is not performed. Vegetation sampled during growing season (~15 mi) (~24.1 km).	WSW
F-1-x	Fish and Invertebrates	One sample of representative commercially and recreationally important species identified in Section 2.4, Ecology, to be taken from the vicinity of the plant discharge area and one sample not influenced by discharge	TBD
F-2-x			

Note: a) Special interest locations

Abbreviations: mi = mile; km = kilometer; TBD = to be determined; E = east; ESE = east-southeast; N = north; NE = northeast; NNE = north-northeast; NNW = north-northwest; NW = northwest; S = south; SE = southeast; SSE = south-southeast; SSW = south-southwest; SW = southwest; W = west; WNW = west-northwest; WSW = west-southwest; D/Q = deposition factor

Table 6.2-3: Preoperational and Operational Radiological Environmental Monitoring Program

Exposure Pathway and/or Sample	Number of Representative Samples and Sample Locations	Sample and Collection Frequency	Analysis Type and Frequency
Direct Radiation	40 Monitoring locations	Continuous monitoring with sample collection quarterly	Gamma exposure— assessed quarterly
Airborne Radioiodine and Particulates	Five locations	Continuous sampler operation with sample collection at least weekly or more frequently if required by dust loading	Radioiodine Canister: Analysis for I-131, weekly Particulate Sampler: Gross beta radioactivity analysis following filter change; Gamma isotopic analysis of composite (by location), quarterly
Waterborne			
Surface	Two Locations	Monthly	Gamma isotopic and tritium analysis monthly. Composite for tritium quarterly
Sediment from Shoreline	One sample from downstream area	Semiannually	Gamma isotopic analysis semi-annually
Ingestion			
Fish and Invertebrates	One sample of representative commercially and recreationally important species in vicinity of plant discharge and another sample from the area not influenced by the discharge	Sample in season, or semiannually if they are not seasonal	Gamma isotopic analysis on edible portions
Food Products (broadleaf vegetation – near site)	Two Samples of broadleaf vegetation grown nearest off-site location of highest predicted annual average ground level D/Q	Monthly during growing season	Gamma isotopic analysis and I-131 analysis
Food Products (broadleaf vegetation – background)	One sample of each of the similar broadleaf vegetation grown 9 to 19 mi (15 to 30 km) in the least prevalent wind direction	Monthly during growing season	Gamma isotopic analysis and I-131 analysis

Abbreviations: I-131 = iodine-131; DQ = deposition factor; mi = mile; km = kilometer

Figures

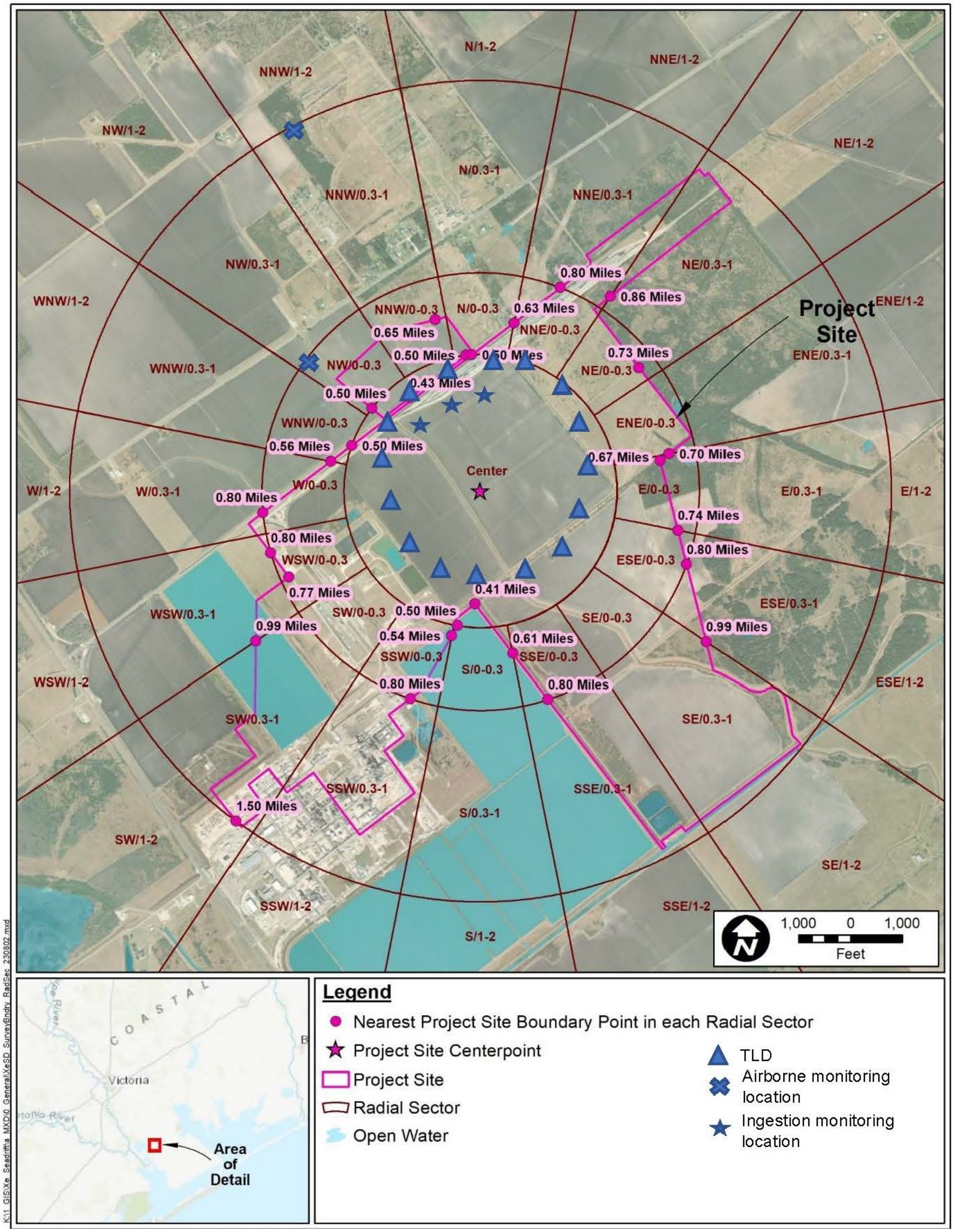

Figure 6.2-1: Long Mott Generating Station Radiological Monitoring and Sampling Locations

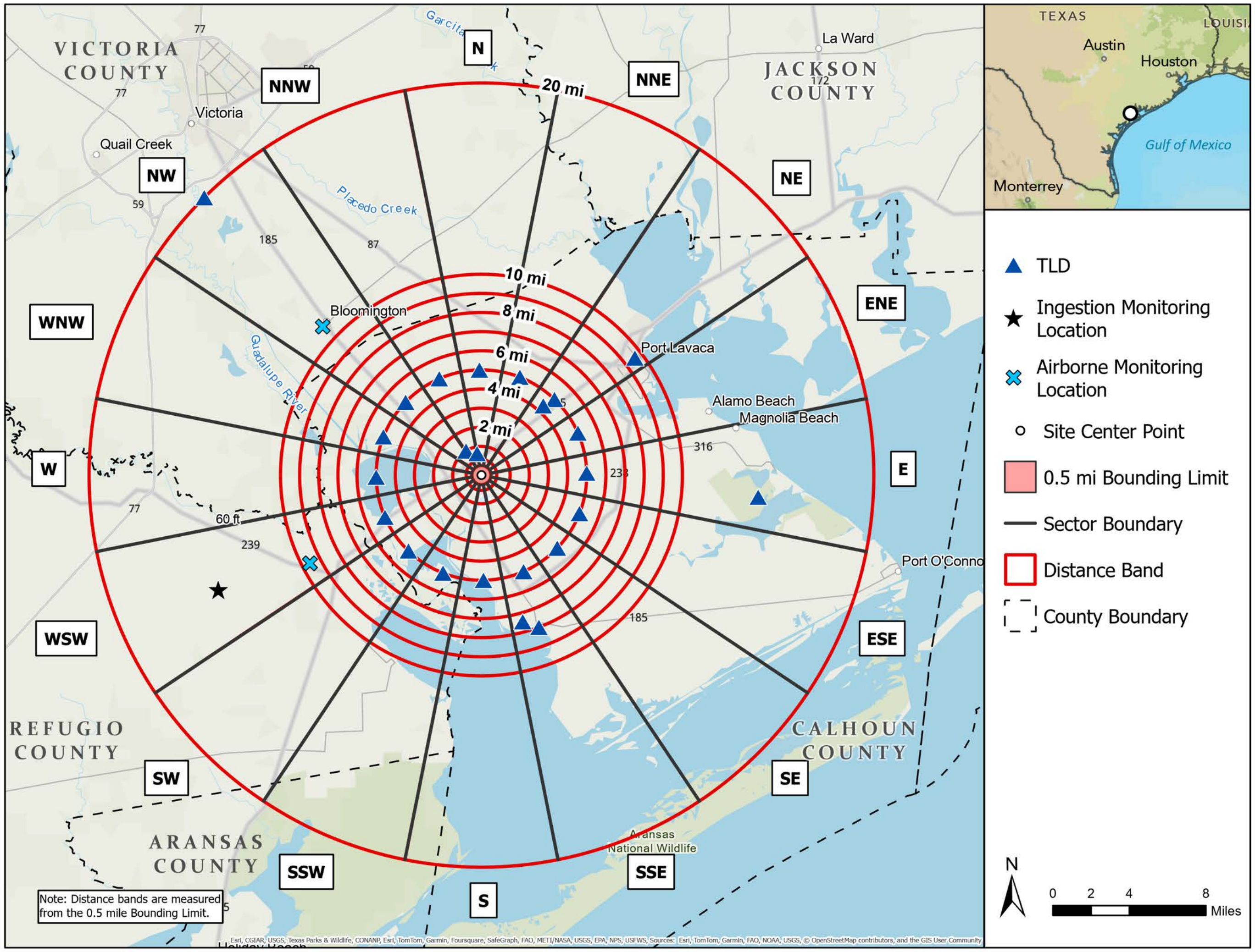

Figure 6.2-2: Long Mott Generating Station Remote Radiological Monitoring and Sampling Locations

6.3 Hydrological Monitoring

This section describes the hydrological monitoring program at LMGS. Information related to historic and current water use at and near the LMGS site are found in Section 2.3.1.2 and Section 2.3.2.2, and plant water use at LMGS is discussed in Section 3.3, Plant Water Use. Chemical Monitoring, including water quality monitoring of surface water and groundwater, are described in Section 6.6.

Potential discharges from LMGS are discussed in Section 3.3, Plant Water Use, Section 3.4, Plant Cooling System, Section 3.6 Nonradiological Waste Streams, and Section 5.5, Waste Impacts. As described in Section 5.2.1, nonradiological waste streams are assumed to tie into existing Seadrift Operations (SDO), the Seadrift, Texas facility owned and operated by the Union Carbide Corporation, an affiliate of The Dow Chemical Company, infrastructure for management and treatment prior to their discharge to Victoria Barge Canal. The exact tie-in location, and treatment system will be determined during final design. Outfall to the Victoria Barge Canal is through an existing permitted outfall location, and all effluents are in accordance with TPDES permit conditions. As such, there is no discrete permitted discharge.

To support the evaluation of potential project related impacts and future TPDES permitting, LMGS established a preapplication monitoring program to establish adequate baseline conditions and to provide a plan for monitoring during building and operations. The hydrological monitoring program at the LMGS site is divided into four phases as outlined below:

- Phase 1—Preapplication monitoring on a seasonal basis for at least one annual cycle to verify the existing hydrologic conditions, validate the design assumptions for hydrologic analyses, and support the characterization of the baseline hydrologic descriptions presented in Section 2.3.1.1 and Section 2.3.2.1
- Phase 2—Building phase monitoring to assess impacts from building activities. These activities are discussed in Section 3.9, Building Activities.
- Phase 3—Preoperational monitoring to establish a post-building baseline as a point of comparison in order to identify potential hydrologic impacts that may result from plant operation
- Phase 4—Operational monitoring to assess impacts to water hydrology resulting from plant operation

All field sampling procedures integrated as part of this monitoring program are conducted according to written procedures and performed by technicians trained in the program procedures. Data quality is assured by using applicable sample gathering, measurement, calibration, and analytical QA/QC standards, as appropriate.

6.3.1 Preapplication Monitoring

The preapplication hydrologic monitoring process involved the collection and analysis of surface water and groundwater data as described in Section 6.3.1.1 and Section 6.3.1.2, respectively.

6.3.1.1 Surface Water

The surface water hydrology in the vicinity of LMGS is described in Section 2.3.1.1. The following preapplication surface water monitoring tasks were conducted to understand surface water hydrologic conditions:

- Field surveys were conducted in conjunction with wetland and stream delineations to observe and characterize physical attributes of surface water features. As part of the preapplication monitoring program, field surveys of potential source-waterbodies and receiving streams were conducted to establish baseline hydrologic characteristics such as location, size, flow, outfall types, outfall elevations, and erosion (Section 2.3.1.1). Additionally, cross sections were measured during field surveys for the GBRA Calhoun Canal. Sediment transport capacity and erosion/scour potential are limited, in general, due to the low topographic relief in the project vicinity. Localized surface water erosive potential may exist due to artificial drainage conditions.
- Water level recording stations were installed at two locations in West Coloma Creek (Figure 2.3.2-7 and Figure 2.3.2-8), and water level information was obtained in 2023 and 2024. Section 2.3.1.1.1.5 provides more information about surface water levels. Water levels were measured using a transducer installed at the bottom of each gage on the stream bed. Data were collected at five-minute intervals for the duration of the monitoring. Water levels at each location were averaged over a 24-hour period.

A summary of the preapplication monitoring program as it relates to surface water hydrology is shown in Table 6.3-1.

6.3.1.2 Groundwater

Preapplication monitoring associated with the subsurface investigation consisted of the following actions:

- Monthly depth-to-groundwater measurements from the top of the surveyed well casing in ten groundwater observation well clusters with three wells in each cluster (30 wells total). The monitoring duration for well clusters 1 through 6 was conducted from December 2023 through November 2024 (12 months), and the monitoring duration for well clusters 101 through 104 was from January 2024 through November 2024 (11 months). More information on groundwater level monitoring is discussed in Section 2.3.2.1.4.1.2 and Section 2.3.2.3.2.2. Monitoring well locations are shown in Figure 2.3.2-25.

A summary of the preapplication monitoring program as it relates to groundwater hydrology is shown in Table 6.3-2.

6.3.2 Building And Preoperational Monitoring

6.3.2.1 Surface Water

Surface water monitoring for building and preoperational activities is developed in compliance with the application for a TPDES stormwater construction general permit (CGP) for discharges of stormwater associated with building activities issued by the TCEQ. Building and preoperational monitoring will be conducted at the two water level recording stations (Figure 2.3.2-7 and Figure 2.3.2-8) in addition to supplemental monitoring locations based on the CGP. Surface water level data collected during preapplication monitoring would continue to be collected using the same automated approach throughout the building phase of the project.

Stormwater discharges into receiving surface waters from large construction activities (defined as those involving five or more acres) are regulated under the TPDES CGP (TXR150000). Prior to initiation of building activities, a Stormwater Pollution Prevention Plan (SWPPP) must be developed and submitted to TCEQ with a Notice of Intent. Typical surface water discharges that may occur during building and preoperational activities include stormwater runoff and construction dewatering discharges. The SWPPP includes procedures to limit erosion, sedimentation, and other impacts to surface water that result from building and preoperational activities. The SWPPP also outlines inspection requirements and frequency as required by the CGP to ensure pollution prevention measures are protective of site surface water. Additional monitoring activities may also be conducted as required by other applicable permits.

6.3.2.2 Groundwater

Building and preoperational monitoring will be conducted at the 30 groundwater monitoring wells established during site characterization (Figure 2.3.2-25). Several of the 30 monitoring wells are located within the development footprint of the LMGS site and would be sealed and abandoned as a part of building activities. Groundwater elevation data, collected at least monthly during pre-application monitoring, will continue to be gathered from the remaining monitoring wells throughout the building phase of the project. Potential groundwater hydrologic impacts resulting from building activities could include increases or decreases to groundwater recharge rates, changes in groundwater elevations caused by dewatering or changes in recharge rates, or general fluctuations of the groundwater table due to topographic alterations.

6.3.3 Operational Monitoring

In general, operational monitoring programs are designed to assess impacts to surface and groundwater parameters (surface water hydrology, sediment transport, groundwater hydrology, groundwater elevation) resulting from facility operations.

6.3.3.1 Surface Water

Monitoring requirements for discharges to receiving surface waters are defined in the existing SDO TPDES permit, including effluent limitations, operational requirements, and biomonitoring requirements. Details related to the operation of LMGS have not yet been finalized; however, operational monitoring programs are designed to comply with the applicable regulatory requirements. After building, a surface water monitoring program will be implemented in accordance with applicable regulatory requirements to provide for ongoing data collection during the operational phase.

6.3.3.2 Groundwater

Water level monitoring of wells established as part of the preapplication monitoring program (Figure 2.3.2-25) will continue to be conducted, but on a reduced quarterly frequency (note that several wells may be abandoned during building phase). Monitoring methods will be consistent with those used in the preapplication monitoring program described in Section 2.3.2. Water level monitoring will be the same as the preapplication monitoring program to allow for comparison against the preoperational baseline data set. Trends in groundwater levels and physical attributes will be assessed on an annual basis to evaluate effects of plant operation on local and regional groundwater levels and associated hydrologic parameters.

Tables

Table 6.3-1: Preapplication Surface Water Hydrological Monitoring Program

Location	Parameter[a]	Sample Type	Frequency
WCC-1 (upstream side of Long Mott Generating Station site)	Water Level	Grab	5 minutes
WCC-3 (downstream of Long Mott Generating Station site)	Water Level	Grab	5 minutes

Notes: a) Water level monitoring was completed using a pressure transducer, at which data were collected at five-minute intervals for the duration of monitoring. Water levels at each location were averaged over a 24-hour period.

Table 6.3-2: Preapplication Groundwater Hydrological Monitoring Program

Well Cluster	Parameter[a]	Sample Type	Frequency	Number of Wells and Water-bearing Zone[b]
MW-XE-1	Groundwater Elevation	Measured	Monthly	3 (A, C, E)
MW-XE-2	Groundwater Elevation	Measured	Monthly	3 (A, C, E)
MW-XE-3	Groundwater Elevation	Measured	Monthly	3 (A, C, E)
MW-XE-4	Groundwater Elevation	Measured	Monthly	3 (A, C, E)
MW-XE-5	Groundwater Elevation	Measured	Monthly	3 (A, C, E)
MW-XE-6	Groundwater Elevation	Measured	Monthly	3 (A, C, E)
MW-XE-101	Groundwater Elevation	Measured	Monthly	3 (A, C, E)
MW-XE-102	Groundwater Elevation	Measured	Monthly	3 (A, C, E)
MW-XE-103	Groundwater Elevation	Measured	Monthly	3 (A, C, E)
MW-XE-104	Groundwater Elevation	Measured	Monthly	3 (A, C, E)

Notes:

a) Groundwater elevations were determined based on field survey from top of casing and ground levels

b) Water-bearing zones are described in Section 2.3.2.1.4

Figures

None

6.4 Meteorological Monitoring

6.4.1 On-Site Meteorological Data Source

The primary source of meteorological data during operations is the LMGS meteorological tower. However, the installation of the meteorological monitoring equipment will not be complete and operational with site-specific data when the Construction Permit Application (CPA) is submitted to the NRC. Preapplication meteorological data collection is outlined in Section 2.7.3. Post-application data collection will begin as soon as installation is complete and the tower is operational. The attributes of a meteorological monitoring system from RG 1.23, Rev. 1 are listed below (NRC, 2007):

- Wind speed and direction—measured on one open-lattice tower or mast at approximately 10 meters (m) (33 feet [ft.]) and 60 m (197 ft) above ground level (AGL)
- Vertical temperature difference (ΔT)—measured on the same open-lattice tower or mast as wind speed and wind direction between the 10 m (33 ft) and 60 m (197 ft) AGL levels. These heights of 10 m (33 ft) and 60 m (197 ft) are based on specifications of RG 1.23 (NRC, 2007). However, RG 1.23 also states a measurement height other than 60 m (197 ft) may be appropriate if the most probable release height is other than 60 m (197 ft) (NRC, 2007).
- Ambient temperature—monitored at approximately 10 m (33 ft) AGL
- Precipitation—measured near ground level near the base of the tower or mast used to measure wind speed and direction and ΔT
- Atmospheric moisture—these measurements should include dew point temperature, wet bulb temperature, or relative humidity at height(s) representative of water vapor release at sites using cooling towers

Specifications for the LMGS Meteorological Tower instrumentation are provided in Table 6.4-1.

According to RG 1.23 the tower or mast utilized to obtain the measurements listed above must be placed in a location that can provide data representative of the atmospheric conditions into which material may be released and transported (NRC, 2007). A location for a meteorological tower is depicted in Figure 6.4-1. While the primary intention is to install meteorological monitoring instrumentation on an existing tower at SDO, this location is included to provide the option to place a standalone meteorological tower if the existing tower is found to be insufficient for project requirements. The following discussion describes this option.

The location of the LMGS Meteorological Tower will be on level and open terrain at a minimal distance of ten times the height of nearby obstructions, and at approximately the same elevation as the LMGS site. Additionally, it will be sufficiently distanced from permanent man-made surfaces or temporary land disturbances. Also, it will be constructed in compliance with ANSI/TIA-222-H (American National Standards Institute/Telecommunications Industry Association [ANSI/TIA]-222, 2017). LMGS is roughly 0.6 mi (0.9 km) from the LMGS Meteorological Tower location (Figure 6.4-1). The tallest building at LMGS is the Reactor

Building (RB) including the Reactor Building Cooling Water (RBCW) expansion tank located on top of the RB with an overall height of approximately 129 ft (40 m) from finished grade to top of structure and is located approximately 0.62 mi. (1.0 km [3168 ft]) heading west-southwest (WSW, 248 degrees) from the LMGS Meteorological Tower location depicted in Figure 6.4-1. Based on the height of the tallest structure, the RB, the location of the tower from the structure would meet the 10:1 (distance:height) offset in RG 1.23.

The area surrounding the LMGS Meteorological Tower location is mostly agricultural and relatively flat with few natural obstructions and no man-made structures nearby that would interfere with meteorological measurements. The prevailing wind is from the south-southwest, and there are no topographical features that would have an impact on wind measurements.

Meteorological instrument calibration and maintenance procedures will meet the expectations as described in RG 1.23 by ensuring annual data recovery of at least 90 percent (NRC, 2007). Meteorological data will be available in real time for analysis and review. Time average accuracies for digital systems will meet the criteria in Table 2, Meteorological System Accuracies and Resolutions, of RG 1.23 (NRC, 2007).

6.4.2 Backup Meteorological Data Source

In the event meteorological data are not available from the LMGS Meteorological Tower representative meteorological data from an alternative source can be obtained from the following:

- Victoria Regional Airport (KVCT)
- Palacios-R. B. Trull Municipal Airport (KPSX)

The nearest, and most accurate and reliable alternative data source for LMGS is the KVCT located approximately 24 mi (39 km) to the north-northwest. KPSX is also an alternative source which could be used for meteorological data. It is located approximately 34 mi (55 km) northeast of LMGS. If weather observations are not available from KVCT other meteorological towers in the area are the Calhoun County-Port Lavaca Airport (KPKV), the Aransas County Airport Rockport (KRKP), the South Texas Project Electric Generating Station (STP), and data from Seadrift, Texas (SDRT2). The locations of these alternative meteorological data sources are shown in Figure 6.4-2.

Since these sources are airports where meteorological measurements are only taken at one level, the Turner Method (Turner, 1964) would need to be utilized to determine stability classes. Meteorological measurements taken at KVCT and KPSX are:

- Temperature (°F)
    - 6 hour (hr.) maximum and minimum (°F)
    - 24 hr. maximum and minimum (°F)
- Dew point (°F)
- Relative humidity (%)

- Heat Index (°F)
- Wind chill (°F)
- Wind direction
- Wind speed (kts)
- Visibility (mi)
- Severe Weather (i.e., thunderstorms)
- Precipitation
    - 1 hr.
    - 3 hr.
    - 6 hr.
- Sky Condition
- Station pressure [millibar (mb)]
- Station pressure [inches of mercury (in. Hg)]
- Altimeter setting (in. Hg)

(NOAA, NWS, 2024a) (NOAA, NWS, 2024b)

Tables

Table 6.4-1: Specifications of Meteorological Instruments on Meteorological Tower (Sheet 1 of 2)

Parameter	System Accuracy	Measurement Resolution	Measurement Height	Additional Specifications
Wind Speed	± 0.2 m/s (± 0.45 mph) or 5% of observed wind speed	0.1 m/s or 0.1 mph	10 m (33 ft) 60 m (197 ft)	• Redundant wind speed sensors at 10 m (33 ft) and 60 m (197 ft) • Sensors have a starting threshold of ≤ 0.4 m/s (1.0 mph) • Sensors operate wind speeds up to at least 22 m/s (50 mph) • Mounted ≥ 2 times the longest horizontal distance of the tower • Sensors located on the upwind side or perpendicular if 2 primary wind directions exist
Wind Direction	± 5°	1.0°	10 m (33 ft) 60 m (197 ft)	• Redundant wind speed sensors at 10 m (33 ft) and 60 m (197 ft) • Sensors have a starting threshold of ≤ 0.4 m/s (1.0 mph) • Aligned to reference true north • Mounted ≥ 2 times the longest horizontal distance of the tower • Sensors located on the upwind side or perpendicular if 2 primary wind directions exist
Ambient Temperature	± 0.5 °C (± 0.9 °F)	0.1 °C or 0.1 °F	10 m (33 ft) 60 m (197 ft)	• Sensor measures temperature continuously, accurately over range of expected climatic extremes • Redundant temperature sensors at 10 m (33 ft) and 60 m (197 ft) • Mounted in fan-aspirated radiation shields
Vertical Temperature Difference	± 0.1 °C (± 0.18 °F)	0.01 °C or 0.01 °F	10 m (33 ft) 60 m (197 ft)	• Measured on same open-lattice tower/mast as wind • Redundant temperature sensors at 10 m (33 ft) and 60 m (197 ft) speed/direction • Mounted in fan-aspirated radiation shields
Dew Point Temperature	± 1.5 °C (± 2.7 °F)	0.1 °C or 0.1 °F	10 m (33 ft) 60 m (197 ft)	• Measured on same open-lattice tower/mast as wind speed/direction • Redundant temperature sensors at 10 m (33 ft) and 60 m (197 ft)
Wet Bulb Temperature	± 0.5 °C (± 0.9 °F)	0.1 °C or 0.1 °F	10 m (33 ft) 60 m (197 ft)	• Measured on same open-lattice tower/mast as wind speed/direction • Redundant temperature sensors at 10 m (33 ft) and 60 m (197 ft)
Relative Humidity	± 4%	0.10%	10 m (33 ft) 60 m (197 ft)	• Measured on same open-lattice tower/mast as wind speed/direction • Redundant temperature sensors at 10 m (33 ft) and 60 m (197 ft)

Table 6.4-1: Specifications of Meteorological Instruments on Meteorological Tower (Continued) (Sheet 2 of 2)

Parameter	System Accuracy	Measurement Resolution	Measurement Height	Additional Specifications
Precipitation (water equivalent)	± 10% for volume of 2.54 mm (0.1 in.) at < 50 mm/hr. (< 2 in./hr.)	0.25 mm or 0.01 in.	Near ground level	• Determined by direct measurements taken with gauges of instruments • Measured near ground level at the base of mast or tower • Gauges shall be equipped with wind shields • Gauges shall be equipped with heater or antifreeze where appropriate
Time	± 5 min	1 min	N/A	N/A
Abbreviations: m/s = meters per second; mph = miles per hour; m = meter; ft = feet; °C = degrees Celsius; °F = degree Fahrenheit; mm = millimeter; hr = hour; in = inch; min = minute; NA = not applicable				

Figures

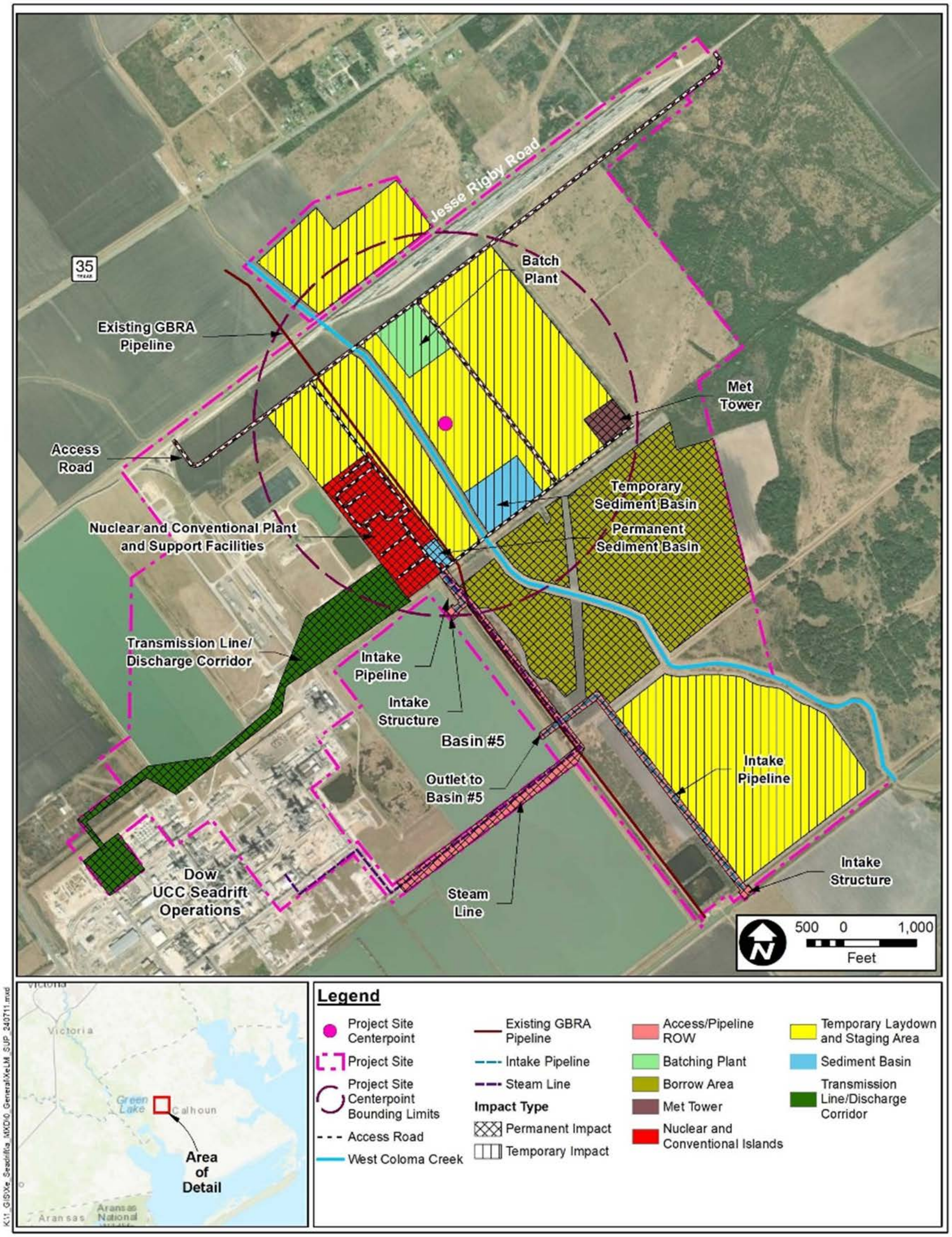

Figure 6.4-1: Location of Long Mott Generating Station Meteorological Tower

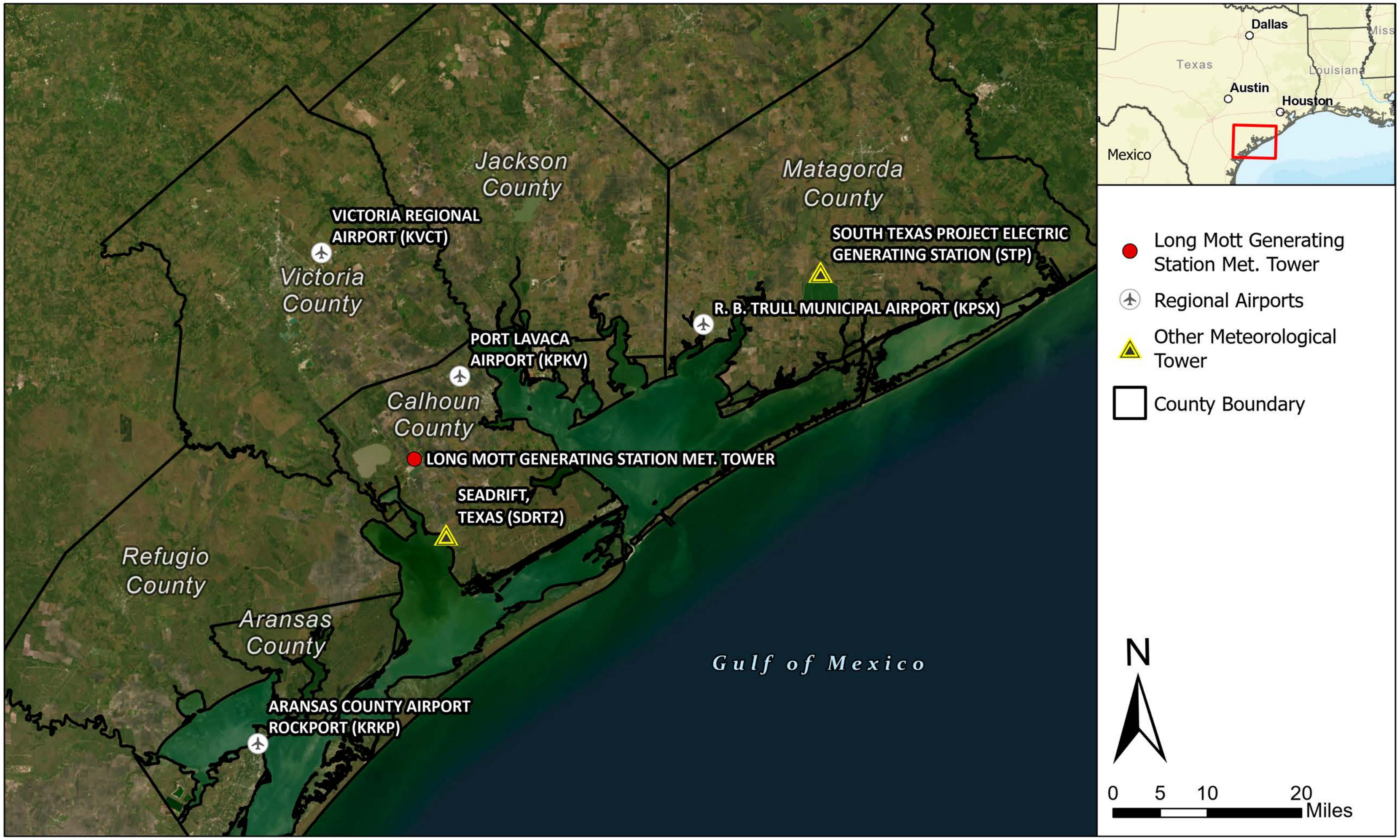

Figure 6.4-2: Locations of Backup Meteorological Data Sources

6.5 Ecological Monitoring

This section addresses monitoring programs for terrestrial ecology, land cover, and aquatic ecology of the areas that could be affected by building activities and operations at the LMGS site. The ecological monitoring programs are designed to establish baseline conditions for all phases of project development. The baseline conditions guide the development of permit conditions and assessment of the effectiveness and success of ecological impact mitigation measures.

6.5.1 Terrestrial Ecology and Land Cover

Section 2.4.1 describes the terrestrial resource characteristics that LMGS could affect. Preapplication monitoring of terrestrial ecosystems was performed to establish baseline conditions for the plant communities (including wetlands), resident wildlife, and important species and habitats at the LMGS site. Preapplication monitoring was designed in consideration of site conditions and performed in accordance with NRC RG 4.2 and RG 4.11.

Preapplication terrestrial surveys included land cover analysis, seasonal vegetation monitoring, wetland identification, wildlife monitoring, and identification of important species and habitats seasonally during 2023 (winter, spring, summer, and fall). The baseline conditions established through these field surveys are used to assess and minimize impacts to terrestrial natural resources to the extent practicable. These surveys are used to identify building activities and operational impacts as described in Section 4.3.1, Section 5.6.1, and Section 5.10.1.

As discussed in Section 4.3.1.1.1 and Section 5.10.1.1, disturbances associated with building activities may create conditions for opportunistic invasive species to establish in different areas of the LMGS site. Monitoring disturbed lands to identify and control areas dominated by invasive species helps limit the spread of invasive species during operation. Invasive species monitoring may include additional pedestrian surveys of terrestrial communities to locate known and new invasive species. Control methods that may be used include pesticides/herbicides, hand pulling, or mechanical treatment as applicable to the species and situation.

Appropriate agencies, such as Texas Parks and Wildlife Department and U.S. Fish and Wildlife Service are consulted prior to and during building activities. Agency recommendations that include monitoring elements and reporting levels are integrated into terrestrial ecology monitoring plans, as appropriate.

Any other monitoring required during LMGS building activities or operation follows guidelines included in NUREG-1555 and RG 4.2, guidelines developed by the U.S. Army Corps of Engineers (USACE), TCEQ, and conditions specified in required permits. Monitoring reports are developed and submitted to appropriate regulatory agencies to demonstrate compliance with performance standards.

6.5.2 Aquatic Ecology

Section 2.4.2 describes the characteristics of the aquatic resources that could be affected by LMGS. Preapplication aquatic ecosystem monitoring is used to establish baseline conditions at the LMGS site. Monitoring during building activities and operation occurs as needed in accordance with federal and state regulations.

Preapplication surveys consisted of seasonal fish and macroinvertebrate surveys on-site and in the project vicinity between 2023 and 2024. These surveys included identification of important aquatic species and aquatic habitats present on the LMGS site and in the vicinity. Baseline conditions established during these field surveys are used to assess impacts to aquatic ecosystems to the extent practicable.

Building activities within or adjacent to navigable waterways (waters of the United States) require permits from the USACE. Stormwater discharges during building activities are regulated under the TPDES. A SWPPP with best management practices (including measures to limit erosion and sedimentation) would be completed before start of building. Additionally, as described in Section 2.4.2, no sensitive habitats or rare aquatic species are known to be present in the aquatic habitats potentially affected by building activities. Compliance with permit stipulations and the SWPPP, and the lack of sensitive receptors, ensures that potential effects on aquatic communities from building are minor, localized, and temporary.

A TPDES permit for stormwater and wastewater discharges during operation likely would include a requirement for toxicity monitoring on at least an annual basis. The requirements for water intakes under the Clean Water Act's (CWA) Section 316(b), for the purpose of minimizing adverse impacts from entrainment and impingement of organisms, also are implemented through the TPDES permitting process. As the intake structure for LMGS is not located on a jurisdictional waterbody, adherence to CWA Section 316(a) or 316(b) is not required for operation.

Tables

None

Figures

None

6.6 Chemical Monitoring

This section describes the chemical monitoring programs at LMGS for surface water and groundwater quality.

Potential discharges from LMGS are discussed in Section 3.3, Plant Water Use, Section 3.4, Plant Cooling System, Section 3.6, Nonradiological Waste Streams, and Section 5.5, Waste Impacts. As described in Section 5.2.1, nonradiological waste streams from LMGS tie into existing SDO infrastructure for management and treatment prior to their discharge to Victoria Barge Canal. The exact tie-in location and treatment system will be determined during final design. Outfall to the Victoria Barge Canal is through an existing permitted outfall location, and all effluents are in accordance with TPDES permit conditions. As such, there is no discrete permitted discharge from LMGS.

