Mississippi Valley Division,
Regional Planning and Environment Division South

Tangipahoa Parish, Louisiana Feasibility Study

Appendix D – Tangipahoa Parish Feasibility Study Environmental Appendix

August 2024

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1.1 LAND USE

Table D:1-1 and Figure D:1-1 show the land use classification in acres for years 2001 and 2021 in the study area. This data indicates that majority of the land in the study area consists of conifer forest, woody wetland, and pasture/hay landcover types. The I-55 corridor west of Tangipahoa River is where most of the developed area is located in the study area. The highest concentration of developed space occurs at the southern portion of the Parish located just north of the coastal zone which is dominated by woody wetlands and herbaceous wetland cover. Areas to the east of the Tangipahoa River are generally more rural, in particular the central and northern thirds of the Parish. The study area consisted of 11% developed, 16% agriculture, and 73% undeveloped land in 2021 (Table D:1-2). Between 2001 and 2021 there was approximately a 10% increase in developed area in the Parish.

Table D: 1-1 Land Use Classification in the Study Area

Land Cover Categories	2001 (area mi2)	2021 (area mi2)	Change in area 2001-2021 mi2	Percent change in area	Landcover Proportion (2021 mi2)
Developed, High Intensity	2.39	3.91	1.52	64%	0.5%
Developed, Medium Intensity	7.24	12.84	5.6	77%	1.5%
Developed, Low Intensity	24.07	26.84	2.77	12%	3.2%
Developed, Open Space	49.21	47.91	-1.3	-3%	5.7%
Cultivated Crops	1.25	1.30	0.05	4%	0.2%
Pasture/Hay	159.48	135.73	-23.75	-15%	16.1%
Grassland	22.30	16.16	-6.14	-28%	1.9%
Deciduous Forest	0.68	0.73	0.05	7%	0.1%
Evergreen Forest	186.74	232.79	46.05	25%	27.6%
Mixed Forest	7.47	7.89	0.42	6%	0.9%
Scrub/Shrub	61.97	36.21	-25.76	-42%	4.3%
Woody Wetland	223.32	223.81	0.49	0%	26.5%
Emergent Herbaceous Wetland	40.80	38.86	-1.94	-5%	4.6%
Barren Land	3.17	5.23	2.06	65%	0.6%
Open Water	53.89	53.78	-0.11	0%	6.4%

Source: USGS National Land Cover Database 2001, 2021

Table D: 1-2 Summary Land Use Classification for Developed, Agricultural, and Undeveloped Land Use Categories in 2001 and 2021 for the Study Area.

Land Cover Categories	2001 (area mi^2)	Percent Cover 2001	2021 (area mi^2)	Percent Cover 2021	Change in area 2001-2021 mi^2
Developed	82.91	9.8%	91.50	10.8%	8.59
Agriculture	160.73	19.0%	137.03	16.2%	-23.70
Undeveloped	600.34	71.1%	615.46	72.9%	15.12

Source: USGS National Land Cover Database 2001, 2021

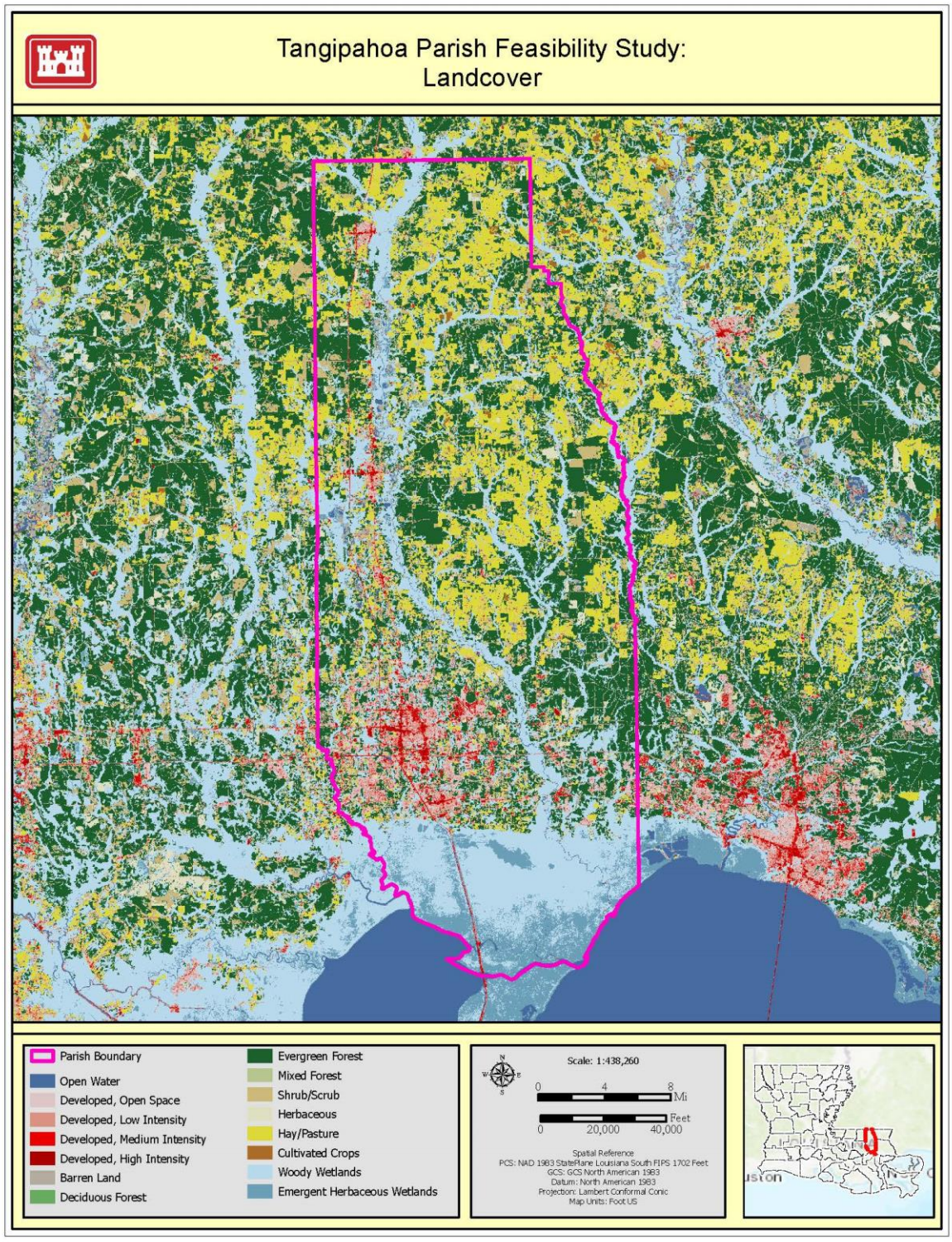

Figure D: 1-1 Land Use Classification in Study Area

Source: USGS National Land Cover Database 2021

1.1.1 Climate

The study area is located within the humid subtropical climate zone which encompasses the southeastern united states. Conditions include long hot summers and short, mild winters. Precipitation is frequent throughout the year, with slightly higher amounts of precipitation in June and July on average. Table 3 consists of the monthly temperature normal recorded from the Hammond, LA monitoring station by the National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center (NCDC). Retrieved 29 June 2024 from https://www.ncdc.noaa.gov/cdo-web/datatools/normals. Variations in daily temperature are influenced by the distance to the Gulf of Mexico. January is the coldest month, averaging approximately 50°F, and July the warmest, averaging 81.5°F (Table D:1-3). Winters are generally mild, with occasional, short-duration cold periods. Normal annual precipitation for the study area between 1991-2020 was 64.2 inches. The prevailing winds are from the north and northeast in the winter and fall, and from the southeast in the spring and summer.

Table D: 1-3. Temperature and Precipitation Normals from Hammond 5E, LA US station (1991-2020).

Month	Precipitation (inches)	Minimum Temperature (°F)	Average Temperature (°F)	Maximum Temperature (°F)
January	5.75	38.3	49.9	61.5
February	4.59	41.9	53.5	65.2
March	5.25	48.6	60.0	71.5
April	5.56	54.7	66.2	77.6
May	5.41	62.5	73.5	84.5
June	6.65	69.1	79.4	89.8
July	6.79	71.5	81.5	91.5
August	5.61	71.0	81.4	91.8
September	4.38	67.1	77.5	88.0
October	4.10	55.6	68.1	80.6
November	4.20	45.5	58.0	70.4
December	5.88	40.5	52.1	63.7

The study area has experienced drought conditions (-2 or less on the Palmer Drought Severity Index) during 31 of the past 74 years (1950-2024) (Figure D: 1-2). There were seven periods of severe-extreme drought that lasted for four months of longer over this time period, including events that began in 1952,1963,1999, 2000, 2006, 2011, and 2023.

Both continental weather patterns and influences from the Gulf of Mexico can result in rather quick changes in conditions. Large storm events, tropical storms, and hurricanes can produce large volumes of rainfall that contribute to widespread runoff and flooding as well as damaging winds. Twenty-two federal disaster declarations

have been made for the Parish due to flooding and tropical storm damages since 1965 (nearly every 2.5 years) (Table D:1-4). Major rivers, such as the Tangipahoa, Natalbany, and Tchefuncte Rivers, have broad floodplains due to gradual changes in topography. Approximately 45% of the land area in the Parish is located within the FEMA 100-year floodplain (Tangipahoa Parish Government, 2020). As a result, a large portion of the Parish could be vulnerable to flood-related impacts or damage. Table D:1-5 summarizes large storm events over the period of 1989-2019 that caused varying degrees of flooding within the Parish. This type of flooding can result from high short-term localized rainfall intensities associated with slow moving storm systems in the late-winter and early spring, heavy summer-time thunderstorms, or due to tropical storm systems such as hurricanes or depressions.

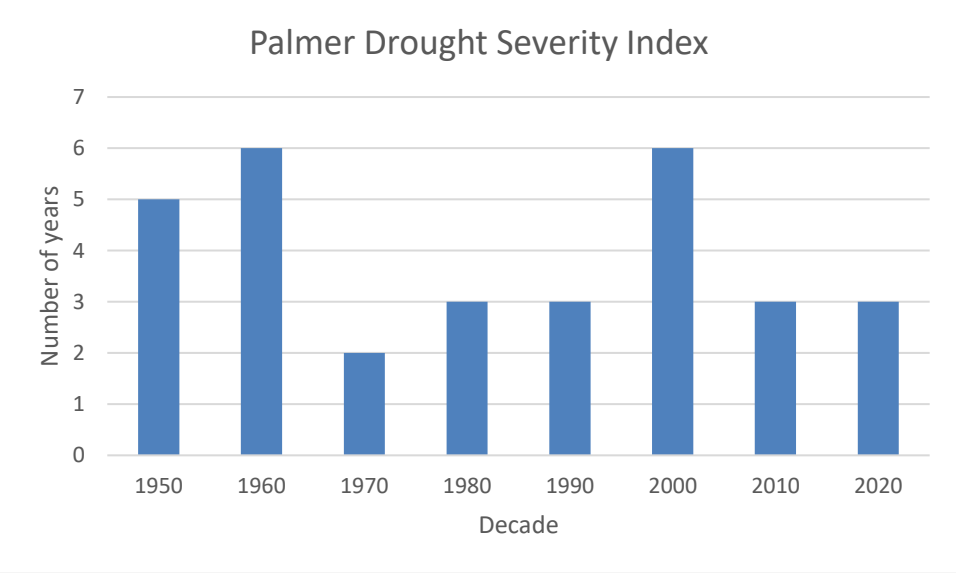

Figure D: 1-2. Number of Years per Decade (1950-2024) That the Palmer Drought Severity Index Reached a Value of -2 or Less (Moderate to Extreme Drought) During at Least One Month.

Table D: 1-4. Summary of Federal Disaster Declarations for Tangipahoa Parish (1965-2020).

Date	Type of Disaster	Description
9/10/1965	Tropical Hurricane (Hurricane Betsy)	Winds measured up to 115 mph in Hammond. Part of I-10 destroyed and washed away, resulting in road closure. Railroad right-of-way blocked by rising flood waters. Interruptions of southbound trains at Hammond. Significant agricultural losses Gas line burst Significant structural damage to commercial and residential structures. Displacement of 14,000 people to shelters.

Date	Type of Disaster	Description
		$1 million in damage within Hammond
4/27/1973	Severe Storm, Flood	Major crop damage throughout the Parish. Several bridge collapses. Floodwater reached within 8 inches of record on Tangipahoa River.
5/2/1977	Severe Storm, Flood	Recorded 13.44 inches of rainfall in 48 hours. Roads closed throughout the Parish estimated damages near $3 million. Rescue personnel sent boats to rescue people trapped by flood waters. Some areas reported 6-7 feet of water.
4/20/1983	Severe Storm, Flood	Water damage in homes recorded above 2 feet deep. Bridge damage at several locations due to flood flows. Approximately 453 families affected.
11/1/1985	Tropical Hurricane (Hurricane Juan)	Five-day rain event. Caused backwater flooding from rivers throughout the Parish. Eight feet of water in buildings at peak. Estimated $1 million in damages for 3 parishes.
6/16/1989	Hurricane, Rain/Storm, Tornado	Eight inches of rain produced by system. Electrical and phone service disabled Parish-wide. Many roads impassable.
8/25/1992	Tropical Hurricane (Hurricane Andrew)	Winds estimated at 75 mph. Wind damage to structures. School closures. Storm debris blocked roads and transportation through Parish. Parts of State and Federal Highways were impassable. Electricity loss to 28,000 structures.
2/2/1993	Severe Storm, Flood	Tides two to three feet above normal. Flooding of low-lying roads and nearby bayous. Power interruptions .
5/8/1995	Rainstorm, Flood	Twelve inches of rain in two days. Several road culverts washed out. Roads inundated throughout the Parish. Flooding of subdivisions along the Tangipahoa River due to overbank flow. Road closures throughout Parish.
9/30/1998	Tropical Hurricane (Hurricane Georges)	Schools closed through the Parish. Wind-cause damage to homes and electrical lines. Widespread storm debris and power-outages. Residents in the southern extent of the Parish forced to evacuate. Parish roads closed.
6/5/2001	Tropical Storm Allison	Estimated rainfall of more than 20 inches. Weather-related accidents. Widespread street flooding.
9/27/2002	Tropical Storm Isadore	Storm surge 4-5 feet above normal. 4 to 8 inches of rainfall occurred within 6 hours. Drainage systems overwhelmed. Streets, homes, and vehicles were flooded.
10/3/2002	Tropical Hurricane (Hurricane Lili)	More than 40 roads closed due to flooding. Widespread storm debris and power line damage through Parish. Loss of power to 10,700 structures.
9/15/2004	Tropical Hurricane (Hurricane Ivan)	$7.9 million in damage in Louisiana. Sustained wind of 83 mph, with gusts of 100 mph.

Date	Type of Disaster	Description
		Power outages to 55,000 structures. Storm surge was 2 to 4 feet above normal.
8/29/2005	Tropical Hurricane (Hurricane Katrina)	Hurricane eye passed though the Parish. Hurricane-force winds over 90mph. Widespread storm debris, potable water shortages, loss of electricity, and communications. Widespread roadway, railway, bridge, drainage system obstructions due to storm debris. Power outages for the entire Parish for 3 days, and some rural areas for up to 2 weeks. Flood damage in low-lying areas of the Parish as a result of 10 inches of rain. 89 homes destroyed. $8.4 million in damages to critical infrastructure. Significant agricultural losses . More than 75% of timber in the Parish was damaged.
9/24/2005	Tropical Hurricane (Hurricane Rita)	Maximum sustained winds of 120 mph. Flooding in areas closest to Lake Pontchartrain.
9/2/2008	Tropical Hurricane (Hurricane Gustav)	4-6 inches of rain in the Parish. Most damage was located in the southern portion of the Parish, near Manchac, where severe flooding occurred.
8/29/2012	Tropical Hurricane (Hurricane Isaac)	Tangipahoa River reached major flood stage and all residing within 0.5 mile of the river were ordered to evacuate. Southern portion of the Parish was ordered to evacuate (Manchac area, Akers community, Lee's Landing, and all areas south of Wadesboro Road and Weinberger Road.
3/8/2016	Flooding	Major river flooding developed along the Tangipahoa River and other large streams.
8/12/16	Flooding	12 to 18 inches of rainfall over a 2-day period 11,000 homes and businesses suffered various degrees of flooding throughout the Parish.
8/22/2020	Tropical Hurricane (Hurricane Laura)	Negligible damage
9/14/2020	Tropical Hurricane (Hurricane Sally)	Negligible damage

Source: (Tangipahoa Parish Government, 2020)

Table D: 1-5. Historical Floods in Tangipahoa Parish With Their Locations from 1989-2019 (National Climate Data Center).