To support the evaluation of potential project related impacts and future TPDES permitting, LMGS created a monitoring program to establish adequate baseline conditions and to provide a plan for monitoring during building and operations. The chemical monitoring program at LMGS is divided into four phases as outlined below:

- Phase 1—Preapplication monitoring that supports the baseline water quality descriptions in Chapter 2
- Phase 2—Building phase monitoring to assess impacts from building activities
- Phase 3—Preoperational monitoring to establish a post-building baseline as a point of comparison in order to identify changes in baseline environmental conditions that may result from operation of the plant
- Phase 4—Operational monitoring to identify environmental effects attributable to new plant operation

Baseline environmental water quality is described in Section 2.3.1 and Section 2.3.2 and anticipated wastewater creation is described in Section 3.3, Plant Water Use, Section 3.4, Plant Cooling System, and Section 3.6, Nonradiological Waste Streams. Potential impacts to surface water and groundwater are discussed in Section 4.2, Water-Related Impacts (construction), Section 5.2, Water-Related Impacts (operations), and Section 5.5, Waste Impacts.

Data quality is ensured by using applicable sample gathering, preservation, chain-of-custody, and analytical QA/QC standards. Samples are analyzed by a certified laboratory using methodologies in accordance with 40 CFR 136 to ensure compliance with applicable permits.

6.6.1 Preapplication Monitoring

The preapplication monitoring program provides baseline data to support the assessment of potential environmental impacts that result from the building and operation of the new plant. The program included surface water monitoring to characterize baseline conditions of source-waterbodies or receiving streams and baseline monitoring of groundwater wells.

6.6.1.1 Surface Water

Surface water monitoring of potential source water bodies and receiving streams was conducted quarterly to characterize seasonal variation in chemical conditions of surface waters as described in Section 2.3.1. Surface water quality parameters are consistent with NUREG-1555 Standard Review Plans for Environmental Reviews for Nuclear Power Plants (NUREG-1555) guidance and are listed in Table 6.6-1.

The sampling locations for surface water monitoring at LMGS are shown in Figure 2.3.2-14. Sampling locations consisted of the following:

- Four sample locations on West Coloma Creek
- Four sample locations on the Guadalupe-Blanco River Authority Calhoun Canal
- Two sample locations on the Dow Drainage Canal

Surface water grab samples were collected at each of these locations. Field water quality parameters (pH, dissolved oxygen, temperature, specific conductance, and turbidity) were also measured during sampling events at each location.

6.6.1.2 Groundwater

Groundwater monitoring was conducted quarterly to characterize seasonal variation in chemical conditions of groundwater as described in Section 2.3.2. Groundwater quality parameters are consistent with NUREG-1555 guidance and are listed in Table 6.6-2.

The sampling locations for groundwater monitoring at LMGS are shown in Figure 2.3.2-25 and listed in Table 2.3.2-1. The well configuration consists of six well clusters with three monitoring wells installed at each cluster. As described in Section 2.3.2.1, one well is installed in the A sands, one well is installed in the C sands, and the third well is installed in the E sands.

Groundwater samples were collected using low flow (low purge) sampling methodology. Field parameters were obtained using appropriately calibrated water quality field meters. Water quality samples were collected after parameter stabilization, as indicated by the field meters, and submitted for analyses to approved analytical laboratories. Field sampling was conducted according to written procedures and performed by technicians trained in the program procedures. Prior to low flow sampling, field technicians measured static water levels (to 0.01 feet as measured from the top of casing) using electronic water level indicators.

6.6.2 Building And Preoperational Monitoring

This monitoring is conducted to provide a basis for identifying and assessing environmental impacts from the building of the project and to provide additional preoperational baseline monitoring data.

6.6.2.1 Surface Water

Surface water monitoring for building and preoperational activities is developed in compliance with documentation requirements specific to the TPDES stormwater construction general permit for discharges of stormwater associated with building activities issued by the TCEQ.

Stormwater discharges into receiving surface waters from large construction activities (defined as those involving five or more acres) are regulated under the TPDES CGP TXR150000. Prior to initiation of building activities, a SWPPP must be created, and a Notice of Intent submitted, to TCEQ. Typical surface water discharges that may occur during building and preoperational activities include stormwater runoff and building phase dewatering discharges. The SWPPP includes procedures to limit erosion, sedimentation, and other impacts to surface water that result from building and preoperational activities. The SWPPP also outlines inspection requirements and frequency as required by the CGP to ensure pollution prevention measures are protective of site surface water. Additional monitoring activities may also be conducted as required by other applicable permits.

TCEQ may not require water quality monitoring of receiving waters as part of a stormwater general permit. However, a limited monitoring program may be implemented in the vicinity of the stormwater discharges to assess the effectiveness of erosion controls established during building, as warranted by site conditions.

Nonradiological waste streams from LMGS will tie into existing Dow infrastructure and discharge to the Victoria Barge Canal via an existing, permitted outfall in accordance with applicable TPDES permit conditions.

Quarterly sampling will be conducted during each year of the building and preoperational phases using the same methodology as the preapplication period as outlined in Section 2.3.1 and Section 6.6.1. Samples will be collected opportunistically based on water availability at each location at the time of each sampling event. Because there is no discrete discharge from LMGS to the Dow discharge canal, continued sampling within the Dow discharge canal is not planned for the building and preoperational monitoring phase. Additional monitoring requirements and locations are based upon TCEQ permit conditions.

6.6.2.2 Groundwater

Groundwater quality monitoring of the wells established as part of the preapplication monitoring network will be conducted throughout the building and preoperational phases. Wells within both the A and C sands are monitored quarterly. Wells within the E sands are monitored annually. Should monitoring results within the A or C sands indicate significant changes in constituents and/or concentrations, the monitoring frequency for E sands may be increased to quarterly. Groundwater elevations at all wells are monitored monthly. These monitoring guidelines are reviewed annually and adjusted as necessary.

Monitoring methods are consistent with those described in Section 2.3.2 and Section 6.6.1. Parameters include those established as part of the preapplication monitoring network to add to the preoperational baseline data set.

6.6.3 Operational Monitoring

After completion of building, a surface water and groundwater sampling program is implemented to provide for ongoing data collection during the operational phase. In general, operational monitoring programs are designed to assess impacts to surface and groundwater water quality parameters resulting from facility operations.

6.6.3.1 Surface Water

Monitoring requirements for discharges to receiving surface waters are defined in the existing SDO TPDES permit, including effluent limitations, operational requirements, and biomonitoring requirements. Details related to the operation of LMGS have not yet been finalized; however, operational monitoring programs are designed to comply with the applicable regulatory requirements. After building, a surface water sampling program is implemented in accordance with applicable regulatory requirements to provide for ongoing data collection during the operational phase.

Surface water sampling of the locations established in Section 6.6.2.1 will be conducted during the first year following initial operation and continued on an annual basis. The sampling program is reevaluated annually based on analytical results and input from the NRC and other regulatory agencies.

Surface water sampling methods and water quality parameters are the same as those established in Section 2.3.1 and Section 6.6.1. Following the first annual monitoring interval, the list of parameters is reviewed and revised to focus on specific indicators for the long-term monitoring program.

6.6.3.2 Groundwater

Quarterly groundwater sampling of the locations established in Section 6.6.1 will be conducted during the first year following initial operation and continued on a quarterly basis. Following the first annual monitoring interval, the list of parameters is reviewed and revised to focus on specific indicators for the long-term monitoring program. The sampling program is reevaluated annually based on analytical results and input from the NRC and other regulatory agencies.

Groundwater sampling methods and water quality parameters are the same as those established in Section 2.3.2 and Section 6.6.1. These monitoring guidelines are reviewed and adjusted as necessary during the five-year reevaluation.

Tables

Table 6.6-1: Surface Water Monitoring Program

Parameter	Sample Type	Frequency	Number of Locations
Total[(a)]	Grab	Quarterly	10
Field Measurements[(b)]	Grab	Quarterly	10
Hardness	Grab	Quarterly	10
TSS/TDS	Grab	Quarterly	10
BOD/COD	Grab	Quarterly	10
XO_X[(c)]	Grab	Quarterly	10
NO_X[(d)]	Grab	Quarterly	10
Inorganics[(e)]	Grab	Quarterly	10
Organics[(f)]	Grab	Quarterly	10
Phyto-Plankton	Grab	Quarterly	10
Dup[(g)]	Grab	Quarterly	1
EB[(g)]	Grab	Quarterly	1
FB[(g)]	Grab	Quarterly	1
MS[(g)]	Grab	Quarterly	1
MSD[(g)]	Grab	Quarterly	1

Notes:

a) Total includes duplicates and MS/MSD samples

b) Field measurements include temperature, pH, conductivity, dissolved oxygen, oxidation reduction potential, color, odor, salinity, and turbidity

c) XO_X includes total and orthophosphate phosphorus

d) NO_X includes nitrate, nitrite, ammonia, and organic nitrogen

e) Inorganics includes Alkalinity (free CO_2), chloride, fluoride, sulfate, sodium, potassium, calcium, magnesium, silica, iron and additional heavy metals under the Target Analyte List (TAL) by the EPA: aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, manganese, nickel, selenium, silver, thallium, uranium, vanadium, zinc, lead, mercury. Also includes gross alpha, gross beta activity

f) Organic (wastewater parameters) include total coliform and fecal coliform

g) QA/QC samples (including field duplicate samples and MS/MSD) to be analyzed at the same time as the field samples. This data will be used to evaluate data quality.

Analyses are performed in accordance with established methods and guidelines

Abbreviations: BOD = biological oxygen demand; CO_2 = carbon dioxide; COD = chemical oxygen demand; Dup. = duplicate sample; EB = equipment blank; FB = field blank; MSD = matrix spike duplicate; MS = matrix spike; HCO_3 = bicarbonate; TDS = total dissolved solids; TSS = total suspended solids

Table 6.6-2: Groundwater Monitoring Program

Parameter	Sample Type	Frequency	Number of Locations
Groundwater Elevations	Low Flow	Monthly	18
Total[(a)]	Grab	Quarterly	18
Field Measurements[(b)]	Grab	Quarterly	18
Hardness	Grab	Quarterly	18
TSS/TDS	Grab	Quarterly	18
BOD/COD	Grab	Quarterly	18
XO_X[(c)]	Grab	Quarterly	18
NO_X[(d)]	Grab	Quarterly	18
Inorganics[(e)]	Grab	Quarterly	18
Organics[(f)]	Grab	Quarterly	18
Dup[(g)]	Grab	Quarterly	1
EB[(g)]	Grab	Quarterly	1
FB[(g)]	Grab	Quarterly	1
MS[(g)]	Grab	Quarterly	1
MSD[(g)]	Grab	Quarterly	1

Notes:

B series wells will be installed, sampled, and analyzed if necessary/required.

a) Total includes duplicates and MS/MSD samples

b) Field measurements include: temperature, pH, conductivity, oxidation reduction potential, dissolved oxygen, color, odor, salinity, and turbidity

c) XO_X includes total and orthophosphate phosphorus

d) NO_X includes nitrate, nitrite, ammonia, and organic nitrogen

e) Inorganics includes alkalinity (free CO_2), chloride, fluoride, sulfate, sodium, potassium, calcium, magnesium, silica, iron, and additional heavy metals under the Target Analyte List (TAL) by the EPA: aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, cyanide, manganese, nickel, selenium, silver, thallium, uranium, vanadium, zinc, lead, mercury. Includes gross alpha and gross beta activity

f) Organic/wastewater parameters include total coliform, and fecal coliform

g) QA/AC samples (including field duplicate samples and MS/MDS) will be analyzed at the same time as the field samples. Frequency of QA/QC samples is presented in QAPD. This data will be used to evaluate data quality.

Analyses are performed in accordance with established methods and guidelines

Abbreviations: BOD = biological oxygen demand; CO_2 = carbon dioxide; HCO_3 = bicarbonate; Dup. = duplicate sample; MS = matrix spike; MSD = matrix spike duplicate; TDS = total dissolved solids; TSS = total suspended solids

Figures

None

6.7 Summary of Monitoring Programs

This section summarizes the environmental monitoring programs described in the preceding sections of Chapter 6. The summary is divided into three sections:

- Preapplication Monitoring
- Building and Preoperational Monitoring
- Operational Monitoring

Table 6.7-1 provides an overview of the monitoring program for each area, including the program scope and references to report sections where further details are available.

6.7.1 Preapplication Monitoring

Preapplication monitoring requirements for LMGS are fulfilled in part by ongoing thermal, radiological, hydrological, meteorological, ecological, and chemical monitoring programs performed and/or planned for the LMGS site and existing SDO. These programs are summarized below and in Table 6.7-1:

- Preapplication thermal monitoring and modeling programs are detailed in Section 6.1.1 and include:
  - Quarterly sampling of on-site water bodies to establish baseline conditions.
- No radiological monitoring program (Section 6.2, Radiological Monitoring) is required during the preapplication phase.
- Hydrological preapplication monitoring programs are detailed in Section 6.3.1. These programs include:
  - Field surveys were conducted in conjunction with wetland and stream delineations to observe and characterize physical attributes of surface water features. As part of the preapplication monitoring program, LMGS conducted field surveys of potential source-waterbodies and receiving streams to establish baseline hydrologic characteristics such as location, size, flow, outfall types, outfall elevations, and erosion (Section 2.3.1.1). Additionally, cross sections were measured during field surveys for the GBRA Calhoun Canal.
  - Water level recording stations were installed at two locations in West Coloma Creek (Figure 2.3.2-7 and Figure 2.3.2-8), and water level information was obtained in 2023 and 2024.
  - Monthly depth-to-groundwater measurements from the top of surveyed well casings in ten groundwater observation well clusters with three wells in each cluster (30 wells total).
- The preapplication meteorological monitoring programs are detailed in Section 2.7.3. The installation of the meteorological monitoring equipment will not be complete when

the CPA is submitted to the NRC. Post-application data collection will begin as soon as installation is complete.

- Terrestrial ecology and land cover monitoring programs are described in Section 6.5.1. These programs include:
  - Preapplication field studies were conducted on the LMGS site on a seasonal basis such that seasonal variations could be characterized throughout at least one annual cycle. The baseline conditions established through these field surveys are used to assess and minimize impacts to terrestrial natural resources to the extent practicable. The following field studies were conducted during the following periods:
    - Terrestrial vegetation community surveys (spring, summer, and fall 2023)
    - Terrestrial wildlife surveys (winter, spring, summer, and fall 2023)
    - Jurisdictional waters delineation/assessment in 2023
- Aquatic ecology monitoring programs are described in Section 6.5.2. These surveys included identification of important aquatic species and aquatic habitats present on the LMGS site and in the vicinity. Baseline conditions established during these field surveys are used to assess impacts to aquatic ecosystems to the extent practicable. These programs include:
  - Fish surveys (summer, fall, and winter 2023, and spring 2024).
  - Macroinvertebrate surveys (fall 2023 and spring 2024).
- Details of the chemical monitoring conducted during site preparation and construction phases are provided in Section 6.6.1. These programs include:
  - Baseline surface water quality monitoring at ten locations (four locations in West Coloma Creek, four locations in the GBRA Calhoun Canal, and two locations in the Dow Drainage Canal) to characterize baseline conditions of source-waterbodies and receiving streams. Field personnel collected quarterly surface water grab samples from these locations. Field water quality parameters (pH, dissolved oxygen, temperature, specific conductance, and turbidity) were also measured during sampling activities at each location.
  - Groundwater monitoring of six well clusters was conducted to characterize baseline monitoring data set. Each of the six groundwater monitoring clusters consist of three nested sampling wells established at different depths. As described in Section 2.3.2.1, for each cluster, one well is installed in the A sands, one well is installed in the C sands, and the third well is installed in the E sands. Groundwater sample collection was performed using low flow (low purge) sampling methodology. Field parameters were obtained using appropriately calibrated water quality field meters. Water quality samples were collected after parameter stabilization, as indicated by the field meters, and submitted for analyses to approved analytical laboratories. Groundwater level measurements were measured prior to well purging and water quality samples were taken after well purging.

6.7.2 Building And Preoperational Monitoring

Additional monitoring during the building phase and the preoperational periods will be conducted in accordance with applicable permit requirements. Parameters to be monitored include thermal, radiological, hydrological, meteorological, ecological, and chemical. Data collected will be evaluated and impacts assessed and mitigated as required.

The purpose of preoperational monitoring, generally conducted in the one or two years prior to the start up a nuclear power plant, is to establish baseline conditions. The information provided below and in Table 6.7-1 provides the preoperational monitoring planned for LMGS:

- Preoperational thermal monitoring is addressed in Section 6.1.2 and includes:
  - Continued sampling of representative surface waters associated with LMGS will be conducted as part of a building phase monitoring program. This program will include temperature monitoring at locations consistent with the preapplication monitoring program.
  - A TPDES permit is required to discharge to surface water during construction. Monitoring will be conducted in accordance with the permit as applicable.
- As addressed in Section 6.2.1, a REMP is initiated two years before scheduled fuel load. It includes monitoring of the environment by sampling air, water, sediment, fish, and food products, as well as measuring radiation directly.
- As addressed in Section 6.3.2, surface water monitoring requirements for building and preoperational activities will be developed in compliance with documentation requirements specific to the licensing application for LMGS as well as the application for a TPDES stormwater CGP for discharges of stormwater associated with building activities issued by the TCEQ.
  - Surface water data collected during preapplication monitoring will continue to be collected using the same automated approach throughout the building phase of the project.
- As addressed in Section 6.3.2, building and preoperational monitoring is conducted at the 30 groundwater monitoring wells established during site characterization with the exception of the wells located within the development footprint of LMGS. Wells located within the development footprint of LMGS will be sealed and abandoned as part of building activities. Groundwater elevation data will continue to be collected on a monthly basis throughout the building phase of the project.
- The installation of the meteorological monitoring equipment will not be complete prior to submitting the CPA application to the NRC. Post-application data collection will begin as soon as installation is complete and the tower is deemed operational. The building and preoperational monitoring details to be implemented are detailed in Section 6.4.1.

- Terrestrial ecology and land use monitoring programs are described in Section 6.5.1. These programs include:
  - Invasive species monitoring may include additional pedestrian surveys of terrestrial communities to locate known and new invasive species.
- Aquatic ecological monitoring, addressed in 6.5.2, will be assessed and implemented as required under TPDES permitting requirements.
- Details of the site preoperational chemical monitoring program are provided in Section 6.6.2. These programs include:
  - Quarterly surface water sampling will be conducted during each year of the building and preoperational phases using the same methodology as the preapplication period as outlined in Section 2.3.1 and Section 6.6.1. Because there is no discrete discharge from LMGS to the Dow discharge canal, continued sampling within the Dow discharge canal is not recommended for the building and preoperational monitoring phase. Additional monitoring requirements and locations are based upon TCEQ permit conditions.
  - Groundwater quality monitoring of the wells established as part of the preapplication monitoring network will be conducted during each year of building and preoperational phases. Wells within the A and C sands are monitored quarterly. Wells within the E sands are monitored annually. If monitoring results within the A or C sands indicate significant changes in constituents and/or concentrations, the monitoring frequency for E sands may be increased to quarterly. Groundwater elevations at all wells are monitored monthly. These monitoring guidelines are reviewed annually and adjusted as necessary. Monitoring methods will be consistent with those used in the preapplication monitoring program described in Section 2.3.2 and Section 6.6.1. Parameters include those established as part of the preapplication monitoring network to add to the preoperational baseline data set.

6.7.3 Operational Monitoring

The purpose of the operational monitoring program is to identify and assess impacts resulting from LMGS operation. Operational monitoring programs are prescribed by the various permits required for new plant operation (e.g., air permit, TPDES permit) or by federal regulations. The information provided below and in Table 6.7-1 provides the known operational monitoring planned for LMGS:

- Operational thermal monitoring is addressed in Section 6.1.3 and includes:
  - An operational monitoring program will be implemented to identify any changes in water quality that may result from the operation of LMGS and to assess the effectiveness of the related effluent treatment systems. The specific elements of an operational monitoring program, including thermal monitoring of water bodies, will be developed in consultation with TCEQ in the course of applying for a TPDES permit.

- No specific operational thermal monitoring is required for the cooling systems as the design of the proposed facility does not utilize water as its cooling source. There are no thermal discharges to regulated water bodies during normal operations.

- As addressed in Section 6.2.1, the operational radiological monitoring is defined by the REMP, begins during the preoperational phase, and includes measures to document the effectiveness of procedures and processes that restrict or control releases of radioactive materials to the environment.
- As addressed in Section 6.3.3, monitoring requirements for discharges to receiving surface waters are defined in the existing SDO TPDES permit, including effluent limitations, operational requirements, and biomonitoring requirements. After building, a surface water sampling program will be implemented in accordance with applicable regulatory requirements to provide for ongoing data collection during the operational phase.
- As addressed in Section 6.3.3, water level monitoring of wells established as part of the preapplication monitoring program will continue but on a reduced frequency of quarterly. Trends in groundwater levels and physical attributes will be assessed on an annual basis to evaluate effects of LMGS operation on local and regional groundwater levels and associated hydrologic parameters.
- As addressed in Section 2.7.3, the primary source of current meteorological data for LMGS is the Victoria, Texas National Weather Service (NWS) Station (KVCT). A meteorological tower that meets the requirements of RG 1.23, Revision 1, March 2007, to be the primary source of meteorological data for LMGS operations will be installed. The location of this tower is east of the Nuclear and Conventional Island (Figure 6.4-1). Data collection includes wind speed and direction, ambient temperature and vertical temperature difference, precipitation, and atmospheric moisture. After construction of this tower, data from the KVCT will be a supplemental source of data.
- No specific ecological monitoring is proposed for the operational phase.
- No specific aquatic monitoring is proposed for the operational phase.
- Operational chemical monitoring programs are detailed in Section 6.6.3 and include:
    - Surface water sampling of the locations established in the preapplication, building, and preoperational monitoring network will be conducted during the first year following first initial operation and continued on an annual basis. The sampling program is to be reevaluated annually based on analytical results and input from the NRC and other regulatory agencies. Surface water sampling methods and water quality parameters will be the same as those included in the preapplication monitoring program. After the first annual monitoring interval, the list of parameters will be reviewed and revised to reflect specific indicators for the long-term monitoring program.

Quarterly groundwater sampling of the locations established in the preapplication monitoring network will be conducted during the first year following initial operation and continued on a quarterly basis. Following the first annual monitoring interval, the list of parameters is reviewed and revised to focus on specific indicators for the long-term monitoring program. The sampling program is to be reevaluated annually based on analytical results and input from the NRC and other regulatory agencies. Groundwater sampling methods and water quality parameters are the same as those established in the preapplication monitoring program. These monitoring guidelines are reviewed and adjusted as necessary during the five-year reevaluation.

Tables

Table 6.7-1: Summary of Monitoring Programs (Sheet 1 of 3)

Resource	Program	Scope/Content	Applicable Section/Subsection for Additional Details
Preapplication Monitoring			
Water	Thermal Monitoring	Quarterly thermal monitoring of the on-site water bodies to establish baseline conditions.	6.1.1
Human Health	Radiological Monitoring	No radiological monitoring program is required during the preapplication phase.	6.2
Water	Hydrological Monitoring	Field surveys were conducted in conjunction with wetland and stream delineations to observe and characterize physical attributes of surface water features. Water level recording stations were installed at two locations in West Coloma Creek, and water level information was obtained in 2023 and 2024. Monthly depth-to-groundwater measurements from the top of the surveyed well casing in ten groundwater observation well clusters with three wells in each cluster (30 wells total).	2.3.1 2.3.2 6.3.1
Meteorology	Meteorological Monitoring	The installation of the meteorological monitoring equipment will not be complete when the Construction Permit application is submitted to the NRC. Post-application data collection will begin as soon as installation is complete.	2.7.3 6.4.1 6.4.2
Terrestrial	Ecological Monitoring	Preapplication field studies were conducted on the LMGS site on a seasonal basis such that seasonal variations could be characterized throughout at least one annual cycle. Terrestrial vegetation community surveys, terrestrial wildlife surveys, and jurisdictional waters delineation/assessment were completed in 2023.	6.5.1
Aquatic	Ecological Monitoring	Seasonal fish and macroinvertebrate surveys were conducted between 2023 and 2024. These studies characterized the baseline conditions of the aquatic habitats and communities.	6.5.2
Water	Chemical Monitoring	Quarterly baseline surface water quality monitoring at ten locations (four locations in West Coloma Creek, four locations in the GBRA Calhoun Canal, and two locations in the Dow Drainage Canal) to characterize baseline conditions of source waterbodies and receiving streams. Quarterly baseline monitoring of six groundwater monitoring well clusters, each with three monitoring wells established at different depths.	2.3.1 2.3.2 6.6.1
Building and Preoperational Monitoring			
Water	Thermal Monitoring	Continued sampling of representative surface waters associated with LMGS will be conducted as part of a building phase monitoring program. This program will include temperature monitoring at locations consistent with the preapplication monitoring program. A TPDES permit will be required to discharge to surface water during building. Monitoring would be conducted in accordance with the permit as applicable.	6.1.2
Human Health	Radiological Monitoring	REMP includes monitoring of the environment by sampling air, water, sediment, fish, invertebrates and food products, as well as measuring radiation directly. The REMP is initiated two years before scheduled fuel load.	6.2.1
Water	Hydrological Monitoring	Surface water monitoring requirements for building and preoperational activities will be developed in compliance with documentation requirements specific to the licensing application for LMGS as well as the application for a TPDES stormwater CGP for discharges of stormwater associated with building activities issued by the TCEQ. Surface water data collected during preapplication monitoring would continue to be collected using the same automated approach throughout the building phase of the project. Building and preoperational monitoring will be conducted at the 30 groundwater monitoring wells established during site characterization with the exception of the wells located within the development footprint of LMGS. Wells located within the development footprint of LMGS will be sealed and abandoned as part of building activities. Groundwater elevation data will continue to be collected on a monthly basis throughout the building phase of the project.	6.3.2

Table 6.7-1: Summary of Monitoring Programs (Continued) (Sheet 2 of 3)

Resource	Program	Scope/Content	Applicable Section/Subsection for Additional Details
Meteorology	Meteorological Monitoring	The installation of the meteorological monitoring equipment will not be complete when the Construction Permit application is submitted to the NRC. Post-application data collection will begin as soon as installation is complete.	2.7.3 6.4.1 6.4.2
Terrestrial	Ecological Monitoring	Terrestrial ecology and land use monitoring programs may include additional pedestrian surveys of terrestrial communities to locate known and new invasive species.	6.5.1
Aquatic	Ecological Monitoring	Aquatic ecological monitoring will be assessed and implemented as required under TPDES permitting requirements.	6.5.2
Water	Chemical Monitoring	Quarterly surface water sampling will be conducted during each year of the building and preoperational phases using the same methodology as the preapplication period. Additional monitoring requirements and locations are based upon TCEQ permit conditions. Groundwater quality monitoring of the wells established as part of the preapplication monitoring network will be conducted during each year of building and preoperational phases. Wells within both the A and C sands are monitored quarterly. Wells within the E sands are monitored annually. Should monitoring results within the A or C sands indicate significant changes in constituents and/or concentrations, the monitoring frequency for E sands may be increased to quarterly. Groundwater elevations at all wells are monitored monthly. These monitoring guidelines are reviewed annually and adjusted as necessary. Monitoring methods are consistent with those used in the preapplication monitoring program. Parameters include those established as part of the preapplication monitoring network to add to the preoperational baseline data set.	2.3.1 2.3.2 6.6.2
Operational Monitoring			
Water	Thermal Monitoring	An operational monitoring program would be implemented to identify any changes in water quality that may result from the operation of LMGS and to assess the effectiveness of the related effluent treatment systems. The specific elements of an operational monitoring program, including thermal monitoring of water bodies, would be developed in consultation with TCEQ in the course of applying for a TPDES permit. No specific operational thermal monitoring is required for the cooling systems as the design of LMGS does not utilize water as its cooling source. There are no thermal discharges to regulated water bodies during normal operations.	6.1.3
Human Health	Radiological Monitoring	Radiological monitoring for the operational period is defined in the REMP and includes measures to document the effectiveness of procedures and processes that restrict or control releases of radioactive materials to the environment.	6.2.1
Water	Hydrological Monitoring	Monitoring requirements for discharges to receiving surface waters are defined in the existing SDO TPDES permit, including effluent limitations, operational requirements, and biomonitoring requirements. After building, a surface water sampling program will be implemented in accordance with applicable regulatory requirements to provide for ongoing data collection during the operational phase. Groundwater level monitoring of wells established as part of the preapplication monitoring program will continue to be conducted, but on a reduced quarterly frequency.	6.3.3
Meteorology	Meteorological Monitoring	The primary source of current meteorological data for LMGS is the Victoria, Texas National Weather Service Station (KVCT). LMGS plans to build a meteorological tower to be the primary source of meteorological data for operations of LMGS. The location of this tower is east of the Nuclear and Conventional Island (Figure 6.4-1). Data collection includes wind speed and direction, ambient temperature and vertical temperature difference, precipitation, and atmospheric moisture. After construction of this tower data from KVCT will be a supplemental source of data.	2.7.3.3 6.4
Terrestrial	Ecological Monitoring	No specific ecological monitoring is proposed.	6.5.1
Aquatic	Ecological Monitoring	No specific ecological monitoring is proposed.	6.5.2

Table 6.7-1: Summary of Monitoring Programs (Continued) (Sheet 3 of 3)

Resource	Program	Scope/Content	Applicable Section/Subsection for Additional Details
Water	Chemical Monitoring	Surface water sampling of the locations established in the preapplication, building, and preoperational monitoring network will be conducted during the first year following first initial operation and continued on an annual basis. The sampling program is reevaluated annually based on analytical results and input from the NRC and regulatory agencies. Surface water sampling methods and water quality parameters will be the same as those included in the preapplication monitoring program. Following the first annual monitoring interval, the list of parameters is to be reviewed and revised to focus on specific indicators for the long-term monitoring program. Quarterly groundwater quality monitoring of wells established as part of the preapplication, building, and preoperational monitoring network will be conducted during the first year following first initial operation and continued on a quarterly basis. The sampling program is to be reevaluated annually based on analytical results and input from the NRC and other regulatory agencies. Monitoring methods are consistent with those used in the preapplication monitoring program. Following the first annual monitoring interval, the list of parameters will be reviewed and revised to reflect specific indicator parameters for the long-term monitoring program.	6.6.3

Abbreviations:

CGP = Construction General Permit; GBRA = Guadalupe Blanco River Authority; LMGS = Long Mott Generating Station; NRC = U.S. Nuclear Regulatory Commission; REMP = Radiological Environmental Monitoring Program; SDO = Seadrift Operations; TCEQ = Texas Commission on Environmental Quality; TPDES = Texas Pollutant Discharge Elimination System

Figures

None

6.8 References

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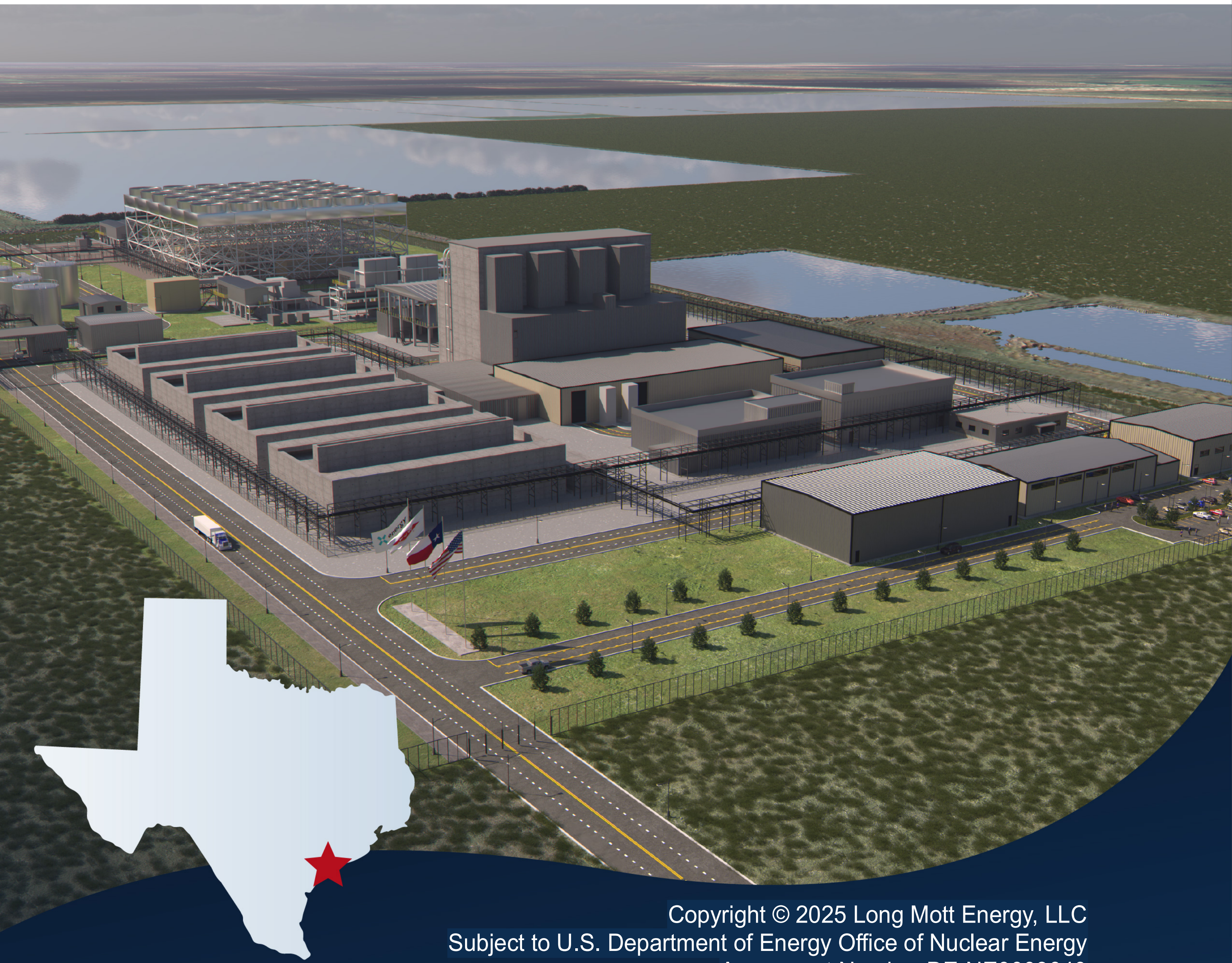
Long Mott Generating Station

Environmental Report
Chapter 7 - Cumulative Impacts



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Chapter 7 - Cumulative Impacts

The U.S. Nuclear Regulatory Commission (NRC) regulations in Title 10 of the Code of Federal Regulations (CFR) Part 51 implementing the National Environmental Policy Act of 1969, as amended (NEPA) (42 United States Code Section 4321 et seq.), require the NRC consider the cumulative impacts of proposals under its review (10 CFR 51.71(d)). Cumulative impacts may result when the environmental effects associated with the proposed action are overlaid or added to temporary or permanent effects associated with past, present, and reasonably foreseeable future actions (RFFAs).

As defined in the Council on Environmental Quality's revised 2024 NEPA regulations (40 CFR 1508.1(i)(3)), cumulative impacts are: "effects on the environment that result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from actions with individually minor but collectively significant effects taking place over a period of time."

The cumulative impact analysis is based on the resources of potential concern and the geographic area in which potential adverse effects from site-specific activities have the potential to alter (degrade) the quality of the regional environmental resources. The geographic area of interest (GAI) over which past, present, and RFFAs could contribute to cumulative impacts is dependent upon the type of each resource under consideration. As indicated by Regulatory Guide 4.2, Revision 3, the resource impact areas and GAIs for each environmental resource must be suited both to the resource and the individual action under consideration. The GAI is defined as the area where foreseeable actions occur that could potentially have impacts within the resource impact area; therefore, the GAI may be different for each resource. The GAI for each resource considered in the cumulative effects analysis is identified in Table 7.1-1. Building, operating, and decommissioning occurs on the Long Mott Generating Station (LMGS) site, most of which was previously disturbed by cultivation.

7.1 Past, Present, and Reasonably Foreseeable Future Projects

Cumulative impacts result when the effects of a proposed action are added to or interact with other past, present, and reasonably foreseeable future effects on the same resources. Actions that have a timing that is "past" or "present" inherently have environmental impacts that are integrated into the base condition for each of the resources described in Chapter 2. However, these actions are included in this subsection to provide for a more complete description of the overall impact of past actions on the environment. RFFAs are those future actions that have been identified as having a likely or reasonable certainty to occur. The reasonable certainty of these actions is based on the availability of existing plans for the proposed action, published permit applications, established funding, or reasonable extensions of current trends. Although such actions are likely to happen, they are still subject to some uncertainty. Actions that are not reasonably foreseeable are those based on speculation or conjecture or are actions that have only been discussed on a conceptual basis.

Table 7.1-2 identifies relevant past, present, and RFFAs within the LMGS GAIs. The analysis of potential cumulative impacts is based on publicly available information about existing and proposed projects and general knowledge of the conditions in the region. Past, present, and RFFAs within the identified GAI for an individual resource area are described in the next section.

Tables

Table 7.1-1: Geographic Area of Interest by Resource (Sheet 1 of 2)

Resource	Resource Impact Area from Regulatory Guide 4.2 Revision 3	Geographic Area of Interest for LMGS
Land Use	The resource impact area should encompass the site, the vicinity, and the extent of off-site areas and transmission line corridors, pipelines, and other elements of LMGS.	LMGS site and 6 mi (10 km) vicinity.
Historic and Cultural Resources	The resource impact area for the cumulative analysis would be the same area of potential effects described in Chapter 2.	The LMGS site and a 0.5 mi (0.8 km) buffer. GAI based on direct and indirect effects per Texas State Historic Preservation Office.
Water Resources **(Hydrology, Water Use and Quality)**		
Surface Water	The resource impact area should reflect the use of surface water and groundwater resources by LMGS and by other projects in the vicinity of the site.	LMGS site, watershed of West Coloma Creek, GBRA Calhoun Canal, Guadalupe River, Guadalupe Bay. GAI based on watershed connectivity.
Groundwater		LMGS site and 6 mi (10 km) vicinity, GAI based on aquifers evident on LMGS site and vicinity (Chicot aquifer) and predominance of dense fat clays in subsurface.
Ecology		
Terrestrial Ecology	At a minimum, the resource impact area should encompass the site, any off-site parcels or corridors, and related segments of the surrounding landscape. The resource impact area should also encompass any parcels recognized early in the design process as likely used for mitigation activities.	LMGS site and 6 mi (10 km) vicinity. GAI based on potential for direct and indirect effects.
Aquatic Ecology	The resource impact area should be defined based on factors such as salinity regimes, watersheds, substrate, or other environmental characteristics that define suitable habitat ranges and preferences of aquatic resources in the area affected by LMGS.	LMGS site, watershed of West Coloma Creek and GBRA Calhoun Canal. GAI based on watershed connectivity and absence of discrete discharge from LMGS.

Table 7.1-1: Geographic Area of Interest by Resource (Continued) (Sheet 2 of 2)

Resource	Resource Impact Area from Regulatory Guide 4.2 Revision 3	Geographic Area of Interest for LMGS
Socioeconomics		
Physical Impacts	The resource impact area should encompass the areas of effect and the distances at which impacts of building and operating over the expected license term may occur. The scope will depend on the extent of project activities but normally would include the site, the local community, the economic region, and demographic region identified in Chapter 2.	The LMGS site and immediate surrounding areas. GAI based on area of direct and indirect effects.
Social and Economic Impacts		ROI (Calhoun, Jackson, Victoria Counties). GAI based on effects associated with workforce population.
Environmental Justice		50 mi (80 km) region.
Nonradiological Waste Management		50 mi (80 km) region. GAI is dependent on type of waste generated and available disposal locations. Identified land-based waste disposal facilities include those within and beyond the region.
Nonradiological Health	The resource impact area changes based on the type of health effect. For example, electric shocks or chronic electric and magnetic field exposure is possible at the site and along the transmission corridor, whereas etiological agents are a threat in the vicinity of the thermal discharges.	The LMGS site and ROI (for transportation related relation impacts).
Air Quality	Criteria pollutants: The resource impact area for criteria pollutants is generally the county where the licensing activity is taking place. Greenhouse gases.	Calhoun County; GAI based on county attainment designation.
Radiological Health	The resource impact area is considered as the area that has the potential to increase radiological exposure at any location within a 50 mi radius of the proposed site.	The 50 mi (80 km) region.
Postulated Accidents	The resource impact area is considered as the area that has the potential to increase risks at any location within a 50 mi (80 km) radius of the proposed site.	The 50 mi (80 km) region.
Fuel Cycle, Transportation, and Decommissioning	Much of the uranium fuel cycle impact occurs at facilities scattered throughout the U.S., or in the case of foreign-purchased uranium, in other countries.	Nationwide or worldwide.

Abbreviations: mi = mile; km = kilometer; LMGS = Long Mott Generating Station, GBRA = Guadalupe-Blanco River Authority; GAI = geographic area of interest; ROI = region of influence

Table 7.1-2: Past, Present, and Reasonably Foreseeable Projects Considered in the Cumulative Impact Analysis (Sheet 1 of 3)

Project Name	Description	Approximate Distance from LMGS	Status
ENERGY PROJECTS			
Nuclear			
STP Electric Generating Station Units 1 and 2	The STP is a 2500 MWe electric dual-unit nuclear plant with 2 units producing roughly 1,250 MWe each.	47 mi (75 km) ENE	Past, present and reasonably foreseeable. Unit 1, licensed for operation through 08/20/2047 and Unit 2 licensed for operation through 12/15/2048. (NRC, 2017, 2022a, 2022b)
Coal-Fired			
Coleto Creek Power Station	650 MWe single unit coal-fired electrical generating facility on roughly 8,000 ac. (3,240 ha) in Fannin, Texas.	30 mi (48 km) NNW	Past, present, reasonably foreseeable. Scheduled to close in 2027. (Burns & McDonnell, 2020; Texas Comptroller, 2023)
Natural Gas-Fired			
Natural Gas-Fired Electric Power Plants	Twelve natural gas-fired plants, with a combined generative capacity of over 2000 MWe.	Throughout the 50 mi (80 km) region	Past, present, reasonably foreseeable. (EIA, 2024)
Other Energy Projects			
Battery Storage Power Plants	Two existing battery storage power plants – Loop 463 and TX2 Port Lavaca – with a combined generative capacity of roughly 20 MWe.	Loop 463 – 27 mi (43 km) NNW TX2 Port Lavaca – 6 mi (10 km) NE	Past, present, reasonably foreseeable. (EIA, 2024)
Petroleum Power Plants	Two existing petroleum power plants – Seadrift Coke and CG PS Victoria WWTP – with a combined generative capacity of roughly 9 MW	CG PS Victoria WWTP – 24 mi (39 km) NNW Seadrift Coke – 2 mi (3 km) NW	Past, present, reasonably foreseeable. (EIA, 2024)
INDUSTRIAL			
SDO	Material manufacturing complex and energy cogeneration facility spanning 4700 ac. (1900 ha).	Adjacent	Past, present, and reasonably foreseeable. (X-energy, 2024)
Dow Seadrift Cogeneration Plant	Closure of the cogeneration plant at SDO .	Adjacent	Reasonably foreseeable.
Formosa Plastics Corp. USA	Petrochemical manufacturing complex on 2,500 ac. (1,011 ha) in Point Comfort.	18 mi (29 km) ENE	Past, present, reasonably foreseeable. (EIA, 2024; Formosa Plastics, 2018)
INEOS Nitriles Green Lake	Petrochemical manufacturing and power generation complex on 4000 ac. (1600 ha) in Victoria, TX.	5 mi (8 km) NNW	Past, present, reasonably foreseeable. (EIA, 2024; INEOS, n.d .)

Table 7.1-2: Past, Present, and Reasonably Foreseeable Projects Considered in the Cumulative Impact Analysis (Continued) (Sheet 2 of 3)

Project Name	Description	Approximate Distance from LMGS	Status
TRANSMISSION LINES/SUBSTATIONS			
Transmission Line Projects	The Electric Reliability Council of Texas identifies eight projects consisting of rebuilding, reconductoring, and upgrading existing transmission lines and substations in the 6 mi (10 km) vicinity.	Throughout the 6 mi (10 km) vicinity	Present and reasonably foreseeable. Approved projects implemented between 2024 and 2028. (Electric Reliability Council of Texas, 2024)
PARKS AND RECREATION			
Aransas National Wildlife Refuge	Implement a land acquisition process to expand Aransas NWR by roughly 95,000 ac. (38,445 ha).	12 mi (19 km) SE	Past, present, reasonably foreseeable. The U.S. Fish and Wildlife Service proposes to expand the conservation land acquisition boundary in Aransas NWR as part of the future Land Protection Plan. (US Fish and Wildlife Service, 2024)
PORT AND SHIP CHANNEL IMPROVEMENT PROJECTS			
Regional Port Development Projects	Port of Victoria, Port of West Calhoun, and Calhoun Port Authority. Various capital improvement projects. Port of West Calhoun: Long Mott Harbor Liquid Cargo Dock Bulkhead Improvement Project.	Various locations within the 50 mi (80 km) region	Present and reasonably foreseeable. Projects included in the 2024 — 2025 Port Capital Investment Report. (TxDOT, 2023)
MSC Improvement Project	The MSC is a federal deep-draft waterway in Calhoun and Matagorda counties. Plans includes deepening and widening of the channel and adding a turning basin.	13 mi (21 km) E	Reasonably foreseeable. Record of Decision dated April 22, 2020, withdrawn pending additional analysis. Notice of Intent to prepare a draft Supplemental Environmental Impact Statement to evaluate impacts of substantial changes to the proposed action and new information relative to environmental concerns, published June 2, 2023. (USACE, 2019; USACE 2023)
TRANSPORTATION PROJECTS			
TxDOT Improvement Projects	Several roadway improvement projects on existing roadways throughout the ROI.	Various locations throughout the ROI	Present and reasonably foreseeable. TxDOT lists 49 projects that are underway or planned in Calhoun County. An additional 154 projects are identified within the surrounding counties of Victoria (86) and Jackson (68). (TxDOT, 2024a)
Bridging the Gulf – Creating Opportunity on the Victoria Barge Canal	Bridge replacement project over the Victoria Barge Canal.	3 mi (5 km) WNW	Reasonably foreseeable. Estimated completion by December 31, 2028. (TxDOT, 2024b)

Table 7.1-2: Past, Present, and Reasonably Foreseeable Projects Considered in the Cumulative Impact Analysis (Continued) (Sheet 3 of 3)

Project Name	Description	Approximate Distance from LMGS	Status
OTHER ACTIONS/PROJECTS			
New Alkoxylation Unit Project	Union Carbide Corporation Alkoxylation Plant Construction and Infrastructure Expansion.	Adjacent	Reasonably foreseeable. Construction expected completion by June 2025. (Texas Comptroller, 2022)
Port Lavaca Reservoir Expansion	LNRA plans to construct a dam and reservoir and associated diversion reach to impound water on the Lavaca River.	23 mi (37 km) ENE	Reasonably foreseeable. LNRA filed a draft water use permit July 10, 2020. (TCEQ, 2024)
Lynas Rare Earths Processing Facility	Construct and operate a 66 ac. (27 ha) manufacturing plant to process heavy rare earth elements on a 149 ac. site (60 ha).	1 mi (2 km) ENE	Reasonably foreseeable. (DOD, 2023)
Recycle Waste Transfer Station	Expansion of existing public recycle waste transfer station in Calhoun County.	7 mi (11 km) NNE	Present and reasonably foreseeable. Construction contractor chosen in May 2024. (Calhoun County, 2024; Formosa Plastics, 2024)
Abbreviations: LMGS = Long Mott Generating Station; STP = South Texas Project; MWe = megawatt electric; mi= mile; km = kilometer; ENE = east-northeast; Ac. = acre; ha = hectare; NNW = north-northwest; NE = northeast; WWTP = Wastewater Treatment Plant; NW = northwest; SDO = Seadrift Operations; TX = Texas; NWR = National Wildlife Refuge; MSC = Matagorda Ship Channel; TxDOT = Texas Department of Transportation; ROI = region of influence; SE = southeast; E = east; WNW = west-northwest; NNE = north-northeast; LNRA = Lavaca-Navidad River Authority			

Figures

None

7.2 Impact Assessment

As described above, the time frame for the cumulative impact analysis incorporates the sum of effects of LMGS in combination with past, present, and RFFAs as impacts may accumulate or develop over time. The baseline assessment presented in the affected environment for each resource (Chapter 2) accounts for past and present actions. The direct and indirect impact analyses (Chapter 4 and Chapter 5) address the incremental impacts of building and operation. These combined impacts may be individually minor but may collectively result in significant impacts from actions taking place over a period of time. An impact that may be SMALL by itself could result in a MODERATE or LARGE cumulative impact when considered in combination with the impacts of other actions on the affected resource. Table 7.2-1 provides a summary of the cumulative impact for each resource. The potential for cumulative effects to each of the identified environmental resources of concern are analyzed below.

7.2.1 Land Use

The description of the affected environment in Section 2.2.1 of this document serves as a baseline for the cumulative impacts assessment for land use. Extensive agricultural practices throughout the region have resulted in changes in land cover to cropland. As described in Section 4.1, Land-Use Impacts, and Section 5.1, Land-Use Impacts, the impacts on land use from building and operation of LMGS are characterized by MODERATE (building activities) and SMALL (operation). Impacts to land use at the LMGS site and in the vicinity occur primarily during building. Land use impacts from building activities associated with LMGS result from effects to agricultural lands, building in a coastal zone, and prime farmland. These impacts occur in an area adjacent to an existing industrial facility, are compatible with existing land uses, and represent a minor coastal zone alteration within the vicinity and region. During operation, LMGS uses a dry cooling system consisting of air-cooled condensers (ACCs); therefore, there is no impact to land use on the LMGS site or in the vicinity from salt deposition from cooling tower operation. Additionally, the operation of LMGS is consistent with existing industrial land uses and does not conflict with established land use controls.

As described in Table 7.1-1, the GAI established for land use includes the LMGS site and vicinity.

Table 7.1-2 identifies past, present, and RFFA projects that have the potential to result in impacts to land use. Among the RFFAs, the following actions within the GAI for land use and are considered to have the potential to contribute to cumulative impacts on land use:

- Seadrift Coke (petroleum power plant)
- Seadrift Operations (SDO) — The Seadrift, Texas facility owned and operated by the Union Carbide Corporation, an affiliate of The Dow Chemical Company
- INEOS Nitriles Green Lake
- Transmission line projects

- Lynas Rare Earths processing facility
- New Alkoxylation Unit Project

Land use within the GAI has been noticeably impacted by the construction and operation of industrial facilities, such as Seadrift Coke, SDO, and INEOS Nitriles Green Lake. These facilities have resulted in development of vacant land and the conversion of lands designated as having prime farmland, farmland of statewide importance, and other agricultural land uses. RFFAs, including the Lynas Rare Earths processing facility, would also impact available land and agricultural resources within the GAI. However, RFFAs, such as the closure of the Dow Seadrift Cogeneration Plant, the New Alkoxylation Unit Project, the various transmission line upgrades, port and ship channel improvements, and transportation projects, would occur on land currently designated for these uses; therefore, the impact of these actions on land use is minimal. The minor loss of on-site agricultural lands, including prime farmland of statewide importance, and the subsequent loss of potential agricultural land to other future industrial facilities and new development, is minor when compared with available agricultural land and land designated as prime farmland remaining within the vicinity (Table 2.2-3).

The cumulative impact of building and operating activities from the proposed action on land use, added to the effects associated with past, present, and RFFAs within the GAI on land use is noticeable but not destabilizing and therefore, MODERATE. Because of extensive past and present modification of land use within the GAI, and the close juxtaposition of LMGS adjacent to the SDO, the impact of the building and operation of LMGS is not a significant contributor to the cumulative impact on land use.

7.2.2 Water

7.2.2.1 Hydrology

7.2.2.1.1 Surface Water Hydrology

The description of the affected environment in Section 2.3.1.1 of this document serves as a baseline for the cumulative impacts assessment for surface water hydrology. Permanent and temporary impacts to surface water hydrology associated with the building and operation of LMGS is described in Section 4.2.1.1 and Section 5.2.1.1, respectively. Building LMGS results in localized impacts to stormwater drainage patterns on the LMGS site, alterations of intermittent and ephemeral tributaries on the LMGS site, and alterations to the Guadalupe-Blanco River Authority (GBRA) Calhoun Canal. Hydrologic impacts from operation include alterations to plant water supply and from the intake structure, alterations in stormwater drainage patterns, and localized alterations associated with the discharge to West Coloma Creek. However, impacts are minimized by the commitment to design and manage surface water and stormwater in accordance with applicable regulatory requirements. As described in Section 4.2.1 and Section 5.2.1, the impacts on surface water hydrology from building and operation of LMGS are SMALL.

As described in Table 7.1-1, the GAI established for surface water hydrology is based on watershed connectivity to potential project activities and includes the LMGS site, the watershed of West Coloma Creek, the GBRA Calhoun Canal, Guadalupe River, and Guadalupe Bay. The Victoria Barge Canal receives discharges from the SDO. However, as noted in Section 5.2.1.1.2, nonradiological liquid waste streams from LMGS tie into existing SDO infrastructure for management and treatment as such there is no discrete permitted discharge from LMGS.

Many of the past, present, and RFFA projects listed in Table 7.1-2 have the potential to result in some effects to surface water hydrology. The following actions listed in Table 7.1-2 are within the GAI for surface water hydrology and are considered to have the potential to contribute to cumulative impacts on surface water hydrology:

- Regional port development projects
- Lynas Rare Earths processing facility

The surface water resources of the GAI have been noticeably impacted by past and ongoing land use practices and industrial use. Extensive agricultural land uses within the GAI have resulted in land cover alteration and stream channelization. These practices have led to the establishment of an extensive network of artificial drainageways and conveyance channels within the GAI. Port development projects within the region are primarily outside of the GAI. However, the Long Mott Harbor Liquid Cargo Dock Bulkhead Improvement Project at the Port of Calhoun is located in the GAI. This project involves localized modifications to shorelines and port depths associated with bulkhead improvements which will be short term and limited in scope. New industrial development of the Lynas Rare Earths processing facility is not expected to result in direct impacts to surface water resources. However, because this project is in proximity to the LMGS site, it may result in indirect effects on tributaries of West Coloma Creek. West Coloma Creek, and its associated tributaries, is the principal water body and is potentially jurisdictional. However, as is the case with the non-jurisdictional canal system, the creek and associated tributaries are substantially impacted by channelization and are characterized by a low-quality aquatic biological community. Nonetheless, these systems are not subject to jurisdiction under the Clean Water Act (CWA).

The cumulative impact of building and operating activities from LMGS on surface water hydrology, added to the effects associated with past, present, and RFFAs within the GAI on surface water hydrology, is MODERATE. The impact on surface water hydrology from past channelization and the development of an extensive network of artificial drainageways, conveyance channels, and artificial basins is noticeable but is not destabilizing in the broader context of the Guadalupe River and Guadalupe Bay. Because agricultural and industrial uses have extensively altered surface water hydrology within the GAI, and because LMGS has localized and limited hydraulic alterations, the impact of the building and operation of LMGS is not a significant contributor to the cumulative impact on surface water hydrology.

7.2.2.1.2 Groundwater Hydrology

Section 2.3.2.1 of this document serves as a baseline for the cumulative impacts assessment for groundwater hydrology. The existing hydrogeologic setting is composed of unconsolidated deltaic sands, silts, and clays incised by meandering streams discharging into the Gulf of Mexico. Permanent and temporary impacts to groundwater hydrology associated with the future building and operation of LMGS is described in Section 4.2.2.1 and Section 5.2.2.1, respectively. Alterations to groundwater hydrology during building of LMGS include those associated with dewatering. Localized changes in water levels within the affected water bearing zone may occur from dewatering. However, due to the shallowness of excavations related to building activities, foundation development and associated dewatering activities does not result in permanent impacts on groundwater hydrology. Furthermore, there are no hydrologic alterations that affect groundwater availability during operations. As described in Section 4.2.2.1 and Section 5.2.2.1, the impacts on groundwater hydrology from building and operation of LMGS are SMALL.

As described in Table 7.1-1, the GAI established for groundwater hydrology is based on aquifers evident on the LMGS site and vicinity. The GAI includes the Chicot aquifer beneath the LMGS site and the vicinity. The predominance of dense fat clays in subsurface areas limits the extent of hydrologic interconnectivity between the water bearing zones within the aquifer. Many of the past, present, and RFFA projects listed in Table 7.1-2 have the potential to result in some effects to groundwater hydrology. Among the RFFAs, the following actions listed in Table 7.1-2 are within the GAI for groundwater hydrology and are considered to have the potential to substantially contribute to cumulative impacts on groundwater hydrology:

- Seadrift Coke (petroleum power plant)
- SDO
- INEOS Nitriles Green Lake
- New Alkoxylation Unit Project
- Lynas Rare Earths processing facility

Groundwater hydrology in the GAI is influenced by surface water bodies, tides in lowland areas, and seasonal precipitation patterns. Large amounts of groundwater are withdrawn from the aquifer system for municipal, industrial, and irrigation needs. Industrial projects such as the ongoing and RFFAs are expected to utilize wells for various facility needs. As such, localized hydrologic alterations may be expected to occur in proximity to wells used for water supply. As described in Section 2.3.2, groundwater level monitoring conducted at the LMGS site identified noticeable irregular groundwater flow patterns in the shallow A sands that are influenced by the artificial basins of the SDO site. Directional flow of the deeper C and E sands is normalized and does not reflect an influence of surface water basins. The effects of other past and ongoing projects on groundwater are localized and cumulative effects to groundwater hydrology will be minor.

The cumulative impact of the proposed action on groundwater hydrology, added to the effects associated with past, present, and RFFAs within the GAI on groundwater hydrology, is noticeable but not destabilizing and therefore, MODERATE. Because groundwater use by LMGS is only associated with the building phase and only results in localized alterations from dewatering, the impact of building and operation of LMGS is temporary and not a significant contributor to the cumulative impact on groundwater hydrology.

7.2.2.2 Water Use

7.2.2.2.1 Surface Water Use

Section 2.3.1.2 of this document serves as a baseline for the cumulative impacts assessment for surface water use. SDO and GBRA, individually and collectively, own surface water rights at an existing diversion point on the Guadalupe River downstream of its confluence with the San Antonio River and just upstream of the GBRA's saltwater barrier. Water from this diversion is designated for industrial, irrigation, mining, stock-raising, and municipal uses. Permanent and temporary impacts to surface water use associated with building and operation of LMGS are described in Section 4.2.1.2 and Section 5.2.1.2, respectively. Overall, LMGS water use represents a minor percentage of available water flow in the Guadalupe River during normal annual and seasonal conditions as well as drought conditions. LMGS operations remain only a small portion of available water rights during drought conditions; therefore, impacts to water use and downstream water users is SMALL.

As described in Table 7.1-1, the GAI established for surface water use is the same as that for surface water hydrology in Section 7.2.2.1.1. All actions listed in Table 7.1-2 will be permitted in accordance with state and federal laws and regulations that ensure the protection of surface water use. Similarly, none are expected to represent a substantial potential to contribute to additional stresses on surface water use within the GAI.

The cumulative impact of building and operating activities from the proposed action on surface water use, added to the effects associated with past, present, and RFFAs within the GAI on surface water use is SMALL. The average annual surface water usage rates during building and operation of LMGS are within existing permitted water rights held by SDO and do not impact other downstream water users; therefore, the impact of building and operation of LMGS is not a significant contributor to the cumulative impact on surface water use.

7.2.2.2.2 Groundwater Use

Section 2.3.2.2 of this document serves as a baseline for the cumulative impacts assessment for groundwater use. Existing groundwater use is regulated by numerous state and federal agencies and local planning groups. The LMGS site lies within Groundwater Management Area 15 and the Calhoun County Groundwater Conservation District. Permanent and temporary impacts to groundwater use associated with the future building and operation of LMGS are described in Section 4.2.2.2 and Section 5.2.2.2. There are no planned uses of groundwater during building or operation; therefore, impacts from groundwater use are SMALL.

As described in Table 7.1-1, the GAI established for groundwater use is the same as that used for groundwater hydrology in Section 7.2.2.1.2. All actions listed in Table 7.1-2 will be permitted or authorized in accordance with state and federal laws and regulations concerning groundwater use. As such, none are expected to represent a substantial potential to contribute to additional stresses on groundwater use within the GAI.

The cumulative impact of building and operating activities from the proposed action on groundwater use, combined with the effects associated with past, present, and RFFAs within the GAI on groundwater use, is not noticeable and therefore, SMALL. As described above, there are no planned uses of groundwater during building and operation of LMGS. Additionally, no permanent dewatering system is planned for use during operation; therefore, the impact of building and operation of LMGS is not a significant contributor to the cumulative impact on groundwater use.

7.2.2.3 Water Quality

7.2.2.3.1 Surface Water Quality

The description of the affected environment in Section 2.3.1.3 of this document serves as a baseline for the cumulative impacts assessment for surface water quality. Surface waters including West Coloma Creek, Powderhorn Lake and the Victoria Barge Canal are not listed as impaired waters. However, San Antonio Bay, Hynes Bay, Guadalupe Bay, and Mission Lake comprise a single segment for the purposes of the 303(d) list. The segment located to the west of the LMGS site, within the six miles (mi.) (9.7 [kilometers] km) vicinity is listed on the 303(d) list as a Category 5 water due to bacteria in oyster water (fecal coliform), which affects the consumption of fish and shellfish. In 2002, data obtained by the Texas Commission on Environmental Quality (TCEQ) showed that 14 bay segments, including the Lavaca-Guadalupe coastal basin, were not safe for harvesting shellfish because of elevated bacteria concentrations. No total maximum daily loads have been established for the bays of the mid-Texas coast at this time.

Permanent and temporary impacts to surface water quality associated with the future building and operation of LMGS are described in Section 4.2.1.3 and Section 5.2.1.3. As stated in Section 4.2.1.3, impacts to surface water quality during building activities are primarily limited to those associated with the building of an intake structure on the GBRA Calhoun Canal, building of bridges across West Coloma Creek, and impacts of sedimentation and erosion to on-site streams. As such, the impacts of building activities to surface water quality are SMALL. Section 5.2.1.3 states that plant design integrates the use of ACCs, and stormwater is managed in accordance with the requirements of TCEQ Texas Pollutant Discharge Elimination System (TPDES) permits; therefore, impacts to surface water quality from operations are SMALL.

As described in Table 7.1-1, the GAI established for surface water quality is the same as that for surface water hydrology in identified in Section 7.2.2.1.

Table 7.1-2 identifies past, present, and RFFA projects that have the potential to result in impacts to surface water quality. Among the RFFAs, the following actions are within the GAI for groundwater hydrology and are considered to have the potential to contribute to cumulative impacts on surface water quality:

- Seadrift Coke (petroleum power plant)
- SDO
- Closure of the Dow Seadrift cogeneration plant
- INEOS Nitriles Green Lake
- Regional Port Development Projects
- Transmission line projects
- Texas Department of Transportation (TxDOT) improvement projects
- Bridging the Gulf – Creating Opportunity on the Victoria Barge Canal
- Lynas Rare Earths processing facility

The surface water quality of the GAI has been noticeably impacted by past and ongoing industrial land uses. Several of the projects identified above are continued and future operation of existing industrial facilities; however, the effects from these facilities are included in the affected environment in Section 2.3.1.3. Existing operations such as the Seadrift Coke Petroleum Power Plant, SDO, and the INEOS Nitriles Green Lake facility operate in accordance with the terms of their existing TPDES permits and are not expected to contribute to reduced water quality within the GAI. Effects of the Long Mott Harbor Liquid Cargo Dock Bulkhead Improvement Project at the Port of Calhoun and Bridging the Gulf — Creating Opportunity on the Victoria Barge Canal will be localized and short term. Additionally, new development projects such as transmission lines, roadway construction, and the construction of the Lynas Rare Earths processing facility, are expected to implement best management practices (BMPs), spill prevention, control, and countermeasure (SPCC) plans and other measures to minimize potential water quality impacts from land disturbance during construction in accordance with state and federal regulations and mitigative measures that minimize such effects on water quality. Additionally, during operations, both LMGS and the Lynas Rare Earths processing facility would rely upon the SDO for treatment of sanitary wastewater and nonradiological liquid wastes and would not have a discrete discharge to surface waters; therefore, there are no contributing effects of these projects on water quality within the GAI during operations.

The cumulative impact of building and operating activities from LMGS and associated with past, present, and RFFAs within the GAI on surface water quality is noticeable and LARGE due to the impaired nature of waters within the GAI. However, the impact of the building and operation of LMGS is localized and minor and is not a significant contributor to the cumulative impact on surface water quality.

7.2.2.3.2 Groundwater Quality

The description of the affected environment in Section 2.3.2.3 of this document serves as a baseline for the cumulative impacts assessment for groundwater quality. Impacts from building activities and operations of the LMGS site are described in Section 4.2.2.3 and Section 5.2.2.3. An SPCC Plan, which includes the use of BMPs to minimize the occurrence of spills and limit their effects on groundwater, will be prepared and implemented at the LMGS site. As described in Section 5.2.2.3, if small amounts of contaminants are released into the environment, they would have only a small, localized, temporary impact on groundwater quality because of the predominance of heavy clays on the LMGS site. Additionally, a permanent stormwater basin is used to control stormwater runoff from the LMGS site. Because LMGS includes engineering controls that prevent or minimize the release of harmful effluents, and because and concentrations of constituents in surface water are maintained at levels below permitted limits, any impacts to groundwater quality from building and operation activities are SMALL.

As described in Table 7.1-1, the GAI established for groundwater quality is the same as that established for groundwater hydrology in Section 7.2.2.1.2. The actions listed in Table 7.1-2 will be permitted or authorized in accordance with state and federal laws and regulations that ensure the protection of groundwater quality. As such, none are expected to represent a substantial potential to contribute to additional stresses on groundwater quality within the GAI.

The cumulative impact of building and operating activities from the proposed action on groundwater quality, combined with the effects associated with past, present, and RFFAs within the GAI on groundwater quality, is SMALL. The impact of the building and operation of LMGS is not a significant contributor to the cumulative impact on groundwater quality.

7.2.3 Ecology

7.2.3.1 Terrestrial Ecosystems

Section 2.4.1 provides a description of the affected environment and a baseline for the cumulative impact assessment for terrestrial ecosystems and wetlands. Due to the presence of agricultural development and industrial development of SDO, existing terrestrial ecosystems are notably affected. Additionally, 17 wetlands were identified within the LMGS site, of which two are considered potentially regulated by U.S. Army Corps of Engineers (USACE). Impacts from building activities and operations of LMGS are described in Section 4.3.1 and Section 5.10.1. Impacts to terrestrial ecosystems during building activities are minimal given the prevalence of similar nearby habitat and the degraded quality of habitat on the LMGS site. Any impacts are reduced through implementation of BMPs and appropriate mitigation measures. During building, direct impacts to wetlands are subject to USACE regulatory authority and mitigated through adherence to federal and state regulations. During operations of LMGS there are minimal impacts to terrestrial ecosystems and wetlands because the habitat quality is low and wildlife is expected to avoid the LMGS site because of the presence of structures and operational noise emissions. As described in Section 4.3.1 and

Section 5.10.1, the impacts on terrestrial ecosystems and wetlands from building and operation of LMGS is SMALL.

Table 7.1-1 identifies the GAI for terrestrial ecosystems and wetlands as the LMGS site and vicinity. Table 7.1-2 identifies past, present, and RFFAs that have the potential to result in impacts to terrestrial ecosystems and wetlands. Among the RFFAs, the following actions are within the GAI for terrestrial ecosystems and wetlands and are considered to have the potential to contribute to additional cumulative impacts on terrestrial ecosystems and wetlands:

- Transmission line projects
- TxDOT improvement projects
- Lynas Rare Earths processing facility
- New Alkoxylation Unit Project

Terrestrial ecosystems have been noticeably impacted and degraded by past and ongoing agricultural development and industrial uses. Several of the projects identified above represent the continued and future operation of existing industrial facilities. The habitat conversion associated with the development of these projects is considered permanent in terms of impacts to terrestrial ecosystems and wetlands with the LMGS site vicinity. This considerable habitat alteration within the GAI has resulted in low-quality habitat. Consequentially, impacts to wildlife population and important species are likely related to the reduction of quality habitat. New industrial developments, such as the Lynas Rare Earths processing facility, are expected to commit additional land to industrial uses. The New Alkoxylation Unit Project is expected to occur entirely within the industrial development complex of the SDO and as such would not affect terrestrial ecosystems of notable quality. Although details of potential impacts to terrestrial ecosystems and wetlands are not known for the various transmission line upgrades, TxDOT improvement projects, and many other RFFAs listed in Table 7.1-2, it is expected that any potential effects of these actions are subject to federal and state permitting; therefore, effects are reduced by appropriate mitigation in accordance with USACE and TCEQ, Section 7 of the Endangered Species Act, and the Migratory Bird Treaty Act, as appropriate.

The cumulative impact of building and operating activities from the proposed action on terrestrial ecology and wetlands, added to the effects associated with past, present, and RFFAs within the GAI on terrestrial ecology and wetlands, is noticeable and destabilizing and therefore, LARGE. The impact on terrestrial ecosystems and wetlands from past and continuing land use alteration and industrial uses result in substantial degradation of quality habitat that are persistent and destabilizing. Because of extensive past alteration of terrestrial ecosystems by agricultural and industrial uses within the GAI, and predominant use of previously disturbed agricultural lands by LMGS, the impact of the building and operation of LMGS is not a significant contributor to the cumulative impact on terrestrial ecology.

7.2.3.2 Aquatic Ecosystems

The description of the affected environment in Section 2.4.2 of this document serves as a baseline for the cumulative impacts assessment for aquatic ecology. Existing aquatic habitats on the LMGS site are substantially affected by channelization and irrigation/drainage alteration and are generally of low quality. Accordingly, aquatic biological communities are dominated by common species. Permanent and temporary impacts to aquatic ecosystems associated with the future building and operation of LMGS is described in Section 4.3.2 and Section 5.10.2, respectively. Construction of LMGS results in localized impacts to aquatic resources and their associated habitats within the West Coloma Creek, intermittent and ephemeral tributaries on the LMGS site, and the GBRA Calhoun Canal during construction. Entrainment and impingement impacts to aquatic biota occur as a result of intake structure operation. However, impingement impacts are minimized by incorporating design and operational measures that are consistent with 316(b) requirements. No planned transmission corridors of LMGS impact aquatic habitats. As described in Section 4.3.2 and Section 5.10.2, the impacts on aquatic ecology from building and operation of LMGS are SMALL.

As described in Table 7.1-1, the GAI established for aquatic ecology is based on watershed connectivity to potential LMGS activities and includes the LMGS site and the watershed of West Coloma Creek and the GBRA Calhoun Canal. The Victoria Barge Canal receives discharges from the SDO. However, as noted in Section 5.2.1.1.2, nonradiological liquid waste streams from LMGS tie into existing SDO infrastructure for management and treatment; therefore, the Victoria Barge Canal and downstream aquatic resources (such as the Guadalupe River) are not within the GAI because there is no discrete discharge from LMGS, and there are no direct impacts of plant discharge on aquatic ecosystems.

Many of the past, present, and RFFA projects listed in Table 7.1-2 have the potential to result in some effects to aquatic ecology. The following action listed in Table 7.1-2 is within the GAI for aquatic ecology and is considered to have the potential to contribute to cumulative impacts on aquatic ecology:

- Lynas Rare Earths processing facility

The aquatic ecosystems of the GAI have been noticeably impacted by past and ongoing land use practices and industrial use. Extensive agricultural land uses within the GAI have resulted land cover alteration and stream channelization. These practices have led to the establishment of an extensive network of artificial drainageways and conveyance channels within the GAI. New industrial development of the Lynas Rare Earths processing facility is not expected to result in direct impacts to aquatic habitats. However, because this project is in proximity to the LMGS site, there may be indirect effects on tributaries of West Coloma Creek, a principal and potentially jurisdictional water body. However, as is the case with the non-jurisdictional canal system, the creek and its associated tributaries are substantially impacted by channelization and are characterized by a low-quality aquatic biological community. The GBRA and Dow have also begun planning for the supplemental water storage facilities (i.e., the Lower Basin Water Storage projects) in the vicinity of the LMGS site. At this time, however, the scope and location of such water storage projects are not determined

(Black & Veatch, 2020). Nonetheless, it is expected that these systems may be established as water bodies that are not subject to jurisdiction under the CWA.

The cumulative impact of building and operating activities from the proposed action on aquatic ecology, added to the effects associated with past, present, and RFFAs within the GAI on aquatic ecology, is MODERATE. The impact on aquatic ecosystems from past channelization and the development of an extensive network of artificial drainageways, conveyance channels, and artificial basins is noticeable but not destabilizing in the broader context of the Guadalupe River and Guadalupe Bay. Because of extensive past alteration of aquatic ecosystems within the GAI by agricultural and industrial uses, and the predominant use of previously disturbed upland lands by LMGS, the impact of the building and operation of LMGS alone is not a significant contributor to the cumulative impact on aquatic ecology.

7.2.4 Socioeconomics

As described in Section 2.5, Socioeconomics, socioeconomic impacts primarily affect the three counties (Calhoun, Jackson, and Victoria Counties) that make up the economic region where cumulative impacts are expected. This economic region is the GAI for cumulative socioeconomic impacts unless otherwise specified.

Table 7.1-2 details recent past, present, and RFFAs within the GAI. As related to evaluation of cumulative impact analysis, only those actions within the three-county region of influence (ROI) are identified as relevant to this socioeconomic analysis.

7.2.4.1 Physical Impacts

As described in Section 4.4.1.5, physical impacts from LMGS building activities, including those associated with air emissions, noise, impacts to workers and structures, and visual impacts, are SMALL and temporary. Impacts from noise from building activities is minimally perceptible to the nearest residence and recreational areas and noise from building-related traffic is intermittent and temporary. Building activities may be visible to nearby residents and recreational users of the Victoria Barge Canal and Guadalupe Wildlife Management Area. However, the visual impacts of building activities are integrated into the existing landscape, which includes the SDO facility, and are screened by existing infrastructure, vegetation, and topography. As stated in Section 5.8.1.6, operation does not impact regional air quality and no significant deterioration to the transportation infrastructure occurs from operation of LMGS. Additionally, operational noise levels decrease to below the baseline ambient noise levels for the nearest residences. The viewshed of LMGS is screened by existing infrastructure, vegetation, and topography and is absorbed into the existing industrial viewshed resulting in a minimal additional visual discord in the existing landscape; therefore, physical impacts associated with operation are SMALL.

Because most physical effects from building and operation diminish rapidly with distance, the GAI for physical impacts is limited to the LMGS site and immediate surrounding areas.

Many of the past, present, and RFFA projects listed in Table 7.1-2 have the potential to result in some physical effects to the surrounding environment. Among the RFFAs, the following are within the GAI for physical impacts and are considered to have the potential to substantially contribute to cumulative impacts on the physical environment:

- Closure of the Dow Seadrift cogeneration plant
- New Alkoxylation Unit Project
- Lynas Rare Earths processing facility

Future actions, such as the closure of the Dow Seadrift cogeneration plant, the New Alkoxylation Unit Project, and the Lynas Rare Earths processing facility, could contribute to physical impacts associated with air emissions, noise, and visual resources. Similar to the effects of LMGS, the physical impacts of each of these projects is expected be localized to the LMGS site, with a magnitude of effect that attenuates rapidly with distance to their respective project boundaries. Additionally, it is expected that construction of each of these facilities will be completed prior to the initiation of construction of LMGS. Physical effects related to air and noise emissions from these RFFAs during operation are minor. Visual impacts of both the closure of the Dow Seadrift cogeneration plant and the New Alkoxylation Unit Project during operation are negligible as the effects of these actions are fully integrated into the existing visual environment of the SDO. The Lynas Rare Earths processing facility would have a persistent visual effect on the environment. However, the proposed facility is located approximately 0.9 mi (1.4 km) from the nearest residence and approximately 0.5 mi (0.8 km) from the nearest public road. It is likely that structures greater in height than the surrounding tree line are seen from nearby roadways. However, the views are brief and intermittent, and consistent with industrial facilities in the area. The Lynas facility includes lighting but follows recommended dark sky lighting practices where practicable without jeopardizing the health and safety of the construction and operational workforces and meeting applicable lighting safety standards; therefore, aesthetic impacts from the Lynas project are minimal.

The cumulative physical impact of building and operating activities from the proposed action on physical effects, added to the associated with past, present, and RFFAs within the GAI on the physical environment is SMALL. The impact on the physical environment from past and continuing industrial development result in minor impacts to air emissions, noise, and visual resources. Additionally, the impact of the building and operation of LMGS are localized and minor; therefore, LMGS is not a significant contributor to the cumulative physical impacts.

7.2.4.2 Demography Impacts

The description of the affected environment in Section 2.5.1 of this document serves as a baseline for the cumulative impacts assessment for demography. As described in Section 4.4.2.1.3, the projected population increases associated with the in-migration of construction workers and their families account for less than five percent of the total population of the ROI or any of the individual counties. Impacts to housing availability from the in-migrating construction workforce are noticeable but not destabilizing to the housing market overall; therefore, the potential impacts associated with the projected population increase during building activities are SMALL to MODERATE. Section 5.8.2.2 details that the projected population increases associated with the in-migration of operations workers and their families account for less than 1 percent of the total population of the ROI or any of the individual counties. Because the in-migrating operations workers, including outage workers, are fewer than the in-migrating construction workers, the increased population is not noticeably affected by the demographic character of the ROI or any of its counties; therefore, the impact for operations is SMALL.

The GAI for demography comprises three counties: Calhoun, Jackson, and Victoria. These counties make up the ROI where socioeconomic impacts are expected based on the effects associated with the workforce population.

Many of the past, present, and RFFA projects listed in Table 7.1-2 have the potential to result in some demographic changes within the GAI. As discussed in Section 2.5.1.2, the projected population in the ROI as a whole is projected to continue to grow at a rate of approximately 0.3 percent annually, led by growth in Victoria County. Among the RFFAs, the following actions listed in Table 7.1-2 are within the GAI for demography and are considered to have the potential to substantially contribute to cumulative impacts on demography:

- New Alkoxylation Unit Project
- Lynas Rare Earths processing facility

Future actions, including the projected population growth within the GAI, the New Alkoxylation Unit Project, and the Lynas Rare Earths processing facility, increase housing, create jobs, and bring in-migrating workers within the ROI. While changes in population are minor in proximity to LMGS and other rural areas of the ROI, the demography of population centers such as Victoria and other communities is noticeable, but not destabilizing. However, as populations within the ROI are anticipated to increase in the future (Table 2.5-3), it is not anticipated that RFFAs will significantly alter populations within the ROI.

The cumulative impact of building and operating activities from the proposed action on demography, added to the effects associated along with past, present, and RFFAs (including projected population growth within population centers within the ROI) within the GAI on demography is MODERATE. Because of the much larger population within the ROI and the comparatively smaller workforces of LMGS during building and operation, the impact of the building and operation of LMGS is not a significant contributor to the cumulative impact on demography.