Date	Extent	Type of Flooding	Location
2/25/1997	Approximately 25 miles of roads, around rivers and low-lying areas near rivers, were flooded after heavy rain.	Flood	Tangipahoa (unincorporated)
1/5/1998	Heavy rain of 3 to 5 inches occurred over portions of extreme southeast Louisiana. The heavy rain occurred within a few hours' time and overwhelmed drainage pumping capacity, resulting in widespread street flooding.	Flood	Hammond
1/22/1998	Heavy rain of 2.5 inches caused extensive street flooding.	Flood	Ponchatoula

Date	Extent	Type of Flooding	Location
6/6/2001 Federal declaration)	Estimated rainfall was over 20 inches.	Flash Flood	Tangipahoa (unincorporated)
4/7/2008	Three to 4 inches of rain fell in a few hours causing flash flooding in areas of poor drainage. Several buildings and houses were flooded. A 12-year-old playing in or trying to cross a creek with several other kids was swept away and drowned.	Flash Flood	Tangipahoa (unincorporated)
5/2/2008	Louisiana Highway 40 and a number of other roads were closed due to flooding from 6-10 inches of rain. One person had to be rescued from a vehicle stranded in high water in the Loranger area.	Flash Flood	Independence
5/14/2008	Several inches of rain flooded numerous streets and a number of homes in Hammond area. Fourteen people had to be rescued from the high water.	Flash Flood	Hammond
8/13/2010	Five inches of rain from remnants of Tropical Depression #5, flooding yards and approached homes near Hammond High School east of Hammond.	Flash Flood	Hammond
8/19/2010	Several inches of rain from thunderstorms produced street flooding in several areas of Hammond and surrounding portions of Tangipahoa Parish.	Flash Flood	Hammond
3/4/2011	A few roads in easter portions of Hammond, including Old Covington Highway and Highway 190 east has 2 to 8 inches of water across them. Several roads were flooded between the Hammond area and Ponchatoula. A few other roads were closed due to high water.	Flash Flood	Tangipahoa (unincorporated)
3/8/2011	Moderate to major flooding developed on the lower portion of the Bogue Falaya and Tchefuncte Rivers in Tangipahoa Parish. The flooding was the result of heavy rain cause by Tropical Storm Bill. River flooding damaged some structures and flood and damaged roadways.	Flash Flood	Tangipahoa (unincorporated)
3/8/2011	Roads cover in water up to 3 to 4 feet in the Kentwood area.	Flash Flood	Kentwood
3/8/2011	Kentwood Police Department reported water rescues caused by flooding along a creek in the Village of Tangipahoa	Flood	Village of Tangipahoa
9/2/2011	Flooding occurred in low-lying areas and roadways south of Ponchatoula as a result of Tropical Storm Lee	Storm Surge/Tide	Tangipahoa (unincorporated)
5/2/2012	Extensive and deep street flooding reported in Amite. Water was reported up to 2 feet deep on some roads	Flash Flood	Amite Roseland
8/28/2012	Localized flooding resulting from Hurricane Isaac. The Tangipahoa River reached 22.87 feet flood stage, causing backflooding of adjacent areas.	Storm Surge, Tide	Tangipahoa (unincorporated)
3/11/2016	Major river flooding along the Tangipahoa River and other large streams. Many houses were flooded, particularly in southern Tangipahoa Parish	Flood	Loranger (unincorporated)
3/11/2016	Approximately 1,850 homes were flooded in the Parish and 2,800 residents evacuated due to flooding.	Flash Flood	(unincorporated)
8/13/2016	11,000 Homes and businesses suffered various degrees of flooding through the Parish. One casualty	Flood	(unincorporated)

Date	Extent	Type of Flooding	Location
	due to drowning.		

1.2 RELEVANT RESOURCES

This section contains a description of relevant resources that are in the area of influence of the proposed project. The important resources described are those recognized by laws, executive orders, regulations, and other standards of national, state, or regional agencies and organizations, technical or scientific agencies, groups, or individuals; and the general public.

Relevant resources that are in the area of influence of the project area include: wetlands, uplands; aquatic resources and fisheries; wildlife; threatened, endangered, and protected species; geology, soils, and water bottoms, prime and unique farmland; water quality; air quality; and environmental justice.

Figure D:1-3 shows the National Wetlands Inventory data within the study area (https://www.fws.gov/wetlands/). Table D:1-6 provides a list of the National Wetlands Inventory and the number of acres of each type within the study area.

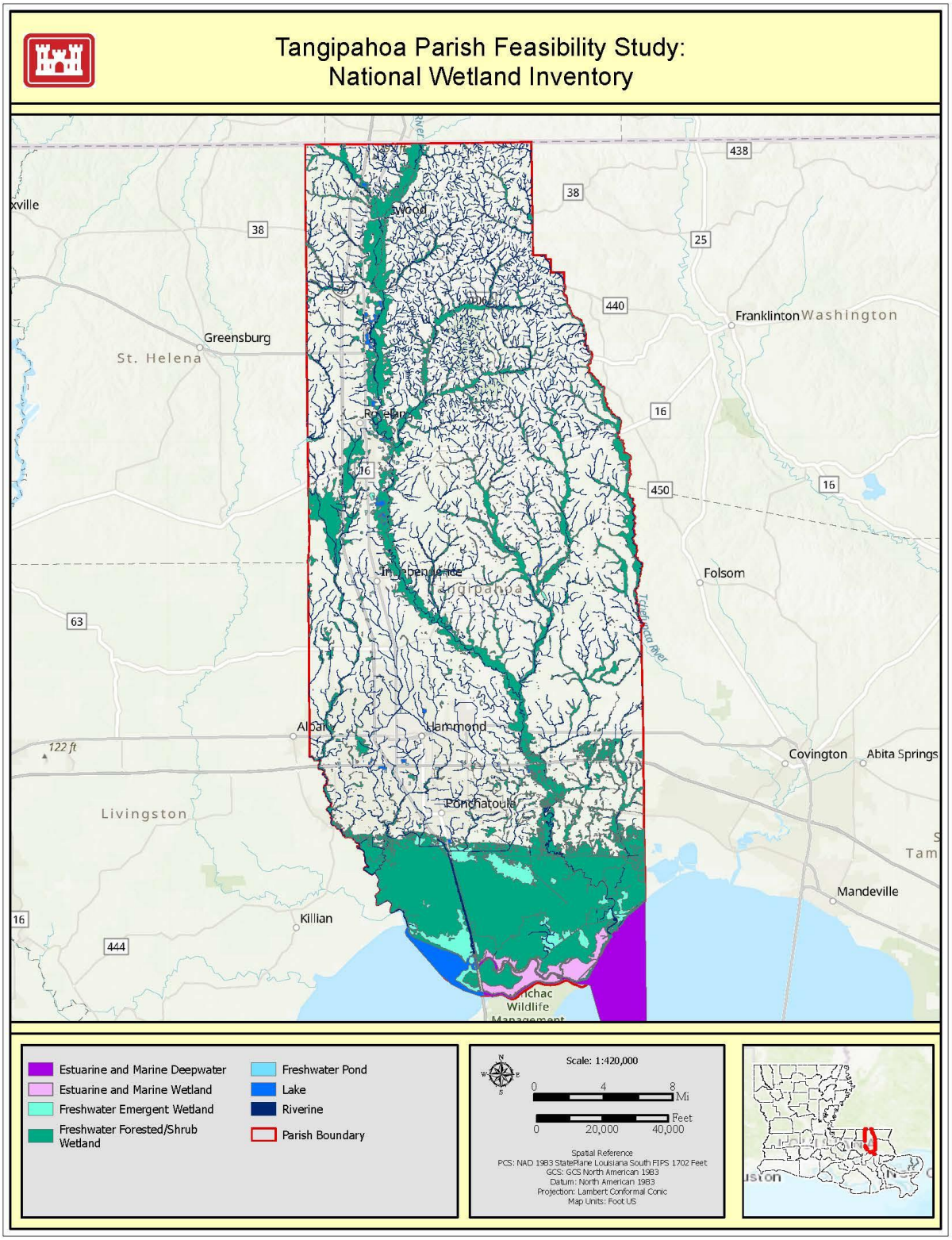

Figure D: 1-3. National Wetlands Inventory Map for Tangipahoa Parish

Table D: 1-6. National Wetlands Inventory Total Acreage by Type in Tangipahoa Parish

Wetland Type	Total Acreage
Estuarine and Marine Deepwater	315,618.95
Estuarine and Marine Wetland	4,408.87
Freshwater Emergent Wetland	7,611.64
Freshwater Forested/Shrub Wetland	116,886.69
Freshwater Pond	2,919.99
Lake	59,517.95
Riverine	7,558.73

Vegetative communities within the Study Area include:

Swamp, found in low-lying areas in the southern-most extent of the Parish, is dominated by cypress and tupelo-gum trees.

Riverine habitats along stream and river bottoms and bottomland forests are comprised of water tupelo, willow, sycamore, cottonwoods, green ash, pecan, elm, cherrybark oak, and white oak trees. Depending upon the location in the Parish, riverine habitats grade into higher elevated and better drained areas comprised of pine and mixed hardwood forest. Freshwater marshes found within the study area support a large diversity of potential plants, including Arrowhead (*Sagittaria* sp.), spikerushes (*Eleocharis sp.*), cordgrasses (*Spartina* sp.), cutgrass (*Leersia sp.*), and others.

Intermediate marsh found along the extreme southern extent of the Parish is comprised of species that tolerate changes in salinity, including wire grass (*Spartina patens*), three-cornered grass (*Schoenoplectus robustus*), and others.

Pasture and rangelands with mixtures of perennial grasses and legumes comprise the majority of non-forested rural areas. The remaining agricultural land is comprised of a mix of grains, legumes, vegetables, melons, potatoes, sweet potatoes, fruits, berries, or nursery stock.

Longleaf pine communities are found primarily on more upland terraces with better drained soils and include longleaf pine, loblolly pine, slash pine, sweetgum elm, oak species, black gum, and Chinese tallow tree.

1.3 INVASIVE SPECIES

Invasive plants in aquatic areas include water hyacinth (*Pontederia crassipes*), alligatorweed (*Alternanthera philoxerioides*), common salvinia (*Salvinia minima*), duck lettuce (*Ottelia alismoides*), and giant salvinia (*Salvinia molesta*) (LDWF, 2021); (LDWF, 2024). Chinese tallow, Chinese privet, Cogon grass, Nutria, and feral hogs. The invasive plant species compete with native flora for resources such as nutrients and light, and alter plant community structure, composition, and ecosystem processes which reduce overall diversity and habitat heterogeneity. Invasive plants provide lower value habitat for wildlife and have

the ability to dominate large areas, limiting food available for wildlife.

The invasive mammals listed above are voracious herbivores that reduce establishment of native plant species and alter disturbance dynamics in native plant communities which alters habitat structure and development.

Water hyacinth, common salvinia, and giant salvinia all limit the amount of light penetrating the water column which affects plankton biomass production.

1.4 RARE, UNIQUE, AND IMPERILED VEGETATITVE COMMUNITIES

The Louisiana Natural Heritage Program (LNHP) identify the following imperiled or vulnerable plant communities in the study area. These communities contribute to the diversity and stability of Louisiana ecosystems. Table D:1-7 displays information from the LNHP database identifying imperiled or vulnerable plant communities that historically occurred in the study area. Species composition commonly found in these plant communities can be found in table D1-8 through table D1-13.

Table D: 1-7. Louisiana Natural Heritage Program Imperiled or Vulnerable Plant Communities Found in the Study Area.

Plant Communities	Basins or Parish(es)
Eastern Longleaf Pine Savanna	St. Tammany, Tangipahoa
Eastern Upland Longleaf Pine Forest	St. Helena, St. Tammany, Tangipahoa, Washington
Pondcypress-Blackgum Swamp	St. Tammany, Tangipahoa
Shortleaf Pine/oak-hickory Forest	Bienville, Bossier, Caddo, De Soto, Grant, Lincoln, Natchitoches, Rapides, St. Tammany, Tangipahoa, Vernon, Washington, Webster, Winn
Small Stream Forest	Bienville, Bossier, Caddo, Claiborne, De Soto, East Baton Rouge, East Feliciana, Franklin, Grant, La Salle, Lincoln, Livingston, Natchitoches, Rapides, Sabine, St. Helena, St. Tammany, Tangipahoa, Vernon, Washington, Webster, West Feliciana, Winn
Freshwater Marsh	Cameron, Lafourche, Plaquemines, St. Charles, St. Mary, St. Tammany, Tangipahoa, Terrebonne, Vermilion

Eastern longleaf pine savanna occupies poorly drained and seasonally saturated depressional areas and low flats. The community may occur in areas where some components of the soil layers slow water movement through the soil. As a result, there can be frequent fluctuations in the water table depending on the season and year. The plant community was historically maintained with fire which reduced woody encroachment and maintained a diverse herbaceous plant community.

Primary threats to this plant community are development (residential, commercial, utility, etc.), conversion to plantations, alterations to hydrologic conditions, altered fire regime, soil

damage from harvesting or recreational activities, vehicle disturbance, and displacement by invasive exotic species. The current threats and trends for this community type are anticipated to continue into the future under the no action and action alternatives (Plan 1 and 3b).

Table D: 1-8. Characteristic Plant Species of Eastern Longleaf Pine Savanna

Common Name	Scientific Name
Longleaf pine	*Pinus palustris*
Slash pine	*Pinus elliottii*
Sweet bay	*Magnolia virginiana*
Blackjack oak	*Quercus marilandica*
Laurel oak	*Quercus laurifolia*
Swamp cyrilla	*Cyrilla racemiflora*
Wax myrtles	*Morella spp.*
St. John's worts	*Hypericum spp.*
Littleleaf snowbell	*Styrax americana*
Pondcypress	*Taxodium ascendens*
Broomsedges	*Andropogon spp.*
Little bluestem	*Schizachyrium scoparium*
Slender bluestem	*Schizachyrium tenerum*
Panic grasses	*Panicum spp.*
Three-awn grass	*Aristida spp.*
Toothache grass	*Ctenium aromaticum*
Hairawn muhly	*Muhlenbergia capillaris*
Plume-grass	*Erianthus spp.*
Jointgrass	*Coelorachis spp.*
Beak-rushes	*Rhynchospora spp.*
Yellow-eyed grasses	*Xyris spp.*
Umbrella grasses	*Fuirena spp.*
Nut-rushes	*Scleria spp.*
White top sedge	*Dicrhomena latifolia*
Pipeworts	*Eriocaulon spp.*
Bog buttons	*Lachnocaulon spp.*
Fimbry-sedge	*Fimbristylis spp.*
Pitcher plants	*Sarracenia spp.*
Parrot pitcherplant	*Sarracenia psittacine*
Gerardias	*Agalinis spp.*
Lobelias	*Lobelia spp.*
Meadow beauties	*Rhexia spp.*
Bog thistle	*Eryngium integrifolium*
Hog-fennel	*Oxypolis filiformis*
Milkworts	*Polygala spp.*
Blazingstarts	*Liatris spp.*
Rose Gentians	*Sabatia spp.*
Sundews	*Drosera spp.*
Butterworts	*Pingulcula spp.*
Butterwort	*Pinguicula lutea*
Bladderworts	*Urticularia spp.*
Fringed orchids	*Platanthera spp.*

Common Name	Scientific Name
Lily	*Lilium family (Liliaceae)*
Yellow colic-root	*Aleris lutea*
Coastal false asphodel	*Tofieldia racemose*
Spreading pogonia	*Cleistes bifaria*
Club mosses	*Lycopodium spp.*

Source: LWDF Natural Plant Communities of Louisiana (https://www.wlf.louisiana.gov/resources/category/plants-and-natural-communities/natural-communities-fact-sheets)

Eastern upland longleaf pine forest occurs on upland terrace soils comprised of acidic loamy sands to acid clays. Longleaf pine is the dominant and occasionally the only canopy species. This plant community is maintained with fire that reduces woody encroachment and promotes development of an herbaceous plant layer in the understory.

Primary threats to this community include: conversion to plantations, altered fire regime (historically 1-3 year frequency), development (residential, commercial, utility, etc.), vehicle disturbance, and displacement by invasive species. The current threats and trends for this community type are anticipated to continue into the future under the no action and action alternatives (Plan 1 and 3b).

Table D: 1-9. Characteristic Plant Species of Eastern Upland Longleaf Pine Forest

Common Name	Scientific Name
Longleaf pine	*Pinus palustris*
Shortleaf pine	*Pinus echinata*
Black gum	*Nyssa sylvatica*
Blackjack oak	*Quercus marilandica*
Post oak	*Quercus stellata*
Persimmon	*Diospyros virginiana*
Sassafras	*Sassafras albidum*
Flowering dogwood	*Cornus florida*
Deer berry	*Vaccinium stamineum*
Winter honeysuckle	*Vaccinium arboretum*
Dwarf blueberry	*Vaccinium darrowii*
Dwarf huckleberry	*Gaylussaica Dumosa*
French mulberry	*Callicarpa americana*
Wax myrtle	*Morella cerifera*

Common Name	Scientific Name
Chittum wood	*Sideroxylon lanuginose*
Yaupon	*Ilex vomitoria*
Blackberries	*Rubus spp.*
Winged sumac	*Rhus copallina*
Wild grape	*Vitis spp.*
Virginia creeper	*Parthenocissus quinquefolia*
Greenbriers	*Smilax spp.*
Yellow jessamine	*Gelsemium sempervirens*
Bracken fern	*Pteridium aquilinum*
Broomsedges	*Andropogon spp.*
Little bluestem	*Schizachyrium scoparium*
Three-awn grasses	*Aristida spp.*
Dropseeds	*Sporobolus spp.*
Panic grasses	*Panicum spp.*
Silky scales	*Anthaenantia sp.*
Toothache grass	*Ctenium aromaticum*
Crab grasses	*Digitaria spp.*
Love grasses	*Eragrostis spp.*
Plume grasses	*Erianthus spp.*
Skelton grasses	*Gymnopogon spp.*
Bristle grasses	*Setaria spp.*
Paspy grasses	*Paspalum spp.*
Asters	*Eurybia spp.; Symphyotrichum spp.*
Vanilla plant	*Carphephorus odoratissimus*
Golden asters	*Chrysopsis spp.*
Golden asters	*Heterotheca spp.*
Elephant foot	*Elephantopus spp.*

Common Name	Scientific Name
Thoroughworts	*Eupatorium spp.*
Flat-topped goldenrods	*Euthamia spp.*
Rabbit tobaccos	*Gnaphalium spp.*
Sneezeweeds	*Helenium spp.*
Sunflowers	*Helianthus spp.*
Blazingstarts	*Liatris spp.*
Brown-eyed susans	*Rudbeckia spp.*
Goldenrods	*Solidago spp.*
Ironweeds	*Vernonia spp.*
Evening primroses	*Oenothera spp.*
Milkworts	*Polygala spp.*
Lobelias	*Lobelia spp.*
Poppy mallow	*Callirhoe papaver*
Wild petunias	*Ruellia spp.*
Yellow-eyed grasses	*Hypoxis spp.*
Milkweeds	*Asclepias spp.*
Pinweeds	*Lechea spp.*
Spurges	*Euphorbia spp.*
Rose gentians	*Sabatia spp.*
Gerardias	*Agalinis spp.*
Meadow beauties	*Rhexia spp.*
Indigos	*Baptisia spp.*
Butterfly pea	*Centrosema virginianum*
Pigeon wings	*Clitoria mariana*
Rattlepods	*Crotolaria spp.*
Beggarticks	*Desmodium spp.*
Bush clovers	*Lespedeza spp.*

Common Name	Scientific Name
Pencil flower	*Stylsanthes biflora*
Snout beans	*Rhynchosia spp.*
Hoary peas	*Tephrosia spp.*

Source: LWDF Natural Plant Communities of Louisiana (https://www.wlf.louisiana.gov/resources/category/plants-and-natural-communities/natural-communities-fact-sheets)

Pondcypress-blackgum swamp is a rare plant community that typically occurs in backwater portions of larger swamplands away from active stream channels. Soils are inundated or saturated by surface water or groundwater consistently during the growing season typically. Water levels fluctuate seasonal and sometimes create a situation where the herbaceous community grows as a "flotant" on a mat of fibrous roots. This plant community and its closely associated plant communities are important for water quality maintenance and support a range of fish and wildlife species. Current distribution is limited to Tangipahoa Parish.