7.2.4.3 Taxes and Economy

The description of the affected environment in Section 2.5.2 serves as a baseline for the cumulative impacts assessment for economic impacts. Section 4.4.2.2 states that building activities on the LMGS site introduce millions of dollars into the economy and creates jobs. These positive economic impacts are realized primarily within the ROI. Minor tax revenue impacts on local jurisdictions accrue through sales and use taxes and indirect franchise taxes generated during building activities; therefore, the economic and tax impacts are MODERATE and beneficial. As detailed in Section 5.8.2.3, operation of LMGS creates direct and indirect jobs that have a positive impact on the local economy and on unemployment rates in the ROI. The in-migrating operations workforce and their families purchase goods and services from within the ROI, creating economic multiplier effects that result in an increase in business activity. In addition, revenue from sales and use taxes, and residential property taxes associated with operations are spread throughout the ROI. However, the property taxes generated from improvements to the LMGS site are solely realized within Calhoun County. As such, impacts to the economy from operation of LMGS are beneficial and SMALL in the context of the larger economy of the ROI; therefore, the economic and tax impact associated with operation of LMGS are MODERATE to SMALL during building and operations, respectively, and beneficial.

The GAI for the cumulative economic effects analysis comprises three counties: Calhoun, Jackson, and Victoria. These counties make up the ROI where socioeconomic impacts are expected based on the effects associated with the workforce population.

Most of the past, present, and RFFA projects listed in Table 7.1-2 have the potential to result in some economic benefits within the GAI. Among the RFFAs, the following actions listed in Table 7.1-2 are within the GAI for taxes and economy and are considered to have the potential to substantially contribute to cumulative impacts on taxes and the economy:

- New Alkoxylation Unit Project
- Lynas Rare Earths processing facility

The development of the New Alkoxylation Unit Project and the Lynas Rare Earths processing facility would entail capital expenditures, result in employment during building and operations, and provide noticeable economic benefits. However, these actions are not anticipated to significantly impact tax revenues within the ROI.

The cumulative economic impact of building and operating activities from the proposed action on the economy, added to the economic effects associated with past, present, and RFFAs within the GAI on economy, is MODERATE and beneficial. The impact on the economy from past and continuing industrial development result in collectively greater economic impacts that are beneficial. Additionally, the impact of the building and operation of LMGS on the economy within the GAI is MODERATE and beneficial; therefore, the impact of the building and operation of LMGS is a noticeable and beneficial contributor to the cumulative impact on the economy.

7.2.4.4 Infrastructure and Community Services

The description of the affected environment in Section 2.5.2 of this document serves as a baseline for the cumulative impacts assessment for infrastructure and community services. Infrastructure and community services impacts span issues associated with traffic, recreation, public services, and occupational health and human health impacts from transportation.

Impacts to occupational and human health are described in Section 7.2.8. As described in Section 4.4.2.3.4, building-related impacts on all infrastructure and community services are SMALL for the ROI, with the exception of traffic impacts. Impacts to transportation due to workforce traffic are MODERATE along the segments south of the city of Bloomington, which provide access to the LMGS site. Traffic impacts at the intersections providing access to the LMGS site are LARGE as level of service (LOS) decreases from LOS A (reasonably free flow) to LOS F (heavily congested) where operating conditions are unstable; therefore impacts to transportation due to workforce traffic are MODERATE to LARGE along the roadway segments south of the city of Bloomington and LARGE at the intersections which provide access to the LMGS site.

Section 5.8.2.7 states that although operations-related traffic results in increases in delays along portions of the roadways providing access to the LMGS site and at some intersections along these roadways, these delays are only experienced during peak hours and do not noticeably disrupt the overall function of the intersections. Additionally, during normal operating conditions where the outage workforce is not present, the delays are less than the worst-case condition analyzed. Given the overall population increase associated with the in-migration of the operational workforce and their families, impacts to public services are minimal; therefore, impacts to infrastructure and community services from the operational workforce are SMALL.

As discussed in Section 2.5.2.7, the Texas State Water Plan concludes that without strategic supplies (water management strategies recommended to address potential shortages), Victoria County will not have enough water to meet demand for all users in 2030 through 2070. The identified future shortage of municipal water in 2030 through 2070 is being addressed by Victoria County as part of strategic planning efforts. As discussed in Section 4.4.2.3.3, the total increase in population from the construction workforce increases the used water capacity by 1 percent in Victoria County and by one percent within the ROI as a whole. Additionally, as described in Section 5.8.2.4.3.1, under the most conservative assumption that the entire in-migrating population live in areas within the ROI serviced by the public supply systems, the in-migrating operations workforce and their families have a negligible impact on public water supply systems; therefore, the associated negligible increase in demand from the LMGS site construction and operations population does not disrupt the effectiveness of strategic planning developed to address the predicted shortages. Thus, the impact to public water supply from the in-migrating construction and operational population is SMALL.

The GAI for infrastructure and community services comprises three counties: Calhoun, Jackson, and Victoria. These counties make up the ROI where socioeconomic impacts are expected based on the effects associated with the workforce population.

Many of the past, present, and RFFA projects listed in Table 7.1-2 have the potential to result in some changes to the infrastructure and community services within the GAI. Among the RFFAs, the following actions listed in Table 7.1-2 are within the GAI for infrastructure and community services and are considered to have the potential to substantially contribute to cumulative impacts on infrastructure and community services:

- New Alkoxylation Unit Project
- Lynas Rare Earths processing facility
- Dow Seadrift cogeneration plant
- Transmission line projects
- TxDOT improvement projects
- Bridging the Gulf — Creating Opportunity on the Victoria Barge Canal
- Regional Port development projects
- Port Lavaca Reservoir expansion
- Recycle waste transfer station

Building-related impacts on all infrastructure and community services are SMALL for the ROI, with the exception of traffic impacts. Future actions, such as TxDOT improvement projects, Bridging the Gulf — Creating Opportunity on the Victoria Barge Canal, directly affect transportation within the ROI. Other projects, such as the New Alkoxylation Unit Project, Lynas Rare Earths processing facility, closure of the Dow Seadrift cogeneration plant, Regional Port development projects, Port Lavaca Reservoir expansion project, and the recycle waste transfer station, indirectly impact regional transportation by contributing to increased traffic. It is likely that construction and operations workforces associated with several of these actions use similar roadways as those used by the LMGS workforces. During construction of the New Alkoxylation Unit Project and the Lynas facility, additional vehicles will be on the roadways within the vicinity of LMGS, which could increase traffic in the area. However, construction of these facilities do not overlap with the building activities of LMGS, and operations-related traffic is minimal compared to construction-related traffic.

Future infrastructure and development in and around LMGS would also place additional demands on the water supply systems within the GAI. However, these additional demands are also met by existing water supplies and by Victoria County's strategic planning efforts. Cumulative impacts from construction of LMGS and other newly identified or updated actions within the GAI could temporarily contribute to adverse cumulative effects on transportation resources. Road improvements, transmission line improvements, port expansions, and TxDOT roadway projects and other capital improvement projects within the GAI have temporary impacts primarily associated with the building phase. The influx of workers associated with the construction and operation of the future and ongoing development projects that overlap with LMGS construction also contribute to a cumulative impact to community services and traffic. The most significant traffic impacts in the vicinity of the LMGS site are limited to the building period.

The cumulative effect of the proposed action and other past, present, and RFFAs on infrastructure and community services within the GAI is SMALL for most aspects of community facilities and services but is MODERATE to LARGE for traffic on roadways serving the LMGS site during the peak building period. The impact of the building and operation of LMGS is a minor contributor to aspects of community facilities and services but is a significant contributor to the MODERATE to LARGE cumulative impacts on traffic on roadways serving the LMGS site during the peak building period.

7.2.5 Environmental Justice

The description of the affected environment in Section 2.5.4 of this document serves as a baseline for the cumulative impacts assessment for environmental justice. As discussed in Section 4.4.3 and Section 5.8.3, the closest minority or low-income population is located over five mi. (8 km) from the LMGS site center point. Minority or low-income populations in the vicinity of LMGS do not experience disproportionately high and adverse human health, environmental, physical, or socioeconomic effects as a result of building activities and operation.

As described in Table 7.1-1, the GAI established for environmental justice includes the 50 mi (80 km) region.

Table 7.1-2 identifies past, present, and RFFAs that have the potential to result in impacts to communities within the GAI. However, some of these identified projects are located in areas outside of identified low-income and minority communities. As described in Section 2.5.4, environmental justice communities are generally concentrated around cities, including Victoria, Bloomington, and Port Lavaca (Figure 2.5-6 and Figure 2.5-7). Thus, RFFAs such as the closure of the Dow Seadrift cogeneration plant, the New Alkoxylation Unit Project, Lynas Rare Earths processing facility, and port and ship channel improvements, result in minimal direct impacts because there are no environmental justice populations in proximity to these projects.

Among the RFFAs, the following actions are considered to potentially contribute to cumulative impacts because of their proximity to identified environmental justice communities:

- Port Lavaca Reservoir expansion
- INEOS Nitriles Green Lake
- CG PS Victoria wastewater treatment plant
- Transmission line projects

Because of their proximity to identified environmental justice communities in Victoria and Port Lavaca, these ongoing and future actions within the GAI have the potential to have disproportionately high and adverse impacts to environmental justice communities. However, it is anticipated that ongoing and foreseeable future actions operate in accordance with state and federal license requirements, minimizing disproportionately high and adverse human health, environmental, physical, or socioeconomic impacts to these populations.

While there may be localized impacts from RFFAs on specific environmental justice communities within the GAI, minority or low-income populations in the vicinity of LMGS do not experience disproportionately high and adverse human health, environmental, physical, or socioeconomic effects as a result of LMGS; therefore LMGS does not contribute to the cumulative impact on regional environmental justice within the GAI.

7.2.6 Historic and Cultural Resources

The description of the affected environment in Section 2.5.3 of this document serves as a baseline for the cumulative impacts assessment for historic and cultural resources. As described in Section 4.1.3 and Section 5.1.3, because no historic properties are present, no direct or indirect impacts to historic properties occur as a result of building activities or operation of LMGS (Appendix 1A and Part VI Supplemental Information).

As described in Table 7.1-1 the GAIs for historic and cultural resources the LMGS site are different but the same as the Area of Potential Effect (APE) described in Section 2.5.3. For archaeological resources, the GAI is the LMGS site. The GAI APE for visual effects to architectural resources includes LMGS site and a 0.5 mi (0.8 km) buffer radiating from the periphery of the LMGS site to account for potential visual impacts to aboveground historic architectural resources that are adjacent to the LMGS site.

Past, present, and RFFAs within the GAI identified on Table 7.1-2 are limited to activities on the SDO site. The SDO site is substantially disturbed, and therefore any RFFAs within the GAI are not considered to affect historic and cultural resources within their respective project footprints or viewsheds. In addition, there are no historic properties present on the LMGS site, or the 0.5 mi (0.8 km) buffer, and no direct or indirect impacts to historic properties will occur during construction, operation, or decommissioning of LMGS; therefore, there are no cumulative impacts to historic and cultural resources.

7.2.7 Air Quality

Section 2.7, Meteorology and Air Quality, provides a description of the affected environment and a baseline for the cumulative impact assessment for air quality. The LMGS site is located in Calhoun County, Texas. Calhoun County is located in the southeastern portion of Texas and is in attainment for all National Ambient Air Quality Standard pollutants.

As described in Section 4.4.1.2, air emissions from LMGS building activities are SMALL. Fugitive dust and fine particulate matter are produced due to earth-moving and material-handling activities. Fugitive dust is also generated during operation of the concrete batch plants. Vehicles and engine-driven equipment (e.g., generators and compressors) generate combustion product emissions such as carbon monoxide, oxides of nitrogen, and to a lesser extent, sulfur dioxides. Painting, coating, and similar building activities also generate emissions from the use of volatile organic compounds. As described in Section 5.9, Air Quality, the number of vehicles on roadways associated with operations is smaller than during building and LMGS is a *de minimis* contributor to air emissions, as expected for a clean energy source. Air emission sources during operation of LMGS are managed in accordance with federal, state, and local air quality control laws and regulations. LMGS complies with the applicable regulatory requirements of the Clean Air Act (CAA) and the TCEQ requirements to minimize impacts on state and regional air quality. More detailed facility-wide assessments will be prepared during the facility's air permitting phases with the TCEQ after final design; therefore, impacts on air quality during operation are SMALL.

As described in Section 5.9.1.4, the impacts of greenhouse gas (GHG) emissions from LMGS and workforce transportation relative to the impacts on GHG emissions in Texas and in the U.S. are also SMALL.

As shown on Table 7.1-1, the GAI for criteria pollutants is Calhoun County, because air quality designations are made on a county-by-county basis.

Table 7.1-2 identifies past, present, and RFFA projects that have the potential to result in air quality impacts. The subset of projects within Calhoun County combined with LMGS are expected to have a minor impact on cumulative effects to air quality. Among the RFFAs, the following actions are within the GAI for air quality and are considered to have the potential to contribute to cumulative impacts on air quality:

- Seadrift Coke (petroleum power plant)
- SDO
- Closure of the Dow Seadrift cogeneration plant
- INEOS Nitriles Green Lake
- Regional Port Development Projects
- Transmission line projects
- TxDOT improvement projects
- Lynas Rare Earths processing facility
- Expansion of existing recycle waste transfer station in Calhoun County

7.2.7.1 Criteria Pollutants

The air quality of the GAI, currently in attainment, has been impacted by past and ongoing industrial land uses. Existing operations such as the Seadrift Coke Petroleum Power Plant, SDO, and the INEOS Nitriles Green Lake facility are not expected to contribute to reduced air quality within the GAI and they are expected to continue their operations within the terms of their existing environmental permits. Additionally, building activities associated with transmission line improvements, TxDOT improvement projects, and the construction of the Lynas Rare Earths processing facility, are expected to implement BMPs to minimize potential air quality impacts during construction. The impacts of their future operation will be limited and controlled in accordance with the applicable state and federal regulations such they will not adversely affect attainment.

The cumulative impact of building and operating activities from the proposed action on criteria pollutants, added to the effects associated along with past, present, and RFFAs within the GAI is SMALL. The impact of the building and operation of LMGS is not a significant contributor to the cumulative impact on air quality.

7.2.7.2 GHG Emissions

Because GHG emissions are relevant to global climate change, the GAI for GHG is appropriately the globe.

As described in Section 5.9.1.4, in 2021, Texas emitted 873.1 million metric tons (MMT) of carbon dioxide equivalent (CO_2e). That same year the total carbon equivalent emissions in the United States was 6343 MMT CO_2e. These emission rates are existing and reflect the contributing effects of all past and existing projects that emit GHG within both Texas and the United States. The development and operation of LMGS and the decommissioning of the existing Dow natural gas fired boilers results in an estimated 0.15 percent less CO_2e emitted and the annual carbon equivalent emissions in the United States is reduced by 0.02 percent. Annual GHG emissions in Texas from other RFFAs identified in Table 7.1-2 are not notable contributors to GHG emissions at the state level.

Estimated annual GHG emissions from LMGS and other RFFA projects are a fraction of national GHG emissions. Because GHG emissions and associated impacts require a global perspective, small incremental changes from individual projects must be evaluated collectively. This is beyond the scope of an individual project and is therefore addressed by the U.S. under the authority of the EPA at the national scale. However, mitigation measures provide individual projects with the ability to minimize GHG emissions. Further, in 2010 the EPA promulgated the Tailoring Rule to address GHG emissions under the CAA permitting programs. As initially promulgated, the Tailoring Rule specified that new sources, as well as existing sources with the potential to emit more than 100,000 tons per year CO_2e were subject to EPA permitting requirements. Modifications of existing facilities that increase GHG emissions by at least 75,000 tons per year are also subject to permitting requirements. Subsequent revisions to the Tailoring Rule have not resulted in different GHG emission thresholds (EPA, 2023).

The cumulative impact of building and operating activities from the proposed action on GHG emissions, added to the effects associated along with past, present, and RFFAs within the GAI is SMALL and net beneficial. The impact of the building and operation of LMGS alone is not a significant contributor to the cumulative impact on GHG emission levels.

7.2.8 Nonradiological Health

The description of the affected environment in Section 2.9, Nonradiological Health, serves as a baseline for the cumulative impacts assessment for nonradiological human health. Potential public health risks associated with building include exposure to chemical hazards or other physical nonradiological hazards, such as air pollution from engine exhaust and fugitive dust, vibration, and noise. Other potential health hazards include transportation-related impacts associated with an increase in crashes related to the additional vehicular capacity from construction workers and the transport of supplies traveling to and from the LMGS site as well as exposure to electromagnetic fields. Cumulative effects of physical nonradioactive hazards such as exposure to noise, vibration, dust, and air pollution are evaluated in Section 7.2.4.1.

As described in Section 4.4.4, the impacts from LMGS building activities on occupational health and safety of workers and the public are minimized through compliance with all applicable state and federal regulations. The increased number of vehicles on surrounding roadways associated with building activities at the LMGS site results in minor increases in crash rates on the roadways providing access to the LMGS site; therefore, nonradiological health impacts of building activities are SMALL. Similar effects may be expected during LMGS operations. However, during operations LMGS uses an ACC for cooling. There is no water discharge from a cooling system and no potential impacts from cooling water discharge. Accordingly, there is no potential for health hazards-associated impacts related to harboring or accelerating growth of etiologic agents. Similarly, LMGS does not build or operate high-voltage transmission lines or switchyards; on-site transmission lines comply with the National Electrical Safety Code standards. There is little potential for health hazards caused by electric shock or electromagnetic fields (EMFs). Noise associated with operation of the ACCs attenuate to below ambient levels at the nearest sensitive receptors. The number of vehicles on roadways associated with operations is smaller than during building, resulting in minor increases to traffic crashes and related injuries for the roadways providing access to the LMGS site.

Because most physical effects from building and operation diminish rapidly with distance, the primary GAI for nonradiological health impacts is limited to the LMGS site and immediate surrounding areas. However, the GAI related to transportation-related health effects extends to the ROI to encompass the potential effects of a commuting workforce.

Many of the past, present, and RFFAs listed in Table 7.1-2 have the potential to result in some effects on nonradiological health. Such effects result from potential releases of substances of pollutants into the environmental such as chemicals or emissions, noise emissions and some increased incidence of injuries/illnesses to workers during building and operations. Exposure to health hazards depends on the particular building activities and their proximity to residences, work locations, schools, recreational sites, or water sources and as such the GAI changes based on the type of health effect. RFFAs listed in Table 7.1-2 includes continuing industrial activity and energy projects that could incur injuries/illnesses to workers during building and operating. It is expected, however, that each of the actions identified in Table 7.1-2 integrate a robust safety culture that integrates training and other measures to enhance worker safety and health. Future development of new transmission lines could increase nonradiological health impacts from exposure to EMFs and electric shock. However, RFFAs that entail a commuting workforce, which contribute to the overall greater use of transportation routes that are also affected by LMGS, may contribute to greater transportation-related cumulative health effects.

Many of the past, present, and RFFA projects listed in Table 7.1-2 have the potential to affect nonradiological health. Actions listed in Table 7.1-2 considered as notable generators of nonradiological health include the following:

- Energy projects (nuclear, coal-fired, natural gas, battery storage, petroleum)
- Industrial projects
- Port and ship channel improvement projects
- Transportation projects
- Transmission line projects
- Other projects (including Lynas Rare Earths processing facility)

Among the RFFAs, the following actions listed in Table 7.1-2 are within the GAI for nonradiological health effects and are considered to have the potential to substantially contribute to nonradiological health effects:

- Closure of the Dow Seadrift cogeneration plant
- New Alkoxylation Unit Project
- Lynas Rare Earths processing facility

Cumulative impacts to nonradiological human health associated with noise and transportation could occur as a result of future construction and operation of projects within the vicinity and ROI and continued industrial operations in the region. However, as discussed in Section 4.4.4 and Section 5.8.1, LMGS's contribution to noise emissions from operations within the vicinity are minimal and attenuate to below ambient levels at the nearest receptor. During construction of the New Alkoxylation Unit Project and the Lynas Rare Earths processing facility, additional vehicles will be on the roadways within the vicinity of LMGS, which could increase the frequency of crashes in the area. However, construction of these facilities does not overlap with building of LMGS and operations-related traffic is minimal compared to construction-related traffic. As stated in Section 5.8, Social and Economic Impacts of Station Operation, the increased number of vehicles on surrounding roadways associated with building and operation at the LMGS site results in minor increases in traffic crashes for the roadways providing access to the LMGS site. Other projects identified in Table 7.1-2 are at sufficient distances from LMGS where traffic to these facilities is dispersed within the ROI and the frequency of crashes is not affected by LMGS activities.

The cumulative impact of building and operating activities from the proposed action, combined with the effects associated with past, present, and RFFAs within the GAI (within the both the general GAI and the transportation-related GAI), on nonradiological health is SMALL. The impact of the building and operation of LMGS alone is not a significant contributor to the cumulative impact on nonradiological human health.

7.2.9 Nonradioactive Waste

Section 4.4.5 identifies nonradioactive waste generated during building activities and Section 5.5, Environmental Impacts of Waste, identifies wastes generated during operation. Generation, handling, and disposal of nonradioactive solid waste during building and operational activities at LMGS are managed in accordance with all applicable state and local requirements and standards. All activities comply with measures outlined in the SPCC plans and regulated practices for managing liquid discharges, including wastewater, as well as the conditions of the TPDES permit with an approved stormwater pollution prevention plan. Air emissions are minor and meet the requirements of the TCEQ. Nonradiological liquid waste streams during operation of LMGS tie into existing SDO infrastructure for management and treatment prior to discharge to the Victoria Barge Canal; therefore, because all solid, liquid, and gaseous wastes generated at the LMGS site are handled according to county, state, and federal regulations, the impacts on land, water, and air from building activities and operations is SMALL.

Cumulative effects of air emissions and liquid discharges are addressed in Section 7.2.7 and Section 7.2.2.3, respectively; therefore, this cumulative effects analysis is focused on land-based waste. The GAI for nonradioactive waste is the focused on the location and of suitable disposal facilities. Licensed disposal facilities that accept nonradioactive waste (hazardous and nonhazardous waste) are identified in Section 3.6.3.1. As noted in Section 5.1, Land-Use Impacts, as of 2022, the nearest off-site landfill is the Victoria City Landfill (a municipal solid waste landfill) which has 22.5 years of remaining capacity. For this analysis, the GAI for nonradiological waste is conservatively established as the region.

Many of the past, present, and RFFA projects listed in Table 7.1-2 have the potential generate nonradiological waste. Actions considered in Table 7.1-2 are notable generators of nonradiological waste include the following:

- Energy projects (nuclear, coal-fired, natural gas, battery storage, petroleum)
- Industrial projects
- Port and ship channel improvement projects
- Transportation projects
- Transmission line projects
- Other projects (including Lynas Rare Earths processing facility)

All past, present, and reasonably foreseeable projects have an impact on cumulative waste management and the region of influence depends on the type of waste and the available disposal locations. For most of the reasonably foreseeable future projects, including transmission, transportation, and port and ship channel improvement projects, nonradiological wastes are produced during construction. These projects are individually limited in scope and generate small amounts of construction waste. Waste generated during operations of these actions is limited. Several of these projects are (or likely) completed before building activities begin for LMGS, or after building completes.

LMGS and some other past, present, and reasonably foreseeable future projects also generate municipal solid waste and hazardous and mixed waste during operation. However, the individual contribution of nonradioactive waste (both nonhazardous and hazardous) by LMGS and other projects in Table 7.1-2 within the GAI are minor. However, mixed waste is not generated during operation of LMGS. Given the existing waste capacity in the region and the scope of the reasonably foreseeable future projects, construction and operation of these facilities do not substantially contribute to waste impacts in the GAI. In addition, it is expected that each facility in the surrounding area complies with applicable U.S. Environmental Protection Agency and state regulations to ensure proper disposal of nonradioactive waste, including hazardous waste.

Based on the availability and expected capacity of existing licensed disposal facilities within and beyond the GAI, the cumulative impact of building and operating activities from LMGS on nonradiological waste, added to the effects associated with past, present, and RFFAs within the GAI on nonradiological waste, is SMALL. The impact of the building and operation of LMGS is not a significant contributor to the cumulative impact on nonradioactive waste.

7.2.10 Radiological Health

The description of the affected environment in Section 2.10, Radiological Environment and Radiological Monitoring, serves as a baseline for the cumulative impacts assessment for radiological health. Section 2.10 also describes potential background radiation exposure from natural sources and man-made sources including that from nuclear reactor facilities. As described in Section 4.5, Radiation Exposure to Construction Workers and 5.4, Radiological Impacts of Normal Operation, the impacts on radiological health from building and operation of LMGS are SMALL and are minimized through compliance with all applicable state and federal regulations.

As shown on Table 7.1-1, the GAI for radiological health is defined as the 50 mi (80 km) region of the LMGS site. Any released radioactive gases, particulates and direct radiation shine dose will be dispersed, diluted or otherwise attenuated as a function of the distance from LMGS. Their contribution will essentially be indistinguishable from the naturally existing background radiation at distances outside the GAI.

Table 7.1-2 identifies past, present, and RFFA projects considered in the cumulative effects analysis. Among the RFFAs, the following actions are within the GAI for impacts on radiological health and are considered to have the potential to contribute to cumulative impacts on radiological health:

- South Texas Project (STP) Electric Generating Station Units 1 and 2

The STP Units 1 and 2 facility is approximately 47 mi (75 km) from LMGS. State and federal regulations relevant to the radiological health and safety of workers and the public for LMGS are also applicable to STP 1 and 2. No other actions within the GAI are considered to represent a notable risk to radiological health; therefore, cumulative radiological health impacts within the GAI from the continued operation of STP Units 1 and 2 are minor.

The cumulative impact of building and operating activities from LMGS on radiological health, added to the effects associated with past, present, and RFFAs within the GAI on radiological health is SMALL. The impact of the building and operation of LMGS is not a significant contributor to the cumulative impact on radiological health.

7.2.11 Postulated Accidents

The effects from postulated design basis accidents on the environment are presented in Section 5.13.1. As described in Section 5.13.1, the impacts from postulated radiological accidents on health and safety of workers and the public during operation are minimized through compliance with all applicable state and federal regulations. LMGS presents a smaller severe accident potential, in part, because the X-energy reactor modules have smaller reactor cores and lower power levels. The calculated doses are significantly below the non-seismic dose criteria specified in 10 CFR 100.21 and 10 CFR 50.34(a)(1). Any released radioactive gases, particulates and direct shine dose will be dispersed, attenuated and greatly diluted as a function of the distance from the plant. Their contribution will be essentially indistinguishable from the naturally existing background radiation at distances outside the 50 mi region. As such, the impact of the postulated radiological releases on the environment during a design basis accident is anticipated to be SMALL.

The effects from a severe accident on the environment are presented in Section 5.13.2. The environmental risks of severe accidents are evaluated based on a source term and release frequency determined from the probabilistic risk assessment (PRA). The MACCS computer code is used to estimate severe accident risks based on site-specific population, land-use data, and site representative meteorology. The individual risks for prompt fatality and latent cancer fatality, provided in Table 5.13.2-2, are below the NRC’s Safety Goals (51 FR 30028). The calculated population dose risk from a severe accident for LMGS is lower than the estimated dose risk from routine releases from a large light water reactor at a PSEG Power, LLC site, as shown in Table 5.13.2-4, and is lower than the maximum, mean, median, and minimum population dose risk for current generation reactors that have undergone or are undergoing license renewal, as shown in Table 5.13.2-3. Therefore, the environmental impact of postulated severe accidents for LMGS is anticipated to be SMALL.

As shown in Table 7.1-1, the GAI for postulated accidents is defined as the 50 mi (80 km) region.

Table 7.1-2 identifies past, present, and RFFA projects considered in the cumulative effects analysis. Among the RFFAs, the following action is within the GAI for postulated accidents and is considered to have the potential to contribute to cumulative impacts of postulated accidents:

- STP Electric Generating Station Units 1 and 2

NUREG-1437, Generic Environmental Impact Statement for License Renewal of Nuclear Plants: South Texas Project, Units 1 and 2 - Supplement 48 considered potential environmental impacts from postulated design-basis accidents and more-severe accident sequences at the South Texas plants. Supplement 48 of NUREG 1437 was updated in November 2013. The NRC concluded that the environmental impacts of DBAs are SMALL and the probability weighted consequences of atmospheric releases, fallout onto open bodies of water, releases to groundwater, and societal and economic impacts from severe accidents are small for all plants. The combined risk at any location within 50 mi (80 km) of the LMGS site would be bounded by the sum of risks for the STP operating units and LMGS.

On this basis, the cumulative impacts (risks) from the proposed action added to the effects of postulated accidents associated with all other past, present, and RFFAs within the GAI at any location within GAI is anticipated to be SMALL. The impact of the building and operation of LMGS is not a significant contributor to the cumulative impact of postulated accidents.

7.2.12 Fuel Cycle, Transportation, and Decommissioning

Table 7.1-2 identifies past, present, and RFFA projects considered in the cumulative effects analysis. Among the RFFAs, the following action is within the GAI and is the only one considered to have the potential to contribute to cumulative UFC, transportation, and decommissioning impacts:

- STP Electric Generating Station Units 1 and 2

STP Units 1 and 2 is the only facility within the region that may contribute to a cumulative effect of LMGS on UFC, transportation, and decommissioning impacts.

7.2.12.1 Uranium Fuel Cycle Impacts

Section 5.7.1 provides a description of the environmental impacts of the uranium fuel cycle (UFC) for LMGS and serves as the baseline for this cumulative impact assessment.

The majority of activities related to the UFC occur at various locations distant from the LMGS site. Much of the UFC impact occurs at facilities scattered throughout the U.S., or in the case of foreign-purchased uranium, in other countries. All U.S. uranium cycle facilities must comply with regulations including limiting radiation dose to members of the public. As such, the GAI is considered nationwide, or in the case of imported uranium, worldwide.

NUREG-2157, Generic Environmental Impact Statement (GEIS) for Continued Storage of Spent Nuclear Fuel, examines the incremental impacts of continued storage on resource areas in combination with other past, present, and RFFAs. Section 6.5 of NUREG-2157 indicates that potential cumulative impacts range from SMALL to LARGE for multiple resource areas. These ranges of impact are primarily driven by activities other than the continued storage of spent fuel at the reactor site. As shown in Table 6-4 of NUREG-2157, the historic and cultural resources area is shown as the only resource to have the potential for a LARGE impact from at-reactor storage. That would not be the case for the LMGS site because no historic properties are present (Section 4.1.3 and Section 5.1.3). At-reactor storage which is the most likely scenario for LMGS and the impact of at-reactor storage would be SMALL. Because the impacts during the short-term time frame are SMALL, continued storage would not be a significant contributor to the cumulative impacts.

In the longer time frames for at-reactor storage, or in the less likely case of away-from-reactor storage, some of the UFC impacts could be greater than SMALL. However, other federal and non-federal activities occurring during the longer time frames, as noted in NUREG-2157, contribute additional uncertainty to the cumulative impacts. All of these uncertainties lead to the ranges in cumulative impacts, as discussed throughout Chapter 6 of NUREG-2157. The overall ranges of cumulative impact conclusions would not be changed. Based on the analysis and impact determination in NUREG-2157, and taking into account the impacts that the NRC can predict with confidence which are SMALL; it is concluded that the cumulative impacts from radiological wastes from the fuel cycle (which includes the impacts associated with spent fuel storage during operation and any continued storage period) would be minor.

The STP units are considered to have UFC impacts based on the same set of activities which occur nationally and globally. The same generic NRC studies and NUREGs and conclusions discussed below are applicable to both the LMGS and STP.

The impacts of the LMGS UFC were evaluated and are SMALL as documented in Section 5.7.1. Similarly, the impacts of the STP Units 1 and 2 were evaluated and accepted as small by the NRC in NUREG-1437, Supplement 48; therefore, it is reasonable to conclude the cumulative impacts of the UFC in the GAI are also SMALL. The impact of LMGS is not a significant contributor to the cumulative impact of the UFC.

7.2.12.2 Transportation Dose Impacts

Doses to workers and the public associated with incident-free transportation of nuclear fuel and waste for LMGS are presented in Section 5.7.2. Section 5.7.2 describes a detailed transportation dose analysis using truck highway routes and distances for transport of fresh fuel, irradiated fuel, and radwaste using guidance from RG 4.2 and NUREG-1555. Doses were compared to those found in Table S-4 for a reference light-water reactor. Based on this comparison, environmental impact of incident-free transportation for LMGS is SMALL.

Doses from accidents in transportation are discussed in Section 5.13.4, which demonstrates that Table S-4 can be considered bounding for transportation accident impacts for LMGS. Table S-4 does not quantify a radiological impact from accidents for shipments of radioactive materials to and from large LWRs but assesses it qualitatively as “small.”

In the Draft Environmental Impact Statement associated with the proposed STP Units 3 and 4 (NUREG-1937), the NRC determined that the combined transportation of fuel and waste to and from all STP units is consistent with Table S-4.

Based on the comparison to Table S-4 values, which were determined to represent a small environmental impact, the cumulative environmental impact from the transportation of nuclear material to and from LMGS and STP in the GAI is SMALL. The impact of LMGS is not a significant contributor to the cumulative impact from the transportation of nuclear material.

7.2.12.3 Decommissioning

As discussed in Section 5.11, Decommissioning, an analysis of decommissioning activities deemed as generic in NUREG-0586 GEIS and the LMGS site-specific issues discussion, the impact of decommissioning is SMALL. A similar conclusion is reached in NUREG-1437, Supplement 48 for the STP that is within the LMGS GAI. It is also relevant that the timing of the decommissioning actions for LMGS will lag with those of the STP and thus, the impacts will be sequential over a period of time and will not be additive.

Furthermore, it is believed that decommissioning of a nuclear facility that has reached the end of its useful life has a positive environmental impact, as stated in NUREG-1555. The NRC concludes in NUREG-0586 GEIS that impacts of the decommissioning activities are either not detectable or are so minor that they do not discernibly alter or destabilize important properties of the site land use, water use, water quality, air quality, aquatic and terrestrial ecology within the operational area, radiological occupational dose to worker and dose to the public, radiological accidents, occupational issues, socioeconomics, cultural and historic resource impacts within the operational area, aesthetic issues, noise, transportation, and irretrievable resources. Impacts of decommissioning on the aquatic and terrestrial ecology, as well as air and water quality, are smaller than during construction and operation because the level of land disturbance is no greater. The decommissioning impact for these issues is generic and classified as SMALL.

Based on the analysis of decommissioning activities deemed as generic in NUREG-0586 GEIS and the preceding site-specific issues discussion, the cumulative impact of decommissioning from the only two contributors within the GAI will be SMALL; therefore, the cumulative impacts of the decommissioning of the LMGS alone are SMALL.

Tables

Table 7.2-1: Summary of Cumulative Impacts of LMGS and Past, Present and Reasonably Foreseeable Future Actions

Resource Category	Impact Level
Land Use	
Site and Vicinity	MODERATE[(a)]
Water-Related	
Hydrologic Alterations – Surface Water	MODERATE[(a)]
Hydrologic Alterations – Groundwater	MODERATE[(a)]
Water Use – Surface Water	SMALL
Water Use – Groundwater Use	SMALL
Water Quality – Surface Water	LARGE[(a)]
Water Quality – Groundwater	SMALL
Ecology	
Terrestrial Ecosystems	LARGE[(a)]
Aquatic Ecosystems	MODERATE[(a)]
Socioeconomics	
Physical Impacts	SMALL
Demography	MODERATE[(a)]
Taxes and Economy	MODERATE (beneficial)
Infrastructure and Community Services	
Traffic and Transportation	MODERATE to LARGE[(b)]
All others	SMALL
Environmental Justice	NONE [(c)]
Historical And Cultural Resources On-site Direct and Indirect Effects Area of Potential Affect	NONE
Meteorology and Air Quality	
Criteria Pollutants	SMALL
Greenhouse Gases	SMALL (beneficial)
Nonradiological Human Health	SMALL
Radiological Health	SMALL
Non-Radioactive Waste Management	SMALL
Postulated Accidents	SMALL
Fuel Cycle, Transportation, and Decommissioning	SMALL

Notes:

a) Long Mott Generating Station (LMGS) is not a significant contributor to the cumulative impact

b) LMGS is a minor contributor to aspects of community facilities and services but is a significant contributor to the MODERATE to LARGE cumulative impacts on traffic on roadways serving the LMGS site during the peak building period

c) A determination of “NONE” for Environmental Justice analyses does not mean there are no adverse impacts on minority or low-income populations from the project. Instead, an indication of “NONE” means that while adverse impacts do exist, they do not affect minority or low-income populations in any disproportionate manner relative to the general population

Figures

None

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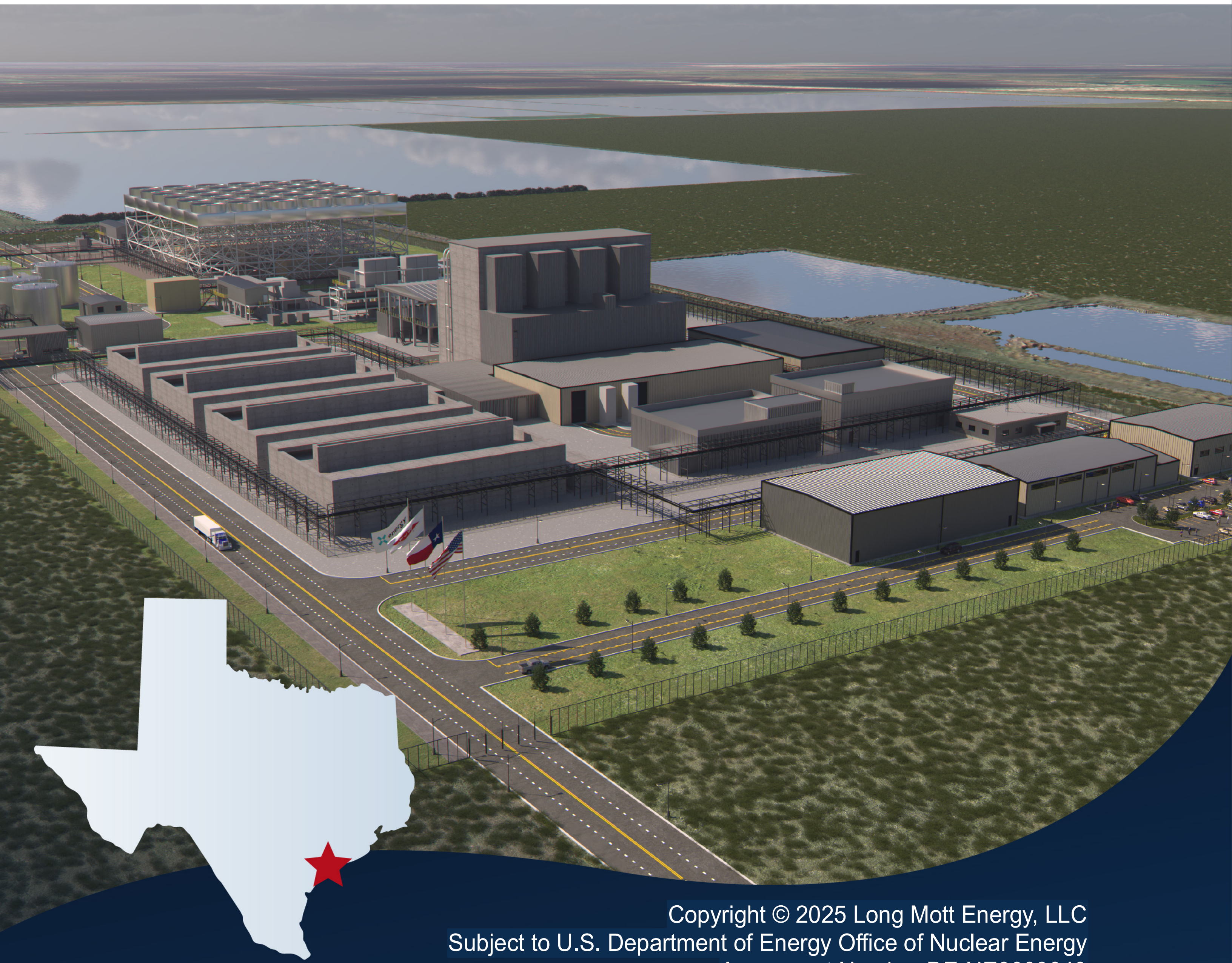
Long Mott Generating Station

Environmental Report
Chapter 8 - Need for Power



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Chapter 8 - Need for Power

The purpose of this project is to provide steam and electrical power to support operations at the Seadrift Operations (SDO), the Seadrift, Texas facility owned and operated by the Union Carbide Corporation, an affiliate of The Dow Chemical Company. Most existing nuclear power reactors were developed for the primary purpose of generating and selling baseload electricity into wholesale or retail markets or to utility customers. In contrast, this project focuses only on supplying the steam and electrical (power) needs of SDO.