Primary threats include agricultural, industrial, residential, and utility development; saltwater intrusion; altered hydrology; soil damage from harvesting and industrial activities; vehicle disturbance, and altered conditions due to exotic species encroachment. The current threats and trends for this community type are anticipated to continue into the future under the no action and action alternatives (Plan 1 and 3b).

Table D: 1-10. Characteristic Plant Species of Pondcypress-Blackgum Swamp

Common Name	Scientific Name
Pondcypress	*Taxodium ascendens*
Swamp blackgum	*Nyssa biflora*
Swamp red maple	*Acer rubrum var. drummondii*
Cypress knee sedge	*Carex decomposita*
Lizard's tail	*Saururus cernuus*
Red-root	*Lacnanthes caroliniana*
Marsh St. John's wort	*Triadenum walteri*
Stinkweed	*Pluchea rosea*
Royal fern	*Osmunda regalis var. spectabilis*
Buttonbush	*Cephalanthus occidentalis*
Wax myrtle	*Morell cerifera*
Pickerel weed	*Pontederia cordata*
Marsh primrose	*Ludwigia Pilosa*
Beggarticks	*Bidens ssp.*
Lanceleaf bulltongue	*Sagittaria lancifolia*

Source: (LDWF, 2009)

The shortleaf pine/oak-hickory forest community occurs sporadically in the Florida Parishes (including Tangipahoa Parish) on dry hills slopes and ridges. Soils generally consist of acidic, silty to sandy loams underlain with clay or silty clays. The dominant pine species was historically shortleaf pine, although loblolly is more abundant now. Periodic fire (5-15 year

interval frequency) is important for maintaining health and structure of this plant community. Overall species composition varies with predominant moisture conditions of a site. Drier sites have greater dominance of shortleaf pine while areas with more moisture consist of approximately half hardwood species and half shortleaf pine.

Threats to this plant community include development and land use change (i.e. conversion to agriculture or plantation), altered fire regime, physical damage during timber harvesting, vehicle disturbance, and altered conditions due invasive exotic species spread. The current threats and trends for this community type are anticipated to continue into the future under the no action and action alternatives (Plan 1 and 3b).

Table D: 1-11. Characteristic Plant Species of Shortleaf Pine/Oak-Hickory Forest

Common Name	Scientific Name
Shortleaf pine	*Pinus echinata*
Loblolly pine	*Pinus taeda*
Southern red oak	*Quercus falcata*
Post oak	*Quercus stellata*
Blackjack oak	*Quercus marilandica*
Black oak	*Quercus velutina*
White oak	*Quercus alba*
Cherrybark oak	*Quercus falcata var. pagodaefolia*
Shumard oak	*Quercus shumardii*
Mockernut oak	*Carya tomentosa*
Black hickory	*Carya texana*
Bitternut hickory	*Carya cordiformis*
Winged elm	*Ulmus alata*
White ash	*Fraxinus americana*
Black gum	*Nyssa sylvatica*
Sweetgum	*Liquidambar styraciflua*
Red maple	*Acer rubrum*
Winter huckleberry	*Vaccinium arboretum*
Bunch blueberry	*Vaccinium virgatum*
Chittumwood	*Bumelia lanuginose*
French mulberry	*Callicarpa americana*
Rusty blackhaw	*Viburnum rufidiulum*
Deciduous holly	*Ilex decidua*
Hawthorn	*Crataegus spp.*
Mexican plum	*Prunus Mexicana*
Asters	*Aster spp.*
Goldenrods	*Solidago spp.*
Rosin-weeds	*Silphium spp.*
Plantain-leaf pussytoes	*Antennaria plantaginifolia*
Beggarticks	*Bidens spp.*
Wake-robins	*Trilium spp.*
Sprangle grasses	*Chasmanthium spp.*
Violets	*Viola spp.*
Partridge berry	*Mitchella repens*
Sunflowers	*Helianthus spp.*

Common Name	Scientific Name
Blazingstars	*Liatris spp.*
Panic grasses	*Panicum spp.*

Source: *(LDWF, 2009)*

The small stream forest community is found in narrow bands along small rivers and large creeks. Although soils are typically classified as silt loams for this plant community, soil composition is highly variable which in turn influences overall plant species composition at a site. As a result of proximity to smaller riverine habitats, this plant community undergoes seasonal flooding for brief periods. This plant community, like other riverine associate plant communities, is important for filtering surface and subsurface flows, improving water quality, and for storing sediment and nutrients.

Threats for this community include: habitat conversion, gravel mining, development for roads, utilities, and pipelines, vehicle disturbance, and altered conditions due to invasive exotic species spread. The current threats and trends for this community type are anticipated to continue into the future under the no action and action alternatives (Plan 1 and 3b).

Table D: 1-12. Characteristic Plant Species of Small Stream Forest

Common Name	Scientific Name
Southern magnolia	*Magnolia grandiflora*
Blackgum	*Nyssa sylvatica*
White oak	*Quercus alba*
Laurel oak	*Quercus laurifolia*
Sweetgum	*Liquidambar styraciflua*
Red maple	*Acer rubrum*
Shagbark hickory	*Carya ovata*
White ash	*Fraxinus americana*
Cherry laurel	*Prunus caroliniana*
Yellow poplar	*Liriodendron tulipifera*
Bald cypress	*Taxodium distichum*
Sweet bay	*Magnolia virginiana*
Beech	*Fagus grandifolia*
Swamp white oak	*Quercus michauxii*
Water oak	*Quercus nigra*
Cherrybark oak	*Quercus pagoda*
Sycamore	*Platanus occidentalis*
River birch	*Betula nigra*
Bitternut hickory	*Carya cordiformis*
Water ash	*Fraxinus caroliniana*
Winged elm	*Ulmus alata*
Spruce pine	*Pinus glabra*
Loblolly pine	*Pinus taeda*
Silverbell	*Halesia diptera*
Arrow-wood	*Viburnum dentatum*
Sweetleaf	*Symplocos tinctoria*
Wild azalea	*Rhododendron canescens*

Common Name	Scientific Name
Ironwood	*Carpinus caroliniana*
Virginia willow	*Itea virginica*
Hazel alder	*Alnus serrulata*
Bigleaf snowbell	*Styrax grandifolia*
Starbush	*Illicium floridanum*
Swamp cyrilla	*Cyrilla racemiflora*
Leucothoe	*Leucothoe axillaris*
Winterberry	*Ilex verticillate*
Sebastian bush	*Ditrysinia fruticosa*
Fetterbush	*Lyonia lucida*
Leucothoe	*Leucothoe racemosa*

Source: *(LDWF, 2009)*

Freshwater marsh in the study area is primarily found adjacent to intermediate marsh area along the northern boundary of the coastal marsh. This community type is the most diverse of the marsh types present in the state. Water salinity is typically less than 2 parts per thousand (ppt) and averages between 0.5-1 ppt. Species composition is highly variable and heterogenous and is determined by microtopography; flood frequency, depth, and duration; substrate; flow; salinity; and competition. This community is important to a wide diversity of fish, particularly as nursery areas and wildlife such as wintering waterfowl.

Primary threats to this community include shoreline erosion; subsidence; commercial, industrial, and utility development; altered hydrology, contamination; fire suppression; and the spread of invasive exotic species. The current threats and trends for this community type are anticipated to continue into the future under the no action and action alternatives (Plan 1 and 3b).

Table D: 1-13. Characteristic Plant Species of Freshwater Marsh

Common Name	Scientific Name
Maidencane	*Panicum hemitomon*
Spikerush	*Eleocharis spp.*
Bulltongue	*Sagittaria falcata*
Alligator weed	*Alternanthera philoxerioides*
Wire grass	*Spartina patens*
Roseau cane	*Phragmites communis*
Coastal water hyssop	*Bacopa monnieri*
Coontail	*Ceratophyllum demursum*
Fragrant flatsedge	*Cyperus odoratus*
Water hyacinth	*Eichhornia crassipes*
Pickerelweed	*Pontederia cordata*
Arrow arum	*Peltandra virginica*
Pennyworts	*Hydrocotyle spp.*
Common duckweed	*Lemna minor*
Water milfoils	*Myriophyllum spp.*
White waterlily	*Nymphaea odorata*
Cattail	*Typha spp.*
Bladderworts	*Utricularia spp.*

Common Name	Scientific Name
Deer pea	*Vigna luteola*
Southern wildrice	*Zizaniopsis miliacea*

Source: *(LDWF, 2009)*

1.5 AQUATICE RESOURCES AND FISHERIES

Several management plans have been developed for major rivers located in the Parish, with the exception of the Natalbany River. The state has identified fish species, mussel species, and aquatic species of conservation concern for the Tangipahoa, Tickfaw, and Tchefuncte River Watersheds based on previous survey data and knowledge of species current and potential ranges. The list of species for each category is provided in table D1-14 and D1-16.

In general, the fresh and low-salinity waters of the study area (ex. streams, rivers, and freshwater marsh), support many commercially and recreationally important fishes and shellfishes. Freshwater sport fishes include largemouth bass (*Micropterus salmoides*), black crappie (*Pomoxis nigromaculatus*), white crappie (*Pomoxis annularis*), bluegill (*Lepomis macrochirus*), redear sunfish (*Lepomis microlophus*), warmouth (*Lepomis gulosus*), channel catfish (*Ictalurus punctatus*) and blue catfish (*Ictalurus furcatus*). Blue catfish, channel catfish, yellow bullhead (*Ameiurus natalis*), freshwater drum (*Aplodinotus grunniens*), bowfin (*Amia calva*), common carp (*Cyprinus carpio*), buffaloes (*Ictiobus* spp.), and gars (*Lepisosteidae* spp.) are the primary freshwater fishes of commercial importance.

The low-to-moderate salinity waters and marshes in the far southern extent of the study area provide habitat for many estuarine-dependent fishes and shellfishes. Some species are permanent residents while others only occur in these habitats during early developmental periods (i.e. nursery habitat) before moving to more saline waters as they mature. Examples of species in the study area that have this developmental requirement include southern flounder (*Paralichthys lethostigma*), sand seatrout (*Cynoscion arenarius*), Atlantic croaker (*Micropogon undulatus*), black drum (*Pogonias cromis*), red drum (*Sciaenops ocellata*), striped mullet (*Mugil cephalus*), Gulf menhaden (*Brevoortia patronus*), blue crab (*Callinectes sapidus*) and white shrimp (Litopenaeus setiferus). Study area streams, surface runoff, and tidal action contribute decaying plant material (detritus) from study area wetlands into the adjacent estuarine waters to supports high finfish and shellfish productivity.

Table D: 1-14. Fish Species Recorded in the Tangipahoa, Tickfaw, and Tchefuncte River Watersheds Organized by Scientific Names.

Scientific Name	Common Name	Tangipahoa River	Tchefuncte River	Tickfaw River
Acipenser oxyrinchus desotoi	Gulf Sturgeon	x	x	x
Adinia xenica	Diamond Killifish		x	
Alosa alabamae	Alabama Shad	x		

Scientific Name	Common Name	Tangipahoa River	Tchefuncte River	Tickfaw River
Alosa chrysochloris	Skipjack Herring	x	x	x
Ambloplites ariommus	Shadow Bass	x	x	x
Ambloplites rupestris	Rock Bass	x		
Ameiurus melas	Black Bullhead	x		x
Ameiurus natalis	Yellow Bullhead	x	x	x
Ameiurus nebulosus	Brown Bullhead			x
Amia calva	Bowfin		x	x
Ammocrypta beanii	Naked Sand Darter	x		x
Ammocrypta vivax	Scaly Sand Darter			x
Anchoa mitchilli	Bay Anchovy	x	x	x
Anguilla rostrata	American Eel	x	x	x
Aphredoderus sayanus	Pirate Perch	x	x	x
Aplodinotus grunniens	Freshwater Drum	x		x
Archosargus probatocephalus	Sheepshead			x
Ariopsis felis	Saltwater Catfish		x	
Atractosteus spatula	Alligator Gar	x	x	
Brevoortia patronus	Gulf Menhaden		x	x
Carpiodes carpio	Rivercarpsucker			x
Centrarchus macropterus	Flier			x
Cyprinella venusta	Blacktail Shiner	x	x	x
Cyprinus carpio	Common Carp			x
Cyprinodon variegates	Sheepshead Minnow	x	x	
Dasyatis sabina	Atlantic Stringray		x	
Dorosoma petenense	Threadfin Shad	x	x	x
Dorosoma cepedianum	Gizzard Shad		x	x
Elassoma zonatum	Banded Pygmy Sunfish	x	x	x
Elops saurus	Ladyfish			x
Erimyzon claviformis	Western Creek Chubsucker			x
Erimyzon oblongus	Creek Chubsucker		x	x
Erimyzon sucetta	Lake Chubsucker			x
Erimyzon tenuis	Sharpfin Chubsucker	x	x	x
Esox americanus vermiculatus	Grass Pickerel	x	x	x
Esox niger	Chain Pickerel	x	x	x
Etheostoma chlorosomum	Bluntnose Darter	x	x	x
Etheostoma fusiforme	Swamp Darter			x
Etheostoma lynceum	Bright-eye Darter	x		
Etheostoma proeliare	Cypress Darter	x	x	x

Scientific Name	Common Name	Tangipahoa River	Tchefuncte River	Tickfaw River
Etheostoma stigmaeum	Speckled Darter	x	x	x
Etheostoma swaini	Gulf Darter	x	x	x
Etheostoma zonale	Banded Darter	x	x	x
Fundulus catenatus	Studfish			x
Fundulus chrysotus	Golden Topminnow	x	x	x
Fundulus euryzonus	Broadstripe Topminnow			x
Fundulus grandis	Gulf Killifish		x	
Fundulus jenkinsi	Saltmarsh Topminnow		x	
Fundulus notatus	Blackstripe Topminnow		x	x
Fundulus nottii	Bayou Topminnow	x	x	
Fundulus olivaceus	Blackspotted Topminnow	x	x	x
Gambusia affinis	Mosquitofish	x	x	x
Gobionellus shufeldti	Freshwater Goby		x	
Gobiosoma bosc	Naked Goby		x	
Heterandria formosa	Least Killifish		x	x
Hybognathus hayi	Cypress Minnow	x		x
Hybognathus nuchalis	Mississippi Silvery Minnow		x	
Hybopsis amblops	Big-eye Chub	x		
Hybopsis amnis	Pallid Shiner			x
Hybopsis winchelli	Clear Chub	x	x	x
Hypentelium nigricans	Northern Hogsucker	x		x
Hypophthalmichthys mollitrix	Silver Carp			x
Ichthyomyzon gagei	Southern Brook Lamprey	x	x	x
Ictalurus furcatus	Blue Catfish	x	x	x
Ictalurus punctatus	Channel Catfish	x	x	x
Ictiobus bubalus	Smallmouth Buffalo			x
Ictiobus cyprinellus	Bigmouth Buffalo			x
Ictiobus niger	Black Buffalo			x
Labidesthes sicculus	Brook Silverside	x	x	x
Lagodon rhomboides	Pinfish			x
Leiostomus xanthurus	Spot		x	
Lepisosteus osseus	Longnose Gar	x	x	x
Lepisosteus oculatus	Spotted Gar	x	x	x
Lepisosteus platostomus	Shortnose Gar			x
Lepisosteus spatula	Alligator Gar			x
Lepomis cyanellus	Green Sunfish	x	x	x
Lepomis gulosus	Warmouth	x	x	x

Scientific Name	Common Name	Tangipahoa River	Tchefuncte River	Tickfaw River
Lepomis humilis	Orange-spotted Sunfish			x
Lepomis fulosus X macrochirus	Warmouth Bluegill Sunfish hybrid	x		
Lepomis macrochirus	Bluegill Sunfish	x	x	x
Lepomis marginatus	Dollar Sunfish	x	x	x
Lepomis megalotis	Longear Sunfish	x	x	x
Lepomis microlophus	Redear Sunfish	x	x	x
Lepomis miniatus	Red Spotted Sunfish	x	x	x
Lepomis punctatus	Spotted Sunfish	x		
Lepomis symmetricus	Bantam Sunfish		x	x
Lucania parva	Rainwater Killifish		x	
Luxilus chrysocephalus	Striped Shiner	x	x	x
Lythrurus fumeus	Ribbon Shiner			x
Lythrurus roseipinnis	Cherryfin Shiner	x	x	x
Macrhybopsis aestivalis	Speckled Chub			x
Macrhybopsis storeriana	Silver Chub			x
Membras martinica	Rough Silverside	x	x	
Menidia beryllina	Inland Silverside	x	x	x
Micropogonias undulatus	Atlantic Croaker	x		x
Micropterus punctulatus	Spotted Bass	x	x	x
Micropterus nigricans	Largemouth Bass	x	x	x
Minytrema melanops	Spotted Sucker			x
Morone chrysops	White Bass		x	x
Morone mississippiensis	Yellow Bass		x	x
Morone saxatilis	Striped Bass		x	
Moxostoma poecilurum	Blacktail Redhorse	x		x
Mugil cephalus	Striped Mullet	x	x	x
Notemigonus crysoleucas	Golden Shiner	x	x	x
Notropis amblops	Bigeye Chub	x		
Notropis cornutus	Common Shiner	x		
Notropis longirostris	Longnose Shiner			x
Notropis maculatus	Taillight Shiner			x
Miniellus longirostris	Longnose Shiner	x	x	
Notropis atherinoides	Emerald Shiner			x
Notropis roseipinnis	Cherryfin Shiner	x	x	
Alburnops texanus	Weed Shiner	x	x	x
Paranotropis volucellus	Mimic Shiner	x		x
Notropis winchelli	Clear Chub	x		
Notorus gyrinus	Tadpole Madtom	x	x	x

Scientific Name	Common Name	Tangipahoa River	Tchefuncte River	Tickfaw River
Notorus leptacanthus	Speckled Madtom	x	x	x
Notorus miurus	Brindled Madtom		x	x
Notorus nocturnes	Freckled Madtom	x	x	x
Opsopoeodus emiliae	Pugnose Minnow	x	x	x
Paralichthys lethostigma	Southern Flounder	x	x	x
Percina caprodes	Logperch			x
Percina maculata	Blackside Darter			x
Percina nigrofasciata	Black-banded Darter	x	x	
Percina oachitae	Oauchita Darter	x		
Percina sciera	Dusky Darter	x	x	x
Percina suttkusi	Gulf Logperch	x		
Percina vigil	Saddleback Darter	x		x
Pimphales promelas	Fathead Minnow			x
Pimephales vigilax	Bullhead Minnow	x		x
Poecilla latipinna	Sailfin Molly	x	x	x
Polyodon spathula	Paddlefish			x
Pomoxis annularis	White Crappie		x	x
Pomoxis nigromaculatus	Black Crappie	x		x
Pylodictis olivaris	Flathead Catfish		x	x
Sciaenops ocellatus	Red Drum		x	
Strongylura marina	Atlantic Needlefish	x		
Syngnathus scovelli	Gulf Pipefish			x
Trinectes maculates	Hogchoker	x	x	x

SOURCE: LDWS WATER BODY MANAGEMENT PLANS FOR THE TANGIPAHOA RIVER, TICKFAW, AND TCHEFUNCTE RIVERS (LDWF, 2020) (LDWF, 2021) (LDWF, 2022)).

Table D: 1-15. Mussel Species Recorded in the Tangipahoa, Tickfaw, and Tchefuncte River Watersheds.

Scientific Name	Common Name	Tangipahoa River	Tchefuncte River	Tickfaw River
Pyganodon grandis	Giant Floater	x		
Anodontoides radiatus	Rayed Creekshell	x	x	
Amblema plicata	Three-ridge	x		
Cyclonaias refulgens	Purple Pimpleback	x	x	
Pleurobema beadleianum	Mississippi Pigtoe	x	x	
Fusconaia cerina	Gulf Pigtoe	x	x	
Lampsilis ornata	Southern Pocketbook	x		
Lampsilis claibornensis	Southern Fatmucket	x	x	
Leptodea fragilis	Fragile Papershell	x		

Scientific Name	Common Name	Tangipahoa River	Tchefuncte River	Tickfaw River
Obovaria jacksoniana	Southern Hickorynut	x		
Potamilus inflatus	Inflated Heelsplitter	x		
Toxolasmus parvus	Lilliput	x		
Villosa lienosa	Little Spectaclecase	x	x	
Utterbackia imbecillis	Paper Pondshell	x	x	
Strophitus subvexus	Southern Creekmussel	x	x	
Plectomerus dombeyanus	Bankclimber	x		
Tritogonia verrucosa	Pistolgrip	x		
Elliptio crassidens	Elephantear	x		
Uniomerus dclivus	Tapered Pondhorn		x	
Uniomerus tetralasmus	Pondhorn	x		
Lampsilis hydiana	Louisiana Fatmucket	x		
Lampsilis teres	Yellow Sandshell	x		
Obliquaria reflexa	Threehorn-Wartyback	x		
Obovaria unicolor	Alabama Hickorynut	x		
Potamilus purpuratus	Bleufer	x		
Toxolasmus texasensis	Texas Lilliput	x		
Villosa vibex	Southern Rainbow	x	x	

(SOURCE: LDWS WATER BODY MANAGEMENT PLANS FOR THE TANGIPAHOA RIVER, TICKFAW, AND TCHEFUNCTE RIVERS (LDWF, 2020) (LDWF, 2021) (LDWF, 2022)).

Table D: 1-16. State Aquatic Species of Conservation Concern for the Tangipahoa, Tchefuncte, and Tickfaw River Watersheds Organized by Group Type.

Group Type	Scientific Name	Common Name	Tangipahoa River	Tchefuncte River	Tickfaw River
Crustaceans	*Procambarus bivittatus*	Ribbon Crawfish	x		
Crustaceans	*Procambarus shermani*	Plain Brown Crawfish	x		
Crustaceans	Creaserinus fodiens	Flatwoods Digger	x		
Fish	*Alosa alabamae*	Alabama Shad			x
Fish	*Acipenser oxyrinchus desotoi*	Gulf Sturgeon	x	x	x
Fish	*Polyodon spathula*	Paddlefish	x	x	x
Fish	*Moxostoma carinatum*	River Redhorse	x	x	
Fish	*Percina suttkusi*	Gulf Logperch	x	x	
Fish	*Fundulus euryzonus*	Broadstripe Topminnow	x		
Fish	*Anguilla rostrata*	American Eel		x	
Fish	*Pteronotropis signipinnis*	Flagfin Shiner			
Mussels	*Anodontoides radiatus*	Rayed Creekshell	x		

Group Type	Scientific Name	Common Name	Tangipahoa River	Tchefuncte River	Tickfaw River
Mussels	*Elliptio crassidens*	Elephant-Ear	x		
Mussels	*Pleurobema beadleianum*	Mississippi Pigtoe	x		
Mussels	*Potamilus inflatus*	Inflated Heelsplitter	x		
Mussels	*Villosa vibex*	Southern Rainbow	x		
Mussels	*Lampsilis ornata*	Southern Pocketbook	x		
Mussels	*Obovaria jacksoniana*	Southern Hickorynut	x		
Mussels	*Obovaria unicolor*	Alabama Hickorynut	x		
Reptiles	*Macrochelys temminckii*	Alligator Snapping Turtle	x		
Reptiles	*Malaclemys terrapin*	Mississippi Diamond-backed Terrapin	x		

(SOURCE: LDWS WATER BODY MANAGEMENT PLANS FOR THE TANGIPAHOA RIVER, TICKFAW, AND TCHEFUNCTE RIVERS (LDWF, 2020) (LDWF, 2021) (LDWF, 2022)).

1.6 WILDLIFE

The study area marshes provide habitat for a number of wildlife species. Migratory waterfowl including mallard (*Anas platyrhynchos*), gadwall (*Mareca strepera*), American widgeon (*Mareca americana*), green-winged teal (*Anas carolinensis*), Northern shoveler (*Spatula clypeata*), Northern pintail (*Anas acuta*), mottled duck (*Anas fulvigula*) and lesser scaup (*Aythya affinis*) utilize the study area. Wading birds expected to occur in the marshes of the study area include great egret (*Ardea alba*), great blue heron (*Ardea herodias*), tricolored heron (*Egretta tricolor*), green heron (*Butorides virescens*), and white ibis (*Eudocimus albus*). Pied-billed grebe (*Podilymbus podiceps*), black-necked stilt (*Himantopus mexicanus*), and common snipe (*Gallinago gallinago*) are also present. Mammals expected to occur in the marshes of the study area include white-tailed deer (*Odocoileus virginianus*), swamp rabbit (*Sylvaligus aquaticus*), muskrat (*Ondatra zibethicus rivalicius*), nutria (*Myocaster coypus*), raccoon (*Procyon lotor*), river otter (*Lutra canadensis*), mink (*Mustela vison*) and opossum (*Didelphis virginiana*).

Riparian zones are valuable as travel corridors and other habitats for wildlife, and also contribute to fishery resources through detrital input, water shading, and as a source of limbs and other debris that provide instream cover. Riparian and forested portions of the study area provide important foraging and breeding habitat to a variety of migratory birds (See Table D: 1-17 for a list of likely migratory birds in the study area). Wood ducks breed and nest in trees in riparian zones swamps then utilize the portions of the channels and flooded swamps with water and herbaceous vegetation for brood-rearing habitat. Raptors

such as red-shouldered hawks (*Buteo lineatus*), Mississippi kites (*Ictinia mississippiensis*), barred owls (*Strix varia*), Eastern screech owls (*Megascops asio*), and great horned owls (*Bubo virginianus*) nest and forage in forested tracts within the study area. Eastern cottontail (Sylvilagus floridanus), swamp rabbit, grey squirrel (*Sciurus carolinensis*), fox squirrel (Sciurus niger), white-tailed deer, raccoon, opossum, and mink are common to abundant in riparian and forested cover types.

Mixed pine/hardwood habitats provide moderate to high value habitat for game species such as white-tailed deer, squirrels, Eastern turkey (*Meleagris gallopavo*), Eastern cottontail, mourning dove (*Zenaida macroura*), bobwhite (*Colinus virginianus*), and American woodcock (*Scolopax minor*). They also provide habitat for a number of songbirds and raptors.

Table D: 1-17. Migratory Birds in the Study Area.

Scientific Name	Common Name	Breeding Season	Occurrence
Pluvias dominica	American Golen-plover	Breeds elsewhere	March
Falco sparverius paulus	American Kestrel	Apr 1 - Aug 31	Sep - Apr
Peucaea aestivalis	Bachman's Sparrow	May 1 - Sep 30	Jan - Nov
Bald Eagle	Haliaeetus leucocephalus	Sep 1 - Jul 31	Year round
Pelecanus occidentalis	Brown Pelican	Jan 15 - Sep 30	Aug - Apr
Sitta pusilla	Brown-headed Nuthatch	Mar 1 - Jul 15	Year round
Setophaga cerulea	Cerulean Warbler	Apr 25 - Jul 20	Apr & Aug - Sep
Chaetura pelagica	Chimney Swift	Mar 15 - Aug 25	Mar - Oct
Antrostomus caolinensis	Chuck-will's-widow	May 10 - Jul 10	Apr - Jul
Setophaga virens waynei	Coastal (Waynes) Black-throated Green Warbler	May 1 - Aug 15	Sep - Oct
Gavia immer	Common Loon	Apr 15 - Oct 31	Nov - Mar
Spiza americana	Dickcissel	May 5 - Aug 31	Apr - Jun
Phalacrocorax auritas	Double-crested Cormorant	Apr 20 - Aug 31	Oct - Apr
Antrostomus vociferus	Eastern Whip-poor-will	May 1 - Aug 20	Apr
Sterna foresteri	Forster's Tern	Mar 1 - Aug 15	Year round
Ammodramus savannarum perpallidus	Grasshopper Sparrow	Jun 1 - Aug 20	Oct
Gelochelidon nilotica	Gull-billed Tern	May 1 - Jul 31	Apr & Aug
Centronyx henslowii	Henslow's Sparrow	Breeds elsewhere	Dec - Feb
Geothylpis formosa	Kentucky Warbler	Apr 20 -Aug 20	Apr - Aug
Rallus elegans	King Rail	May 1 - Sep 5	Jan - May; Sep - Oct
Ammospiza leconteii	Le Conte's Sparrow	Breeds elsewhere	Jan
Sternula antillarum antillarum	Least Tern	Apr 25 - Sep 5	Apr - Sep
Tringa flavipes	Lesser Yellowlegs	Breeds elsewhere	Mar - May; Aug - Oct
Egretta caerulea	Little Blue Heron	Mar 10 - Oct 15	Year round
Fregata magnificens	Magnificent Frigatebird	Breeds elsewhere	May - Jun; Sep
Passerina ciris	Painted Bunting	Apr 25 - Aug 15	Apr - Aug
Calidris melanotos	Pectoral Sandpiper	Breeds elsewhere	Mar - Apr
Lanius ludovicianus	Prairie Loggerhead	Feb 1 - Jul 31	Year round

Scientific Name	Common Name	Breeding Season	Occurrence
excubitorides	Shrike		
Setophaga discolor	Prairie Warbler	May 1 - Jul 31	Apr - Oct
Protonotaria citrea	Prothonotary Warbler	Apr 1 - Jul 31	Mar - Sep
Mergus serrator	Red-breasted Merganser	Breeds elsewhere	Jan - Feb
Melanerpes erythrocephalus	Red-headed Woodpecker	May 10 - Sep 10	Year round
Egretta rufescens	Reddish Egret	Mar 1 - Sep 15	Jun
Larus delawarensis	Ring-billed Gull	Breeds elsewhere	Sep - Apr
Thalasseus maximus	Royal Tern	Apr 15 - Aug 31	Year round
Euphagus carolinus	Rusty Blackbird	Breeds elsewhere	Nov - Mar
Thalasseus sandvicensis	Sandwich Tern	Apr 25 - Aug 31	Jul - Aug
Onychoprion fuscatus	Sooty Tern	Mar 10 - Jul 31	Sep
Elanoides forficatus	Swallow-tailed Kite	Mar 10 - Jun 30	Mar - Jul
Hylocichla mustelina	Wood Thrush	May 10 - Aug 31	Mar - Oct

Table D: 1-18. State Wildlife of Conservation Concern That May Occur in the Study Area.

Type	Scientific Name	Common Name
Mollusc	*Obovaria unicolor*	Alabama Hickorynut
Fish	*Alosa alabamae*	Alabama Shad
Reptile	*Macrochelys temminckii*	Alligator Snapping Turtle
Reptile	*Malaclemys terrapin*	Mississippi Diamond-backed Terrapin
Bird	*Peucaea aestivalis*	Bachman's Sparrow
Bird	*Haliaeetus leucocephalus*	Bald Eagle
Mammal	*Eptesicus fuscus*	Big Brown Bat
Fish	*Fundulus euryzonus*	Broadstripe Topminnow
Insect	*Bagisara brouana*	Brou's Mallow Moth
Fish	*Percina copelandi*	Channel Darter
Fish	*Hybopsis winchelli*	Clear Chub
Reptile	*Plestiodon anthracinus*	Coal Skink
Reptile	*Farancia erytrogramma erytrogramma*	Common Rainbow Snake
Reptile	*Atryotonopsis hianna*	Dusted Skipper
Reptile	*Ophisaurus ventralis*	Eastern Glass Lizard
Reptile	*Heterodon platirhinos*	Eastern Hog-nosed Snake
Amphibian	*Scaphiopus holbrookii*	Eastern Spadefoot
Mammal	*Spilogale putorius*	Eastern Spotted Skunk
Mollusk	*Elliptio crassidens*	Elephant-ear
Reptile	*Gopherus polyphemus*	Gopher Tortoise
Amphibian	*Necturus beyeri*	Gulf Coast Waterdog
Fish	*Percina suttkusi*	Gulf Logperch
Insect	*Lapara phaeobrachycerous*	Gulf Pine Sphinx
Fish	*Acipenser oxyrinchus desotoi*	Gulf Sturgeon
Reptile	*Micrurus fulvius*	Harlequin Coalsnake
Bird	*Centronyx henslowii*	Henslow's Sparrow
Insect	*Phanogomphus hodgesi*	Hodges' Clubtail
Fish	*Notropis chalybaeus*	Ironcolor Shiner
Insect	*Satyrium kingi*	King's Hairstreak
Insect	*Amblyscirtes aesculapius*	Lace-winged Roadside Skipper
Mollusk	*Pleurobema beadleianum*	Mississippi Pigtoe

Type	Scientific Name	Common Name
Reptile	*Lamproeltis rhombomaculata*	Mole Kingsnake
Reptile	*Graptemys pearlensis*	Pearl River Map Turtle
Reptile	*Sistrurus miliarius*	Pygmy Rattlesnake
Fish	*Etheostoma caeruleum*	Rainbow Darter
Mollusk	*Strophitus pascagoulaensis*	Rayed Creekshell
Bird	*Dryobates borealis*	Red-cockaed Woodpecker
Reptile	*Tantilla coronata*	Southeastern Crowned Snake
Mammal	*Sorex longirostris*	Southeastern Shrew
Mollusk	*Lampsilis ornata*	Southern Pocketbook
Mollusk	*Villosa vibex*	Southern Rainbow
Insect	*Ophiogomphus australis*	Southern Snaketail
Bird	*Elanoides forficatus*	Swallow-tailed Kite
Fish	*Megalops atlanticus*	Tarpon
Mammal	*Perimyotis subflavus*	Tricolored Bat
Animal aggregation	*Colonial Waterbird Nesting Area*	Waterbird Nesting Colony
Mammal	*Trichechus manatus*	West Indian Manatee
Insect	*Megathymus yuccae*	Yucca Giant Skipper

1.7 THREATENED, ENDANGERED, AND PROTECTED SPECIES

Factors affecting the status of threatened and endangered species in the study area are primarily driven by alteration, degradation, and loss of the habitats they utilize as well as from human disturbance. The increase in commercial and residential development in the study area will continue to reduce and degrade available habitats for threatened, endangered, and protected species as well as more abundant fauna and flora in the Parish. On 30 June 2022, U.S. Army Corps of Engineers (USACE) obtained from the USFWS lists of threatened and endangered species that may occur in the study area, and/or may be affected by the proposed project. A request for a list updated was submitted and received 30 June 2024. Table D:1-18 provides a summary of these findings including the presence of critical habitat. Descriptions for species that may be affected follow below.

Table D: 1-18. Threatened (T), Endangered (E), Protected (P), Candidate, and Proposed Species Identified for the Study Area.