SDO encompasses 4700 acres (ac.) (1902 hectares [ha]) and serves a multitude of purposes for Dow, including manufacturing plastics (polyethylene) for many applications, which include food and beverage containers, glycols for antifreeze, polyester, and bottles, and oxide derivatives for health and beauty products, cleaning products, paint, and brake fluids.

8.1 Description of Power System

SDO currently has cogeneration capacity with gas turbines and heat recovery steam generators to produce the steam and electrical power required for their operations. The cogenerated steam production is also supplemented with steam generated through the recovery of heat from various process units. The internal steam generation meets the facility demand and any excess steam is used for power generation. In the event that SDO generates excess power, it is supplied to the grid. The SDO cogeneration plant provides reliable power for the facility. A detailed description of SDO power demand is provided in Section 8.2, Power Demand.

Long Mott Generating Station (LMGS) replaces the SDO cogeneration plants with four Xe-100 reactor modules supplying steam to two turbine-generator sets. Each Xe-100 reactor module can provide approximately 200 megawatt thermal (MWt) (682 million British thermal units per hour [MBtu/hr]) of thermal power. With four reactor modules operating, the thermal power generated supports the demand for both 44.1 kilograms per second (kg/s) (350 kilopounds per hour [kp/h]) of peak steam demand and 90-110 megawatt electric (MWe) of power for the entirety of SDO. Thus, LMGS supplies all SDO's steam and electrical demands such that it is independent from carbon-based fuels such as natural gas. While SDO is the sole recipient of steam and the primary recipient of electricity from LMGS, excess electricity that SDO does not consume is sold on the grid.

The Electric Reliability Council of Texas (ERCOT) manages the power supply for the state of Texas. Subsection 8.4.2 describes the regional power supply in more detail, including limitations of the local grid relevant to SDO in Subsection 8.4.2.2.

A timeline for building and operation of LMGS is provided in Table 1.3-1.

Tables

None

Figures

None

8.2 Power Demand

The electrical power and steam generated by LMGS fulfills the steam and electrical power needs of SDO. This section describes the requirements for SDO to have quality steam and electrical power on a continuous basis.

8.2.1 Power and Energy Requirements

SDO has a demand for both quality steam and electrical power. The target steam demand flow to which LMGS is designed is 350 kp/h (44.1 kg/s). However, during off-normal plant trip scenarios, the steam supply to SDO is expected to increase to a maximum value of 800 kp/h (100.8 kg/s). Historically, these transients occur 8-9 times per year with an expected duration of three to five days each time. The electrical demand for SDO is between 90 and 110 MWe.

SDO requires steam and electrical power with adequate margin and redundancy to achieve 99.99 percent availability to support continuous operation. Subsection 8.4.2. discusses the unreliability of alternative energy supplied from the regional grid. Net electrical power produced from the project, less SDO's consumption, is supplied to the grid as available.

8.2.2 Factors Affecting Growth of Demand

Because the purpose of this project is to provide a cogeneration nuclear facility that supplies steam and electrical power to SDO, factors affecting growth of demand are limited to SDO's demand for steam and power. Dow has not indicated any plans for the expansion at SDO that would increase the steam or power demand. However, the sizing of the four Xe-100 reactor modules for this project supports the peak steam demand and power consumption of SDO with margin such that additional increases in steam and/or power demand can be accommodated by the project.

<u>Tables</u>

None

<u>Figures</u>

None

8.3 Power Supply

8.3.1 Existing SDO Power Supply

SDO currently has cogeneration capacity with gas turbines and heat recovery steam generators that produce sufficient steam and power required for SDO operations. The cogenerated steam production is also supplemented with steam generated through the recovery of heat from various process units. The internal steam generation meets the facility demand, and any excess steam is used for electrical power generation. Currently, SDO generates surplus power, which is supplied to the grid.

8.3.2 Regional Power Supply for Calhoun County, Texas

ERCOT manages the power supply for the state of Texas. The local grid has sufficient capacity to meet power demands for SDO (90-110 MW) during normal conditions with over 6000 MW of operating reserves (ERCOT, 2024). However, as discussed in Section 8.4, Assessment of Need for Power, the local grid cannot provide steam required by SDO processes or the reliability necessary to support SDO production goals.

Tables

None

Figures

None

8.4 Summary of Need for Power Analysis and Conclusions

As described in Section 8.2, Power Demand, SDO requires both steam and electrical power for operations. These resources are currently provided by a natural gas cogeneration plant that is nearing its end of life. As described in Subsection 8.4.2, the regional power supply is insufficient to meet the needs of SDO because it cannot provide steam and because it does not provide sufficient reliability for SDO operation. In addition, power from the regional grid does not satisfy Dow's decarbonization goals. Thus, there is a positive need for replacement energy and power for SDO. As described in Section 8.1, Description of Power System, LMGS meets SDO requirements for reliable steam and electric power while supporting Dow's decarbonization goals.

8.4.1 Existing SDO Power Supply

The purpose of this project is to replace the existing natural gas cogeneration plant that is approaching its end of life with LMGS to provide both steam and electrical power to operate SDO.

8.4.2 Alternative Energy Supply from Regional Power Supply

ERCOT manages the power supply for the state of Texas. While the grid has sufficient capacity to meet the power demands for SDO (90-110 MW) during normal conditions with over 6000 MW of operating reserves (ERCOT, 2024), the grid is not a reasonable source of energy to support SDO operations for the following reasons:

- Steam supply is also required to support SDO operations
- The grid does not provide the reliability needed to ensure near 100 percent availability
- The grid does not significantly lower the overall carbon footprint of SDO, which is a Dow corporate goal

8.4.2.1 Steam Supply

In addition to supplying electrical power to support SDO processes, LMGS also provides steam to SDO. The target steam supply to SDO is 44.1 kg/s (350 kp/h). The Xe-100 reactor modules are designed to support both peak steam demand and electrical power demand for SDO. If electrical demand was supplied by the local grid operator, steam would still be required to support SDO. This steam demand is currently met using gas-fired boilers. If power were supplied by the grid, electric boilers would be required to support steam supply for SDO. This would require additional infrastructure to support the significant power demand to provide the steam necessary for SDO. In addition, the steam supply would still be limited based on reliability concerns and would not support decarbonization goals as discussed in Subsections 8.4.2.2 and 8.4.2.3.

8.4.2.2 Grid Reliability

LMGS is designed to ensure a near 100 percent availability of steam and electrical power supply to SDO. At a minimum, an N+1 design philosophy for steam and electrical supply for SDO is adopted to ensure availability, even when a reactor module is removed from service.

This availability is not reliably met with the grid operator as power outages due to weather related events can disrupt power delivery to SDO from the grid. Over the past year, the state of Texas had six major power outages (impacting over 50,000 customers) due to severe weather events. In addition, Calhoun County had an electrical system separation event due to partial failure of an integrated electrical transmission system (EIA, 2024).

8.4.2.3 Decarbonization Goals

Using the regional power supply to provide electrical power to SDO would only transfer emissions from the on-site cogeneration plant to off-site power generating facilities. In Calhoun County, Texas, the majority of power generated comes from natural gas powered plants, comprising almost 98 percent of the total power generated within the county (Find Energy, 2024). Thus, using the regional power supplier to support the electrical demand for SDO would not support Dow’s decarbonization goals. Further discussion of these ancillary benefits is provided in Section 10.6, Benefit-Cost Balance.

<u>Tables</u>

None

<u>Figures</u>

None

8.5 References

References

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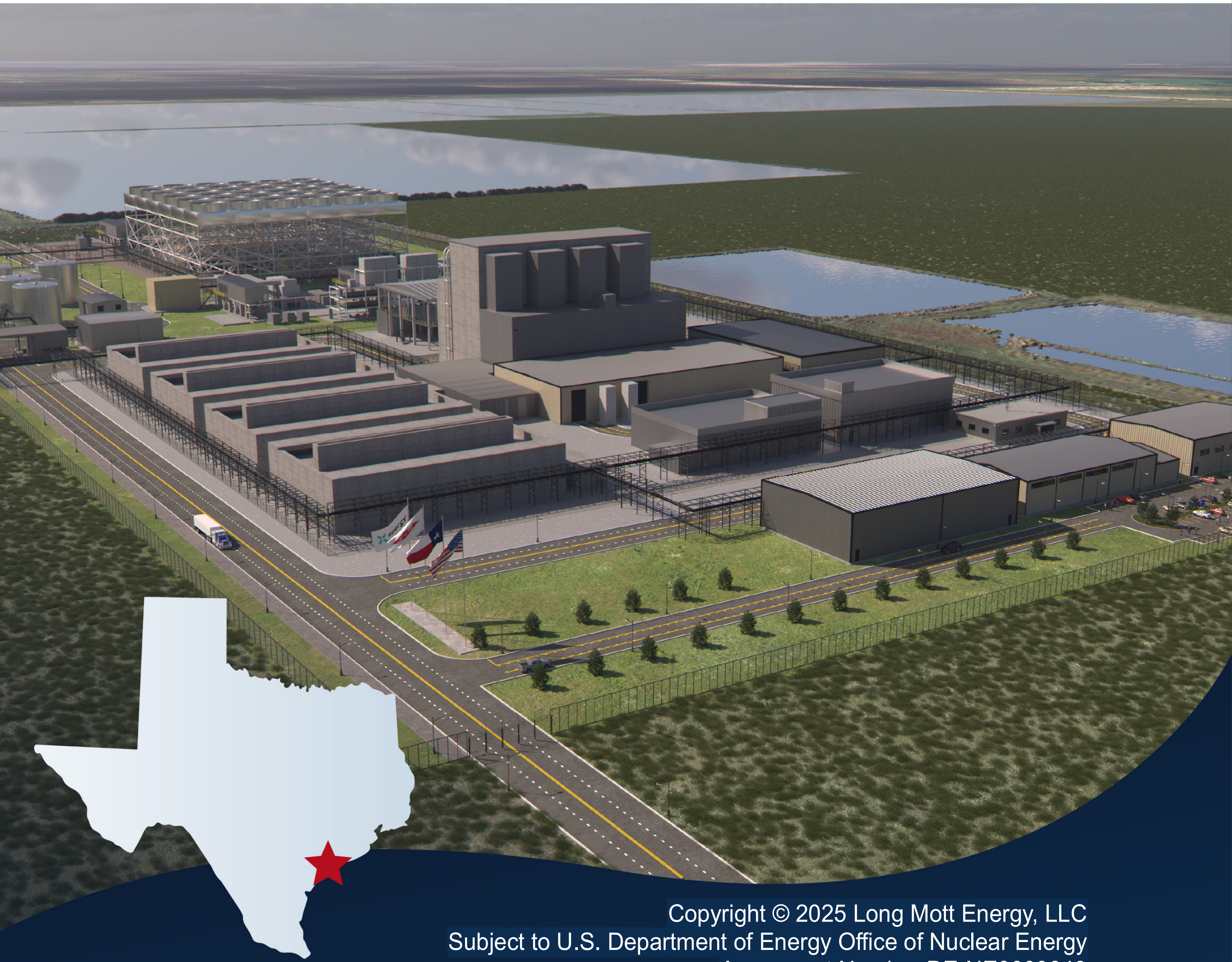
Environmental Report
Chapter 9 - Alternatives to Proposed Action



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Chapter 9 - Alternatives to the Proposed Action

This chapter identifies and describes alternatives to siting, constructing, and operating the new Long Mott Generating Station (LMGS). The descriptions provide sufficient detail to facilitate evaluation of the impacts of the no-action alternative, energy alternatives, alternative sites, and alternative plant and transmission systems for the new plant, LMGS. The chapter is divided into four sections:

- No-Action Alternative (Section 9.1)—Section 9.1 describes the environmental impact and energy consequences if a construction permit is not issued and the new plant is not constructed or operated
- Energy Alternatives (Section 9.2)—Section 9.2 examines the potential environmental impacts associated with alternatives to the construction of a new Xe-100 plant
- Alternative Sites (Section 9.3)—Section 9.3 describes and evaluates alternative sites considered for the new plant
- Alternative Plant and Transmission Systems (Section 9.4)—Section 9.4 describes and evaluates plant and transmission system alternatives for the new plant

9.1 No-Action Alternative

Under the No-Action Alternative, the U.S. Nuclear Regulatory Commission (NRC) does not issue a license for the building and operation of LMGS. As such, all potential local environmental impacts related to water use, land use, groundwater contamination, ecology, transportation, air emissions, human health and occupational safety, socioeconomics, waste storage and disposal, disposition of depleted uranium, and decommissioning projected to occur during building, operations, and decommissioning phases are avoided.

As described in Chapter 8, Seadrift Operations (SDO), the Seadrift, Texas facility owned and operated by the Union Carbide Corporation, an affiliate of The Dow Chemical Company, uses a separate natural gas-fired co-generation plant to both meet the significant steam needs associated with the SDO processes and provide reliable 24/7 power for the facility that are not available from the grid. The power demand for the SDO cogeneration plant and the region surrounding the SDO service area is described in Section 8.2, Power Demand. The electrical power supply for SDO and the region surrounding the Electric Reliability Council of Texas service area is described in Section 8.3.1 and Section 8.3.2, respectively. As stated in Section 8.4.1 and Section 8.4.2, SDO plans to retire and replace the current carbon-emitting natural gas-fired cogeneration plant with a carbon-free technology to support corporate decarbonization goals.

While the No-Action Alternative would not result in environmental impacts associated with a new nuclear plant building and operation and eventual decommissioning, the following beneficial environmental impacts would not be achieved or would be significantly challenged:

- The existing co-generation plant has sufficient capacity using natural gas to support steam and electrical power needs of SDO operations with excess power generated transferred to the grid when available. However, the No-Action Alternative using natural gas does not meet corporate goals for decarbonization. Further, since the existing natural gas co-generation plant is reaching its end of life, rebuild or replacement of the existing natural gas co-generation plant would be required, which would create its own environmental impacts under the No-Action Alternative.

- The No-Action Alternative does not meet the requirement of the project which is to demonstrate the Xe-100 technology as part of the U.S. Department of Energy Advanced Reactor Demonstration Program (ARDP).
- The socioeconomic benefits associated with new nuclear power plant building and operation including the creation of high paying jobs, both direct and indirect, and increased tax revenue would not be achieved under the No-Action alternative.
- A new nuclear plant results in decreased emissions of air pollutants, including priority pollutants and greenhouse gases, which decreases air pollutant related health effects (NEI, 2024). These air pollutant reduction health benefits would not be achieved under the No-Action alternative.

Tables

None

Figures

None

9.2 Energy Alternatives

This section examines the potential environmental impacts associated with energy alternatives to satisfy the purpose and need for LMGS. This section is organized as follows:

- Section 9.2.1, Alternatives Not Requiring New Generating Capacity, assesses conservation (energy efficiency) programs and purchasing power from other power generators outside of Dow.
- Section 9.2.2, Alternatives Requiring New Generating Capacity, assesses wind power, solar power, hydropower, geothermal power, biomass power, petroleum liquids, fuel cells, coal, Integrated Gasification Combined Cycle (IGCC) generation sources, natural gas, and combinations of alternatives. Reasonable alternatives that can meet the purpose and need of the proposed action are identified based on availability in the region, overall feasibility, ability to generate required power and environmental consequences.

Each of the Energy Alternatives are reviewed against the following needs for the project:

- Provide sufficient electrical power to support operations at SDO
- Provide sufficient steam at a nominal steam header temperature of 640 °F (338 °C) to support operations at SDO
- Provide sufficient redundancy and margin to achieve a 99.99 percent availability of steam to SDO
- Support Dow's corporate decarbonization goals
- Provide demonstration of the Xe-100 advanced reactor technology in accordance with the ARDP program

9.2.1 Alternatives Not Requiring New Generating Capacity

One of the requirements of the project is to provide demonstration of advanced reactor technology in accordance with the ARDP program. Advanced nuclear energy has enormous potential to lower emissions, create new jobs, and build a stronger economy. The projects under the ARDP demonstrate the commercial uses of nuclear energy beyond simple firm electricity generation, while catalyzing new nuclear fuel infrastructure and regulatory innovation, to support the commercialization and deployment of other advanced nuclear technologies. This allows U.S. companies to regain global leadership in advanced nuclear energy and move the world forward on the commercialization and deployment of advanced nuclear reactors as a climate and energy solution.

The project requirement presented in this CPA is to demonstrate the Xe-100 high temperature gas reactor. Alternatives not requiring new generation do not meet the goals of the ARDP and are not considered further.

9.2.2 Alternatives Requiring New Generating Capacity

The alternative energy solutions listed below do not meet the project requirement for demonstrating the Xe-100 through the ARDP program:

- Wind
- Geothermal
- Hydropower
- Solar Power
- Biomass
- Petroleum Liquids (Oil)
- Fuel Cells
- Coal
- Natural Gas (with or without carbon capture)
- IGCC
- Hydrogen Combustion
- Advanced nuclear other than the Xe-100

Since none of the above alternatives meet the requirement for supporting the ARDP program, there is no reasonable energy alternative.

Tables

None

Figures

None

9.3 Alternative Sites

As required by NEPA and 10 CFR 51.50, this section provides an evaluation of reasonable alternative locations to the Proposed Site for building and operation of a new plant. This section summarizes the process used to select the Proposed Site as the proposed location for the new plant and evaluates whether any alternative sites are “environmentally preferable” to the Proposed Site, and if so, whether they are “obviously superior” to the Proposed Site for the eventual building and operation of the new plant.

9.3.1 Alternative Site Selection Process

Four potential sites for building and operating LMGS were evaluated based on a process that considered relevant factors related to nuclear licensing, environmental acceptability, water availability, and engineering / cost / transmission issues.

The process used to perform the review was informed by NRC guidance provided in Section 9.3 of Regulatory Guide (RG) 4.2, Preparation of Environmental Reports for Nuclear Power Stations, and Section 9.3 of NUREG-1555, Environmental Standard Review Plan.

As the primary objective of this new power plant is to provide electricity and steam directly to SDO, the region of interest and candidate sites are limited to areas adjacent to SDO. All candidate plant sites must be either on the SDO site or immediately adjacent.

The basic parameters of the Site Feasibility Study and Alternative Site Study were determined based on regulatory guidance, benchmarking, and the experience of recent Early Site Permit (ESP) and Combined License (COL) applicants. These basic parameters included the following:

- Site acreage and makeup water requirements must bound the requirements of a four-module Xe-100
- Site must be located within 1.5 miles (mi.) of SDO to provide process steam at the required temperature and pressure
- The potential power plant must interconnect with a transmission line or substation with a voltage of at least 138 kilovolt (kV)

The Site Feasibility Study and Alternative Site Study included the following primary tasks:

- Establish the region of interest
- Identify Candidate Areas
- Identify Potential Sites
- Identify Candidate Sites
- Evaluate Candidate Sites
- Identify one or more Preferred Sites

9.3.1.1 The Region of Interest

NUREG-1555 defines the region of interest as the area to be considered in searching for potential power plant sites. NUREG-1555 provides the following guidance on the selection of the region of interest:

- The region of interest is typically selected based on geographic boundaries (e.g., the State in which the Proposed Site is located) or the relevant service area for the proposed plant. In cases where the proposed plant would not have a service area, the applicant should define a reasonable region of interest and provide a justification.

In order to transport process steam from LMGS to SDO, only areas within a 1.5 mi radius from SDO were considered. Greater distances result in thermal heat loss in the process steam and result in reduced steam quality; therefore, only areas within 1.5 mi of SDO were considered. Based on the mandate of the project partners, the SDO is the region of interest. Sites located outside of the region of interest are not reasonable alternatives due to the specific nature of the uses for the power and steam produced by LMGS.

9.3.1.2 Identification of Candidate Areas

Candidate areas are areas within the region of interest that remain after unsuitable areas are eliminated. Unsuitable areas have features that make nuclear power plant siting infeasible. Similar to the region of interest, only areas within 1.5 mi of SDO are considered to support transport of process steam. As a result, the region of interest and candidate areas are limited to areas adjacent or near SDO.

9.3.1.3 Identification of Potential Sites

Potential sites are specific locations within candidate areas that are identified for preliminary assessment in establishing candidate sites.

During the Site Feasibility Study, four sites (A, B, C, and D) were chosen as potential sites, as shown in Figure 9.3-1. The factors taken into the initial decision were the availability of the land near SDO and the distance that the steam pipe needs to traverse from the plant to the process location at SDO; therefore, all potential plant sites are either located on Dow property or adjacent to existing Dow property.

As a result of their close proximity to each other, the majority of the impacts are consistent for each potential site.

9.3.1.4 Identification of Candidate Sites

Candidate sites are those potential sites that are considered to be among the most suitable sites that can reasonably be found for the siting of a nuclear power plant. Candidate sites were identified by examining the four potential sites identified in Section 9.3.1.3 above to determine whether the sites had any significant issues that make them infeasible or otherwise undesirable for development of a nuclear power plant. Issues considered in this evaluation included the following:

- Environmental Acceptability
- Water Availability
- Land Availability
- Proximity to SDO facility
- Transmission

Potential drawbacks were identified for all candidate sites, but none were sufficient to eliminate a site from further consideration. Factors that were identified, but did not meet any exclusionary or avoidance criteria about the siting of LMGS, included size of the site and the potential impact on wetlands. As no exclusionary or avoidance criteria were met, all four of the potential sites are considered as candidate sites as shown on Figure 9.3-1.

9.3.1.5 Evaluation of Candidate Sites

The candidate sites were evaluated in more detail in order to provide a quantifiable basis for comparison. In order to support the evaluations, various specific aspects of the candidate sites were investigated and assessed, based on the following methodology:

- Desktop Analysis—A desktop analysis was performed for each candidate site based upon review of site-specific reports and publicly available datasets, maps, and documents that are relevant to the resources addressed under each of the suitability criteria related to flooding, chemical hazards, cultural resources, water resources, hydrology, ecology, environmental justice, seismicity, geologic, contaminated sites, air quality, and aircraft hazards.
- Field Reconnaissance—The field reconnaissance was intended to supplement and confirm the information collected from maps, aerial photographs, and other publicly available sources.
- Development of Site Layouts—Customized plant arrangements were developed for each Candidate Site for a typical four module plant layout.

Due to the candidate sites being in close proximity, the site evaluation process focused on the noticeable differences between the candidate sites, primarily wetlands and pipelines on the candidate sites.

9.3.2 Environmental Assessment of Alternative Sites

The site selection process described above, performed as part of the Site Feasibility Study, resulted in the selection of Candidate Site A as the “Proposed Site”. The environmental impacts of the Proposed Site are evaluated in detail in Chapter 4 and Chapter 5. This section evaluates the environmental impacts of the candidate sites, now designated as alternative sites, using the resource categories suggested in NUREG-1555. The purpose of this evaluation is to determine if any of the alternative sites are “environmentally preferable” to the Proposed Site and, if so, whether any of the sites are “obviously superior” to the Proposed Site.

The alternative sites are evaluated here based on publicly available information, including field reconnaissance site visits, geographic information system mapping, and a review of government agency websites.

In order to evaluate the environmental impacts of constructing and operating a nuclear plant at the alternative sites, the general plant design described in Chapter 3 and the building and operation practices described in Chapter 4 and Chapter 5 were consistently applied to each site. This allowed for a comprehensive and qualitatively consistent assessment of environmental impacts.

Section 9.3.2.1.1 through Section 9.3.2.1.12 summarize the evaluation of the proposed and alternative sites, using consistent criteria and assumptions applied to the attributes and features of the proposed and alternative sites. These subsections also discuss the potential environmental impacts of developing the proposed and alternative sites and the off-site features listed above.

9.3.2.1 Environmental Evaluation of Alternative Sites

9.3.2.1.1 Land Use

9.3.2.1.1.1 Alternative Site B

Alternative Site B is approximately 235 acres (ac.) (95 hectares [ha]) in size and is currently agricultural land used for cultivation. It is owned by, and is bounded on the north, west and south by land that is owned by, Dow Hydrocarbons and Resources, LLC, a wholly owned subsidiary of Dow. It is bounded on the east by pastureland that is not owned by Dow.

This site is currently being used for agriculture and is prime farmland and causes the loss of approximately 235 ac (95 ha) of prime farmland. Similar to the Proposed Site, the impact on prime farmland results in a MODERATE impact to land use.

9.3.2.1.1.2 Alternative Site C

Alternative Site C is approximately 166 ac (67 ha) in size and is currently agricultural land used for cultivation. It is owned by, and is bounded on the north by land that is owned by, Dow Hydrocarbons and Resources, LLC, a wholly owned subsidiary of Dow. It is bounded on the south (partially) and the east by pastureland that is not owned by Dow Hydrocarbons and Resources, LLC, a wholly owned subsidiary of Dow. Alternative Site C has one pond and an associated wetland.

This site is currently being used for agriculture and is considered prime farmland and causes the loss of approximately 166 ac (67 ha) of prime farmland. Similar to the Proposed Site, the impact on prime farmland results in a MODERATE impact to land use.

9.3.2.1.1.3 Alternative Site D

Alternative Site D is approximately 193 ac (78 ha) in size. A majority of the site is currently agricultural land used for cultivation. It is owned by, and is bounded on the south and east by land that is also owned by, Dow Hydrocarbons and Resources, LLC, a wholly owned subsidiary of Dow and has one stream and emergent wetlands.

This site is currently being used for agriculture and is considered prime farmland and causes the loss of approximately 193 ac (78 ha) of prime farmland. Similar to the Proposed Site, the impact on prime farmland results in a MODERATE impact to land use.

9.3.2.1.2 Hydrology, Water Use, and Water Quality

Groundwater hydrology in the vicinity of the SDO site is part of the Gulf Coast Aquifer system that parallels the Gulf of Mexico coastline from the Louisiana border to the border of Mexico (TWDB, 2023). A sole source aquifer is not located in the vicinity of the SDO site; therefore, LMGS has a SMALL impact on the Proposed Site's hydrology. The alternative sites are in close proximity to the proposed site and share similar hydrology characteristics; therefore hydrology has a small impact at these alternative sites.

Water use for the proposed and alternative sites is from a new intake structure on the Guadalupe-Blanco River Authority (GBRA) Calhoun Canal. Estimated water withdrawal for LMGS is a very small percentage of water that reaches the saltwater barrier and the San Antonio Bay System regardless of the site being considered; therefore, the impact from water usage as a result of siting LMGS on any of the sites is SMALL.

Water quality at the proposed and alternative sites is managed in accordance with the Texas Pollutant Discharge Elimination System Permits (TPDES), Storm Water Prevention Protection Plan (SWPPP), and best management practices (BMPs); therefore, LMGS has a SMALL impact on the water quality regardless of the site being considered.

9.3.2.1.3 Terrestrial Biological Resources Including Protected Species

Any large construction project impacts terrestrial ecology primarily by disturbing natural habitats and making those habitats unavailable or of lower value to plants and animals. Although building activities may result in direct mortality to some plants and animals, most animal species are able to move away to avoid direct impacts. Even those species, however, may experience disruptions due to loss of habitat. In addition, increased human activity, noise, lights, and dust may cause some animals to leave areas near building activities. The displacement of animal species into adjacent and surrounding habitats is also experienced as a loss of usable habitat. Surrounding habitats which are indirectly impacted by construction noise, dust, and lights may temporarily provide reduced functions and values to the wildlife species that depend on them.

Given that the proposed and alternative sites are primarily agricultural sites, there is a potential displacement impact to small animal and bird species which may be located on or traverse all of these sites.

There are no known state or federally listed species or natural habitats on the proposed and alternative sites.

The impact on terrestrial resources both during building and operations is SMALL regardless of the site being considered due to the ability of these species to relocate to other agricultural parcels in the immediate area and the lack of protected species or habitats.

9.3.2.1.4 Aquatic Biological Resources Including Protected Species

9.3.2.1.4.1 Proposed Site

The Proposed Site has four streams and associated wetlands. The streams are intermittent, and with the exception of aquatic biota on a seasonal basis, the Proposed Site would not support aquatic species and there are no known state or federally listed species or natural habitats on the Proposed Site.

The impact on aquatic biological resources at the Proposed Site is SMALL.

9.3.2.1.4.2 Alternative Site B

Alternative Site B has one stream and one drainage ditch with associated wetlands. The streams are intermittent and do not support aquatic species, with the exception of aquatic biota on a seasonal basis.

Similar to the Proposed Site, Site B is currently agricultural land used for cultivation. There are no known state or federally listed species or natural habitats on Site B. As a result, the impact on aquatic biological resources including protected species at Alternative Site B is SMALL.

9.3.2.1.4.3 Alternative Site C

Alternative Site C has one pond and associated wetlands. Alternative Site C consists mainly of agriculture land used for cultivation. Based on the review, there are no essential fish habitats located within or adjacent to the Site C. As a result, the impact on aquatic biological resources including protective species at Alternative Site C is SMALL.

9.3.2.1.4.4 Alternative Site D

Alternative Site D has one perennial stream and an emergent wetland. The stream is intermittent and does not support aquatic species, with the exception of aquatic biota on a seasonal basis. Alternative Site D consists mainly of agriculture land used for cultivation. Based on the review, there are no essential fish habitats located within or adjacent to Site D. As a result, the impact on aquatic resources including protective species at Alternative Site D is SMALL.

9.3.2.1.5 Socioeconomics

This subsection evaluates the social and economic impacts that result from building and operating the new plant at the alternative sites. The evaluation includes the impacts of building and operation activities and demands placed by the building and operation workforces on the site and surrounding region. It is assumed that all building activities occurring within the site boundaries described in Section 9.3.2.1.1 and physical impacts are restricted to these construction areas and nearby properties. Other socioeconomic impacts generally occur on a regional basis and the following subsections evaluate the region of interest and the region within 50 mi (80.5 kilometers [km]) of the alternative sites. Due to the proximity of the alternative sites to the proposed site, socioeconomic impacts for each of the areas below are assumed to be similar.

9.3.2.1.5.1 Physical Impacts of Station Operation

9.3.2.1.5.1.1 Physical Impacts

Any large construction project can cause temporary and localized physical impacts such as noise, vibration, dust, vehicle exhaust, road wear and tear and/or damage, and odors. In addition, construction materials, equipment, and workers must be transported to the construction areas, and these transportation activities also cause noise, vibration, dust, vehicle exhaust, road wear and tear and/or damage, and odors. For the proposed and alternative sites, large equipment and materials are transported to the site using public roadways. Public roadways are used to transport smaller equipment, as well as large numbers of construction workers. Appropriate measures are taken to minimize noise, dust, and other impacts due to both building and transportation activities.

Based upon review of aerial imagery, there is a grouping of residences along State Highway (SH) 35 and Broadway Avenue, approximately but no closer than 0.5 mi (0.8 km) north of the Proposed Site. There are also additional scattered residences within approximately one mile of the Proposed Site's boundary. As the residences are more than 0.5 mi (0.8 km) from the site no residences are expected to experience impacts from construction-related noise, vibration, and dust. For this reason, the physical impacts due to project building are SMALL.

Any potential physical impacts from the proposed and alternative sites are transitory in nature and have a SMALL impact.

9.3.2.1.5.1.2 Air Quality

LMGS is located in Calhoun County, Texas, which is in attainment for all National Ambient Air Quality Standards (NAAQS). (EPA, 2023)

Air quality impacts associated with the use of the proposed and alternative sites include the need for air quality permits for any project emissions sources, such as emergency diesel generators. The impact to air quality from the proposed and alternative sites is SMALL as a result of the minimal air emissions and management of any potential emissions with the use of the best-available-technology during LMGS operations.

9.3.2.1.5.2 Social and Economic Impacts of Station Operation

This section evaluates the potential demographic, economic, infrastructure, and community impacts associated with the operation of LMGS. The assessment includes impacts from routine and ongoing capital expenditures needed to support operations and the size of the operations workforce. As described in Section 2.5, Socioeconomics, the region of influence identified for social and economic impacts, which is defined by the areas where the operations workforce and their families reside, spend their income, and use their benefits, is Victoria, Calhoun, and Jackson Counties.

9.3.2.1.5.2.1 Demographic Impacts

Impacts on demography from the proposed and alternative sites are associated with construction workers and operation workers moving into the region surrounding the project site, potentially causing changes in off-site land use and development patterns. Construction employment is inherently temporary, but construction workers sometimes move their families into the region, magnifying the population increase.

Per NUREG-1437, demographic impacts are SMALL if project-related population growth represents less than 5 percent of the study area's total population, MODERATE if 5 to 20 percent, and LARGE if more than 20 percent.

The current population of the region of influence is 126,413. The closest communities are the city of Seadrift with a population of 995 and Port Lavaca with a population of 11,557.

Although the impact to the region of influence as a whole is SMALL during both building and operations, the impact is LARGE for Seadrift, and MODERATE for Port Lavaca due to the population size of each city.

9.3.2.1.5.2.2 Housing

Impacts on housing from the proposed and alternative sites are caused by building and operation workers moving, either permanently or temporarily, into the region surrounding the project site. This influx of workers decreases the availability of unoccupied housing units and increases the cost to buy or rent housing. The severity of such impacts depends primarily on the existing availability of unoccupied housing units compared with the number of workers who are expected to move into the area.

The increase in workers during the building phase of the proposed or alternative sites are both transient and permanent. Dependent upon their assignment, construction workers are at the site for intermittent/inconsistent periods of time. Regardless of the nature of their residency, there is limited housing available in the region of influence. As noted in Table 2.5-17, there are presently 9208 vacant housing units in the region of influence. Due to the number of workers during the building phase, the impact is MODERATE.

Impact to housing during the operation phase is much more limited, as the number of workers declines significantly and there may be cross training of current employees at SDO. As a result, the impact to housing during the LMGS operations stage is SMALL.

9.3.2.1.5.2.3Economic Impacts to Community

9.3.2.1.5.2.3.1Economy

Impacts on the economy from the proposed and alternative sites are caused primarily by the jobs provided to building and operation workers. The wages paid to workers result in additional spending, which tends to stimulate the economy, particularly in the retail and service sectors. This provides opportunities for new businesses and new jobs and is considered beneficial.

9.3.2.1.5.2.3.2Taxes

Property taxes, sales taxes, and other taxes paid during building and operation of the new plant at either the proposed and alternative sites benefit the state and local jurisdictions that collect the taxes. Per NUREG-1437, beneficial tax impacts are considered SMALL if project-related tax revenues represent less than 10 percent of the total tax revenues of the local taxing jurisdictions, MODERATE if 10 to 20 percent, and LARGE if more than 20 percent.

During the building period, revenues generated by payments in lieu of taxes are notable compared to the existing condition, the impact over a 10-year period is minor compared to annual property tax revenues. Impacts to franchise taxes and sales and use taxes are minimal during both building and operations; therefore, the overall impact of the building and operation periods on franchise tax, sales and use taxes, and property tax is MODERATE.

9.3.2.1.5.2.3.3Community Infrastructure Impacts

This section provides estimated impacts on infrastructure and community services, including traffic, recreation, and public services for the proposed and alternative sites.

9.3.2.1.5.2.3.4 Traffic

Traffic in the vicinity of the proposed and alternative sites is impacted by the increase in vehicle traffic associated with building and operation workers commuting to the site and the delivery of materials and equipment to the site.

As described in Section 2.5.2.2, United States highways (U.S.), SH, county roads, and county Farm-to-Market (FM) roads comprise the roadway network in the Project Region. Principal arterials U.S. 59, U.S. 77, and U.S. 87 provide the primary regional access to the project site, and minor arterials SH 35 and SH 185 provide primary access to the proposed and alternative sites within the project vicinity.

Currently, the roads in the vicinity of the proposed and alternative sites are generally rated at a Level of Service (LOS) B, which means reasonably free flowing operations and the ability to maneuver with the traffic stream with slight restriction on freeway and multi-lane highways. There are two segments on U.S. 59 and one segment on SH 35 which are at a LOS C, which means the freedom to maneuver within the traffic stream is noticeably restricted.

Impacts on traffic during the building phase are MODERATE along the segments south of the city of Bloomington, which provides access to the site from Victoria, TX. Overall traffic impacts at the intersections providing access to the LMGS site are LARGE as LOS decreases from A (reasonably free flow) to LOS F (heavily congested) where operating conditions are unstable. These impacts would be experienced during the building period in the AM and PM peak hours. However, mitigative measures developed in conjunction with Texas Department of Transportation may reduce impacts.

9.3.2.1.5.2.3.5 Recreation

Recreational areas impacted by the building and operation of LMGS are those located within the 6 mi (10 km) vicinity. None of these recreational areas are located directly on the proposed and alternative sites. The operation of LMGS on the proposed and alternative sites does not impede access to the recreation opportunities in the vicinity of the site.

9.3.2.1.5.2.3.6 Public Services

This section discusses the impacts from the proposed or alternative sites on existing water supply, wastewater treatment, police, fire protection, healthcare services, and education in the economic region.

Per NUREG-1437, impacts on public services generally are SMALL if there is little or no need to add facilities, programs, and/or staff because of the influx of workers, and MODERATE or LARGE if additional facilities, programs, and/or staff are required.

Although there is an increase in employees during both the building and operation phases, the workers are not located in a central location; therefore, the impact on public services is SMALL.

9.3.2.1.6 Occupational Health

The incidence of occupational health risks is not dependent on the individual site location, and is a function of health risks and standards, practices, and procedures in place to protect workers at the site. These safety parameters are not dependent on the location of the site; therefore, the impact on occupational health is the same as the proposed and alternative sites location as noted in Section 5.8.2.5 and is considered SMALL.

9.3.2.1.7 Human Health Impacts from Traffic

As described in Section 2.5.2.2, U.S. highways, SH, county roads, and county FM roads comprise the roadway network in the project region. Principal arterials U.S. 59, U.S. 77, and U.S. 87 provide the primary regional access to the project site, and minor arterials SH 35 and SH 185 provide primary access to the project and alternative sites within the project vicinity.

Traffic accident rates for these roads are low and the additional human health impacts from the added traffic from the building and operation of LMGS at any of these sites are SMALL because all of the sites use the same roadway network.

9.3.2.1.8 Environmental Justice

Environmental justice (EJ) issues involve aspects of the project that disproportionately impact minority or low-income populations. The potential for disproportionate impacts depends primarily on the location of the power plant and off-site facilities in relation to existing minority and low-income populations.

The closest minority census block group to the proposed and alternative sites is approximately 5.3 mi (9 km) to the southwest and the closest low-income census block group is in Port Lavaca, which is approximately 9.1 mi (14.6 km) to the northeast.

As discussed in Section 9.3.2.1.5.2.3, positive socioeconomic benefits for the environmental justice population in the area of the SDO are the economic benefits the construction and permanent positions bring to the area. The economy within the region of influence benefits through the reduction of unemployment, increase in capital expenditures, payment of wages and salaries to the construction workforce, and creation of new business opportunities in the retail and service industries. Beneficial impacts to the economy and tax revenues are proportionately spread across the general and EJ populations and are not disproportionate.