Scientific Name	Common name and status (T, E, or P)	Determination of effects: no effect (NE) may affect, not likely to adversely affect (NLAA), or likely to adversely affect (LAA)
Myotis septentrionalis	Northern Long-eared Bat (E)	No effect
Perimyotis subflavus	Tricolored Bat (Proposed E)	No effect
West Indian Manatee	Trichechus manatus (T)	No effect
Picoides borealis	Red-cockaded Woodpecker (E)	No effect
Gopherus polyphemus	Gopher Tortoise (T)	No effect
Macrochelys temminckii	Alligator Snapping Turtle (Proposed T)	No effect
Graptemys oculifera	Ringed Map Turtle (T)	No effect
Graptemys pearlensis	Pearl River Map Turtle (T)	No effect

Scientific Name	Common name and status (T, E, or P)	Determination of effects: no effect (NE) may affect, not likely to adversely affect (NLAA), or likely to adversely affect (LAA)
Acipenser oxyrinchus desotoi	Gulf Sturgeon (T)	No effect
Danaus plexippus	Monarch Butterfly (Candidate)	No effect
Isoetes louisianensis	Louisiana Quillwort (E)	No effect
Haliaeetus leucocephalus	Bald Eagle (P)	NLAA

1.7.1 Northern Long-eared Bat

The northern long-eared bat (*Myotis septentrionalis*), federally listed as an endangered species, is a medium sized bat about 3 to 3.7 inches in length and 9-to-10-inch wingspan. Its fur color can range from medium to dark brown on the back and tawny to pale brown on the underside. The northern long-eared bat can be found in much of the eastern and north central United States and all Canadian provinces from the Atlantic Ocean west to the southern Yukon Territory and eastern British Columbia. In Louisiana, there have been confirmed reports of sightings in West Feliciana, Winn, and Grant parishes. The species has not been documented in Tangipahoa Parish to date.

Northern long-eared bats can be found in mixed pine/hardwood forest with intermittent streams. Northern long-eared bats roost alone or in small colonies underneath bark or in cavities or crevices of both live trees and snags (dead trees). During the winter, northern long-eared bats can be found hibernating in caves and abandoned mines, although none have been documented using caves in Louisiana. Northern long-eared bats emerge at dusk to fly through the understory of forested hillsides and ridges to feed on moths, flies, leafhoppers, caddis flies and beetles, which they catch using echolocation. This bat can also feed by gleaning insects from vegetation and water surfaces.

The most prominent threat to this species is white-nose syndrome, a disease known to cause high mortality in bats that hibernate in caves. Other sources of mortality for northern long-eared bats are wind energy development, habitat destruction or disturbance, climate change and contaminants. The proposed nonstructural measures would be limited to the immediate area of structures included in the selected plan. There is potential that isolated trees near homes may need to be removed if required to elevate eligible structures safely. Surrounding habitats would be unaffected because of proposed measures and therefore no impact to this species is anticipated.

1.7.2 Tricolored Bat

The tricolored bat was identified as a proposed endangered species in September of 2022, but it is not yet listed. While no Endangered Species Act Section (ESA) 7 requirements apply to proposed species, agencies are encouraged to take advantage of any opportunity they may have to conserve such species. Tricolored bats were formerly called eastern

pipistrelle. Tricolored bats are usually found roosting singly, only sometimes in pair or clusters of up to a dozen individuals. In winter, Tricolored bats hibernate in caves, mines, and in some parts of its range, road culverts. They prefer caves that are humid and warm. In summer, they leave their hibernation caves and roost in trees, primarily among the leaves. They forage for insects high in the air along forest edge and the boundary of streams or open bodies of water. Tricolored Bats mate during spring, fall, and sometimes in the winter. Maternity colonies begin forming in mid-April and females bear 1 to 2 pups by late May to mid-July. The primary cause of decline is white-nose syndrome. The proposed nonstructural measures would be limited to the immediate area of structures included in the selected plan. There is potential that isolated trees near homes may need to be removed if required to elevate eligible structures safely. Surrounding habitats would be unaffected because of proposed measures and therefore only minor, temporary impacts to this species would be anticipated. Coordination with the USFWS Ecological Services Office will continue through feasibility level design (leading to a final report) to avoid and minimize impacts. If the proposed project is approved, coordination would continue through the engineering and design phase.

1.7.3 West Indian Manatee

Federally listed as a threatened species, Trichechus manatus (West Indian manatees) occasionally enter Lakes Pontchartrain and Maurepas and associated coastal waters and streams during the summer months (i.e., June through September). Manatee occurrences appear to be increasing, with regular reports in the Amite, Blind, Tchefuncte, and Tickfaw Rivers, and in canals within the adjacent coastal marshes of Louisiana. Observations have been recorded from the Tangipahoa River in the past as well. The manatee has declined in numbers due to collisions with boats and barges, entrapment in flood control structures, poaching, habitat loss, and pollution. Cold weather and outbreaks of red tide may also adversely affect these animals. A partial rebound in the population led to the reclassification of the West Indian Manatee from endangered to threatened.

Human activity is the primary cause for declines in species number due to collisions with boats and barges, entrapment in flood control structures, poaching, habitat loss, and pollution. Collisions with watercraft account for an average of 24 percent (%) of known manatee deaths in Florida annually (1976-2000), with 30% in 1999 and 29% in 2000. Deaths attributed to water control structures and navigational locks represents 4% of known deaths. The future of the current system of warm-water refuges for manatees is uncertain as deregulation of the power industry in Florida occurs, and if minimum flows and levels are not established and maintained for the natural springs on which many manatees depend.

The proposed nonstructural measures would be limited to the immediate area of structures included in the selected plan. As a result, no impacts to aquatic resources (species or habitat) are expected.

1.7.4 Red-cockaded Woodpecker (RCW)

RCWs are black and white with a ladder back (white and black barring) and wings, and large white cheek patches. Their breasts and bellies are white to grayish white with distinctive

black spots along the sides of the breast changing to bars on the flanks. Central tail feathers are black and outer tail feathers are white with black barring. Adults have black crowns, a narrow white line above the black eye, a heavy black stripe separating the white cheek from a white throat, and white to grayish or buffy nasal tufts. Bills are black, and legs are gray to black.

RCWs are endemic to open, mature, and old growth pine ecosystems in the southeastern United States but were once common throughout the longleaf pine ecosystem, which covered at least 90 million acres before European settlement (Frost C. , 2006). Historical population estimates are 1-1.6 million family groups (Conner R. N., 2001). The birds inhabited the open pine forests of the southeast from New Jersey, Maryland, and Virginia to Florida, west to Texas and north to portions of Oklahoma, Missouri, Tennessee, and Kentucky.

RCWs are a cooperatively breeding species, living in family groups that typically consist of a breeding pair with or without one or two male helpers. Females may become helpers but do so at a much lower rate than males. The ecological basis of cooperative breeding in this species is unusually high variation in habitat quality, due to the presence or absence of a critical resource. This critical resource is the cavities that RCWs excavate in live pines, a task that commonly takes several years to complete. RCWs exploit the ability of live pines to produce large amounts of resin, by causing the cavity tree to exude resin through wounds, known as resin wells, that the birds keep open. This resin creates an effective barrier against climbing snakes. Longleaf pine is a preferred tree species for cavity excavation because it produces more resin, and for a longer period of time, than other southern pines.

RCWs prefer open longleaf pine uplands throughout the southeast. RCWs roost and forage year-round and nest seasonally (i.e., April through July) in open, park-like stands of mature pine trees containing little hardwood component, a sparse midstory, and a well-developed herbaceous understory. RCWs can tolerate small numbers of overstory and midstory hardwoods at low densities found naturally in many southern pine forests, but they are not tolerant of dense midstories resulting from fire suppression or from overstocking of pine. Trees selected for cavity excavation are generally at least 60 years old, although the average stand age can be younger. The collection of one or more cavity trees plus a surrounding 200-foot-wide buffer of continuous forest is known as a RCW cluster. RCW foraging habitat is located within one-half mile of the cluster and is comprised of pine and pine-hardwood stands (i.e., 50 percent or more of the dominant trees are pines) that are at least 30 years of age and have a moderately low average basal area (i.e., 40 – 80 square feet per acre is preferred. The proposed project would be located in a parish that was historically inhabited by RCWs.

Primary threats to species viability for red-cockaded woodpeckers all have the same basic cause: lack of suitable habitat. Red-cockaded woodpeckers require open mature pine woodlands and savannas maintained by frequent fire, and there is very little of this habitat remaining (Lennartz, 1983); (Frost C. , 1993); (Simberloff, 1993); (Ware, 1993). On public and private lands, both the quantity and quality of red-cockaded woodpecker habitat are

impacted by past and current fire suppression and detrimental silvicultural practices (Ligon, Stacey, Conner, Bock, & Adkisson, 1986); (Baker, 1995); (Cely & Ferral, 1995); (Masters, Skeen, & J., 1995). Serious threats stemming from this lack of suitable habitat include (1) insufficient numbers of cavities and continuing net loss of cavity trees (Costa & Escano, 1989); (James F. C., 1995); (Hardesty, 1995); (2) habitat fragmentation and its effects on genetic variation, dispersal, and demography (Conner & Rudolph, 1991); (3) lack of foraging habitat of adequate quality (Walters, Daniels, Carter III, & Doerr, 2002); (James, Hess, Kicklighter, & Thum, 2001); and (4) fundamental risks of extinction inherent to critically small populations from random demographic, environmental, genetic, and catastrophic events (Shaffer, 1981).

There is potential that isolated trees near homes may need to be removed if required to elevate eligible structures safely. Surrounding habitats would be unaffected as a result of proposed measures and therefore no impact to potential foraging or nesting habitat for RCW is anticipated.

1.7.5 Gopher Tortoise

The gopher tortoise occurs in the Southeastern Atlantic and Gulf Coastal Plains from southern South Carolina west through Georgia, the Florida panhandle, Alabama, and Mississippi to eastern Louisiana, and south through peninsular Florida (Auffenberg & Franz, 1982). The gopher tortoise is the only tortoise that is native to the southeastern United States and is known to live up to 60 years in the wild.

Gopher tortoises prefer “open” longleaf pine-scrub oak communities that are thinned and burned every few years. The gopher tortoise builds underground burrows in dry, sandy soil where it nests, which can be used by other species. Habitat degradation (lack of thinning or burning on pine plantations), predation, and conversion to agriculture or urbanization have contributed to the decline of this species. That habitat decline has concentrated many remaining gopher tortoise populations along pipeline and power line rights-of-way (ROW) within their range. Tortoise burrows also can be found along road ROWs, and other marginal habitats, including fence rows, orchard edges, golf course roughs and edges, old fields, and pasturelands. Tortoises are often pushed into these areas due to adjacent habitat becoming unsuitable.

Gopher tortoises were found to mostly forage on foliage, seeds, and fruits of grasses and forbs, generally in an area of about 150 feet surrounding burrows (McRae, Landers, & Garner, 1981). The diet of adults resembles that of a generalist herbivore, with at least some preference for certain plants over others, and may also include insects and carrion (Macdonald, 1986) (Macdonald & Mushinsky, 1988); Legumes are thought to be particularly important for re-conditioning females after egg laying, and it has been shown that clutch sizes and percent of gravid females were lowest in areas with low percent cover of legumes (White, 2009).

Gopher tortoises mostly breed from May through October (Landers, Garner, & McRae, 1980); (McRae, Lander, & Cleveland, 1981); (Taylor, 1982); (Diemer, 1992); (Ott-Eubanks,

Michener, & Guyer, 2003). Female gopher tortoises usually lay eggs from mid-May through mid-July, and incubation lasts 80 - 110 days (Diemer, 1986). Tortoises may nest in the soil at the entrance of a burrow (Butler & Hull, 1996); (Smith, Hurley, & Seigel, 1997), or in other open sandy areas, when available. Range wide, average clutch size varies from about four to eight eggs/clutch (Ashton, Burke, & Layne, 2007).

There is potential that isolated trees near homes may need to be removed if required to elevate eligible structures safely. Surrounding habitats would be unaffected as a result of proposed measures and therefore no impact to potential foraging or nesting habitat for gopher tortoise is anticipated.

1.7.6 Alligator Snapping Turtle

The Alligator Snapping Turtle was identified as a proposed threatened species in November of 2021, but it is not yet listed or proposed for listing. While no Endangered Species Act Section (ESA) 7 requirements apply to proposed species, agencies are encouraged to take advantage of any opportunity they may have to conserve such species.

The alligator snapping turtle is currently proposed for federally threatened species status. Habitat generally includes large rivers and major tributaries, but also occurs in a range of bayous, canals, swamps, lakes, and ponds. Within these bodies of water, alligator snapping turtle tend to select areas with structure such as tree roots, submerged trees, logs, etc., and may also select for areas with more canopy cover (Howey & Dinkelacker, 2009). There is a shift in use of habitat in waterbodies from deeper water in late summer through mid-winter to shallower water in early summer. Young hatchlings are associated with shallower water areas. Alligator snapping turtles reach reproductive age in 11-21 years for males and 13-21 years for females. Reproductive females can lay up to one clutch of eggs per year with an average of approximately 24 eggs in Louisiana (Dobie, 1971). Number of eggs per clutch may vary with age and size, with larger, more mature females producing more eggs than smaller, younger reproductive females. Poor foraging success in some years may decrease the total number of years that eggs are produced. Nesting in Louisiana is typically between May and July. In general, nest sites occur within 2.5 and 200 m from the nearest waterbody. Predation rates on active nests have been reported to occur at high rates and therefore limit reproductive output. Alligator snapping turtles are opportunistic predators and foragers which include primarily fish, but also include crayfish, mollusks, smaller turtles, insects, nutria, snakes, birds, and vegetation (Ernst & Lovich, 2009). In the project area, the species would primarily occur along the Tangipahoa and Natalbany Rivers but likely also occurs in swamps and marshes in the southern portion of the parish.

The proposed nonstructural measures would be limited to the immediate area of structures included in the selected plan. As a result, no impacts to aquatic resources (species or habitat) are expected.

1.7.7 Ringed Map Turtle

Federally listed as threatened, the ringed map turtle is a riverine species that occurs in the Pearl and Bogue Chitto Rivers. No observations have been identified in Tangipahoa Parish but is considered here due to proximity with the Pearl and Bogue Chitto Rivers. The species utilizes stretches of river with moderate current, numerous basking areas, and sparsely vegetated sandy substrates relatively close to shore for nesting (USFWS, 1988). The ringed map turtle spends significant parts of the day basking on submerged logs and prefers open channels where the water column experiences a high degree of light penetration. Declines in population for this species are attributed to habitat modification (i.e., loss of exposed sandbars, basking areas) and water quality deterioration, reservoir construction, channelization, desnagging for navigation, siltation, and the subsequent loss of invertebrate food sources) resulting from changes in hydrologic regime, channel modifications, activities that impact water quality and turbidity, and sand and gravel dredging.

The ringed map turtle has not been recorded in Tangipahoa Parish. In addition, the proposed nonstructural measures would be limited to the immediate area of structures included in the selected plan. As a result, no impacts to aquatic resources (species or habitat) are expected.

1.7.8 Pearl River Map Turtle

The threatened Pearl River map turtle (*Graptemys pearlensis*) is a freshwater turtle that typically ranges in size from 2.5 to 4.2 inches in males, and 7.3 to 9.3 inches in females. This species was previously classified with the Pascagoula map turtle (*G. gibbonsi*) but was determined to be a distinct species in 2010. The Pearl River map turtle has a continuous black stripe on the dorsal mid-line while the Pascagoula map turtle has a discontinuous black stripe.

The Pearl River map turtle occurs in small to medium sized permanent streams with a sand and mud substrate. The species can also be found in large to medium-sized rivers, especially those with an abundance of mollusks, sandy banks, sandbars, deep pools, and logs or other suitable basking sites. Nests are in sandy banks or sand bars. Adult females depend largely on mollusks, especially clams and snails, while males and juveniles feed mostly on insects and other arthropods.

This species is highly vulnerable to availability of preferred prey. In particular, the species is sensitive to the impacts of water pollution and sedimentation on its freshwater mollusk prey. Exploitation for the pet trade, particularly in the Lower Pearl River drainage in Louisiana, may also be a significant threat. Other impacts may occur through nest predation by wildlife species.

1.7.9 Gulf Sturgeon

The gulf sturgeon, federally listed as a threatened species, is an anadromous fish that occurs in many rivers, streams, and estuarine waters along the northern Gulf coast between the Mississippi River and the Suwannee River, Florida. In Louisiana, Gulf sturgeon have been reported at rivers and lakes of the Lake Pontchartrain basin, and adjacent estuarine areas. Within Tangipahoa Parish, Gulf Sturgeon have been observed in the Tangipahoa, Tchefuncte, and Tickfaw Rivers (LDWF, 2022) (LDWF, 2021) (LDWF, 2020) and potentially other rivers with suitable habitat. Spawning occurs in coastal rivers between late winter and early spring (i.e., March to May). Adults and sub-adults may be found in those rivers and streams until November, and in estuarine or marine waters during the remainder of the year. Sturgeon less than 2 years old appear to remain in riverine habitats and estuarine areas throughout the year, rather than migrate to marine waters. Habitat alterations such as those caused by water control structures that limit and prevent spawning, poor water quality, and over-fishing have negatively affected this species.

On March 19, 2003, the US Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) published a final rule in the Federal Register (Volume 68, No. 53) designating critical habitat for the Gulf sturgeon in Louisiana, Mississippi, Alabama, and Florida. No critical habitat is found within the study area or would be impacted by proposed measures.

The proposed nonstructural measures would be limited to the immediate area of structures included in the selected plan. As a result, no impacts to aquatic resources (species or habitat) are expected.

1.7.10 Monarch Butterfly

The monarch butterfly (*Danaus plexippus*) was identified as a candidate species in December of 2020, but it is not yet listed or proposed for listing. While no Endangered Species Act Section (ESA) 7 requirements apply to candidate species, agencies are encouraged to take advantage of any opportunity they may have to conserve such species. Adult monarch butterflies are large and conspicuous, with bright orange wings surrounded by a black border and covered with black veins. The bright coloring of a monarch serves as a warning to predators that eating them can be toxic. Monarch populations of eastern North America have declined 90%. During the breeding season, monarchs lay their eggs on their obligate milkweed host plant, and larvae emerge after two to five days. Larvae develop over a period of nine to eighteen days, feeding on milkweed and sequestering toxic chemicals as a defense against predators. The larva then pupates into a chrysalis before emerging six to fourteen days later as an adult butterfly. There are multiple generations of monarchs produced during the breeding season, with most adult butterflies living approximately two to five weeks (USFWS, 2020).

Much of the monarch butterfly's life is spent migrating between Canada, Mexico, and the U.S. The Monarch occurs in a variety of habitats where it searches for its host plant,

milkweed. Of the over 100 species of milkweed that exist in North America, only about one fourth of them are known to be important host plants for monarch butterflies. The main monarch host plant is common milkweed (*Asclepias syriaca*) (Kaul & Wilsey, 2019). Other common hosts include swamp milkweed (*Asclepias incarnata*), butterfly milkweed (*Asclepias tuberosa*), whorled milkweed (*Asclepias verticillata*), and poke milkweed (*Asclepias exaltata*) (USFWS, 2020). Three factors appear most important to explain the decline of Monarchs: loss of milkweed habitat, logging at overwintering sites, and climate change and extreme weather. In addition, natural enemies such as diseases, predators, and parasites, as well as chemicals used in agricultural areas may also contribute to the decline.

There is potential that isolated trees near homes may need to be removed if required to elevate eligible structures safely. Surrounding habitats would be unaffected as a result of proposed measures and therefore no impact to potential foraging or host plant habitat for the monarch butterfly is anticipated.

1.7.11 Louisiana Quillwort

Louisiana quillwort is a small, semi-aquatic, facultative evergreen plant. Louisiana quillwort occurs in the East Gulf Coastal Plain physiographic province in Pleistocene Prairie Terraces and Pleistocene High Terraces in southeastern Louisiana an in Pleistocene High Terraces in southern Mississippi. This species grows on sand and gravel bars on the accreting sides of streams and moist overflow channels within riparian forest and bay head swamp communities. The Louisiana quillwort is believed to be dependent on a special hydrologic regime resulting from the presence of small springs scattered at the base of banks or bluffs.

Louisiana quillwort is currently known to occur in Washington and St. Tammany parishes in Louisiana and two counties in southern Mississippi. In Washington parish the species has been identified within the Bogue Chitto River watershed in upper Mill Creek and the lower portions of Thigpen and Clearwater Creeks. In adjacent St. Tammany parish, the species had been identified within the Tchefuncte River watershed. No observations in Tangipahoa parish have been documented.

Major threats to this species include habitat loss through hydrologic modifications of stream habitat, and land use practices that significantly alter stream water quality and hydrology. Dredging, ditching, channelization, road construction, and offroad vehicles (ORV) can alter natural processes and result in habitat loss. Timber removal increases surface runoff and contributes to stream erosion and sediment siltation. Removal of canopy alters light and temperature regimes on the forest floor; soils become drier and weedy vegetation tends to invade. Logging adjacent to creeks creates debris and detritus which can obstruct water flow and change stream dynamics. Sand and gravel mining poses a significant threat, as it affects flow and water quality.

The proposed nonstructural measures would be limited to the immediate area of structures included in the selected plan. As a result, no impacts to aquatic resources (species or

habitat) are expected.

1.7.12 Bald Eagle

The project-area forested wetlands provide nesting habitat for *Haliaeetus leucocephalus* (bald eagle), which was officially removed from the List of Endangered and Threatened Species on August 8, 2007. Bald eagles nest in Louisiana from October through mid-May. They typically nest in mature trees (e.g., bald cypress, sycamore, willow, etc.) near fresh to intermediate marshes or open water in the southeastern Parishes. Areas with high numbers of nests include the north shore of Lake Pontchartrain and the Lake Salvador area. Major threats to this species include habitat alteration, human disturbance, and environmental contaminants (i.e., organochlorine pesticides and lead).

Breeding bald eagles occupy “territories” that they will typically defend against intrusion by other eagles, and that they likely return to each year. A territory may include one or more alternate nests that are built and maintained by the eagles, but which may not be used for nesting in a given year. Potential nest trees within a nesting territory may, therefore, provide important alternative bald eagle nest sites. Bald eagles are vulnerable to disturbance during courtship, nest building, egg laying, incubation, and brooding. Disturbance during this critical period may lead to nest abandonment, cracked and chilled eggs, and exposure of small young to the elements. Human activity near a nest late in the nesting cycle may also cause flightless birds to jump from the nest tree; thus, reducing their chance of survival.

Although the bald eagle has been removed from the List of Endangered and Threatened Species, it continues to be protected under the MBTA and the Bald and Golden Eagle Protection Act (BGEPA). The USFWS developed the National Bald Eagle Management (NBEM) Guidelines to provide landowners, land managers, and others with information and recommendations to minimize potential project impacts to bald eagles, particularly where such impacts may constitute “disturbance,” which is prohibited by the BGEPA. A copy of the NBEM Guidelines is available at: https://www.fws.gov/sites/default/files/documents/national-bald-eagle-management-guidelines_0.pdf.

Those guidelines recommend: (1) maintaining a specified distance between the activity and the nest (buffer area); (2) maintaining natural areas (preferably forested) between the activity and nest trees (landscape buffers); and (3) avoiding certain activities during the breeding season. On-site personnel should be informed of the possible presence of nesting bald eagles within the project boundary, and should identify, avoid, and immediately report any such nests to this office. If a bald eagle nest is discovered within or adjacent to the proposed project area, then an evaluation must be performed to determine whether the project is likely to disturb nesting bald eagles. That evaluation may be conducted on-line at: https://www.fws.gov/media/bald-eagle-monitoring-guidelines-southeastern-us. Following completion of the evaluation, that website will provide a determination of whether additional consultation is necessary.

There is potential that isolated trees near homes may need to be removed if required to elevate eligible structures safely. Surrounding habitats would be unaffected as a result of proposed measures and therefore no impact to potential roost habitat for the bald eagle is anticipated. Temporary disturbance due to noise related to the construction of nonstructural measures could occur.

1.8 AT-RISK SPECIES

USFWS has defined “at-risk species” as those that are: 1) proposed for listing under the Endangered Species Act (ESA) by the Service; 2) candidates for listing under the ESA, which means the species has a “warranted but precluded 12-month finding”; or 3) petitioned for listing under the ESA, which means a citizen or group has requested that the Service add them to the list of protected species. Petitioned species include those for which the Service has made a substantial 90-day finding as well as those that are under review for a 90-day finding. As the Service develops proactive conservation strategies with partners for at-risk species, the states’ Species of Greatest Conservation Need (defined as species with low or declining populations) will also be considered.

The Service’s goal is to work with private and public organizations to engage in proactive conservation for these species, thereby precluding the need to federally list as many at-risk species as possible. While not all species identified as at-risk will become ESA listed species, their potentially reduced populations warrant their identification and consideration during project planning. Species currently designated as “at-risk” that may occur within the proposed study area include Southern snaketail (*Ophiogomphus australis*), tricolored bat (*Perimyotis subflavus*), Alabama hickorynut (*Obovaria unicolor*), alligator snapping turtle (*Macrochelys temminckii*), and eastern diamondback (*Crotalus adamanteus*). A description of habitat needs and threats for Tricolored bat and alligator snapping turtle was already discussed in Section 1.7 of this appendix. The remaining species habitat needs and threats will be discussed below.

Southern Snaketail

The Southern snaketail is a dragonfly (order *Odonata*) with a restricted range in Florida, Louisiana, and Mississippi. The species typically inhabits medium-sized freshwater streams with gravel substrate. Records from the Tangipahoa River occurred in areas that averaged less than 10 m wide and had a few pools reaching a depth of 2 m. The substrate was primarily a mixture of sand and pea-gravel eroded from local deposits. The larvae are sensitive to water pollution and depend on clean, gravel stream bottoms to survive. Threats may include gravel mining, siltation, pesticides, flood scour, clear cutting/deforestation, perturbation of stream flow, and a naturally occurring limited range of the species.

Alabama Hickorynut

The Alabama hickorynut (*Obovaria unicolor*) is a 1.2- to 2-inch-long freshwater mussel with

round or elliptical shape. The species occurs on sand and gravel bottoms of large river systems with moderate currents in the Eastern gulf drainages of Alabama, Louisiana, Mississippi, and Oklahoma. Moderate gradient pool and riffle habitats in other stream and river sizes can also be utilized by the species. In Louisiana, Alabama hickorynut has been documented in four southeastern parishes, including Tangipahoa Parish (LWDF, 2009.). This species is a long-term brooder that can carry fertilized eggs from June through August of the following year. Like other freshwater mussels, the Alabama hickorynut releases its larvae (glochidia) into the water column, where they parasitize a fish (glochidial host) to transform into a juvenile mussel. Once the glochidia are mature enough, they release from the host to find a suitable substrate. Known host fishes for this species include the naked sand darter (*Ammocrypta beani*), southern sand darter (*Ammocrypta meridiana*), Johnny darter (Etheostoma nigrum), Gulf darter (*Etheostoma swaini*), blackbanded darter (*Percina nigrofasciata),* dusky darter (*Percina sciera*), and redspot darter (*Etheostoma artesiae*). These are small fish that live along the bottoms of clear streams. Habitat modification and destruction due to siltation and impoundment threaten this species. It is also negatively affected by the pollution of streams and rivers.

Eastern Diamondback Rattlesnake

The eastern diamondback rattlesnake (*Crotalus adamanteus*) historically occupied a very similar range to long leaf pine forests. This species prefers open canopy long-leaf pine savannas with herbaceous ground cover. Presently, eastern diamondback rattlesnakes occur in open canopy forests with an established herbaceous ground layer which partially mimics the conditions found in open canopy long-leaf pine forest. The species may also still occur in areas where remnant native habitat remains. This species requires large tracts of habitat, and home ranges average 116 and 208 acres, for females and males, respectively. They reach sexual maturity at 2-6 years and have a gestation period of approximately one year. Females reproduce at 2-to-4-year intervals and may live for 10 years, with a few snakes living 15-20 years.

Threats to this species include persecution by humans out of fear, intentional hunting, vehicle strikes, and conversion of suitable habitat to other land uses. Another issue faced by the snake is a lack of any legal protections throughout much of its range.

1.9 PRIME AND UNIQUE FARMLAND

The Farmland Protection Policy Act of 1981 (FPPA) was enacted to minimize the extent that Federal programs contribute to the unnecessary and irreversible conversion of farmland to non-agricultural uses, and to assure that Federal programs are administered in a manner that, to the extent practicable, would be compatible with state, unit of local government, and private programs and policies to protect farmland.

Under this policy, soil associations are used to classify areas according to their ability to support different types of land uses, including urban development, agriculture, and silviculture. The USDA Natural Resource Conservation Service (NRCS) designates areas with particular

soil characteristics as either “Farmland of Unique Importance,” “Prime Farmland,” “Prime Farmland if Irrigated,” or variations on these designations. Prime farmland, as defined by the FPPA, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. Farmland of unique importance is land other than prime farmland that is used for the production of specific high-value food and fiber crops, such as citrus, tree nuts, olives, cranberries, and other fruits and vegetables. A recent trend in land use in some areas has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, drought-prone, and less productive, and cannot be easily cultivated as compared to prime farmland (USDA, 2016). The soil texture acreage, prime farmland acreage, and prime farmland distribution in the study area is provided in Tables D:1-19 and D:1-20, and Figure D:1-4. No effect on farmland would be expected as a result of the project since nonstructural measures will be limited to the immediate location of existing structures.

Table D: 1-19. Soil Textures in the Study Area

Soil Texture	Acreage
Clay	2.7
Course Loam	1.5
Fine Sandy Loam	133955.8
Muck	63959.6
Pits Arents complex	3592.3
Sandy clay loam	13.1
Sandy Loam	27.2
Silt Loam	301454.1
Water	7525.5
Grand Total	510531.9

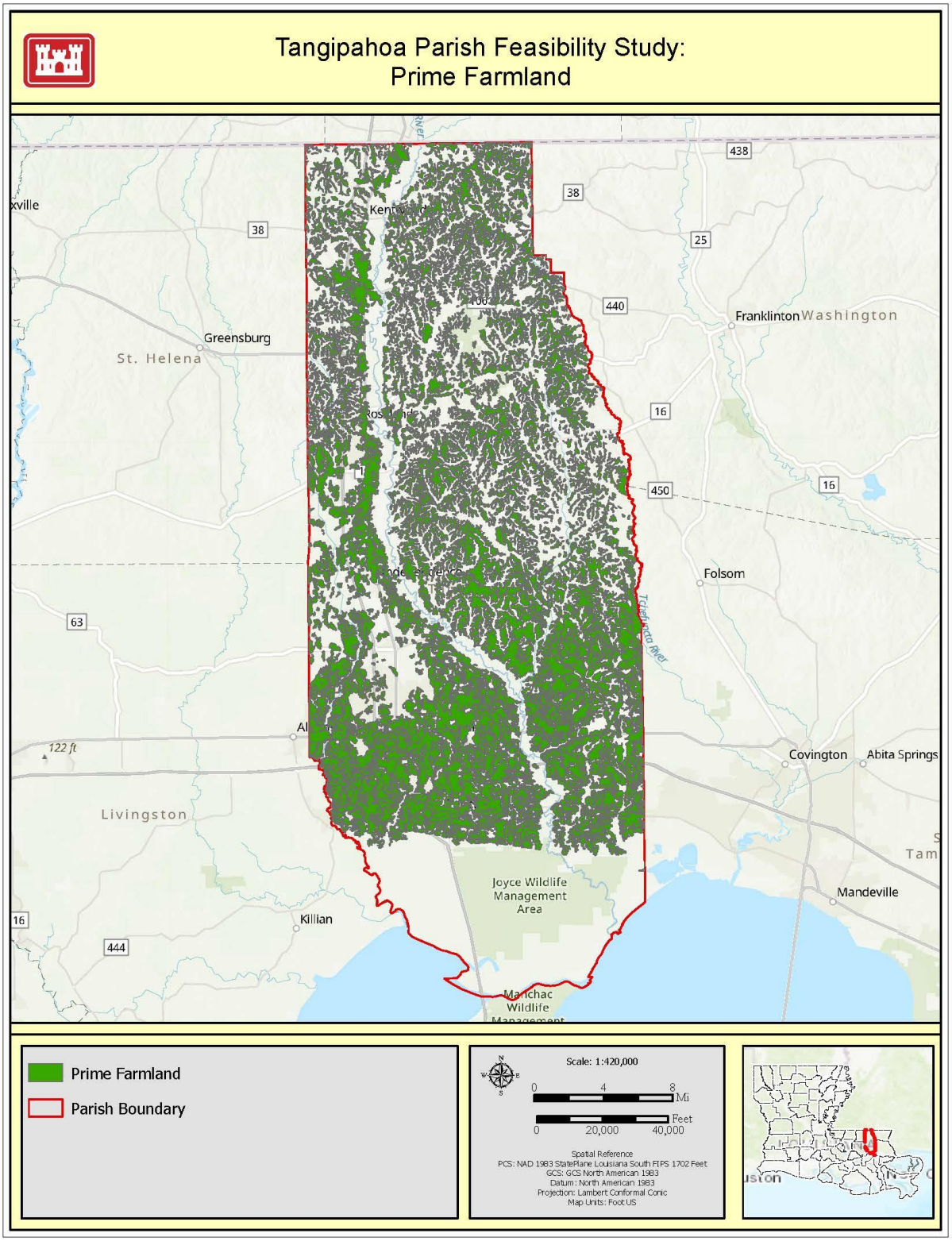

Figure D: 1-4. Prime and Unique Farmland Classification Map of Study Area.

Table D: 1-20. Prime and Unique Farmland Acres in the Study Area.

Type	Acres
Prime Farmland	204955.8
Not Prime Farmland	305576.1
Total:	510531.9

1.10 WATER QUALITY

Eight rivers and streams (some with multiple segments), Lake Maurepas, and Lake Pontchartrain are listed as impaired for one or more designated uses in the 2022 Integrated Report of Water Quality in Louisiana. Table D:1-21 identifies the 305(b) impaired waterbodies in the study area from the LDEQ Final 2022 Integrated Report of Water Quality in Louisiana (LDEQ, 2022).

The highest number of segments are impaired for fish and wildlife propagation due to elevated mercury (Hg) levels. Fish consumption advisories are in place at those locations. The next highest water use impairment category is for primary contact recreation (swimming). The most frequently cited suspected causes of impairment in the study area after elevated mercury levels include low dissolved oxygen levels, fecal coliform, total phosphorus, and nitrate/nitrite levels. The top five suspected causes of impairment account for 2/3 of the causes of impairment in segments of 10 rivers as well as Lakes Maurepas and Pontchartrain.

Table D: 1-21. Water Quality 305(b) Impaired Waterbodies and their Designated Waterbody Uses in the Study Area.