9.3.2.1.9 Historical and Archaeological Resources

Historical and archaeological resources are directly disturbed by building activities or indirectly disturbed by noise, dust, vehicle emissions, or visual intrusion during project building and operation. The severity of such impacts depends on the historic significance of the resources and the degree of disturbance.

A Phase 1 Archaeological Study was not completed on Alternative Sites B, C, and D as they are not the Proposed Site. While the Phase 1 Archaeological Survey was only completed for the Proposed Site, the area in the survey covered much of Site B. Based on the results of the survey, no archaeological or cultural materials were identified (Appendix 1A and Part VI Supplemental Information).

U.S Geological Survey (USGS) 7.5 minute quadrangle maps from 1952 are reviewed for the alternative sites to identify former structures and indicate areas with a high probability of containing historic cultural deposits. Based on the review Site B does not have any indications that potential historic resources are located on the site. However, Sites C and D have indications that potential historic resources are located on or adjacent to the site. For both Sites C and D, the potential structures are located at the site boundary. Given that the land for these sites is currently cultivated farmland, the potential impact to historical or archaeological resources for Sites C and D are SMALL to MODERATE and SMALL for Site B.

9.3.2.1.10 Postulated Accidents

As discussed in Section 5.13.1.3, the calculated doses for operations at the Proposed Site are significantly below dose criteria specified in 10 CFR 100.21 and 10 CFR 50.34(a)(1). The dose impacts of postulated accidents at the alternative sites would be similar to the Proposed Site. Thus, the impact of the postulated radiological releases on the environment during a Design Basis Accident (DBA) is SMALL.

The NRC performed a generic analysis of the environmental effects of the transportation of fuel and waste to and from Light Water Reactors in the Environmental Survey of Transportation of Radioactive Materials To and From Nuclear Power Plants, WASH-1238, and in a supplement to WASH-1238, NUREG-75/038, and found the impact to be SMALL.

The NRC has concluded in NUREG-0170 that the radiological risks from accidents in transportation of low-level radioactive waste is SMALL.

9.3.2.1.11 Cumulative Impacts

Cumulative impacts for the project site are addressed in Chapter 7. The methodology for addressing cumulative impacts for the alternative sites is similar to the methodology documented for the Proposed Site in Chapter 7. Since the project purpose is to provide steam to SDO, all alternative sites, as well as the Proposed Site, are located within and/or adjacent to SDO property boundary. As a result, the geographic area of interest (GAI) for each of the resources of the alternative sites are the same as those established for cumulative effects analysis of the Proposed Site. Additionally, the past, present, and reasonably foreseeable future actions (RFFAs) identified for the Proposed Site in Section 7.1, Past, Present, and Reasonably Foreseeable Future, and listed in Table 7.1-2 are considered applicable to the alternative sites.

9.3.2.1.11.1 Land Use

The cumulative impact for the Proposed Site on land use, including the impacts for past, present, and RFFA for the Proposed Site is addressed in Section 7.2.1. Similar to the Proposed Site, the predominate existing land use for the alternative sites is agricultural and prime farmland; therefore, the impacts on land use from building and operation of LMGS at alternative sites are MODERATE (building activities) and SMALL (operation). However, the impact of the loss of agricultural lands, including prime farmland of statewide importance, would be similar to the Proposed Site, when combined with past, present, and RFFA, and is considered minor when compared to the available agricultural land and land designated as prime farmland remaining within the region. Because impacts on land use are similar to the Proposed Site, the cumulative impact of building and operating activities from the proposed action at alternative sites on land use, added to the effects associated with past, present, and RFFAs within the GAI on land use is noticeable but not destabilizing and therefore, MODERATE.

9.3.2.1.11.2 Water

9.3.2.1.11.2.1 Hydrology

9.3.2.1.11.2.1.1 Surface Water Hydrology

Since all alternative sites are located adjacent to SDO and in a similar hydrologic setting, it is expected that hydrologic impacts for the alternative sites would affect surface water resources and stormwater in a manner similar to the Proposed Site. Thus, the impact on surface water hydrology would be similar to Proposed Site and impacts on surface water hydrology from building and operation of LMGS at alternative sites would be SMALL. Because impacts on surface water hydrology are expected to be similar to the Proposed Site, the cumulative impact on surface water hydrology would also be similar to the Proposed Site location; therefore, the cumulative impact of building and operating activities from LMGS on surface water hydrology at alternative sites, added to the effects associated with past, present, and RFFAs within the GAI on surface water hydrology, is MODERATE.

9.3.2.1.11.2.1.2 Groundwater Hydrology

Due to the close proximity of the alternative sites to the Proposed Site, the groundwater hydrology is similar to that of the Proposed Site. As noted in Section 7.2.2.1.2, the impacts of the proposed action on groundwater is relegated to dewatering during building. However, due to the shallowness of excavation and foundation development, the associated dewatering activities do not result in permanent impacts on groundwater hydrology and are therefore SMALL. Because impacts on groundwater hydrology are expected to be similar to the Proposed Site, the cumulative impact of the proposed action on groundwater hydrology at alternative sites, added to the effects associated with past, present, and RFFAs within the GAI on groundwater hydrology, is noticeable but not destabilizing and therefore, MODERATE.

9.3.2.1.11.2.2 Water Use

9.3.2.1.11.2.2.1 Surface Water Use

The impacts of surface water use at the Proposed site are SMALL. The average annual surface water usage rates during building and operation of LMGS at the Proposed Site are within existing permitted water rights held by SDO and do not impact other downstream water users. The cumulative impact of building and operating activities on surface water use at the Proposed Site, added to the effects associated with past, present, and RFFAs within the GAI on surface water use, is SMALL (Section 7.2.2.2.1).

Due to the proximity of the alternative sites to the Proposed Site, impacts from the proposed action and the cumulative impacts of the proposed action on surface water use at alternative sites are the same as the Proposed Site.

9.3.2.1.11.2.2.2 Groundwater Use

There are no planned uses for groundwater during building or operation. Additionally, no permanent dewatering system is planned for use during operation; therefore, impacts at the Proposed Site are SMALL. The cumulative impact associated with groundwater use at the Proposed Site, combined with the effects associated with past, present, and RFFA within the GAI on groundwater use, is not noticeable and therefore, SMALL (Section 7.2.2.2.2).

Due to the proximity of the alternative sites to the Proposed Site, impacts from the proposed action and the cumulative impacts of the proposed action on groundwater use at alternative sites are the same as the Proposed Site.

9.3.2.1.11.2.3 Water Quality

9.3.2.1.11.2.3.1 Surface Water Quality

Nonradiological wastewater is routed to the liquid waste stream of SDO, where it will be eventually discharged through the existing SDO outfall to the Victoria Barge Canal. Similarly, sanitary waste will be processed by the SDO sanitary waste treatment facility; therefore, the impacts of building and operational activities to surface water quality from the proposed action at the Proposed Site are SMALL. The cumulative impact of building and operating activities on surface water quality at the Proposed Site, combined with the effects associated with past, present, and RFFAs within the GAI on surface water quality is LARGE due to the impaired nature of waters within the GAI (Section 7.2.2.3.1).

Due to the proximity of the alternative sites to the Proposed Site, impacts from the proposed action and the cumulative impacts of the proposed action on surface water quality at alternative sites are the same as the Proposed Site.

9.3.2.1.11.2.3.2 Groundwater Water Quality

A Spill Prevention, Control, and Countermeasures (SPCC) Plan, which would include BMPs to minimize the occurrence of spills and limit the effects on groundwater, would be implemented. Additionally, because of the predominance of heavy clays accidental spills would have only a small, localized, temporary impact on groundwater quality; therefore, the impacts of building and operational activities to groundwater quality from the proposed action at the Proposed Site are SMALL. The cumulative impact of building and operating activities from the proposed action on groundwater quality, combined with the effects associated with past, present, and RFFAs within the GAI on groundwater quality, is SMALL (Section 7.2.2.3.2).

Due to the proximity of the alternative sites to the Proposed Site, impacts from the proposed action and the cumulative impacts of the proposed action on groundwater quality at alternative sites are the same as the Proposed Site.

9.3.2.1.11.3 Ecology

9.3.2.1.11.3.1 Terrestrial Ecosystems

The Proposed Site consists of mostly agricultural land. The habitat quality is low and wildlife are expected to avoid the area due to the presence of structures and operational noise emissions; therefore, the impacts on terrestrial ecosystems and wetlands from building and operation of LMGS are SMALL. The cumulative impact associated with building and operating activities from the proposed action on terrestrial ecology and wetlands at the Proposed Site, combined with the effects associated with past, present, and RFFA within the GAI, is LARGE (Section 7.2.3.1).

Similar to the Proposed Site, the alternative sites consist of mostly agricultural land; therefore, impacts from the proposed action and the cumulative impacts of the proposed action on terrestrial ecology at alternative sites are the same as the Proposed Site.

9.3.2.1.11.3.2 Aquatic Ecosystems

The impacts to aquatic ecosystems at the Proposed Site are limited to the GBRA Calhoun Canal, West Coloma Creek, and intermittent and ephemeral tributaries that may located on or near the site. The impacts on aquatic ecosystems from building and operation of LMGS at the Proposed Site are SMALL. The cumulative impact of building and operating activities from the proposed action on aquatic ecology, combined the effects associated with past, present, and RFFAs within the GAI, is MODERATE. (Section 7.2.3.2).

Similar to the Proposed Site, the impact on aquatic ecosystems for the alternative sites would be limited to the GBRA Calhoun Canal, West Coloma Creek, and intermittent and ephemeral tributaries that may located on or near the alternative sites; therefore, impacts from the proposed action and the cumulative impacts of the proposed action on aquatic ecosystems at alternative sites are the same as the Proposed Site.

9.3.2.1.11.4 Socioeconomics

Since the alternative site locations are all located in close proximity to SDO and near the Proposed Site, the GAI for the alternative sites primarily affect same the three counties (Calhoun, Jackson, and Victoria Counties) that are impacted by the Proposed Site. Thus, the GAI used for cumulative socioeconomic impacts for the alternative sites is the same as the GAI identified for the Proposed Site in Section 7.2.4.

9.3.2.1.11.4.1 Physical Impacts

Each of the alternative site locations are located adjacent to SDO, and as such, the physical impacts are similar to the Proposed Site. Physical impacts from LMGS building and operational activities, including those associated with air emissions, noise, impacts to workers and structures, and visual impacts, are SMALL and temporary based on characteristics of LMGS and the distance of sensitive receptors from the Proposed Site. Because these characteristics are also applicable to the alternative sites, physical impacts associated with building and operational activities at the alternative sites are also SMALL. Since the GAI remains the same for both the alternative sites and the Proposed Site, the cumulative impact associated with physical impacts is the same as that provided in Section 7.2.4.1, which is SMALL.

9.3.2.1.11.4.2 Demography Impacts

Demographic characteristics of proposed action (workforce characteristics associated with the building and operational phases) for each of the alternative sites are similar to that of the proposed action. As such, the potential effects of the alternative sites on demographic characteristics within the region of influence during building activities are SMALL (population) to MODERATE (housing), and SMALL during operations.

Since the GAI does not change for the alternative sites, and demography is based on the number of workers which does not change with the alternative site locations, the cumulative impacts on demography are the same as the impacts for the Proposed Site. Therefore, the cumulative impact of building and operating activities for each of the alternative sites from the proposed action on demography, added to the effects associated along with past, present, and RFFAs (including projected population growth within population centers within the region of influence) within the GAI on demography is MODERATE (Section 7.2.4.2).

9.3.2.1.11.4.3 Taxes and Economy

The impacts on taxes and the economy are a function of the size of the workforce during building and operation activities and the GAI. These factors do not change with the alternative site locations. These positive economic impacts are realized primarily within the region of influence. Minor tax revenue impacts on local jurisdictions accrue through sales and use taxes and indirect franchise taxes generated during building and operational activities. Therefore, the economic and tax impacts associated with the alternative sites are MODERATE to SMALL due to building and operations, respectively, and beneficial. As a result, the cumulative impacts on taxes and the economy at the alternative sites are the same as the Proposed Site; therefore, cumulative impacts of building and operating activities from the proposed action on the economy at the alternative sites added to the economic effects associated with past, present, and RFFAs within the GAI on economy is MODERATE and beneficial (Section 7.2.4.3).

9.3.2.1.11.4.4 Infrastructure and Community Services

Due to the close proximity of the alternative sites to the Proposed Site, the impacts on infrastructure would be essentially the same at the alternative sites as it is for the Proposed Site. This is based on the following reasons:

- The state highways and routes used to access the alternative sites would be the same as the Proposed Site
- The in-migrating workforce needed to support building and operating activities would be the same as the Proposed Site, as this is not dependent on-site location
- The GAI for both the alternative sites and the Proposed Site is the same based on the proximity of the alternative sites to the Proposed Site

As a result, the impacts of the proposed action infrastructure and community services at the alternative site locations are the same the impacts for the Proposed Site identified in Section 7.2.4.4 and are as follows:

- Impacts to traffic are MODERATE to LARGE during the building phase and SMALL during operations
- Impacts to recreation are SMALL during building and operations
- Impacts to community services (utilities, police and fire protection, healthcare and education) are SMALL during building and operations

The cumulative impacts of the proposed action at alternative sites and other past, present, and RFFAs on infrastructure and community services within the GAI are the same as those summarized above for the Proposed Site. The impact of building and operation of the LMGS at alternative sites is a minor contributor to most aspects of community and services but is a notable contributor to the MODERATE to LARGE cumulative impacts on traffic on roadways serving the alternative sites during the peak building period.

Thus, the cumulative effect of the proposed action and other past, present and RFFAs on infrastructure and community services for alternative site locations is SMALL for most aspects of community facilities and services but is MODERATE to LARGE for traffic on roadways serving the alternative sites during peak building period. The impact of building and operation of LMGS at alternative sites is a minor contributor to most aspects of community and services but is a significant contributor to the MODERATE to LARGE cumulative impacts on traffic on roadways serving the alternative sites during the peak building period.

9.3.2.1.11.5 Environmental Justice

Due to the close proximity of the alternative sites to the Proposed Site, the potentially affected environmental justice communities within the GAI for is the same. Minority or low-income populations in the vicinity of the proposed action do not experience disproportionately high and adverse human health, environmental, physical, or socioeconomic effects as a result of building activities and operation.

While there may be localized impacts from RFFAs on specific minority or low-income populations within the GAI, minority or low-income populations in the vicinity of the alternative sites do not experience disproportionately high and adverse human health, environmental, physical, or socioeconomic effects as a result of building or operating LMGS.

9.3.2.1.11.6 Historical and Cultural Resources

No historic properties or cultural resources were determined to be present on the Proposed site (Appendix 1A and Part VI Supplemental Information). While the Phase 1 Archaeological Survey was only completed for the Proposed Site, much of the area in the survey covered much of Site B. Based on the results of the survey, no archaeological or cultural resources were identified. While there were no Phase 1 archaeological surveys performed on Site C and D, these sites are predominantly previously disturbed areas used for agriculture.

USGS 7.5 minute quadrangle maps from 1952 were used to identify former structures and indicate areas with a high probability of containing historic cultural deposits for the alternative sites. Based on the review, Site B does not have any indications that potential historic resources are located on the site. However, Sites C and D have indications that potential historic resources are located on or adjacent to the site. For both Sites C and D, the potential structures are located at the site boundary. Given that the land for these sites is cultivated farmland, the potential impact to historical or archaeological resources for Sites C and D are SMALL to MODERATE and SMALL for Site B.

As noted in Section 7.2.6, past, present and RFFAs within the GAI identified in Table 7.1-2 are limited to activities within the Area of Potential Effect (APE) which is limited to the Proposed Site. Similarly, for alternative sites, the APE for direct effects to historic and cultural resources is similarly expected to be limited to the boundary of the alternative sites; therefore, there are no additional cumulative impacts.

9.3.2.1.11.7 Air Quality

Activities and emissions associated with building and operating activities at the Proposed Site are applicable to the alternative sites. As such the impacts of building and operations are SMALL.

Given the close proximity of the alternative sites to the Proposed Site, the GAI is the same and are all located within the attainment area for all NAAQS criteria pollutants in Calhoun County.

As the GAI remains the same, the cumulative impact on air quality at the alternative sites is the same as the cumulative impact for the Proposed Site. The cumulative impact of building and operating activities from the alternative sites on criteria pollutants and greenhouse gases, added to the effects associated along with past, present, and RFFAs within the GAI is SMALL (Section 7.2.7).

9.3.2.1.11.8 Nonradiological Health

Activities and potential factors affecting nonradiolgical health of the public and workers associated with building and operating activities at the Proposed Site are expected to be applicable to the alternative sites. Such factors include occupational injuries, etiological agents, noise, human health issues associated with transportation and electromagnetic fields (EMFs). As such, the impacts of building and operations at the alternative sites are SMALL. The potential intensity and degree of exposure of the public and the workforce to these factors is similar the Proposed Site at each of the alternative sites; therefore, the potential impacts of the alternative sites on nonradiological health is SMALL.

Due to the close proximity of the alternative sites, the GAI for cumulative impacts on nonradiological health is the same as the Proposed Site location. Since the evaluation of alternative sites is based on the same technology used for the Proposed Site, the cumulative impacts on nonradiological health for the alternative sites is the same as the cumulative impacts associated with the Proposed Site location documented in Section 7.2.8, which is SMALL.

9.3.2.1.11.9 Nonradioactive Waste

Nonradiological waste generation, management and disposal procedures during building and operating activities at the Proposed Site are applicable to the alternative sites. Because all solid, liquid, and gaseous wastes generated at the alternative sites are handled according to county, state, and federal regulations, the impacts on land, water, and air from building activities and operations is SMALL.

Given the close proximity of the alternative site locations to the Proposed Site, the GIA for nonradioactive waste at the alternative sites is the same as that for the Proposed Site. Based on the availability and expected capacity of existing licensed disposal facilities within and beyond the GAI, the cumulative impact of building and operating activities at each of the alternative sites on nonradiological waste, added to the effects associated with past, present, and RFFAs within the GAI on nonradiological waste, is SMALL (Section 7.2.9).

9.3.2.1.11.10 Radiological Health and Postulated Accidents

Based on the proximity of the alternative sites to the Proposed Site, radiological health and radiological impacts from postulated accidents would be the same. Specifically, the distance to population centers are essentially the same and the Exclusion Area Boundary would be limited to the site boundary for the alternative sites, as is the case for the Proposed Site.

Since the GAI is the same for both the alternative site locations and the Propose Site location, the cumulative impacts associated with radiological health and postulated accidents would be the same. Therefore, the cumulative impact of building and operating activities at the alternative sites on radiological health, added to the effects associated with past, present, and RFFAs within the GAI on radiological health is SMALL (Section 7.2.10 and Section 7.2.11).

9.3.2.1.11.11 Uranium Fuel Cycle

Impacts associated with uranium fuel cycle (UFC) are not dependent on the location of the site. As a result, the cumulative impacts associated with UFC are the same as those provided in Section 7.2.12.1, which is SMALL.

9.3.2.1.11.12 Transportation Dose Impacts

Given the close proximity of the alternative site locations to the Proposed Site, the transportation distances associated with fuel and radioactive wastes is essentially the same as transportation does impacts associated with the Proposed Site. As a result, the cumulative impacts of transportation dose are the same as those provided in Section 7.2.12.2. which is SMALL.

9.3.2.1.11.13 Decommissioning

The activities required to support decommissioning are the same for the alternative sites as the Proposed Site. Due to the close proximity of the alternative sites to the Proposed Site, the GAI for cumulative effects related to decommissioning remain the same for the alternative sites as it is for the Proposed Site. As a result, the cumulative impact of decommissioning at the alternative site locations is the same as the cumulative impact for the Proposed Site as documented in Section 7.2.12.3, which is SMALL.

9.3.2.1.12 Summary

Due to the close proximity of the alternative sites, the environmental impacts of the alternative sites are essentially the same as the Proposed Site location, with the exception of historic and archaeological resources for Sites C and D, for which impacts may be greater than those for the Proposed Site and Site B. Accordingly, none of the alternative sites would be environmentally preferable to the Proposed Site.

<u>Tables</u>

None

Figures

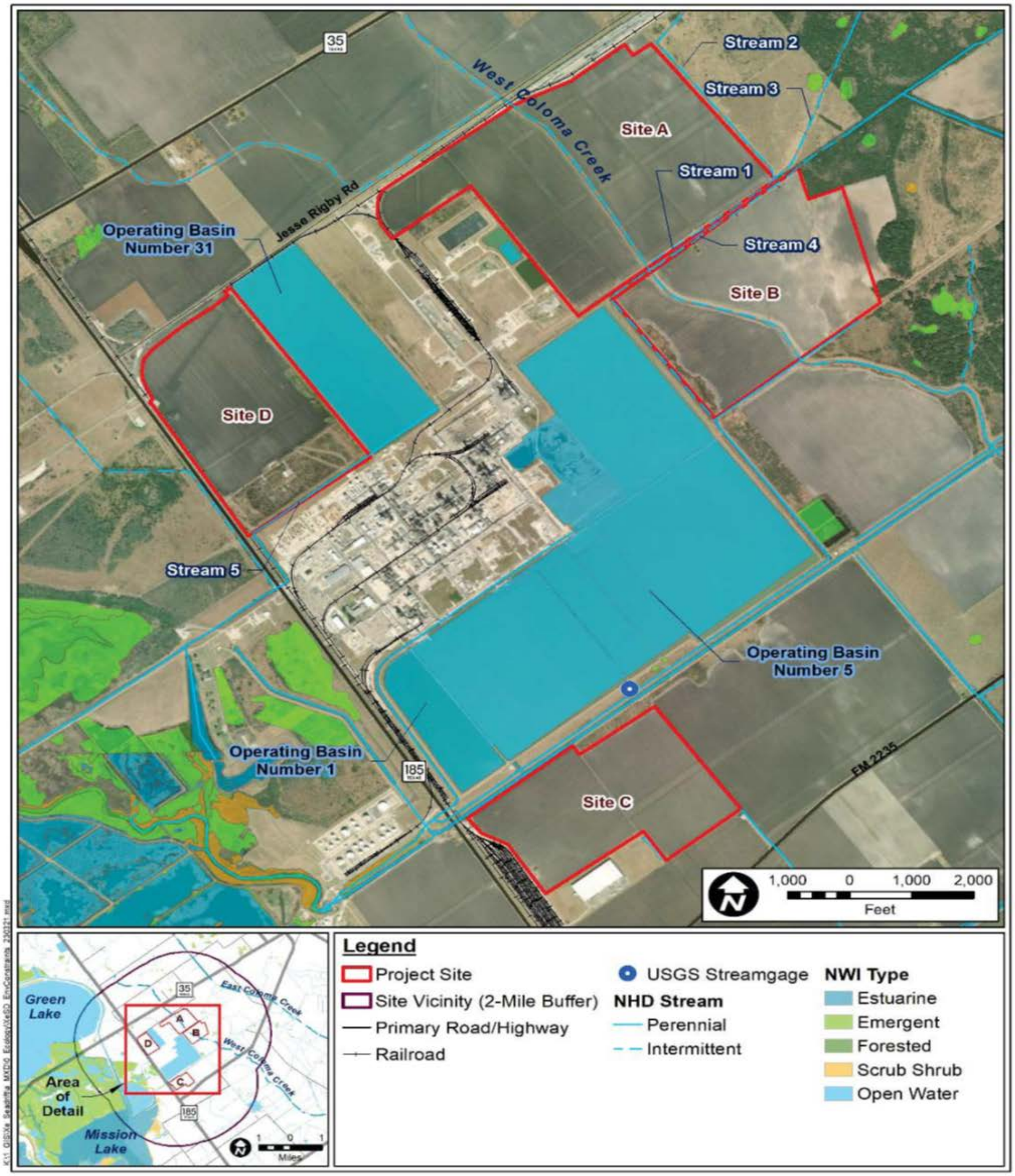

Figure 9.3-1: Candidate Sites

9.4 System Alternatives

Discussed in this section are the proposed heat dissipation and circulating water systems, as well as alternatives to those plant systems for LMGS. The intent of this section is to provide information for the proposed and alternative systems thus enabling the comparison of environmental impacts of each system. Chapter 3 details the proposed heat dissipation, circulating water, and transmission systems.

9.4.1 Heat Dissipation Systems

Multiple alternative systems, with a variety of energy transfer methods, exist for dissipating heat energy to the environment. Each alternative heat dissipation system has potential environmental impacts which are evaluated using the guidance of NUREG-1555 in the following subsections.

9.4.1.1 Proposed Heat Dissipation System

An ACC is the primary heat dissipation system proposed for LMGS. A description of the system and explanation of the operational modes are provided in Section 3.4.1. In summary, the ACC functions as a heat exchanger to remove heat from the turbine exhaust and transfer the heat to the ambient air.

The ACC system, a dry cooling system, is closed, retaining steam and condensate in the tubes and piping. Excess heat is dissipated through cooling fins as described above. This is unlike the operation of a wet cooling system consisting of a conventional steam condenser and mechanical draft cooling tower (MDCT). In MDCTs, cooling water is pumped from the conventional steam condenser to the cooling tower where it falls down through packing (fill) in the upper part of a cell against air blown upward by a fan. Excess heat in cooling water is transferred to the atmosphere by evaporation of cooling water. In addition to evaporative heat losses, water is lost in the form of droplets (drift). The droplets evaporate downwind, leaving dissolved solids as deposits.

In December 2001, the U.S. Environmental Protection Agency (EPA) published in the Federal Register the National Pollutant Discharge Elimination System: Regulations Addressing Cooling Water Intake Structures for New Facilities; Final Rule (66 FR 65256). In its evaluation of available technologies, the EPA concluded that dry cooling is not the best technology available for minimizing adverse environmental impact but may be appropriate in areas with limited water availability or where extremely sensitive biological resources are associated with the water source. Additional concerns associated with dry cooling towers which contributed to the EPA's conclusion is that dry cooling reduces energy efficiency of steam turbines, and the higher capital and operating costs can be a barrier to entry in the marketplace for some facilities. SDO is located on a border between a low-medium water stress area and high water stress area. Due to the proximity to a high water stress area, ACCs are used to reduce water demand and overall water consumption.

9.4.1.2 Alternatives to the Proposed Heat Dissipation System

NUREG-1555, Subsection 9.4.1, provides guidance for evaluating alternatives to the proposed heat dissipation system. Alternative heat dissipation systems can generally be classified as either a once-through or a closed-cycle cooling system. In addition to a once-through cooling system (OTCS), NUREG-1555 suggests a variety of closed-cycle cooling systems (CCCS) be evaluated such as mechanical draft wet cooling towers, natural draft cooling towers, hybrid (wet/dry) cooling towers, dry cooling towers, cooling ponds, and spray ponds.The following subsections assess the environmental impacts of the alternative cooling systems as they relate to LMGS.

9.4.1.2.1 Once-Through Cooling Systems

OTCS require water to be withdrawn from a nearby waterbody, make a single pass through the condenser, and subsequently discharge back to the waterbody from which it was removed. The typical nuclear power plant OTCS flow rate is approximately 736,000 gallons per minute (gpm) (46 cubic meters per second [m^3/s]) per 1000 MWe or 1,060 million gallons per day (MGD). Although nearly all the water would be returned, impacts to the surface water quality and the effects on aquatic organisms due to changes in water quality (temperature and chemistry), entrainment, and impingement require consideration.

The EPA has responsibility for regulating nonradiological impacts to water quality and aquatic ecology under the Clean Water Act (CWA). The CWA, Section 316(a) establishes thermal effluent limitations while Section 316(b) requires the best technology available be used to minimize environmental impacts including impingement and entrainment of aquatic organisms (EPA, 2001a). Further, EPA regulations (40 CFR Part 125 Subpart I) governing cooling water intake structures under Section 316(b) for new facilities, effectively prohibits newly constructed steam electric generating plants from using once through cooling systems for steam electric generating plants with intake flows greater than 10 MGD.

Further, based on the lack of proximity to a surface water body suitable to supply the required water volume as well as the potential impacts and the mitigation measures which would be required to comply with EPA regulations and alleviate these impacts, an OTCS is not an environmentally preferable heat dissipation system.

9.4.1.2.2 Closed-Cycle Cooling Systems

Mechanical draft wet cooling towers, natural draft cooling towers, hybrid (wet/dry) cooling towers, cooling ponds, and spray ponds are alternative heat dissipation CCCS considered for LMGS.

9.4.1.2.2.1 Mechanical Draft Wet Cooling Towers

Water from the condenser is pumped to the mechanical draft wet cooling tower where heat from the water is rejected to the air. Large fans are used to increase the air flow through the tower and enhance the heat transfer from the water to the air. Once the heat has transferred from the water to the air, the water returns to the condenser. System losses through evaporation and drift require a makeup water source, the volume of which is minimal in comparison to the water required for an OTCS. To address buildup of dissolved salts in the water, a portion of mineral-rich water would be discharged as blowdown and replaced with freshwater. Fogging and/or icing are potential atmospheric effects of the mechanical draft wet cooling towers.

Due to the large amount of water necessary to support MDCTs, this alternative is removed from consideration due to the limitation of available water.

9.4.1.2.2.2 Natural Draft Cooling Towers

Allowing the air to move naturally by convection, natural draft cooling towers require no fans to assist in the thermal transfer. Hot water is pumped into the upper elevation of the tower and then passes through a fill media or packing material which increases the dispersion and surface area of the water. While passing through the fill material, heat is transferred to the air and evaporative cooling of the water occurs. At the base of the tower, ambient air passes over a pool of cooler water. This passing of ambient air over the cool water at the base of the tower, as evaporation and heating of the air in the upper elevation of the tower occurs, creates a differential in both air temperature and density resulting in a natural flow of the less dense and warmer air to the top of the tower. This chimney like upward flow of air is enhanced by the hyperbolic shape of the tower.

Natural draft cooling towers have a large cooling capacity, which generally means only one is required for each reactor. Fans are not used in natural draft cooling towers; therefore, there is little noise, low power needs, and less maintenance required. Given the generally taller height of natural draft towers as compared to mechanical draft towers, the drift and moisture exiting the tower are dispersed over a long distance and local impacts such as fogging and icing are less likely to occur.

Typical natural draft cooling tower height is over 500 feet (ft) (160 meters [m]) to achieve adequate airflow. Significant water flow and a wide tower circumference are also necessary to achieve required heat dissipation. The height of these towers and plumes are visible from a great distance, which may have a negative public perception. Four reactor modules will be constructed at LMGS; therefore, this alternative is removed from consideration due to the noticeable aesthetic impact, volume of water required, and large footprint of multiple towers.

9.4.1.2.2.3 Wet/Dry Hybrid Cooling Towers

The combination of wet and dry cooling tower design is also known as a hybrid cooling tower. Hybrid cooling towers can achieve efficiencies similar to those of a wet cooling tower and reduced visible plume associated with dry cooling towers. Hybrid cooling tower designs can be customized with varying portions of the system being wet versus dry, as appropriate, based on site-specific parameters and water source availability. The general arrangement of a hybrid cooling tower has a lower wet section and dry section above which allows for wet air to rise through the dry section thereby reducing the visible water vapors exiting the tower. Water use of hybrid cooling towers is less than a fully wet tower, but the additional energy needed to move air through the dry portion results in a reduced net electrical output and additional maintenance. Functioning primarily as a wet cooling tower during warmer weather, the hybrid tower operations can be shifted to exclusively dry mode operation when ambient temperature is low and risks of localized fog and/or icing increases.

The wet/dry hybrid cooling tower is eliminated from consideration based on the reduced net electrical generation and increased maintenance costs associated with the dry portion, as well as the water needs of the wet portion.

9.4.1.2.2.4 Cooling Pond

A cooling pond is a closed-cycle reservoir with a large surface area to facilitate heat dissipation through evaporation and convection to the ambient air. Power plants using cooling ponds function like a OTCS with an intake and discharge structure at the pond. Cooling ponds may have additional purposes such as stormwater collection and water supply for the power plant. Cooling ponds require a discharge outlet for blowdown and the release of excess water which accumulates in the pond during major rain events. A source of makeup water is required to replenish water loss from evaporation and blowdown. The blowdown and makeup of cooling pond water also helps address increasing total dissolved solids, metals, and other contaminant concentrations in the cooling pond. Discharge from a cooling pond is classified as an industrial wastewater discharge and is subject to the CWA TPDES permitting requirements.

Makeup water requirements for a cooling pond are not greatly different from those of a cooling tower. The main disadvantage for a cooling pond is the amount of land required. Currently, nine nuclear plants use cooling ponds as the primary means to dissipate heat. The surface areas of the cooling ponds associated with these plants range from 629 to 2924 ha (1573 to 7310 ac) (NRC, 1996). While the land use is extensive, the cooling ponds can provide a positive contribution to the recreational, aesthetic, and ecological value of a community.

Due to the lack of suitable surface water near the facility for makeup water and potential impacts, a cooling pond is not an environmentally preferable option for heat dissipation at LMGS.

9.4.1.2.2.5 Spray Pond

Spray ponds offer significant advantages over conventional cooling ponds by requiring significantly less land to dissipate the same amount of heat. Spray ponds consist of a series of spray nozzles in a relatively long and narrow pond. Water from the condenser is sprayed into the air, cooled by evaporation, and returns to the pond where it is drawn into the intake structure and is pumped back to the condenser. A discharge outlet for blowdown and the release of excess water which accumulates in the spray pond during major rain events is also required; this effluent is classified as an industrial wastewater discharge and is subject to TPDES permitting requirements of the CWA (EPA, 2001b).

Like cooling ponds, spray ponds require a makeup water source to replenish water lost to evaporation and blowdown. Because the main source of cooling is evaporative cooling through the spray nozzles, the water makeup requirements for a spray pond are similar to that of a wet cooling tower. The blowdown and makeup of pond water also helps address increasing total dissolved solids, metals, and other contaminant concentrations in the spray pond.

The evaporative heat transfer due to the nozzles spraying the water into the air is inherently less efficient when compared to a cooling tower that utilizes either forced or natural draft effects to increase airflow over a sprayed water pattern. The relatively lesser airflows associated with a spray pond equate to a decrease in efficiency of the heat transfer and an increase in the amount of land required for the spray pond to dissipate an equivalent amount of heat when compared to a wet cooling tower. Plant output as a function of land use at power plants utilizing spray ponds is approximately 1 ac (0.4 ha) per 15 MWe. Thus, utilizing a spray pond for the Xe-100 plant would require approximately 80 ac (32 ha) of land of land for the spray pond while the total ACC footprint is approximately 2 ac (0.8 ha) (Section 3.1, Plant and Project Description).

As well as limitations on acreage, there is a constraint by Dow to limit the amount of water taken from the GBRA. Because of the lack of suitable surface water near the facility for makeup water, a spray pond is not an environmentally preferable option for heat dissipation at LMGS.

9.4.2 Circulating Water Systems

Since LMGS uses ACCs, there is no circulating water system. Makeup water required for LMGS is primarily needed to support the consumption of steam by SDO. Liquid discharge from the site is based on normal plant liquid waste systems and is not related to heat discharge from cooling water systems. As a result, alternatives related to the Circulating Water System are not applicable to LMGS.

Tables

None

Figures

None

9.5 References

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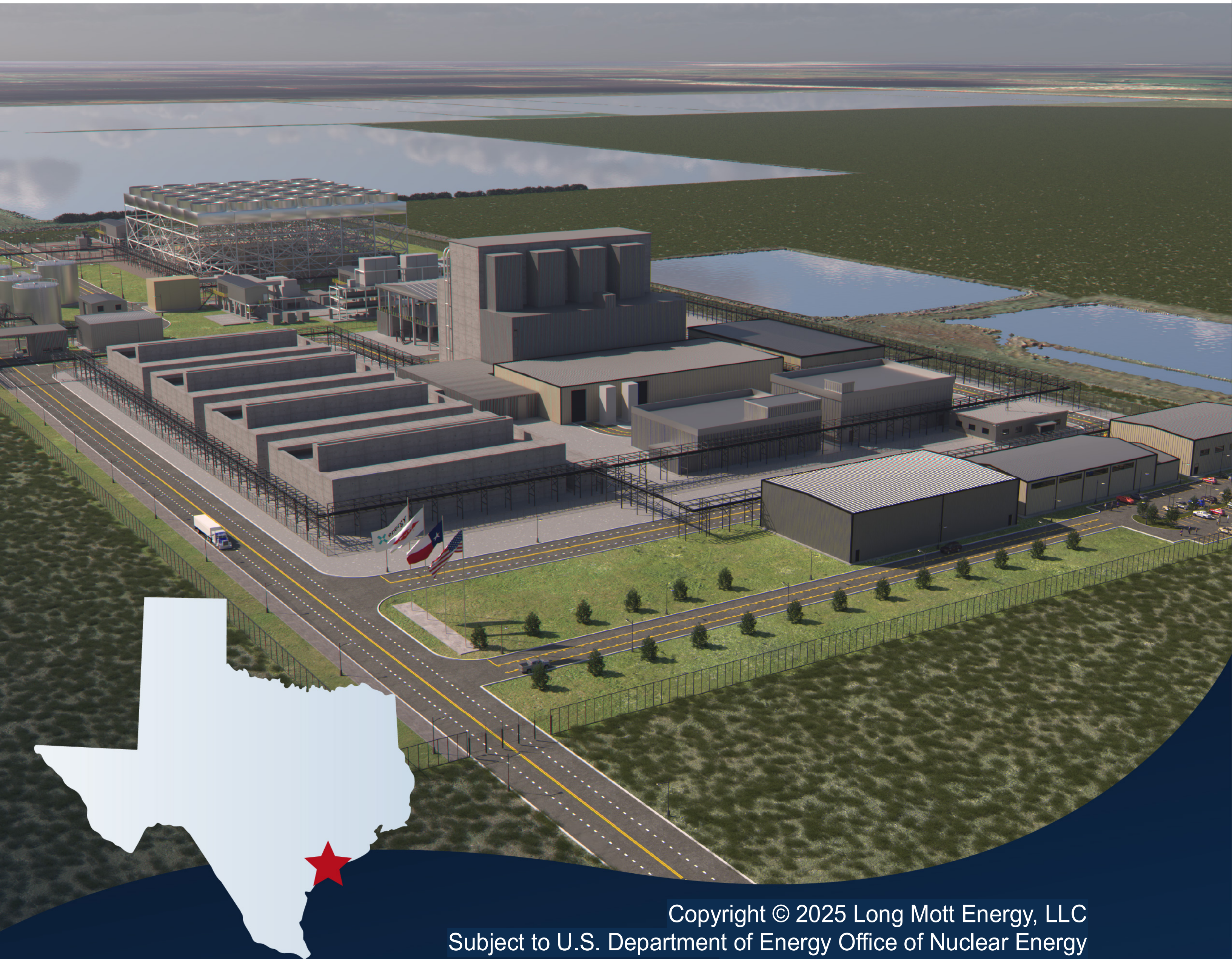
Long Mott Generating Station

Environmental Report
Chapter 10 - Environmental Consequences of the Proposed Action



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Chapter 10 - Environmental Consequences of the Proposed Action

Section 101 of the National Environmental Policy Act of 1969 (NEPA) requires federal agencies to assess the environmental effects of proposed major federal actions prior to making decisions. Section 102 of NEPA establishes procedural requirements, applying that national policy to proposals for major federal actions significantly affecting the quality of the human environment by requiring federal agencies to prepare a detailed statement on: (1) the environmental impact of the proposed action; (2) any adverse effects that cannot be avoided; (3) alternatives to the proposed action; (4) the relationship between the proposed action's short-term use of environmental resources and the maintenance and enhancement of long-term productivity; and (5) any irreversible and irretrievable commitments of resources that would be involved in the proposed action.