(Abbreviations for Designated Waterbody Uses in the Table are: (PCR) Primary Contact Recreation, (SCR) Secondary Contact Recreation, (FWP) Fish and Wildlife Propagation, (ONR) Outstanding Natural Resources. F- Fully Supporting Designated Use. N- Not Supporting Designated Use)

Subsegment Number	Subsegment Description	Size (mi)	PCR	SCR	FWP	ONR	Impaired Use for Suspected Cause	Suspected Causes of Impairment	Suspected Sources of Impairment
LA040502_00	Tickfaw River-From La. Highway 42 to Lake Maurepas	26	N	F	N		FWP	CHLORIDE	NATURAL SOURCES
LA040502_00	Tickfaw River-From La. Highway 42 to Lake Maurepas	26	N	F	N		FWP	DISSOLVED OXYGEN	SOURCE UNKNOWN

Subsegment Number	Subsegment Description	Size (mi)	PCR	SCR	FWP	ONR	Impaired Use for Suspected Cause	Suspected Causes of Impairment	Suspected Sources of Impairment
LA040502_00	Tickfaw River-From La. Highway 42 to Lake Maurepas	26	N	F	N		FWP	MERCURY - FISH CONSUMPTION ADVISORY	ATMOSPHERIC DEPOSITION - TOXICS
LA040502_00	Tickfaw River-From La. Highway 42 to Lake Maurepas	26	N	F	N		FWP	MERCURY - FISH CONSUMPTION ADVISORY	SOURCE UNKNOWN
LA040502_00	Tickfaw River-From La. Highway 42 to Lake Maurepas	26	N	F	N		FWP	PH, LOW	NATURAL SOURCES
LA040502_00	Tickfaw River-From La. Highway 42 to Lake Maurepas	26	N	F	N		FWP	SULFATE	NATURAL SOURCES
LA040502_00	Tickfaw River-From La. Highway 42 to Lake Maurepas	26	N	F	N		FWP	TOTAL DISSOLVED SOLIDS (TDS)	NATURAL SOURCES
LA040502_00	Tickfaw River-From La. Highway 42 to Lake Maurepas	26	N	F	N		PCR	TEMPERATURE	NATURAL SOURCES
LA040503_00	Natalbany River-From headwaters to La. Highway 22	31	N	F	N		FWP	DISSOLVED OXYGEN	ON-SITE TREATMENT SYSTEMS (SEPTIC SYSTEMS AND SIMILAR DECENTRALIZED SYSTEMS)
LA040503_00	Natalbany River-From headwaters to La. Highway 22	31	N	F	N		FWP	MERCURY - FISH CONSUMPTION ADVISORY	ATMOSPHERIC DEPOSITION - TOXICS
LA040503_00	Natalbany River-From headwaters to La. Highway 22	31	N	F	N		FWP	MERCURY - FISH CONSUMPTION ADVISORY	SOURCE UNKNOWN

Subsegment Number	Subsegment Description	Size (mi)	PCR	SCR	FWP	ONR	Impaired Use for Suspected Cause	Suspected Causes of Impairment	Suspected Sources of Impairment
LA040503_00	Natalbany River-From headwaters to La. Highway 22	31	N	F	N		PCR	FECAL COLIFORM	SOURCE UNKNOWN
LA040504_00	Yellow Water River-From headwaters to Ponchatoula Creek	13	N	N	N		FWP	DISSOLVED OXYGEN	SOURCE UNKNOWN
LA040504_00	Yellow Water River-From headwaters to Ponchatoula Creek	13	N	N	N		FWP	TOTAL DISSOLVED SOLIDS (TDS)	NATURAL SOURCES
LA040504_00	Yellow Water River-From headwaters to Ponchatoula Creek	13	N	N	N		PCR	FECAL COLIFORM	ON-SITE TREATMENT SYSTEMS (SEPTIC SYSTEMS AND SIMILAR DECENTRALIZED SYSTEMS)
LA040504_00	Yellow Water River-From headwaters to Ponchatoula Creek	13	N	N	N		SCR	FECAL COLIFORM	ON-SITE TREATMENT SYSTEMS (SEPTIC SYSTEMS AND SIMILAR DECENTRALIZED SYSTEMS)
LA040505_00	Ponchatoula Creek-From headwaters to La. Highway 22	21	N	N	N		FWP	DISSOLVED OXYGEN	RESIDENTIAL DISTRICTS
LA040505_00	Ponchatoula Creek-From headwaters to La. Highway 22	21	N	N	N		FWP	MERCURY - FISH CONSUMPTION ADVISORY	ATMOSPHERIC DEPOSITION - TOXICS

Subsegment Number	Subsegment Description	Size (mi)	PCR	SCR	FWP	ONR	Impaired Use for Suspected Cause	Suspected Causes of Impairment	Suspected Sources of Impairment
LA040505_00	Ponchatoula Creek-From headwaters to La. Highway 22	21	N	N	N		FWP	MERCURY - FISH CONSUMPTION ADVISORY	SOURCE UNKNOWN
LA040505_00	Ponchatoula Creek-From headwaters to La. Highway 22	21	N	N	N		FWP	NITRATE/NITRITE (NITRITE + NITRATE AS N)	RESIDENTIAL DISTRICTS
LA040505_00	Ponchatoula Creek-From headwaters to La. Highway 22	21	N	N	N		FWP	PHOSPHORUS, TOTAL	RESIDENTIAL DISTRICTS
LA040505_00	Ponchatoula Creek-From headwaters to La. Highway 22	21	N	N	N		FWP	TOTAL DISSOLVED SOLIDS (TDS)	NATURAL SOURCES
LA040505_00	Ponchatoula Creek-From headwaters to La. Highway 22	21	N	N	N		PCR	FECAL COLIFORM	SOURCE UNKNOWN
LA040505_00	Ponchatoula Creek-From headwaters to La. Highway 22	21	N	N	N		SCR	FECAL COLIFORM	SOURCE UNKNOWN
LA040507_00	Natalbany River-From La. Highway 22 to Tickfaw River	9.6	N	F	N		FWP	DISSOLVED OXYGEN	SOURCE UNKNOWN
LA040507_00	Natalbany River-From La. Highway 22 to Tickfaw River	9.6	N	F	N		FWP	MERCURY - FISH CONSUMPTION ADVISORY	ATMOSPHERIC DEPOSITION - TOXICS
LA040507_00	Natalbany River-From La. Highway 22 to Tickfaw River	9.6	N	F	N		FWP	MERCURY - FISH CONSUMPTION ADVISORY	SOURCE UNKNOWN
LA040507_00	Natalbany River-From La. Highway 22 to Tickfaw River	9.6	N	F	N		PCR	TEMPERATURE	NATURAL SOURCES

Subsegment Number	Subsegment Description	Size (mi)	PCR	SCR	FWP	ONR	Impaired Use for Suspected Cause	Suspected Causes of Impairment	Suspected Sources of Impairment
LA040508_00	Ponchatoula Creek-From La. Highway 22 to Natalbany River	5.3	N	F	N		FWP	DISSOLVED OXYGEN	RESIDENTIAL DISTRICTS
LA040508_00	Ponchatoula Creek-From La. Highway 22 to Natalbany River	5.3	N	F	N		FWP	MERCURY - FISH CONSUMPTION ADVISORY	ATMOSPHERIC DEPOSITION - TOXICS
LA040508_00	Ponchatoula Creek-From La. Highway 22 to Natalbany River	5.3	N	F	N		FWP	MERCURY - FISH CONSUMPTION ADVISORY	SOURCE UNKNOWN
LA040508_00	Ponchatoula Creek-From La. Highway 22 to Natalbany River	5.3	N	F	N		FWP	NITRATE/NITRITE (NITRITE + NITRATE AS N)	RESIDENTIAL DISTRICTS
LA040508_00	Ponchatoula Creek-From La. Highway 22 to Natalbany River	5.3	N	F	N		FWP	PHOSPHORUS, TOTAL	RESIDENTIAL DISTRICTS
LA040508_00	Ponchatoula Creek-From La. Highway 22 to Natalbany River	5.3	N	F	N		PCR	FECAL COLIFORM	SOURCE UNKNOWN
LA040602_00	Lake Maurepas	91	F	F	N		FWP	NON-NATIVE AQUATIC PLANTS	INTRODUCTION OF NON-NATIVE ORGANISMS (ACCIDENTAL OR INTENTIONAL)
LA040603_00	Selsers Creek-From headwaters to Sisters Road	6.0	N	F	N		FWP	AMMONIA, TOTAL	ON-SITE TREATMENT SYSTEMS (SEPTIC SYSTEMS AND SIMILAR DECENTRALIZED SYSTEMS)

Subsegment Number	Subsegment Description	Size (mi)	PCR	SCR	FWP	ONR	Impaired Use for Suspected Cause	Suspected Causes of Impairment	Suspected Sources of Impairment
LA040603_00	Selsers Creek-From headwaters to Sisters Road	6.0	N	F	N		FWP	AMMONIA, TOTAL	PACKAGE PLANT OR OTHER PERMITTED SMALL FLOWS DISCHARGES
LA040603_00	Selsers Creek-From headwaters to Sisters Road	6.0	N	F	N		FWP	AMMONIA, TOTAL	SOURCE UNKNOWN
LA040603_00	Selsers Creek-From headwaters to Sisters Road	6.0	N	F	N		FWP	DISSOLVED OXYGEN	ON-SITE TREATMENT SYSTEMS (SEPTIC SYSTEMS AND SIMILAR DECENTRALIZED SYSTEMS)
LA040603_00	Selsers Creek-From headwaters to Sisters Road	6.0	N	F	N		FWP	DISSOLVED OXYGEN	PACKAGE PLANT OR OTHER PERMITTED SMALL FLOWS DISCHARGES
LA040603_00	Selsers Creek-From headwaters to Sisters Road	6.0	N	F	N		FWP	NITRATE/NITRITE (NITRITE + NITRATE AS N)	ON-SITE TREATMENT SYSTEMS (SEPTIC SYSTEMS AND SIMILAR DECENTRALIZED SYSTEMS)
LA040603_00	Selsers Creek-From headwaters to Sisters Road	6.0	N	F	N		FWP	NITRATE/NITRITE (NITRITE + NITRATE AS N)	PACKAGE PLANT OR OTHER PERMITTED SMALL FLOWS DISCHARGES

Subsegment Number	Subsegment Description	Size (mi)	PCR	SCR	FWP	ONR	Impaired Use for Suspected Cause	Suspected Causes of Impairment	Suspected Sources of Impairment
LA040603_00	Selsers Creek-From headwaters to Sisters Road	6.0	N	F	N		FWP	PH, LOW	SOURCE UNKNOWN
LA040603_00	Selsers Creek-From headwaters to Sisters Road	6.0	N	F	N		FWP	PHOSPHORUS, TOTAL	ON-SITE TREATMENT SYSTEMS (SEPTIC SYSTEMS AND SIMILAR DECENTRALIZED SYSTEMS)
LA040603_00	Selsers Creek-From headwaters to Sisters Road	6.0	N	F	N		FWP	PHOSPHORUS, TOTAL	PACKAGE PLANT OR OTHER PERMITTED SMALL FLOWS DISCHARGES
LA040603_00	Selsers Creek-From headwaters to Sisters Road	6.0	N	F	N		FWP	TOTAL DISSOLVED SOLIDS (TDS)	NATURAL SOURCES
LA040603_00	Selsers Creek-From headwaters to Sisters Road	6.0	N	F	N		PCR	FECAL COLIFORM	SOURCE UNKNOWN
LA040604_00	South Slough; includes Anderson Canal and Interstate Highway 55 borrow pit canal to North Pass	12	N	F	N		FWP	DISSOLVED OXYGEN	NATURAL SOURCES
LA040604_00	South Slough; includes Anderson Canal and Interstate Highway 55 borrow pit canal to North Pass	12	N	F	N		FWP	DISSOLVED OXYGEN	ON-SITE TREATMENT SYSTEMS (SEPTIC SYSTEMS AND SIMILAR DECENTRALIZED SYSTEMS)

Subsegment Number	Subsegment Description	Size (mi)	PCR	SCR	FWP	ONR	Impaired Use for Suspected Cause	Suspected Causes of Impairment	Suspected Sources of Impairment
LA040604_00	South Slough; includes Anderson Canal and Interstate Highway 55 borrow pit canal to North Pass	12	N	F	N		PCR	FECAL COLIFORM	SOURCE UNKNOWN
LA040604_00	South Slough; includes Anderson Canal and Interstate Highway 55 borrow pit canal to North Pass	12	N	F	N		PCR	TEMPERATURE	SOURCE UNKNOWN
LA040606_00	Selsers Creek-From Sisters Road to South Slough	5.1	F	F	N		FWP	DISSOLVED OXYGEN	ON-SITE TREATMENT SYSTEMS (SEPTIC SYSTEMS AND SIMILAR DECENTRALIZED SYSTEMS)
LA040606_00	Selsers Creek-From Sisters Road to South Slough	5.1	F	F	N		FWP	DISSOLVED OXYGEN	PACKAGE PLANT OR OTHER PERMITTED SMALL FLOWS DISCHARGES
LA040606_00	Selsers Creek-From Sisters Road to South Slough	5.1	F	F	N		FWP	NITRATE/NITRITE (NITRITE + NITRATE AS N)	ON-SITE TREATMENT SYSTEMS (SEPTIC SYSTEMS AND SIMILAR DECENTRALIZED SYSTEMS)

Subsegment Number	Subsegment Description	Size (mi)	PCR	SCR	FWP	ONR	Impaired Use for Suspected Cause	Suspected Causes of Impairment	Suspected Sources of Impairment
LA040606_00	Selsers Creek-From Sisters Road to South Slough	5.1	F	F	N		FWP	NITRATE/NITRITE (NITRITE + NITRATE AS N)	PACKAGE PLANT OR OTHER PERMITTED SMALL FLOWS DISCHARGES
LA040606_00	Selsers Creek-From Sisters Road to South Slough	5.1	F	F	N		FWP	PHOSPHORUS, TOTAL	ON-SITE TREATMENT SYSTEMS (SEPTIC SYSTEMS AND SIMILAR DECENTRALIZED SYSTEMS)
LA040606_00	Selsers Creek-From Sisters Road to South Slough	5.1	F	F	N		FWP	PHOSPHORUS, TOTAL	PACKAGE PLANT OR OTHER PERMITTED SMALL FLOWS DISCHARGES
LA040607_00	South Slough Wetland-Forested freshwater and brackish marsh bounded to the north by South Slough, west by Interstate Highway 55 borrow pit canal, and south by North Pass	25,904		X	N		FWP	CAUSE UNKNOWN	SOURCE UNKNOWN
LA040701_00	Tangipahoa River-From Mississippi state line to Interstate Highway 12 (Scenic)	61	F	F	N	F	FWP	MERCURY - FISH CONSUMPTION ADVISORY	ATMOSPHERIC DEPOSITION - TOXICS

Subsegment Number	Subsegment Description	Size (mi)	PCR	SCR	FWP	ONR	Impaired Use for Suspected Cause	Suspected Causes of Impairment	Suspected Sources of Impairment
LA040701_00	Tangipahoa River-From Mississippi state line to Interstate Highway 12 (Scenic)	61	F	F	N	F	FWP	MERCURY - FISH CONSUMPTION ADVISORY	SOURCE UNKNOWN
LA040701_00	Tangipahoa River-From Mississippi state line to Interstate Highway 12 (Scenic)	61	F	F	N	F	FWP	PH, LOW	SOURCE UNKNOWN
LA040702_00	Tangipahoa River-From Interstate Highway 12 to Lake Pontchartrain	19	F	F	N		FWP	DISSOLVED OXYGEN	SOURCE UNKNOWN
LA040702_00	Tangipahoa River-From Interstate Highway 12 to Lake Pontchartrain	19	F	F	N		FWP	MERCURY - FISH CONSUMPTION ADVISORY	ATMOSPHERIC DEPOSITION - TOXICS
LA040702_00	Tangipahoa River-From Interstate Highway 12 to Lake Pontchartrain	19	F	F	N		FWP	MERCURY - FISH CONSUMPTION ADVISORY	SOURCE UNKNOWN
LA040704_00	Chappepeela Creek-From headwaters to Tangipahoa River	32	N	F	F	N	ONR	TURBIDITY	SILVICULTURE ACTIVITIES
LA040704_00	Chappepeela Creek-From headwaters to Tangipahoa River	32	N	F	F	N	PCR	FECAL COLIFORM	SOURCE UNKNOWN

Subsegment Number	Subsegment Description	Size (mi)	PCR	SCR	FWP	ONR	Impaired Use for Suspected Cause	Suspected Causes of Impairment	Suspected Sources of Impairment
LA040705_00	Bedico Creek-From headwaters to Tangipahoa River	18	F	F	N		FWP	CHLORIDE	SOURCE UNKNOWN
LA040705_00	Bedico Creek-From headwaters to Tangipahoa River	18	F	F	N		FWP	DISSOLVED OXYGEN	SOURCE UNKNOWN
LA040705_00	Bedico Creek-From headwaters to Tangipahoa River	18	F	F	N		FWP	PH, LOW	SOURCE UNKNOWN
LA040705_00	Bedico Creek-From headwaters to Tangipahoa River	18	F	F	N		FWP	TOTAL DISSOLVED SOLIDS (TDS)	SOURCE UNKNOWN
LA040801_00	Tchefuncte River-From headwaters to US Highway 190; includes tributaries (Scenic)	52	N	F	N	N	FWP	MERCURY - FISH CONSUMPTION ADVISORY	ATMOSPHERIC DEPOSITION - TOXICS
LA040801_00	Tchefuncte River-From headwaters to US Highway 190; includes tributaries (Scenic)	52	N	F	N	N	FWP	MERCURY - FISH CONSUMPTION ADVISORY	SOURCE UNKNOWN
LA040801_00	Tchefuncte River-From headwaters to US Highway 190; includes tributaries (Scenic)	52	N	F	N	N	FWP	TURBIDITY	CONSTRUCTION

Subsegment Number	Subsegment Description	Size (mi)	PCR	SCR	FWP	ONR	Impaired Use for Suspected Cause	Suspected Causes of Impairment	Suspected Sources of Impairment
LA040801_00	Tchefuncte River-From headwaters to US Highway 190; includes tributaries (Scenic)	52	N	F	N	N	FWP	TURBIDITY	SITE CLEARANCE (LAND DEVELOPMENT OR REDEVELOPMENT)
LA040801_00	Tchefuncte River-From headwaters to US Highway 190; includes tributaries (Scenic)	52	N	F	N	N	ONR	TURBIDITY	CONSTRUCTION
LA040801_00	Tchefuncte River-From headwaters to US Highway 190; includes tributaries (Scenic)	52	N	F	N	N	ONR	TURBIDITY	SITE CLEARANCE (LAND DEVELOPMENT OR REDEVELOPMENT)
LA040801_00	Tchefuncte River-From headwaters to US Highway 190; includes tributaries (Scenic)	52	N	F	N	N	PCR	FECAL COLIFORM	SEWAGE DISCHARGES IN UNSEWERED AREAS
LA041001_00	Lake Pontchartrain-West of US Highway 11 bridge (Estuarine)	594	N	F	F		PCR	ENTEROCOCCUS	SOURCE UNKNOWN

1.11 AIR QUALITY

The Clean Air Act Amendment of 1990 directed the EPA to establish National Ambient Air Quality Standards (NAAQS) for the following six criteria pollutants considered harmful to public health and the environment:

- carbon monoxide (CO),

- nitrogen dioxide (NO2),
- ozone (O3),
- sulfur oxides (commonly measured as sulfur dioxide [SO2]),
- lead (Pb),
- particulate matter no greater than 2.5 micrometers (µm) in diameter (PM2.5),
- particulate matter no greater than 10 µm in diameter (PM10).