This chapter presents the potential environmental consequences of building, operating, and decomissioning the Long Mott Generating Station (LMGS). The environmental consequences are evaluated in six sections:

- Section 10.1—Impacts of the Proposed Action
- Section 10.2—Unavoidable Adverse Impacts
- Section 10.3—Irreversible and Irretrievable Commitments of Resources
- Section 10.4—Relationship Between Short-Term Uses and Long-Term Productivity of the Human Environment
- Section 10.5—Alternatives to the Proposed Action
- Section 10.6—Benefit-Cost Balance

10.1 Impacts of the Proposed Action

The relative magnitude of the impacts associated with building LMGS are discussed in Chapter 4 and summarized in Table 4.6-1. Impacts associated with operating LMGS are discussed in Chapter 5 and summarized in Table 5.12-1. Chapter 7 describes the cumulative impacts associated with building activities, operation, and decommissioning of LMGS when considered along with other past, present, and reasonably foreseeable future projects in the geographic area of interest for each resource.

The following sections provide a summary of the impacts from building activities, operation, and cumulative impacts associated with LMGS.

10.1.1 Land Use

10.1.1.1 The Site, Vicinity, and Region

Impacts to land use in the site, vicinity, and region are discussed in Section 4.1.1, Section 5.1.1, and Section 7.2.1.

Land use impacts from building activities associated with LMGS result from permanent conversion of agricultural land to industrial use, loss of prime farmland and changes in a coastal zone. As identified in Section 4.1.1, a Farmland Conversion Impact Rating (Form AD-1006) was completed in consultation with the U.S. Department of Agriculture's Natural Resources Conservation Services to evaluate the potential impacts to prime farmland. Correspondence is located in Appendix 1A. Based on the AD-1006 impact score, there is a potential adverse and noticeable impact to prime farmland. However, given the amount of prime farmland in the vicinity, the impact is noticeable, but not destabilizing; therefore, impacts to land from building activities are MODERATE.

LMGS is located within the official boundary of the Texas Coastal Management Program (CMP) (Figure 2.2-5). A Texas CMP Consistency Certification package was submitted to the Texas General Land Office (Appendix 1A). Due to the project dependence upon proximity to SDO, the established adjacent industrial use of SDO, and the distance from the coast, site use is consistent with the goals and polices of the Texas CMP.

LMGS permanently occupies approximately 320 acres (ac) 130 hectares (ha) of land within the LMGS site. No new areas will be disturbed during operations. Additionally, LMGS uses a dry cooling system and as such, there is no impact to land use from salt deposition from cooling tower operation; therefore, impacts to land from operations at the LMGS site are SMALL.

As identified in Section 7.2.1, the cumulative impact on the LMGS site in combination with the past, present, and reasonably foreseeable future actions (RFFAs) in the Geographic Area of Interest (GAI) is MODERATE. Due to the extensive past and present modification of land use, and the close juxtaposition of the LMGS adjacent to SDO, the LMGS is not a significant contributor to the cumulative impact on land use.

10.1.1.2 Transmission Corridors and Off-Site Areas

Impacts to land use in electric transmission corridors and off-site areas are discussed in Section 4.1.2 and Section 5.1.2, while cumulative impacts of electric transmission corridors and off-site areas are considered in the cumulative analysis of land use in Section 7.2.1.

No new transmission line corridors are planned for off-site connections from LMGS. As such, impacts to land use associated with building the transmission corridor are minor. Given that the transmission lines are located within the LMGS site, there are no impacts to off-site areas.

There are no off-site transmission corridors, and no other off-site areas affected during operation. As such there are no additional impacts to land use within off-site areas as a result of operation of LMGS.

As noted above, transmission corridors and off-site areas are considered in the cumulative analysis of land use (Section 10.1.1.1).

10.1.1.3 Historic Properties

Impacts to historic properties are discussed in Section 4.1.3, Section 5.1.3, and Section 7.2.6

No archaeological sites are located within the LMGS site or in the 0.6 miles (mi) 1 kilometer (km) buffer surrounding the site. In addition, a search was completed to identify National Register of Historic Places (NRHP)-listed properties within 10 mi (16 km) of the LMGS site center point. None of these properties are listed in the NRHP; therefore, there is no indirect visual impact to historic resources in the 10 mi (16 km) viewshed. The Texas Historic Commission concurred on February 16, 2024, with the archaeological findings and the architectural viewshed findings that no historic properties are present or affected by LMGS (Appendix 1A and Part VI Supplemental Information).

Since the SDO site is substantially disturbed, any RFFAs within the LMGS site or within the 0.5 mi (0.8 km) buffer would not affect historic and cultural resources. Additionally, there are no historic properties present on the LMGS site, and no direct or indirect impacts to historic properties associated with the LMGS; therefore, there are no cumulative impacts to historic and cultural resources.

10.1.2 Water Resources

10.1.2.1 Surface Water

Impacts to surface waters are discussed in Section 4.2.1, Section 5.2.1, and Section 7.2.2.

10.1.2.1.1 Hydrologic Alterations

Hydrologic alterations during building depend on final LMGS site design and building activity details and phasing. Temporary drainage ditches replace stormwater drainage via the existing agricultural drainage ditches. Placement of permanent or temporary fill or temporary material stockpiles may obstruct flood conveyance through West Coloma Creek overbank areas. Impacts associated with alterations of West Coloma Creek are minor and localized. Impacts associated with alterations of streams by water supply pipeline installation are minor, localized and temporary. Impacts associated with building the intake structure on the Guadalupe-Blanco River Authority (GBRA) Calhoun Canal are minimal based on the location of the intake structure recessed into the northern Canal bank. During building, stormwater alterations are managed by the incorporation of stormwater controls, or stormwater best management practices (BMPs). Stormwater from LMGS is controlled by the temporary sediment basin and permanent stormwater basin.

Based on the commitment to design and manage surface water and stormwater in accordance with applicable regulatory requirements, impacts of stormwater management are minor. Hydrologic alteration of surface waters from operational activities within LMGS site and off-site, particularly upstream and downstream of West Coloma Creek and the GBRA Calhoun Canal, are mitigated using design standards, BMPs, and maintenance practices. Furthermore, nonradiological liquid waste streams from LMGS tie into existing SDO infrastructure and discharge to the Victoria Barge Canal via an existing, permitted outfall. Concentrations of all effluents are in accordance with the Texas Commission on Environmental Quality (TCEQ) Texas Pollutant Discharge Elimination System (TPDES) permit conditions. As such, there is no discrete permitted discharge from LMGS and consequently, no hydrologic alterations associated with plant discharge; therefore, hydrologic alterations of surface water from building and operation of LMGS are SMALL.

As stated in Section 7.2.2 surface water resources have been noticeably impacted by past and ongoing land use practices and industrial. These past, present and RFFAs together with the LMGS represent a MODERATE cumulative impact to surface water hydrology. Because LMGS has localized and limited hydrologic alterations, the impact of LMGS is not a significant contributor to the cumulative impact on surface water hydrology.

10.1.2.1.2 Water Use

Building activities require the use of surface water, which is obtained from Basin #5. Water obtained from Basin #5 for building activities is sourced from the GBRA Calhoun Canal. The average annual water usage rate required for building activities is less than 1 percent of the average annual water usage rate by SDO in 2022; therefore, water use from building activities is minor relative to water availability associated with basins developed for uses by the SDO, GBRA and other water users physically downstream of SDO on the GBRA Calhoun Canal. Runoff flowing into West Coloma Creek from lands disturbed by building activities is controlled via engineered structures, the temporary sediment basin, permanent stormwater basin, and BMPs. Discharges into West Coloma Creek are authorized and maintained in compliance with all necessary state and federal permits, including a TPDES construction stormwater permit; therefore, there is no degradation of the quantity or quality of water for downstream users. Impacts of surface water use due to building activities at the LMGS site are SMALL.

Operational water use represents a minor percentage of available water flow in the Guadalupe River during normal annual and seasonal conditions as well as drought conditions. Additionally, the physical locations used for the intake and discharge of water at LMGS occur on surface water resources that are currently utilized by SDO and are permitted under existing water rights. While LMGS operations result in less water availability within the Guadalupe River, operations comply with existing surface water rights at SDO and remain only a small portion of available water rights during drought conditions; therefore, impacts to water use and downstream water users during LMGS operations is SMALL.

SDO and the GBRA own surface water rights on the Guadalupe River. The RFFAs in the GAI are permitted in accordance with the state and federal laws and regulations that ensure the protection of surface water use. The cumulative impact from past, present, and RFFAs in combination with the proposed action on surface water use is SMALL. The impact of LMGS is not a significant contributor to the cumulative impact on surface water use.

10.1.2.1.3 Water Quality

Impacts to surface water quality during building activities result from direct physical alteration of surface waters from activities such as in-filling of streams. Indirect impacts on surface water quality may be caused by activities such as erosion and sedimentation, accidental spills or releases of stormwater. Direct impacts are primarily limited to those associated with the building of an intake structure on the GBRA Calhoun Canal, building the water intake pipeline that crosses three streams and building of bridges across West Coloma Creek. Indirect impacts result from erosion leading to sediment deposition in on-site streams. Indirect impacts to water quality are minimized through the use of BMPs and implementation of a stormwater pollution prevention plan (SWPPP) to reduce pollutant loading and decrease downstream impacts on water quality. The potential for accidental spills of petroleum or industrial chemicals are managed through the implementation of a Spill Prevention, Control, and Countermeasure (SPCC) Plan. As such, the impacts of building activities to surface water quality are SMALL.

Operational plant design integrates the use of air-cooled condensers (ACCs) that do not result in salt deposition from cooling tower drift. Stormwater is managed in accordance with the provisions of the SWPPP and implementation of appropriate BMPs. Additionally, there are no discrete plant effluents from LMGS. Stormwater discharges are monitored and controlled in accordance with the requirements of the TPDES permit; therefore, impacts to surface water quality from operations are SMALL.

As described in Section 2.3.1.3, several surface water resources near LMGS are listed on the 303(d) list. Surface water quality has been noticeably impacted by past and ongoing industrial land uses. Existing operations, including SDO, Seadrift Coke Petroleum Power Plant, and INEOS Nitriles Green Lake facility, operate in accordance with the terms of their existing TPDES permits. RFFAs are expected to implement BMPs, SPCC plans and other measures to minimize potential water quality impacts. Both the proposed LMGS and the Lynas Rare Earths processing facility would rely on SDO for treatment of sanitary wastewater and nonradiological liquid wastes and would not have a discrete discharge to surface waters. As such the cumulative impact of the past, present, and RFFA in addition to the proposed LMGS is noticeable and LARGE. However, the impact of the proposed LMGS is localized and minor and is not a significant contributor to the cumulative impact on surface water quality.

10.1.2.2 Groundwater

Impacts to groundwater are discussed in Section 4.2.2, Section 5.2.2, and Section 7.2.2.

10.1.2.2.1 Hydrologic Alterations

Temporary dewatering may be required to maintain a dry excavation for building the foundations for LMGS structures. Localized changes in water levels within the affected water bearing zone may occur from dewatering. All dewatering flows are routed to the permanent stormwater basin. Once building activities are completed, dewatering is no longer needed and the water table is expected to return to static conditions. Due to the shallow depth required for foundation excavation, foundation development does not result in long-term impacts on groundwater levels, availability, or flow patterns; therefore, impacts of hydrologic alteration of groundwater during building activities are SMALL.

There are no hydrologic alterations that affect groundwater availability during operations. Additionally, there are no site groundwater withdrawals that affect local aquifers; therefore, impacts of hydrologic alteration of groundwater from operations are SMALL.

Past, present and RFFAs in the GAI are expected to utilize wells for facility needs; hydrological alteration may be expected to occur in proximity to wells used. The cumulative impacts of the proposed action added to the effects of the present, and RFFAs on groundwater hydrology is MODERATE. Although temporary dewatering may be required to maintain a dry excavation for the building of the foundations for the LMGS structures, there are no planned uses of groundwater during building or operation. Hydrologic alterations from dewatering are temporary and not a significant contributor to the cumulative impact on groundwater hydrology.

10.1.2.2.2 Groundwater Use

There are no planned uses of groundwater during building; therefore, the impacts of groundwater use are SMALL.

No groundwater from on-site or off-site sources is used during operation of LMGS. Furthermore, no permanent dewatering system is planned for use during operations; therefore, impacts of groundwater use from operations are SMALL.

The cumulative impact on groundwater use, combined with the effects associated with past, present, and RFFAs within the GAI on groundwater use, is not noticeable and therefore, SMALL.

10.1.2.2.3 Water Quality

All dewatering flows are routed to the permanent stormwater basin prior to its permitted release to West Coloma Creek. Accidental releases or spills of fluids have the potential to contaminate groundwater. A SPCC Plan will be prepared and implemented at LMGS site, which would include the use of BMPs to minimize the occurrence of spills and limit their effects on groundwater. In the unlikely event small amounts of contaminants are released into the environment, they would have only a small, localized, temporary impact on the groundwater because of the predominance of heavy clays on the LMGS site. Impacts to groundwater quality from building activities are SMALL.

During operations, accidental releases or spills of fuels, fluid, or lubricants are unlikely; however, if they occur, they will be cleaned up in accordance with the SPCC Plan. A permanent stormwater basin is used to control stormwater runoff from LMGS site. This permanent stormwater basin may increase infiltration of stored water within the area of the basin and increase local recharge to groundwater. However, recharge of local groundwater and potential infiltration of constituents from the permanent stormwater basin are limited based on design requirements, BMPs, and the predominance of dense clay soils on the LMGS site.

Additionally, the permanent stormwater basin is designed to meet the requirements of the TPDES permit for the discharge system limiting the impact of the stormwater basin on groundwater quality; therefore, impacts of operation on groundwater quality are SMALL.

Past, present, and RFFAs are permitted or authorized in accordance with state and federal laws and regulations that ensure the protection of groundwater quality. The cumulative impact on groundwater quality from LMGS in combination with the associated past, present, and RFFAs is SMALL.

10.1.3 Ecological Impacts

10.1.3.1 Terrestrial Ecosystems

Impacts to terrestrial ecosystems and wetlands are discussed in Section 4.3.1, Section 5.3.3.2, Section 5.6.1, Section 5.3.3.2, Section 5.10.1, and Section 7.2.3.1.

Impacts to plant communities and habitats are limited because of the degraded quality of habitat on-site and the availability of similar habitat throughout the vicinity and region. Impacts to wildlife are limited through the implementation of mitigation measures and BMPs, and individual losses of species as a result of building activities do not affect species populations within the vicinity or region. Impacts to important terrestrial species are limited because these species are not found on the LMGS site or there is limited impact on habitats and populations found within the vicinity and region. The only important habitat on the LMGS site consists of wetlands, and approximately 3.7 ac (1.5 ha) are permanently impacted. Direct impacts to wetlands, which are subject to United States Army Corps of Engineers regulatory authority pursuant to Sections 401 and 404 of the Clean Water Act (CWA), are mitigated through adherence to federal and state mitigative requirements that result in no net loss to wetlands. Indirect impacts to wetlands on the LMGS site are minimized by the use of BMPs such as erosion and sedimentation controls that limit the transport of sediment to wetlands via stormwater; therefore, the impacts to terrestrial ecology and wetlands from building activities are SMALL.

Operational impacts of LMGS on terrestrial ecosystems result from landscape maintenance activities, utility corridor operation and maintenance, increased noise levels, use of transmission towers as perching or nesting site, and the presence of vertical structures that represent a potential for collisions by birds. These impacts are minimized by the predominance of low-quality habitats in lands potentially affected by plant operations, expected wildlife avoidance of areas on the LMGS site characterized by elevated noise levels, compliance with Migratory Bird Treaty Act, and the use of BMPs in conjunction with maintenance activities.

Operational plant design integrates the use of ACCs. As such, there is no impact to land use or terrestrial resources on the LMGS site or in the vicinity from any emissions associated with cooling the facility. Additionally, based on the use of ACCs, potential thermal impacts to plant communities and wetlands are not concerns.

Therefore, based on the above assessments of environmental impacts, the impacts of LMGS operation on terrestrial ecosystems are SMALL.

Terrestrial ecosystems in the GAI have been noticeably impacted by agricultural and industrial development. Development of RFFAs would permanently commit additional land to industrial uses. The cumulative impact of the LMGS, in addition to the past, present, and RFFAs is noticeable and destabilizing and therefore, LARGE. Due to the predominant use of previously disturbed agricultural lands by LMGS, the impact of LMGS is not a significant contributor to the cumulative impact on terrestrial ecology.

10.1.3.2 Aquatic Ecosystems

Impacts to aquatic ecosystems are discussed in Section 4.3.2, Section 5.10.2, Section 7.2.3.2.

Impacts to aquatic ecology during building activities are primarily limited to those associated with building the intake structure on the GBRA Calhoun Canal and the water intake pipeline, building bridges across West Coloma Creek, and indirect impacts associated with erosion and sedimentation to on-site streams. Indirect impacts to important species and habitats in West Coloma Creek are minimized with use of BMPs and implementation of a SWPPP to reduce pollutant loading and decrease downstream impacts on water quality. On-site transmission lines do not cross jurisdictional waters that include aquatic ecosystems. The potential for accidental releases or spills of petroleum or industrial chemicals is managed through the implementation of an SPCC plan; therefore, the impacts of building activities on aquatic ecosystems are SMALL.

Because the primary means for heat dissipation to the environment for LMGS is directly to the atmosphere through ACCs, there is no discharge to aquatic ecosystems from heat dissipation systems. Impacts to aquatic ecology from operations are limited to operation of the intake system on the GBRA Calhoun Canal, operational discharge to the Victoria Barge Canal, and stormwater discharges to West Coloma Creek. Impacts to aquatic ecology associated with operation of the of the water intake structure are minimized through maintenance of water levels within the GBRA Calhoun Canal and integration of design and operational measures consistent with those in CWA 316(b) requirements. Operational discharge from LMGS ties into existing SDO infrastructure and as such, there is no discrete discharge from LMGS. Impacts from stormwater discharges are mitigated by using BMPs and adhering to regulations set forth by the plant's TPDES permit. There are no impacts to aquatic ecosystems associated with transmission line systems; therefore, impacts of operations on aquatic ecosystems are SMALL.

Existing aquatic habitats on the LMGS site are substantially affected by channelization and irrigation/drainage alteration and are generally of low quality. Accordingly, aquatic biological communities are dominated by common species. New industrial development associated with the RFFAs in the GAI is not expected to result in direct impacts to aquatic habitats, but may have indirect effects on tributaries of West Coloma Creek. Based on prior alterations of West Coloma Creek, the cumulative impact of the LMGS and the past, present, and RFFAs on aquatic ecology is MODERATE. Based on the extensive past alteration of aquatic ecosystems by agricultural and industrial uses, and the predominant use of previously disturbed land by LMGS, the LMGS is not a significant contributor to the cumulative impact on aquatic ecology.

10.1.4 Socioeconomic Impacts

10.1.4.1 Physical Impacts

Physical impacts are discussed in Section 4.4.1, Section 5.8.1, and Section 7.2.4.1.

Physical impacts during building activities include impacts associated with noise, air and dust emissions, visual intrusions, and physical impacts to transportation routes. Impacts from noise from building activities is minimally perceptible to the nearest residence and recreational areas and noise from building-related traffic is intermittent and temporary. Impacts associated with dust and air emissions are limited in duration, infrequent, and localized mostly to the LMGS site. Air emissions are controlled using minimization measures and through maintaining the established regulatory limits designed to minimize impacts. Building activities may be visible to nearby residents and recreational users of the Victoria Barge Canal and Guadalupe Wildlife Management Area; however, the visual impacts of building activities are integrated into the existing landscape which includes the SDO facility and are screened by existing infrastructure, vegetation, and topography. Public roadways impacted by increased traffic during building activities are repaired to existing conditions or better once building activity completes; therefore, physical impacts of building activities are SMALL.

Operational noise levels attenuate to below the baseline ambient noise levels for the nearest residences. The workforce and truck deliveries primarily access LMGS from SH 185 and Jesse Rigby Road, where adjacent land uses are largely agricultural or industrial and therefore, less sensitive to increased noise levels. Operation does not impact regional air quality and LMGS uses a dry cooling system that does not result in salt deposition from cooling tower drift that could impact structures. The viewshed of LMGS is screened by existing infrastructure, vegetation, and topography and is absorbed into the existing industrial viewshed; therefore, LMGS contributes only minimal additional visual discord in the existing landscape. No significant deterioration to the transportation infrastructure is anticipated from operations; therefore, physical impacts associated with operation are SMALL.

Future actions in the GAI, including the SDO cogeneration plant closure, the New Alkoxylation Unit Project, and the Lynas Rare Earths processing facility, could contribute to physical impacts associated with air emissions, noise, and visual resources. Construction of these facilities is localized and completed before the LMGS building phase. Operation of these facilities would introduce new visual elements. However, the presence of SDO and other existing industrial features would help absorb the visual disturbance, resulting in brief and intermittent disruptive views which are consistent with the surrounding industrial facilities in the area. The cumulative physical impact from LMGS together with the past, present, and RFFA is SMALL.

10.1.4.2 Demographic Impacts

Impacts to demographics are discussed in Section 4.4.2.1, Section 5.8.2.1, and Section 7.2.4.2.

The projected population increases associated with the in-migration of construction workers and their families account for less than five percent of the total population of the region of influence (ROI) or any of the individual counties. However, impacts to housing availability from the in-migrating construction workforce are noticeable but not destabilizing to the housing market overall; therefore, the potential impacts associated with the projected population increase during building activities are SMALL to MODERATE.

The projected population increases associated with the in-migration of operations workers and their families account for less than one percent of the total population of the ROI or any of the individual counties. Because the in-migrating operations workers, including outage workers, are fewer than the number of in-migrating construction workers, the increased population does not noticeably affect the demographic character of the ROI or any of its counties; therefore, the impact is SMALL.

Many of the past and present actions have resulted in demographic population changes within the GAI. Similarly, RFFAs that entail the in-migration of workforces have the potential to result in some demographic changes. In population centers such as Victoria, the increase in housing demand, job creation, and recruitment of workers is noticeable but not destabilizing; therefore, the cumulative impact to demographics from LMGS, in combination with past, present, and RFFAs, is MODERATE. However, the small in-migrating workforce of LMGS, in comparison to the population of the ROI, is not a significant contributor to the cumulative impact on demography.

10.1.4.3 Economic Impacts

Economic impacts are discussed in Section 4.4.2.2, Section 5.8.2.3, and Section 7.2.4.3.

Building activities on the LMGS site introduce millions of dollars into the economy and creates jobs. These positive economic impacts are realized primarily within the ROI. Minor tax revenue impacts on local jurisdictions accrue through sales and use taxes, and indirect franchise taxes generated during building activities; therefore, the economic and tax impact are SMALL to MODERATE and beneficial.

Operation of LMGS creates direct and indirect jobs which have a positive impact on the local economy and on unemployment rates in the ROI. The in-migrating operations workforce and their families purchase goods and services from within the ROI, creating economic multiplier effects that result in an increase in business activity. In addition, revenue from sales and use taxes, and residential property taxes associated with operations are spread throughout the ROI. The property taxes generated from improvements to the LMGS site are solely realized within Calhoun County. As such, impacts to the economy from operation of LMGS are beneficial and MODERATE, but SMALL in the context of the larger economy of the ROI.

RFFAs in the GAI would involve capital expenditures, leading to employment opportunities during both the building and operational phases, and providing noticeable economic benefits. The cumulative economic impact from LMGS in combination with the past, present, and RFFAs is MODERATE and beneficial. Due to the building of LMGS which introduces millions of dollars into the economy and provides minor increases in tax revenues, LMGS is a noticeable and beneficial contributor to the cumulative impact on the economy.

10.1.4.4 Community Characteristics

Impacts to infrastructure and community services are discussed in Section 4.4.2.3, Section 5.8.2.4, and Section 7.2.4.4.

Building-related impacts on all infrastructure and community services are SMALL for the ROI due to relatively small increase in total population, with the exception of traffic impacts. Impacts to transportation due to workforce traffic are MODERATE along the segments south of the city of Bloomington, which provide access to the LMGS site. Traffic impacts at the intersections providing access to the LMGS site are LARGE as level of service (LOS) decreases from A (reasonably free flow) to LOS F (heavily congested) where operating conditions are unstable. These impacts would be experienced during the building period in the AM and PM peak hours. These impacts may be addressed by implementation of mitigative measures developed in conjunction with the Texas Department of Transportation designed to accommodate building activity traffic which may reduce impacts.

Operations-related traffic results in increases in minor delays along portions of the roadways providing access to LMGS and at some intersections along these roadways. These delays are temporary and experienced during peak hours and do not noticeably disrupt the overall function of the intersection. Given the relatively small overall population increase associated with the in-migration of the operational workforce and their families, impacts to public services are minimal; therefore, impacts to infrastructure and community services are SMALL.

Development of RFFAs in the GAI may indirectly impact regional transportation by contributing to increased traffic. It is likely several of these projects would utilize the same roadways as LMGS. Additionally, RFFAs would place additional demand on the water supply systems and other community services. The cumulative impact of LMGS and other past, present, and RFFAs on infrastructure and community services is SMALL for most resources and MODERATE to LARGE for traffic on roadways during LMGS building period.

LMGS is a significant contributor to the MODERATE to LARGE cumulative impacts on traffic on roadways serving the LMGS site during the peak LMGS building period.

10.1.4.5 Environmental Justice

Impacts to environmental justice (EJ) are discussed in Section 4.4.3, Section 5.8.3, and Section 7.2.5.

The closest minority or low-income population is located over 5 mi (8 km) from the LMGS site center point. Minority or low-income populations in the Project Vicinity would not experience disproportionately high and adverse human health, environmental, physical, or socioeconomic effects as a result of building activities.

The review of pathways for physical and environmental, socioeconomic, and human health impacts to EJ population reviewed indicated impacts are small. Minority or low-income populations in the vicinity of the LMGS site are not likely to experience disproportionately high and adverse human health, environmental, physical, or socioeconomic effects as a result of operations.

RFFAs near Victoria and Port Lavaca have the potential to impact environmental justice communities. However, it is anticipated that ongoing and RFFAs operate in accordance with state and federal license requirements, minimizing disproportionately high and adverse human health, environmental, physical, or socioeconomic impacts to these populations. While there may be localized impacts from RFFAs on specific environmental justice communities within the GAI, the cumulative effect of the proposed action and other past, present, and RFFAs on regional environmental justice within the GAI is SMALL. Minority or low-income populations in the vicinity of LMGS do not experience disproportionately high and adverse human health, environmental, physical, or socioeconomic effects as a result of LMGS; therefore, LMGS does not contribute to the cumulative impact on regional environmental justice within the GAI.

10.1.4.6 Nonradiological Health

Impacts to nonradiological health are discussed in Section 4.4.4, Section 5.3.4, Section 5.8.2.5, Section 5.8.2.6, Section 5.6.3 and Section 7.2.8.

Impacts on occupational health and safety of workers and the public during building activities are minimized through compliance with all applicable state and federal regulations. The increased number of vehicles on surrounding roadways associated with building activities may result in minor increases to traffic crashes for the roadways providing access to the LMGS site. However, these impacts are not destabilizing; therefore, the nonradiological health impacts of building activities are SMALL.

During operation impacts from etiologic agents and noise on the public is minimized due to the use of dry cooling. There is no discharge from the cooling system and noise levels attenuate to below existing ambient levels at the nearest sensitive receptor. Health impacts to workers during operation from nonradiological emissions, noise, and electric shock hazards during operation are monitored and controlled as needed in accordance with applicable federal and state regulations. Potential health effects from electrical transmission systems on members of the public include impacts associated with air quality; electrical shock; chronic effect of electromagnetic fields (EMFs); and exposure to noise, radio, and television interference. The scientific evidence regarding the chronic health effects from EMFs does not conclusively link exposure to adverse health impacts. Collectively, these impacts are minor and do not pose a noticeable risk to the public. Operation and maintenance of the new transmission lines is generally indistinguishable from the existing lines and therefore does not result in a visual discord; therefore, the nonradiological health impacts of operation are SMALL.

Cumulative impacts to nonradiological human health associated with noise and transportation could occur as a result of development of the RFFAs in the GAI. However, construction of these facilities does not overlap with building of LMGS and operations-related traffic is minimal compared to construction-related traffic. The cumulative impact, combined with the effects associated with past, present, and RFFAs on nonradiological health is SMALL.

10.1.5 Nonradioactive Waste

Impacts of nonradioactive waste are discussed in Section 4.4.5, Section 5.5, and Section 7.2.9.

Generation, handling, and disposal of nonradioactive solid waste during building activities at the LMGS site are managed in accordance with all applicable state and local requirements and standards. Building activities comply with control measures outlined in the SPCC plan and regulated practices for managing liquid discharges, including wastewater, as well as the conditions of the TPDES permit with an approved SWPPP. Air emissions are minor and meet the requirements of the TCEQ; therefore, because all solid, liquid, and gaseous wastes generated during building activities at LMGS are handled according to county, state, and federal regulations, the impacts on land, water, and air from building activities is SMALL.

During operations, solid waste is managed in accordance with all applicable federal, state, and local requirements and standards. No additional landfill expansion is required to accommodate nonhazardous solid waste from LMGS during operations. As LMGS design integrates the use of ACCs, there are no thermal discharges. Nonradiological waste streams from LMGS tie into existing SDO infrastructure for management and treatment prior to their discharge to along with other effluents from the SDO to the Victoria Barge Canal. The outfall from SDO to the Victoria Barge Canal is through an existing permitted outfall location, and concentrations of all effluents are in accordance with TPDES permit conditions. As such, there is no discrete permitted discharge from LMGS. Stormwater discharges are managed through compliance with TPDES permitting for the permanent stormwater basin. No mixed waste is generated during operations; therefore, impacts associated with nonradioactive waste during operations are SMALL.

All past, present, and reasonably foreseeable projects have an impact on cumulative waste management.

Based on the availability and expected capacity of existing licensed disposal facilities within and beyond the GAI, the cumulative impact from LMGS on nonradiological waste, added to the effects associated with past, present, and RFFAs within the GAI on nonradiological waste, is SMALL.

10.1.6 Radiological Health

Operation of LMGS begins after all reactor modules have completed construction. As described in Section 4.5, Radiation Exposure to Construction Workers, construction worker dose is limited to background radiation dose. No significant dose is expected from specific radioactive materials on site used in support of construction. Section 5.4, Radiological Impacts of Normal Operation, discusses the radiological effects of normal plant operation on the public, plant workers, and the local biota. The evaluation considered potential exposure pathways by which radiation and radioactive effluents could be transmitted from LMGS to nearby organisms, human and nonhuman biota. The radiation dose to the public is below regulatory limits.

The assessment examined liquid, gaseous, and direct radiation pathways. Because LMGS does not release radiological liquid effluents into the environment, there are no anticipated liquid exposure pathways.

Gaseous pathways include external exposure to airborne radioactivity, external exposure to deposited activity on the ground, inhalation of airborne radioactivity and ingestion of contaminated agricultural products. It is conservatively assumed that food production rates within 50 mi (80 km) of LMGS are equal to the food consumption rates of the population within 50 mi (80 km) of LMGS.

While humans and biota may be exposed to direct radiation from the Nuclear Island (NI), the direct radiation shine from plant buildings is not considered significant. This conclusion is reasonable given that the annual direct shine dose contribution at the site boundary of a typical commercial nuclear pressurized water reactor power plant is comparable to natural background levels. Direct radiation dose will be further assessed as LMGS design develops.

Dose rate estimates for gaseous pathways were calculated for scenarios involving individuals of various ages exposed to gaseous radioactive effluents. The primary pathways considered include direct radiation from immersion in the gaseous effluent plume (and from particulates deposited on the ground), inhalation of gases and particulates, and ingestion of foods contaminated by gases and particulates.

Table 5.4-23 and Table 5.4-24 summarize annual public dose exposures, showing that these exposures are below regulatory limits. Additionally, population dose from gaseous effluents and background radiation to individuals living within a 50 mi (80 km) radius of LMGS is summarized in Table 5.4-22 and Table 5.4-25, respectively. The population doses in Table 5.4-22 and Table 5.4-25 can be compared to show that exposure from the plant is less than the exposure from background radiation; therefore, the impacts on the public from operation of LMGS are SMALL.

Section 5.4, Radiological Impacts of Normal Operation, also discusses occupational dose. The annual occupational dose to operational workers, including major maintenance activities, will be provided in the application for the operating license. This dose will comply with Title 10 Code of Federal Regulations (CFR) Part 20.

Section 5.4 also includes an assessment of dose to nonhuman biota. Table 5.4-26 presents the calculated maximum biota doses, with the total maximum biota dose of 1.60E-01 millirem per year (mrem/yr), which is below the 25 mrem/yr whole-body limit prescribed by 40 CFR 190. Section 5.4.4 of NUREG-1555 discusses that no other living organisms are likely to be significantly more radiosensitive than members of the public, and there is no substantial scientific evidence indicating that chronic radiation dose rates below 100 millirad per year harm animal or plant populations. Moreover, because this analysis applies to the maximum-exposed animal, the dose to the average animal is much lower; therefore, dose impacts to biota are SMALL.

The South Texas Project (STP) (Units 1 and 2), approximately 47 mi (75 km) from LMGS, is the only action within the GAI with the potential to contribute to cumulative impacts on radiological health. State and federal regulations relevant to the radiological health and safety of workers and the public for LMGS are also applicable to STP 1 and 2. The cumulative impact from LMGS on radiological health, added to the effects associated with past, present, and RFFAs within the GAI on radiological health, is SMALL. The impact of LMGS is not a significant contributor to the cumulative impact on radiological health.

10.1.7 Uranium Fuel Cycle

Section 5.7, Uranium Fuel Cycle and Transportation Impacts, discusses the environmental and transportation impacts of the uranium fuel cycle (UFC). As specified by 10 CFR 51.51(a), environmental reports must use Table S-3 (CFR 51.51(b) – Table of Uranium Fuel Cycle Environmental Data) as a baseline to evaluate the environmental effects of uranium mining, milling, uranium hexafluoride production, isotopic enrichment, fuel fabrication, irradiated fuel reprocessing, radioactive material transportation, and the management of both low- and high-level wastes associated with UFC activities. Table S-3 present estimates of the environmental effects for a reference light water reactor (LWR). While 10 CFR 51.51 applies specifically to LWRs, a similar UFC assessment is required for other nuclear reactor types per 10 CFR 51.50(b)(3) and 51.50(c).

The evaluation presented in Section 5.7 considered six environmental areas for analysis of fuel cycle impacts associated with LMGS, including uranium recovery, uranium conversion, enrichment, fuel fabrication, reprocessing, and storage and disposal. Each of these areas were evaluated, with the conclusion the parameters in Table S-3 are expected to bound the UFC associated with LMGS.

This conclusion is based on the following:

- Current LWRs are using nuclear fuel more efficiently due to higher levels of fuel burnup levels, which reduces the demand for mining and milling activities
- Decreased reliance on coal-fired electrical generation plants, leading to fewer gaseous emissions from electricity generation associated with mining and milling operations
- The transition of U.S. uranium enrichment technology from gaseous diffusion to gas centrifugation, which reduces electrical usage per separative work unit.

- The environmental impact for manufacturing TRi-structural ISOtropic-X fuel is bounded by current fuel fabrication techniques

In conclusion, the environmental impacts associated with the LMGS fuel cycle are SMALL. Table 5.7.1-1 provides further details, comparing the Table S-3 parameters to those of LMGS. Section 5.7 also assesses other aspects of the UFC, such as land use, water use, fossil fuel consumption, chemical impacts, radiological effluents, radiological wastes, occupational dose, and transportation dose. In these areas, the impacts were similarly determined as SMALL, as the parameters for the Xe-100 design are consistent with or bounded by those in Table S-3.

STP (Units 1 and 2) is the only facility within the region that may contribute to a cumulative effect of impacts from the UFC and transportation of radioactive materials. Impacts from the UFC and transportation of radioactive materials associated with operation of STP is bounded by impacts described in Tables S-3 and S-4 of 10 CFR 51 by the NRC in NUREG-1437, Supplement 48, and NUREG-1937 and, therefore, is SMALL. The cumulative impacts of the UFC and transportation of radioactive materials from LMGS and STP in the GAI are SMALL. LMGS is not a significant contributor to the cumulative impact of the UFC and transportation of radioactive materials.

10.1.8 Air Quality Impacts

Section 5.9, Air Quality, addresses the impact of the project on air quality, including sources of gaseous and particulate matter that may be emitted during project and plant operation activities. Air emissions are managed in accordance with federal, state, and local air quality regulations, including the Clean Air Act (CAA) and TCEQ standards. These regulations ensure that environmental safeguards are in place to minimize the project's impact on both state and regional air quality.

During building, additional traffic and equipment movement around the site may generate fugitive dust, which can be mitigated using BMPs. These include covering trucks carrying dust-prone materials and maintaining gas- and diesel-powered equipment to reduce smoke emissions. The use of these BMPs results in SMALL impact determination on air quality during building activities.

During plant operation, vehicle-related emissions may be a result of increased traffic from employees and delivery vehicles. While this leads to nominal localized increases in emissions, mitigation efforts are employed. These include requiring delivery vehicles to shut off engines while unloading, limiting the idling time of on-site vehicles, and encouraging the use of electric or hybrid vehicles. These steps help reduce the overall air quality impact of the increased vehicular activity around LMGS.

The air quality in the region of LMGS is governed by the CAA, which requires the U.S. Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards or pollutants harmful to public health and the environment. Calhoun County, where the LMGS site is located, is in attainment for all criteria pollutants as of 2024.

Air emission sources at LMGS fall under the scope of air pollution regulations promulgated under the Texas CAA, the federal CAA and associated amendments. The purpose of these regulations is to protect air resources from pollution by controlling or abating air pollution and harmful emissions. Although nuclear generation of electricity is a form of ‘zero-emission’ clean energy, LMGS uses small amounts of fossil fuel for backup and emergency equipment that will be used to support LMGS operations.

Principal sources of nonradiological air emissions associated with LMGS include four diesel generators and one diesel driven fire pump. Estimated diesel emissions from these sources are provided in Table 5.9-2. The assessment provided in Section 5.9 demonstrates air emissions from operations do not surpass TCEQ thresholds (Table 5.9-1 and Table 5.9-2); therefore, the impacts on air quality are SMALL.

The Xe-100 differs from conventional power plants by not burning fossil fuels, thus producing virtually no greenhouse gases (GHGs) or associated pollutants typical of industrial power generation. As a zero-emissions energy source, nuclear power plays a significant role in preserving clean air within the community. The primary sources of GHG emissions associated with LMGS come from workforce transportation and the occasional use of installed diesel-powered plant equipment, with no emissions from the plant's fuel source. The existing natural gas boilers at SDO, which currently generate steam and electrical power, will be replaced by LMGS, leading to a substantial reduction in GHG emissions; therefore, the overall impact of GHG emissions from LMGS and related workforce transportation is considered SMALL and net beneficial.

Air quality in Calhoun County, currently in attainment for all criteria pollutants, is impacted by past and present industrial land uses. Existing operations in the GAI are expected to continue their operations within the terms of their existing environmental permits and are not expected to contribute to reduced air quality. RFFAs implement BMPs to minimize potential air quality impacts during construction and future operations such that impacts are limited and controlled in accordance with applicable state and federal regulations and do not adversely affect attainment. Annual GHG emissions in Texas from RFFAs are not notable contributors to GHG emissions at the state or national level. The cumulative impact to air quality from LMGS along with past, present, and RFFAs is SMALL. LMGS is not a significant contributor to cumulative impacts on air quality with regard to criteria pollutants or GHG.

10.1.9 Decommissioning

Section 5.11, Decommissioning, addresses the environmental impacts of decommissioning. The decommissioning of a nuclear facility aims to reduce residual radioactivity to safe levels, allowing the site to be released and the license terminated without significant environmental impacts. Upon deciding to cease operations, licensees must notify the U.S. Nuclear Regulatory Commission (NRC) and certify that all fuel has been removed from the reactor. Within two years of permanent shutdown, a post-shutdown decommissioning activities report must be submitted. Decommissioning must be completed within 60 years of permanent cessation of operations. The statutory and regulatory framework, including the NEPA and

10 CFR regulations, guides the review and management of environmental impacts associated with decommissioning.

The NRC provides guidance for assessing environmental impacts during decommissioning through NUREG-0586, the Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities (GEIS). This document outlines the anticipated environmental impacts for LWRs and high-temperature gas-cooled reactors (HTGRs). The decommissioning process for HTGRs, including the Xe-100, is expected to have environmental impacts similar to those of LWRs. Key activities evaluated in the GEIS include fuel removal, decontamination, dismantlement of radioactive and nonradioactive structures, and management of spent fuel. The NRC concludes in NUREG-0586 that impacts of the decommissioning activities are either not detectable or are very minor.

Decommissioning strategies vary, including DECON (immediate decontamination to a level that permits license termination), SAFSTOR (delayed dismantling), and ENTOMB (long-term encasement), each with different timelines and environmental considerations. While the GEIS covers most decommissioning impacts generically, site-specific factors such as land use, aquatic and terrestrial ecology, and cultural resources may require additional analysis. The NRC typically reassesses environmental impacts once formal decommissioning plans are submitted and before activities begin to ensure compliance with regulatory standards.

Site-specific issues like EJ are also considered during decommissioning. Decommissioning impacts do not affect minority and low-income populations in any disproportionate manner relative to the general population, similar to impacts during building and operation. Additionally, GHG emissions from decommissioning are lower than those from building due to fewer labor hours and less earthwork. These emissions, while not negligible, are expected to have a SMALL environmental impact based on previous studies of building emissions for similar reactors.

Financial assurance is required to ensure sufficient funds are available for decommissioning. Federal regulations mandate that combined or operating license applicants provide a financial guarantee, as outlined in 10 CFR 50.75(c)(1), to cover decommissioning costs. These regulations ensure that the decommissioning process can be completed safely and in accordance with environmental protection standards.

Based on the analysis of decommissioning activities deemed as generic in NUREG-0586 GEIS and the preceding site-specific issues discussion, the impact of decommissioning is SMALL.

As stated in NUREG-1555, it is believed that decommissioning of a nuclear facility that has reached the end of its useful life has a positive environmental impact. As decommissioning activities are deemed as generic in NUREG-0586 GEIS, cumulative impact of decommissioning of the STP and LMGS would be SMALL.

Tables

None

Figures

None

10.2 Unavoidable Adverse Environmental Impacts

Direct, indirect, and cumulative impacts from building and operating LMGS are summarized in Section 10.1. This section summarizes the unavoidable adverse impacts of building and operating LMGS. Unavoidable impacts are those adverse impacts that cannot be avoided or for which there are no practical means of further mitigation.

Many mitigation measures and controls for reducing building-related impacts are referred to as BMPs which are designed to reduce, manage or eliminate the negative effect of building and operational activities. The specific BMP used can vary based on the types of activities that are performed. Many BMPs are required as part of regulatory compliance, such as through TPDES permits or through implementation of SPCC plans. When properly implemented, BMPs can effectively control pollutants, manage stormwater, prevent erosion, and protect natural habitats. This means that the potential adverse impacts are addressed and mitigated to levels that are not considered unavoidable or significantly adverse; therefore, impacts from building and operating LMGS which are mitigated through BMPs are not unavoidable adverse impacts and are not included on Table 10.2-1 or Table 10.2-2.

10.2.1 Unavoidable Adverse Impacts of Construction

Impacts from building activities are described in Chapter 4. Table 4.6-1 summarizes those impacts and identifies mitigation measures and controls that may be implemented to reduce or eliminate impacts. As noted in Table 4.6-1, most of the impacts are SMALL, as they are either not detectable or are minor compared to the availability of the affected resources. Table 10.2-1 summarizes building-related impacts that result in a measurable loss or permanent change in resources, the mitigation and control measures available to reduce those impacts, and the remaining unavoidable adverse impacts after mitigation and control measures are applied. For many of the impacts related to building activities, the mitigation measures are BMPs. Typically, these mitigation measures are based on the types of activities performed. The mitigation measures are implemented through permitting requirements, and plans and procedures developed for the building activities.

Building activities on the LMGS site includes land use changes on approximately 721 ac (292 ha) of land. These changes are necessary to support building of permanent structures including the NI/Conventional Island (CI) island, permanent stormwater basin, two bridges over West Coloma Creek, a new intake structure on the GBRA Calhoun Canal and on-site transmission lines, as well as temporary changes to support building activities (such as a temporary sediment basin, laydown and parking areas). Additionally, building activities may disturb or adversely affect 3.7 ac (1.5 ha) of wetlands.

Throughout the building period, the in-migrating construction workforce increases demand for available housing in the ROI. Additionally, increased traffic associated with the workforce commute and transport of building materials to and from the LMGS site increases congestion on surrounding roadways.

10.2.2 Unavoidable Adverse Impacts During Operation

Operational impacts are discussed in detail in Chapter 5. Table 5.12-1 summarizes operational impacts and identifies measures and controls available to reduce or eliminate those impacts. As noted in Table 5.12-1, operations-related impacts are considered SMALL as they are not detectible or are minor compared to the availability of the resource. Table 10.2-2 summarizes the operations-related impacts that result in measurable loss or permanent change in the availability of the resource, the mitigation and control measures available to reduce these impacts and the remaining adverse impacts after mitigation and controls measures are applied.

Tables

Table 10.2-1: Unavoidable Adverse Environmental Impacts from Construction of the Long Mott Generating Station (Sheet 1 of 2)

Resource Area	Summary Impact Determination	Mitigation Measures and Controls	Unavoidable Adverse Impact
4.1 Land Use	MODERATE	Restore temporarily impacted areas after building is complete using native or noninvasive plant species. Restrict soil stockpiling and reuse in designated areas on the LMGS site. Further consultation with U.S. Department of Agriculture Natural Resources Conservation Service and incorporate any mitigation requirements as needed. Conduct consistency determination and incorporate any mitigation measures as needed. Dispose of construction-related debris generated in an existing licensed facility.	Permanent conversion of 721 ac. (292 ha) from primarily cropland to an industrial use.
	NONE (Historic Properties)	None	None
4.2 Water Resources			
Surface Water	SMALL	Impact to West Coloma Creek overbank flow during high flow conditions is managed through adherence of regulatory requirements for site design and operation. Temporary features uses during construction of two bridges over West Coloma Creek comply with relevant regulations, agency approvals, and typical standards for construction related to overall channel flow capacity.	Minor, localized, short-term impact to West Coloma Creek. Minor, short-term impact related to the use of water during building activities. The average annual water usage rate required for building activities is less than 1 percent of the average annual water usage rate by SDO in 2022.
Groundwater	SMALL	Management of dewatered groundwater in permanent stormwater basin.	None
4.3 Ecological Resources			
Terrestrial Ecology and Wetlands	SMALL	Restore temporarily affected area with native or non-invasive plant species and conduct periodic monitoring and control measures. Minimize the amount of nighttime light, using down-shielding, and full cutoff luminaries. Comply with Texas Commission on Environmental Quality and US Army Corps of Engineers 404 permit guidelines to mitigate destruction of 3.7 ac. (1.5 ha) of wetlands.	Localized establishment of invasive species in disturbed areas. Localized impacts due to lighting. Direct and indirect impacts to potential wetlands are avoided and minimized as much as possible. Mitigation could reduce impacts.
Aquatic Ecology	SMALL	To minimize stream disturbance, personnel and equipment will only enter riparian areas when essential to complete work.	Minor, localized, short-term impacts to aquatic ecosystems during building.

Table 10.2-1: Unavoidable Adverse Environmental Impacts from Construction of the Long Mott Generating Station (Continued) (Sheet 2 of 2)

Resource Area	Summary Impact Determination	Mitigation Measures and Controls	Unavoidable Adverse Impact
4.4 Socioeconomics			
Physical Impacts	SMALL	Train and appropriately protect employees and construction workers to reduce the risk of potential exposure to noise, dust, and exhaust emissions. Return public roads, signs, and markings to preexisting conditions or better to address physical deterioration of roadways used to access the LMGS site.	None
Social and Economic Impacts	SMALL to MODERATE beneficial impacts	None	None
Community Infrastructure Impacts	MODERATE to LARGE	Consult with Texas Department of Transportation to develop mitigative measures to accommodate building activity traffic	Increased congestion on surrounding roadways and intersections.
Environmental Justice	NONE[(a)]	None	None
Nonradioactive Waste Management)	SMALL	None	Minor reduction in landfill capacity.
4.5 Radiation Exposure to Construction Workers	SMALL	None	None

Note: a) A determination of "NONE" for Environmental Justice analyses does not mean there are no adverse impacts on minority or low-income populations from the project. Instead, an indication of "NONE" means that while adverse impacts do exist, they do not affect minority or low-income populations in any disproportionate manner relative to the general population.

Abbreviations: LMGS = Long Mott Generating Station; ac. = acre; ha = hectare; SDO = Seadrift Operations

Table 10.2-2: Unavoidable Adverse Environmental Impacts from Operation of the Long Mott Generating Station (Sheet 1 of 2)

Resource Area	Summary Impact Determination	Mitigation Measures and Controls	Unavoidable Adverse Impacts
5.1 Land Use	SMALL	None	Permanent alteration of 320 ac. (130 ha) over the operational life of LMGS.
	NONE (Historic and Cultural Resources)	None	None
5.2 Water Resources			
Surface Water	SMALL	The intake structure on the GBRA Calhoun Canal is designed to limit flow velocities, which then minimizes sediment scour. Adherence to regulatory requirements for proper design and operation of stormwater management facilities to address changes in frequency of both peak runoff rates and runoff volumes from storm events discharged to West Coloma Creek and downstream areas and localized changes in water surface elevations and flow patterns within West Coloma Creek and downstream areas. Incorporate hydraulic modifications that meet site design standards to provide appropriate flood protection and avoid impacts to off-site properties including those upstream of LMGS.	Minor, localized changes in water flow patterns and water levels in the GBRA Calhoun Canal. Modification of the West Coloma Creek 100-year flood water surface elevation and associated flows. Minor Increase in water use, accounting for approximately 10.5 percent of total water rights allowed by Dow and accounts for 1.7 percent of the annual Guadalupe River flow.
Groundwater	SMALL	Recharge and potential infiltration to groundwater is limited by the design of a permanent stormwater basin and the predominance of subsurface dense clay soils on the LMGS site.	None
5.3 Cooling System	SMALL	(see relevant summaries by resource topic)	None
5.4 Radiologic Impacts of Normal Operation	SMALL	Develop administrative programs and procedures governing Radiation Protection and Health Physics in conjunction with the radiation protection design features with the intent to maintain occupational radiation exposures to as low as (is) reasonably achievable levels (ALARA).	Exposure of plant personnel to radiation.
5.5 Environmental Impacts of Waste	SMALL	Solid waste is managed in accordance with the applicable federal, state, and local requirements and standards, and disposed of within landfills having sufficient capacity.	None
5.6 Transmission System	SMALL	(see relevant summaries by resource topic)	None
5.7 Uranium Fuel Cycle Impacts	SMALL	None	Increase in off-site energy requirements, land use, erosion, emissions and water use, and associated impacts to land use, water use, air and water quality, aquatic and terrestrial ecosystems, the public, construction workforce, and socioeconomic resources due to LMGS fuel consumption. Occupational and public exposures to radioactive materials from incident-free transportation.

Table 10.2-2: Unavoidable Adverse Environmental Impacts from Operation of the Long Mott Generating Station (Continued) (Sheet 2 of 2)

Resource Area	Summary Impact Determination	Mitigation Measures and Controls	Unavoidable Adverse Impacts
5.8 Socioeconomic			
Physical Impacts	SMALL	Any damage to public roads, markings, or signage caused by operational activities is repaired to preexisting conditions or better, as appropriate.	None
Social and Economic Impacts	SMALL to MODERATE beneficial impacts	None	None
Community Infrastructure Impacts	SMALL	Increase in demand for public water supply services within the ROI. Future shortage of municipal water in 2030 through 2070 is being addressed by Victoria County as part of planning and strategy.	None
Environmental Justice	NONE[(a)]	None	None
5.9 Air Quality	SMALL	Air emissions will comply with Federal and State air quality control laws and regulations. LMGS complies with the regulatory requirements of the Clean Air Act and the TCEQ requirements to minimize impacts on state and regional air quality. Ventilation systems are designed and operated to assure adequate control of radioactive dust and particulate material from process equipment. Emissions control systems are provided where necessary to treat effluents before their discharge to the atmosphere.	None
5.10 Ecological Resources	SMALL	Operational plant design integrates the use of air-cooled condensers. As such, there is no impact to land use or terrestrial resources on the LMGS site or in the vicinity from salt deposition from cooling tower operation. Additionally, based on the use of ACCs, potential thermal impacts to plant communities and wetlands are not concerns for LMGS. Intake structure is designed to include features that are consistent with Section 316(b) of the Clean Water Act requirements to minimize adverse impingement associated with operation of water intake structure.	None
5.11 Decommissioning	SMALL	Occupational exposure to radiation during decommissioning, including transportation of materials to disposal sites; small radiological releases to the environment, and ingestion and inhalation of these by the public and biota. Air quality, ecological, and water quality impacts due to smaller level of land disturbance during decommissioning.	Appropriate decommissioning methods will be chosen when decommissioning is authorized, as will appropriate mitigations and controls. Decommissioning activities at HTGRs are not expected to result in environmental impacts different from those at LWR facilities. Environmental impacts are substantially less because land disturbance is less during decommissioning than during building and operation. Radiological releases are also less during decommissioning. Mitigating measures used during building for air quality and dust control would also be used during decommissioning.

Note:

a) A determination of "NONE" for Environmental Justice analyses does not mean there are no adverse impacts on minority or low-income populations from the project. Instead, an indication of "NONE" means that while adverse impacts do exist, they do not affect minority or low-income populations in any disproportionate manner relative to the general population.

Abbreviations: ac. = acre; ha = hectare; LMGS = Long Mott Generating Station; GBRA = Guadalupe-Blanco River Authority; ROI = region of influence; TCEQ = Texas Commission on Environmental Quality; ACC = air-cooled condenser

Figures

None

10.3 Irreversible and Irretrievable Commitment of Resources

For the purposes of this analysis, the term "irreversible" applies to the commitment of environmental resources (e.g., permanent use of land) that are irreparably changed by the building or operation of LMGS that cannot be reversed to restore the environmental resources to their former state by practical means. In contrast, the term "irretrievable" applies to the commitment of material resources (e.g., irradiated steel, petroleum) that, once used, cannot be recycled or restored for other uses by practical means.

10.3.1 Irreversible Environmental Commitments

In the building and operation of any electric generating station, few environmental resources are irreversibly committed to the facility beyond its operational life. Most commitments of environmental resources at or in proximity to LMGS that were identified for the building, operating, and decommissioning of LMGS could be restored after the closure and decommissioning. The irreversible commitments of resources resulting from the building and operation of LMGS include:

- Changes in land cover and land use
- Land disposal of wastes
- Loss of aquatic and terrestrial and ecosystems
- Releases to air and water resources

10.3.1.1 Land Use

As summarized in Table 4.1-1 building activities primarily occur on approximately 721 ac (292 ha) of the 1,537 ac (622 ha) LMGS site. Approximately 320 ac (130 ha) are permanently dedicated to operation of LMGS. Approximately 401 ac (162 ha) are temporarily impacted from building activities, including a batch plant, temporary laydown and staging areas, and a temporary sediment basin. Most of the land on the site is currently used for agriculture. At the end of its useful life, LMGS will be decontaminated and decommissioned in accordance with applicable NRC license termination requirements. Once the plant is decommissioned in accordance with NRC requirements, the land used for LMGS could be used for future industrial or nonindustrial use; therefore, irreversible loss related to land use is a temporal loss evident during the building and operational phase of LMGS.

Wastes generated by the building, operation, and decommissioning of LMGS require the irreversible commitment of land use resources at off-site land disposal facilities. These wastes include nonhazardous wastes, hazardous wastes, and radioactive wastes. Additionally, the land committed to the disposal of radioactive and nonradioactive wastes generated as a result of building and operation of LMGS is governed by the applicable regulations relevant to regulated waste disposal facilities.

10.3.1.2 Terrestrial and Aquatic Ecosystems

Building activities associated with LMGS could affect terrestrial and aquatic ecosystems occurring on and adjacent to the LMGS site. Building activities within the permanently disturbed areas of the site permanently displace wildlife that temporarily and permanently use the habitat. Areas temporarily impacted during building activities are revegetated or otherwise restored once building activities cease which mitigates some of the temporary disruptions to habitat. Building activities can impact wildlife through collisions with tall equipment, which can be exacerbated through the use of artificial lighting, as well as increased noise levels. As discussed in Section 4.3.1, habitat on the LMGS site consists of disturbed, low-quality plant communities that are common and abundant throughout the vicinity and local region.

Subsequent to the completion of building activities, floral and fauna uses are expected to recover in areas on the LMGS site that are not affected by ongoing operations. During building and operations, irretrievable losses of terrestrial biota are primarily due to the presence of vertical structures and transmission lines that may represent a collision hazard to birds. Additional mortality may result from incidental collisions with vehicles or the operation of the intake structure that results in entrainment and impingement on aquatic biota. However, once operation of LMGS ceases and the plant is decommissioned, these impacts to terrestrial and aquatic biota will end; therefore, irreversible commitments to terrestrial and aquatic ecosystems are limited to the operational phase of LMGS.

10.3.1.3 Releases to Air and Water

There are notable releases to the atmosphere or surface waters from operations. Nonradioactive liquid waste is collected and discharged to the SDO liquid waste system where it is eventually discharged to the Victoria Barge Canal, via a preexisting outfall location. All potentially radioactive waste is collected and trucked off-site for disposal. Gaseous effluents are handled by the heating, ventilation, and air condition system and the Helium Purification System to filter and reduce gaseous emissions. During operation and decommissioning of LMGS, minor releases also occur in conjunction with the use of ancillary equipment or fossil-fuel vehicles. Following decommissioning, operations cease, thereby discontinuing any releases to air and water.

10.3.2 Irretrievable Environmental Commitments

Irretrievable environmental commitments resulting from this project include:

- Construction materials and irradiated materials
- Water consumption
- Consumption of energy
- Consumption of uranium fuel

10.3.2.1 Construction and Irradiated Materials

Building activities require materials such as concrete, rebar, steel, cables, and piping. Because some of this material may be reused (if uncontaminated) or decontaminated for future use, the recycled portion does not constitute an irretrievable commitment of resources. However, throughout the operational life of LMGS, some materials may become contaminated or irradiated and therefore cannot be reused or recycled. Radioactive waste created during the operation and decommissioning of LMGS is routinely collected and shipped off-site and is not considered irretrievable environmental commitments. The types of construction materials used for most of the building of LMGS are similar to those used for any major new construction project. The amount of such materials accounts for a relatively small incremental increase in the overall availability of such materials; therefore, even if this material is eventually disposed of, use of these construction materials in such quantities is small with respect to availability of these resources on a larger scale.

10.3.2.2 Water Consumption

Operational water use represents a small percentage of available water flow in the Guadalupe River during normal annual conditions, seasonal conditions, and drought conditions. Operational water use complies with the water rights granted to SDO. The consumptive use of surface water for operations is considered irreversible during the operation of the facility. However, consumptive uses of surface water use would be discontinued following decommissioning.

10.3.2.3 Consumption of Fossil Fuels

During building and operations, nonrenewable energy in the form of fossil fuels (i.e., gas, oil, and diesel) and electricity are consumed. Fossil fuels are required for ancillary equipment and vehicle use. The total energy consumed during building and operation is minimal compared to the total amount consumed within the United States.

10.3.2.4 Consumption of Uranium

As described in Section 5.7, Uranium Fuel Cycle Impacts, operation of LMGS requires the mining and refining of uranium ores to produce and supply fuel for the nuclear reactors. UFC impacts include irretrievable water and fuel consumption. At the end of its operational use, uranium fuel is disposed of as spent fuel. Final disposal of spent fuel is an irretrievable commitment of resources; therefore, the depletion of uranium ores from operation of LMGS is an irretrievable commitment of resources.

The United States had 93 operating nuclear power plants in 2023. Owners and operators of these plants purchased a total of 51.6 million pounds (25,800 tons) of uranium (EIA 2023). Existing purchase contracts for 2024 through 2033 totals to 249 million pounds (124,500 tons) of uranium (EIA, 2024), suggesting that uranium resource supplies are sufficient to meet current demands. Thus, the addition of LMGS as a consumer of uranium resources by itself does not result in a significant commitment of domestic and worldwide uranium resources.

Tables

None

Figures

None

10.4 Relationship Between Short-Term Uses and Long-Term Productivity

This section examines the relationship between the short-term use of environmental resources and the maintenance and enhancement of long-term environmental productivity. It compares the significant short-term benefits and uses of these resources with their potential long-term impacts on environmental productivity. For purposes of this analysis, the environmental impacts associated with building and operating LMGS are considered short-term uses of the environment and long-term productivity is that which occurs beyond decommissioning.

The uses of the environment associated with LMGS include the unavoidable adverse impacts to resources as described in Section 10.2, Unavoidable Adverse Impacts. The irreversible and irretrievable commitments of environmental resources associated with LMGS are described in Section 10.3, Irreversible and Irretrievable Commitments of Resources.

Impacts that would cease, or could be reversed, following decommissioning of LMGS are considered short-term, because they would be restored to their role in supporting long-term productivity. These include those impacts to water resources, terrestrial ecology and wetlands, aquatic ecology, physical impacts (air quality, noise, visual resources, and impacts to infrastructure), socioeconomic resources, and air quality. Long-term productivity of the land may be returned through reuse of the LMGS site.

Impacts that cannot be reversed or impacts that would continue past decommissioning are considered long-term. These may include impacts related to the long-term productivity of land that is affected by LMGS. Long-term management of radioactive waste and management of irradiated materials and fuel represent a long-term commitment of resources, as they would no longer support long-term productivity following decommissioning. Long-term impacts associated with LMGS consist of commitments of resources and the consumption of nonrenewable resources during building and operations. Such impacts include land committed for waste storage and management.

During operation of LMGS, gaseous and liquid radioactive releases and radiation exposures are mitigated and reduced in accordance with state and federal regulations. Once LMGS is decommissioned, use of radioactive materials ceases. The storage and management of radioactive waste and irradiated materials in existing licensed facilities represents a long-term commitment of land use.

Production of energy and steam for use by the SDO is the principal short-term benefit resulting from building and operation of LMGS. Operation of LMGS results in short-term economic benefits to the local area and the region through employment and expenditures. Because operation of LMGS supports other businesses in the area, operation of LMGS results in enhanced long-term regional productivity; therefore, the long-term economic development within the region outweighs the impacts to the environment from building and operation of LMGS. In addition, the successful demonstration of an advanced reactor technology through the Advanced Reactor Demonstration Program (ARDP) improves accessibility to clean energy and strengthens the regional and national economy.

Tables

None

Figures

None

10.5 Alternatives to the Proposed Action

Chapter 9 describes a range of alternatives considered for LMGS. Section 10.5 is a high-level summary of those alternatives.

10.5.1 No-Action Alternative

The No-Action Alternative, whereby the NRC does not issue a license for the construction and/or operation of LMGS, is evaluated in Section 9.1, Alternatives to the Proposed Action. The No-Action Alternative would result in no environmental impact associated with a new nuclear plant construction and operation.

However, given that the existing natural gas cogeneration plant is reaching its end of life, rebuild or replacement of the existing natural gas cogeneration plant would be required, which presents its own environmental impacts under the No-Action Alternative.

10.5.2 Energy Alternatives

Alternate sources of energy available to install instead of the Xe-100 technology are evaluated in Section 9.2, Energy Alternatives. The alternatives reviewed that did not require new generating capacity include conservation programs (life extension of existing cogeneration plant), purchasing power from power generators/utilities, and demand-side management.

Alternatives that required new generating capacity were reviewed and included wind, solar, hydropower, geothermal, biomass, petroleum liquids, fuel cells, coal, integrated gasification combined cycle generation sources, natural gas, and combinations of alternatives.

Based on the assessment of energy alternatives in Section 9.2, the Xe-100 is the best option for supplying power and steam to the SDO facility while demonstrating advanced reactor technology as part of the ARDP program.

10.5.3 Alternative Sites

Alternative sites and the site selection process are discussed in Section 9.3.

A site feasibility study was conducted that includes four Candidate Sites (Sites A, B, C, and D):

- Candidate Site A is approximately 320 ac (129 ha) in size and is primarily agricultural land used for cultivation. Dow owns Candidate Site A, and it is bounded on the north, east, south, and west by land Dow also owns. It is bounded on the north by Jesse Rigby Road and the north Dow railyard site. Candidate Site A has four streams and associated wetlands. West Coloma Creek bisects the Proposed Site.

- Candidate Site B is approximately 235 ac (95 ha) in size and is currently agricultural land used for cultivation. Dow owns Candidate Site B. It is bounded on the north, west and south by land that is owned by Dow. It is bounded on the east by pastureland that is not owned by Dow. Candidate Site B has one stream and one drainage ditch.
- Candidate Site C is approximately 166 ac (67 ha) in size and is currently agricultural land used for cultivation. Dow owns Candidate Site C, and it is bounded on the north by land that Dow also owns. It is bounded on the south (partially) and the east by pastureland that is not owned by Dow. Candidate Site C has one pond and an associated wetland.
- Candidate Site D is approximately 193 ac (78 ha) in size. Most of the site is currently agricultural land used for cultivation. The site is bounded on the south and east by land that is owned by Dow. Candidate Site D has one stream and emergent wetlands.

The study considered relevant factors related to nuclear licensing, environmental acceptability, water availability, and engineering/cost/transmission issues. The study included desktop analysis, field reconnaissance, and development of site layouts.

Because SDO requires electricity and steam from the project, the steam piping distance is a significant siting criterion; therefore, all four Candidate Sites are within 1.5 mi (2.4 km) of the SDO facility. As a result of the proximity of the sites, most of the environmental impacts are identical or virtually identical.The site selection process resulted in the selection of Candidate Site A as the “Proposed Site”, and none of the alternative sites (Candidate Sites B, C, and D) are identified as obviously superior sites.

10.5.4 System Alternatives

Alternatives to the plant systems are evaluated in Section 9.4.

10.5.4.1 Heat Dissipation Systems

Alternative heat dissipation systems were considered for LMGS. These alternatives included once-through cooling systems, mechanical draft wet cooling towers, natural draft cooling towers, dry cooling towers, hybrid (wet/dry) cooling towers, cooling ponds, and spray ponds (Section 9.4.1.2).

Once-through cooling systems were excluded due to the lack of proximity to a surface water body suitable for the required water volume, as well as due to particular EPA regulations related to these systems.

Additional systems that were excluded due to lack of proximity to surface water body were the wet/hybrid cooling towers, cooling pond, and spray pond.

Mechanical draft and natural draft cooling towers were excluded primarily due to lack of water resources to support makeup water needs. In addition, mechanical draft and natural draft cooling towers have environmental impacts associated with fogging, icing, and salt deposition due to cooling tower drift, as well as aesthetic impacts related to cooling tower plumes.

As a result, ACCs are selected as the primary means for heat dissipation for the LMGS.

Tables

None

Figures

None

10.6 Benefit-Cost Balance

This section provides a description of the anticipated benefits of LMGS against the costs, including environmental costs, as required by 10 CFR 51.45(c). Inputs for this section were compiled from the purpose and need of the project (Chapter 1); building and operations impacts (Chapter 4 and Chapter 5); and analysis of the need for power (Chapter 8).

10.6.1 Benefits

10.6.1.1 Power and Steam Supply

As detailed in Chapter 1, SDO currently has significant cogeneration capacity with gas turbines and heat recovery steam generators to produce the steam and power required for operations that are not available from the grid. The SDO facility generates excess electrical power that is transferred to the regional transmission system for use by others. However, the plant is reaching its end-of-life limit and a rebuild or replacement of the existing cogeneration plant is required to provide electrical power and steam for ongoing operation of SDO.

As described in Chapter 8, the Electric Reliability Council of Texas manages the power supply for the state of Texas. The local grid has sufficient capacity to meet power demands for the SDO facility during normal conditions. However, the local grid alone cannot provide the steam required to support operations at SDO and cannot provide the reliability necessary to support production goals.

LMGS provides replacement power and steam to support SDO operations. Each Xe-100 reactor module can provide approximately 200 megawatts thermal (682 million British thermal units per hour) of power. With four reactor modules operating, the thermal power generated from LMGS can support the demand for both peak steam and power for the entirety of the SDO facility. While SDO is the sole recipient of steam and the primary recipient of electricity from LMGS, excess electricity that is not consumed on-site may be sold to the grid.

10.6.1.2 Emission Reduction Benefits

Nuclear power generation results in reductions in emissions of criteria pollutants such as sulfur oxides, nitrogen oxides (NO_x), and particulates when compared to coal-fired and natural gas-fired plants. As described in Section 5.9, Air Quality, air emissions associated with LMGS are limited to relatively small amounts of criteria pollutants from diesel generators, dust (particulate matter) from heating ventilation and air conditioning (HVAC) systems, and workforce transportation. Therefore, operation of LMGS provides an important environmental benefit by reducing emissions of criteria pollutants and contributes to an improvement in regional air quality.

The operation of LMGS provides important benefits regarding carbon emissions and potential climate change. Primary greenhouse gases that contribute to climate change include NO_x, carbon dioxide and methane. As stated in Section 5.9, Air Quality, combining the net deduction from replacing the existing gas-fired boilers, and the emissions from the reference 1,000-megawatt electric plant and the workforce emissions over a 40-year operating lifetime amounts to an estimated 40.36 million metric tons (MT), or 1.01 million MT annual, carbon dioxide equivalent reduction from present day levels. As described in Chapter 8, the conversion from fossil-fuel based cogeneration to nuclear cogeneration results in a significant level of decarbonization for operation at SDO and marks notable progress toward Dow's corporate decarbonization goals while also providing reliable 24/7 power.

10.6.1.3 Advanced Reactor Demonstration

The U.S. Department of Energy (DOE) implements programs, such as the ARDP, in support of its broader mission of ensuring the security and prosperity of the United States by addressing its energy, environmental, and nuclear challenges through transformative science and technology solutions (DOE, 2024a). LMGS is funded in part by the ARDP, which intends to speed up the development and delivery of nuclear power by demonstration of advanced reactors through cost-shared partnerships with U.S. industry. The Xe-100 is one of two advanced reactor technologies awarded demonstration-level funding by the ARDP, which supports the design, licensing, construction, and operation of this technology (DOE, 2024b).

The building and operation of LMGS provides a commercial demonstration of an advanced reactor technology that uses a high-temperature gas-cooled design that provides flexible electricity output suited for integration in a renewable heavy grid. The Xe-100 reactor module can also meet the process heat needs for a wide range of industrial heat applications that are difficult to decarbonize (DOE, 2024b).

10.6.1.4 Economic Benefits

Additional important benefits from the building and operation of LMGS include socioeconomic effects such as increases in purchases of local and regional goods and services, local and regional direct and indirect employment, and tax revenues to local taxing jurisdictions.

As detailed in Section 4.4.2.2.1, expenditures during the building phase of LMGS benefit employment in other sectors of the local economy. The Economics and Statistics Division of the U.S. Bureau of Economic Analysis (BEA) provides Regional Input-Output Modeling System (RIMS II) regional multipliers for industry employment and earnings. The BEA RIMS II multipliers were obtained for the ROI (Calhoun, Jackson, and Victoria Counties) and used to evaluate impacts on the economic output, employment, and earnings based on the cost of building at the LMGS site.

The total construction expenditure results in an estimated total economic value added of approximately $1.6 billion across all local industries, including goods and services produced in the ROI that are used during the building phase and induced effects related to worker spending. The economic output creates annual earnings of approximately $94 million dollars over the 44-month building phase.

In addition, the multipliers also indicate that building of the facility leads to the creation of approximately 5700 jobs over the building period. This includes both direct employment and indirect employment, which is employment created by the additional demand on goods and services as a result of the added construction employment. Most indirect jobs are service related, and those jobs are filled by the existing workforce in the ROI. Some of these indirect jobs could benefit unemployed or underemployed workers in the ROI. Overall, based on 2021 data, approximately 2.7 percent of the total labor force within the ROI are employed as a result of LMGS building-related employment annually (direct construction jobs plus indirect jobs).

Likewise, as described in Section 5.8.2.3.1, employment and purchases associated with LMGS during operations also support employment in other sectors of the local economy. The RIMS II direct effect employment multiplier for jobs in the electric power generation industry is 3.0. Operation of LMGS creates 96 direct jobs, and based on the RIMS II multiplier, approximately 193 indirect jobs are created within the ROI, resulting in 289 jobs created as a result of LMGS.

Capital expenditures, the purchase of goods and services, and payment of wages and salaries to the operations workforce has a multiplier effect through an increase in business activity, particularly in retail and service industries. The in-migrating operations workforce and their families also purchase goods and services from within the ROI, thereby creating an expanded economic effect resulting in increased business activity. The RIMS II multiplier for earnings in the electric power generation industry sector of 1.9 was applied to the estimated total wages earned per year by LMGS operations workforce. The total impact of the operations workforce earnings, assuming it is all spent within the ROI, is $46.5 million per year. Of this, $22.1 million is indirect earnings spent within the ROI, the remaining $24.3 million is annual payroll for the operations workforce. However, it should be noted impacts could be less depending upon expenditures that occur outside the economic region.

10.6.1.5 Tax Benefits

As detailed in Section 4.4.2.2.2 and Section 5.8.2.3.2, building and operations-related purchases and labor force expenditures generate tax revenues, including corporate franchise taxes, sales and use taxes, and property taxes which benefit the state and local jurisdictions. Project activities have a multiplier effect on spending within the ROI that may result in new business developments. Therefore, there may be a minor increase in franchise taxes due to the indirect spending. Expenditures by the in-migrating workforce and their families on items subject to sales and use taxes lead to further increases in sales tax revenues in the ROI.

In addition, as detailed in Section 4.4.2.2.2.3, Dow has agreed to payments in lieu of taxes totaling $4 million to Calhoun County, in accordance with an approved tax abatement agreement. The agreement is for 100 percent abatement for 10 years beginning on January 1 of the Start Year (based on the issuance of a construction permit by the NRC and the date construction begins). Because the term of the tax abatement agreement is 10 years, it will extend through the 44-month building period and into a portion of the 40-year operating period. During the overlap on the tax abatement agreement and operation of LMGS, no property tax payments are made to the applicable taxing entities. Once the abatement period is over, property taxes are paid in accordance with state and local rates. Improvements to the LMGS site increase the appraised value of the property, thus increasing the property tax revenue.

Monetary and nonmonetary benefits of this ARDP project are summarized in Table 10.6-1.

10.6.2 Costs

The costs associated with building and operation of the new plant are broken down into internal and external costs. Internal costs are those expended by the applicant in support of the building and operation of a new plant and are generally expressed in monetary values. External costs are the environmental costs that result from the building and operation of the new plant, and are expressed in terms of monetary, quantitative, and qualitative values.

10.6.2.1 Internal (Monetary) Costs

10.6.2.1.1 Building Costs

Direct costs are defined as all costs to construct a permanent plant, excluding support services such as field indirect costs, construction supervision, and other indirect costs. Direct costs include equipment, direct installation labor hours, and commodities for installation such as wire and concrete.

10.6.2.1.2 Operation Costs

Estimated annualized operational costs for LMGS include operation and maintenance costs, including plant staff salaries, fuel and spent fuel costs, and decommissioning and decontamination funding.

10.6.2.2 External Costs

External costs are those environmental and societal costs that remain after mitigation and controls have been considered. The environmental impacts of building and operation of LMGS are described in Chapter 4 and Chapter 5 of this document, respectively. Section 10.2 identifies unavoidable adverse impacts of the proposed action (i.e., impacts after consideration of proposed mitigation actions) and Section 10.3 identifies irreversible and irretrievable commitments of resources and materials. Table 10.6-2 summarizes these costs.

10.6.3 Summary

Table 10.6-1 and Table 10.6-2 summarize benefits and costs of LMGS. As detailed in Section 10.2 and Section 10.3, the costs of plant building and operation are reduced by continuing efforts to avoid and minimize impacts to environmental resources. Design features, BMPs, permitting, controls, and mitigation measures reduce environmental impacts to SMALL to MODERATE, with the exception of LARGE, localized, periodic impacts to traffic during the building period. The benefits of LMGS are significant with respect to power and steam generation, carbon emissions, and the economy in the long term of the operational period. Therefore, the benefits of LMGS are greater than the economic and environmental costs.

Tables

Table 10.6-1: Monetary and Nonmonetary Benefits of Long Mott Generating Station

Category of Benefit	Description of Benefit
Power and Steam Supply	Each module can generate 200 MWt of steam for electricity production and/or process heat. LMGS can supply both electrical power and steam to SDO.
Emission Reduction	Reduced emissions of criteria pollutants such as SO_x, NO_x, and particulates when compared to coal-fired and natural gas-fired plants. Operation of LMGS results in a reduction of an estimated 40.36 million MT CO_2 equivalent from present day levels over a 40-year operating lifetime.
Advanced Reactor Demonstration	Supports the future delivery of nuclear power by demonstration of advanced reactor deployments by addressing the licensing, construction and operational risks of advanced reactor designs.
Economics	
Construction Workers	Creation of approximately 9112 direct and indirect jobs over the building period.
Building Expenditure	The total building expenditure results in an estimated total economic value added of approximately $1.6 billion including goods and services produced in the ROI that are used during the building phase and induced effects related to worker spending.
Operations Workers	96 full-time operations workers create an incremental increase in 193 indirect jobs within the ROI for at least 40 years of plant operations.
Operations Earnings	The total impact of the operations workforce earnings, assuming it is all spent within the ROI, is $46.5 million per year.
Taxes	Increased tax revenue, including $4 million in payments in lieu of taxes to Calhoun County, support improvements to public infrastructure and social services.
Abbreviations: MWt = megawatt thermal; LMGS = Long Mott Generating Station; SDO = Seadrift Operations; SO_x = sulfur oxides; NO_x = nitrogen oxides; MT = metric tons; CO_2 = carbon dioxide; ROI = region of influence	

Table 10.6-2: Internal and External Costs of Long Mott Generating Station

Category of Cost	Description of Cost
Internal/Monetary Costs	
Building Costs	Direct cost
Operation Costs	Annual operating costs include: · Operation and Maintenance · Fuel and Spent Fuel Costs · Decommissioning and decontamination funding
External Costs	
Land Use	Permanent alteration of 320 ac. (130 ha) over the operational life of LMGS.
Surface Water	Minor, localized changes in water flow patterns and water levels in the GBRA Calhoun Canal. Modification of the West Coloma Creek 100-year flood water surface elevation and associated flows. Minor increase in water use, representing approximately 10.5 percent of total water rights allowed by SDO and accounting for 1.7 percent of the annual Guadalupe River flow.
Terrestrial Ecology	Localized establishment of invasive species in disturbed areas and localized impacts on birds due to collisions and effects from artificial lighting.
Aquatic Ecology	Minor, localized, short-term impacts to aquatic ecosystems during building. Minor impacts during operation of intake system on the GBRA Calhoun Canal.
Socioeconomics and Community Infrastructure	Short-term decrease in housing availability in the four-county Region of Influence during building. Increased congestion on surrounding roadways and intersections during building.
Nonradioactive Waste	Minor reduction in landfill capacity during building.
Radiological	Occupational radiation exposures maintained as low as is reasonably achievable through radiation protection design features and development of administrative programs and procedures governing Radiation Protection and Health Physics.
Abbreviations: ac. = acre; ha = hectare; LMGS = Long Mott Generating Station; GBRA = Guadalupe-Blanco River Authority; ROI = region of influence	

Figures

None

10.7 References

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