Ozone is the only parameter not directly emitted into the air but forms in the atmosphere when three atoms of oxygen (O_3) are combined by a chemical reaction between nitrogen oxides and volatile organic compounds in the presence of sunlight. Motor vehicle exhaust and industrial emissions, gasoline vapors, and chemical solvents are some of the major sources of nitrogen and volatile organic compounds, also known as ozone precursors. Strong sunlight and hot weather can cause ground-level ozone to form in harmful concentrations in the air.

The EPA Green Book Nonattainment Areas for Criteria Pollutants (Green Book) maintains a list of all areas within the United States that are currently designated nonattainment areas with respect to one or more criteria air pollutants. Nonattainment areas are discussed by county or metropolitan statistical area (MSA). MSAs are geographic locations, characterized by a large population nucleus, that are comprised of adjacent communities with a high degree of social and economic integration. MSAs are generally composed of multiple counties. Based on a review of the Green Book, the parish is currently designated as being in attainment for all NAAQS.

SECTION 2
Environmental Justice

The Environmental Justice (EJ) Appendix D-2 provides more detailed information than is available in the Environmental Assessment's (EA) EJ Sections 3.5.8 & 5.3.1.10) in the main feasibility report. The EJ appendix provides information on the methodology used to identify areas of EJ concern. The EJ assessment in Chapter 5 of the EA identifies impacts to these areas of EJ concern and describes how residents may be beneficially and adversely impacted by the Federal action. Appendix D also provides some tables and figures not in the main report.

EJ is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people should bear a disproportionate share of the negative environmental consequences resulting from industrial, governmental, and commercial operations or policies. (https://www.epa.gov/environmentaljustice/learn-about-environmental-justice, accessed 05/2024).

EJ is institutionally significant because of Executive Order (EO) 12898 of 1994, EO 14008 of 2021 and the Department of Defense's Strategy on Environmental Justice of 1995. Federal agencies are to identify and address any disproportionately high and adverse human health or environmental effects of Federal actions to minority and/or low-income populations and to those populations challenged with environmental hazards. This resource is technically significant because the social and economic welfare of minority and low-income populations may be positively or adversely disproportionately impacted by the proposed actions.

This resource is publicly significant because of public concerns about the fair and equitable treatment (fair treatment and meaningful involvement) of all people with respect to environmental and human health consequences of Federal laws, regulations, policies, and actions.

Below are other relevant EOs and memorandum related to EJ:

- Executive Order 13985, Advancing Racial Equity and Support for Undeserved Communities through the Federal government dated 20 January 2021;
- Executive Order 13990, Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis dated 20 January 2021;
- Executive Order 14008, Tackling the Climate Crisis at Home and Abroad dated 27 January 2021; Office of Management and Budget Memorandum M-21-28;
- Comprehensive Documentation of Benefits in Decision Document, January 5, 2021, Issued by the Assistant Secretary of the Army (Civil Works);

- Indian Self-Determination and Education Assistance Act, as Amended (25 U.S. Code Chapter 46) SACW Subject; Implementation of Environmental Justice and the Justice40 Initiative 2;
- Water Resources Development Act (WRDA) of 2020, December 27, 2020;
- Interim Implementation Guidance for the Justice40 Initiative, dated 20 July 2021; and Memorandum for Commanding General. U.S. Army Corps of Engineers Subject: Implementation of Environmental Justice and the Justice40 Initiate Dated 15 March 2022.
- Executive Order 14096: Revitalizing Our Nation's Commitment to Environmental

2.1 JUSTICE FOR ALL

Minority populations are those persons who identify themselves as Black, Hispanic, Asian American, American Indian/Alaskan Native, Pacific Islander, some other race, or a combination of two or more races. A minority population exists where the percentage of minorities in an affected area either exceeds 50 percent or is meaningfully greater than in the general population. Low-income populations as of 2020 are those whose income are $26,200 for a family of four and are identified using the Census Bureau's statistical poverty threshold. For the purpose of this study, a low-income population is defined as residents in a geographic area, such as a census block group, exceeding Louisiana's 2020 low-income percentage of 19.6 percent. Minority and low-income populations, identified using the above thresholds, are considered areas of EJ concern.

EO 12898 directs Federal agencies to identify and address any disproportionately high adverse human health or environmental effects of Federal actions to minority and/or low-income populations. Areas of EJ concern are identified to help inform planners as to the location of those areas needing a particular focus and attention when determining the impacts of the Federal action, as described in EO 12898. Federal agencies should assess the effects of their projects on communities with EJ concerns in accordance with EO 12898: Environmental Justice, 1994 and EO 14008, Tackling the Climate Crisis at Home and Abroad, 2021. For U.S. Army Corps of Engineers, compliance with these EOs is mandatory pursuant to Section 112(b)(1) of WRDA 2020 (Public Law 116-260). ("In the formulation of water development resources projects, the Secretary shall comply with any existing Executive Order regarding environmental justice . . . to address any disproportionate and adverse human health or environmental effects on minority communities, low-income communities, and Indian Tribes."). For purposes of consistency with EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, the terms "minority populations" and "low-income populations" are used in this document.

2.2 JUSTICE 40

EO 14008, signed by President Biden in April 2023, is a commitment to securing environmental justice and spurring economic opportunity for disadvantaged communities that have been historically marginalized and overburdened by pollution and underinvestment in housing, transportation, water and wastewater infrastructure, and health care. As per EO 14008, the Federal government has made it a goal that 40 percent of the overall benefits of certain Federal investments flow to disadvantaged communities that are marginalized, underserved, and overburdened by pollution. This goal has been designated the Justice40 Initiative.

The Council on Environmental Quality developed the Climate and Economic Justice Screening Tool (CEJST) to assist identifying disadvantaged communities. The CEJST uses several burdens that qualify a census tract as disadvantaged. Burden categories in CEJST include housing, health, climate change, energy, legacy pollution, transportation, water/wastewater infrastructure, and workplace development. For a tract to be considered disadvantaged, it must be at or above the 90th percentile in one or more burdens and be at or above the 65th percentile for low income. Detailed methodology can be found on the CEJST website.

Out of 31 census tracts in the Tangipahoa Parish study area, 22 are historically burdened by a CEJST burden category. When flood risk is present in a tract, these identified communities could be impacted disproportionately by inundation events as they may not have the resources to recover from the impacts or be able to properly mitigate prior to the event.

For the EJ assessment, the project delivery team (PDT) used U.S Census data to identify areas of EJ concern (minority and low- income communities) within the Tangipahoa Parish study area.

For purposes of the EJ analysis, “environmental justice communities” were defined as communities that meet established thresholds for identifying low-income residents or who identify as a person of color, or minority. Methods for determining thresholds are explained in the Environmental Protection Agency’s (EPA) EJ Promising Practices document and are presented below.

The PDT used the most recent U.S. Census Bureau 5-year survey data, 2018-2022 (Table D: 2-1). Data for U.S. Census tracts in the study area are presented, which helps highlight areas of EJ concern for different geographic areas. The U.S. Census tract is a geographic area consisting of several smaller U.S. Census blocks, which are combined to form block groups. Each of these groups represent geographic areas and people living in communities.

Table D: 2-1. Percent Poverty Levels and Percent Minority Population for Census Tracts in the Study Area Compared to Parish, State, and National Averages.

Location	Population for Whom Poverty Status is Known	% Below Poverty Level	% Minority
U.S.	323,275,448	12.5	40.6
Louisiana	4,513,793	18.7	36.2
Tangipahoa Parish	129,545	19.2	36.5
Census Tract 9532	2,987	7.2	29
Census Tract 9533	3,733	27.6	68.9
Census Tract 9534.01	2,809	30.8	65.8
Census Tract 9534.02	2,186	17.7	35.6
Census Tract 9535.01	3,553	11.9	17.6
Census Tract 9535.02	3,299	8.5	33.6
Census Tract 9536.01	2,412	15.7	98.3
Census Tract 9536.02	3,455	39.9	68.6
Census Tract 9537.01	4,934	2.1	12.9
Census Tract 9537.02	5,348	5.8	6.8
Census Tract 9538	4,873	12.6	29.8
Census Tract 9539.01	4,905	35	40.3
Census Tract 9539.02	4,803	9.1	37
Census Tract 9540.01	4,215	37.5	39.9
Census Tract 9540.03	3,641	20.3	36.6
Census Tract 9540.04	3,697	37.9	66.4
Census Tract 9541.03	4,474	27.8	41.4
Census Tract 9541.04	1,787	36.7	60.9
Census Tract 9541.05	5,922	19.7	26
Census Tract 9541.06	5,609	19.7	20
Census Tract 9542	2,863	23.2	33.4
Census Tract 9543	4,142	48.7	72.1
Census Tract 9544	3,124	30.2	50.1
Census Tract 9545.03	3,830	28.1	41.1
Census Tract 9545.04	2,336	18.4	34.9
Census Tract 9545.05	6,182	16.8	45.9
Census Tract 9545.06	1,687	12.9	36.4
Census Tract 9546.01	8,583	8.1	31.1
Census Tract 9546.02	7,209	7.5	13.7
Census Tract 9547	4,957	14.8	32
Census Tract 9548	5,990	8.4	14.8

Source: U.S Census Bureau, American Community Survey (ACS) 5-year estimates 2018-2022

2.2.1 Low-income Threshold Criteria

A reference area's percentage of residents living below poverty was used as the threshold for identifying areas of EJ concern based upon poverty status. The state of Louisiana is the reference area for the study area. The 2022 percentage of Louisiana residents living below the poverty level is 18.8 percent. Any area in Louisiana that consists of 18.8% or more of residents living below poverty, respectively, is considered an area of EJ concern (highlighted in blue on Table D: 2-1). The poverty income level for year 2022 in the United States was $27,750 for a family of four.

2.2.2 Minority population threshold criteria

If 50 percent of residents in an area identify as a person of color (minority), then the area is considered an area of EJ concern. Additionally, if the percentage of minority residents in an area is meaningfully greater (15 percent) than the percentage minority in the state of Louisiana or Mississippi, that area is also considered an area of EJ concern. The threshold used to identify minority areas of EJ concern is the lower of the two. In this case, the minority threshold used to identify areas of EJ concern in Louisiana is 48.5 percent. Areas of EJ concern for this category are highlighted in blue on Table D: 2-1.

2.2.3 Environmental Justice Community Evaluation

The PDT used census tract data to identify areas where the population may be overburdened or historically underserved. Census tract data provides greater resolution than data at the parish level but less than resolution than block group or block data. The team chose to use census tract data (Section 1.3, 1.4) to provide additional context for potential vulnerability of a geographic area to additional stressors such as flooding. Fourteen of 31 census tracts are considered areas of EJ concern based upon exceeding the low-income threshold criteria of 18.8 percent of residents living below the poverty level. Eight of 31 census tracts are considered areas of EJ concern based upon exceeding the minority threshold of 48.5 percent. Cumulatively 15 tracts meet one or both threshold criteria.

Just under 134,000 people live in the study area, and over 59,000 (~44%) of the study area population live in areas of EJ concern according to these two criteria. The census tracts highlighted in Table D: 2-1 represent the areas of EJ concern based on the criteria discussed in section 2.2.1 and 2.2.2. However, the ability of a community to respond and recover after a flood event is influenced by a number of factors.

Fifteen of 31 census tracts meet the threshold levels for minority or low-income populations. Forty-four percent of the population lives in these Census Tracts. A total of 7% of eligible structures in the Parish occur in census tracts meeting the above threshold. When evaluating the number of eligible structures that occur in these 15 census tracts, 22% are included in the NED Plan, 35% are included in Plan 3a, 50% are included in Plan 3b (proposed TSP), and 54% are included in Plan 3c. Approximately, 5% and 6% of the overall eligible structures occur in these 15 census tracts for the NED and Plan 3b (proposed TSP) plans.

The following sections identify additional locations that could be vulnerable to flood-related damage due to one or more factors.

2.3 SOCIAL VULNERABILITY INDEX

Social Vulnerability refers to the demographic and socioeconomic factors (such as poverty, lack of access to transportation, and crowded housing) that adversely affect communities that encounter hazards and other community level stressors. These stressors can include natural or human-caused disasters such as flooding, chemical spills, or diseases outbreaks.

The Social Vulnerability Index (SVI) was developed by the Centers for Disease Control (CDC) and Prevention and Agency for Toxic Substances and Disease Registry (ATSDR) to help identify and map communities that will most likely need support before, during, and after hazardous events. The SVI value indicates the relative vulnerability of geographic area at the census tract level. The SVI is comprised of the 16 socials factors below which can be grouped into four related themes (i.e. socioeconomic status, household characteristics, racial and ethnic minority status, and housing type and transportation).

Socioeconomic Status Theme

Below 150% Poverty

- Unemployed
- Housing Cost Burden
- No High School Diploma
- No Health Insurance

Household Characteristics

- Aged 65 and Older
- Aged 17 and Younger
- Civilian with a Disability
- Single-Parent Households
- English Language Proficiency

Racial and Ethnic Minority Status

- Hispanic or Latino (of any race); Black and African American, Not Hispanic or Latino; American Indian and Alaska Native, Not Hispanic or Latino; Asian, Not Hispanic or Latino; Native Hawaiian and Other Pacific Islander, Not Hispanic or Latino; Two or More Races, Not Hispanic or Latino; Other Races, Not Hispanic or Latino

Housing Type and Transportation

- Multi-Unit Structures
- Mobile Homes
- Crowding
- No Vehicle
- Group Quarters

SVI ranking values reported by theme and overall are based on national percentiles. The percentile ranking value ranges from 0 to 1 for each, with higher values indicating greater social vulnerability for that category. The PDTs evaluation of social vulnerability risk followed the symbology used in the CDC/ATSDR SVI interactive map (https://www.atsdr.cdc.gov/placeandhealth/svi/interactive_map.html) which divides the level of vulnerability into fourths. The 0-24th (0-0.24) percentile represented the lowest

vulnerability for a category, 25th-49th (0.25-0.49) percentile represented a low-medium level of vulnerability, 50th-74th (0.50-0.74) percentile range represented a medium-high level of vulnerability, and 75th-100th (0.75-1.0) percentile range represented a high level of vulnerability.

Social vulnerability summary data is provided in Tables D: 2-2, and 2-3 and visually represented in Figures D: 2-1, 2-2, 2-3, 2-4, and 2-5.

Overall, a large proportion of the population resides in census tracts with medium-high to high levels of vulnerability for one or more of the SVI themes. Additionally, 46% of the population is lives in a census tract that has a high level of vulnerability, according to the CDC SVI assessment, for one or more themes.

Table D: 2-2. Summary Data of CDC/ATSDR Social Vulnerability Themes by Census Tract in Tangipahoa Parish.

Location	Socio-economic	Household Characteristics	Racial and Ethnic Minority	Housing Type and Transportation	Overall
Census Tract 9532	0.20	0.34	0.37	0.39	0.25
Census Tract 9533	0.84	0.94	0.77	0.88	0.96
Census Tract 9534.01	0.68	0.71	0.75	0.49	0.69
Census Tract 9534.02	0.09	0.73	0.45	0.30	0.27
Census Tract 9535.01	0.56	0.63	0.21	0.63	0.56
Census Tract 9535.02	0.39	0.96	0.46	0.45	0.60
Census Tract 9536.01	0.59	0.22	0.96	0.36	0.48
Census Tract 9536.02	0.88	0.78	0.77	0.71	0.87
Census Tract 9537.01	0.16	0.11	0.15	0.35	0.11
Census Tract 9537.02	0.10	0.83	0.07	0.11	0.16
Census Tract 9538	0.55	0.58	0.42	0.50	0.54
Census Tract 9539.01	0.96	0.48	0.52	0.90	0.91
Census Tract 9539.02	0.21	0.49	0.50	0.15	0.22
Census Tract 9540.01	0.87	0.47	0.51	0.97	0.90
Census Tract 9540.03	0.31	0.78	0.47	0.11	0.32

Location	Socio-economic	Household Characteristics	Racial and Ethnic Minority	Housing Type and Transportation	Overall
Census Tract 9540.04	0.76	0.71	0.75	0.85	0.85
Census Tract 9541.03	0.75	0.35	0.54	0.48	0.59
Census Tract 9541.04	0.55	1.00	0.74	0.19	0.70
Census Tract 9541.05	0.56	0.72	0.36	0.58	0.60
Census Tract 9541.06	0.36	0.73	0.26	0.28	0.38
Census Tract 9542	0.71	0.10	0.44	0.50	0.46
Census Tract 9543	0.83	0.82	0.79	0.75	0.87
Census Tract 9544	0.73	0.85	0.66	0.84	0.86
Census Tract 9545.03	0.79	0.95	0.59	0.93	0.95
Census Tract 9545.04	0.32	0.72	0.44	0.60	0.50
Census Tract 9545.05	0.38	0.94	0.62	0.76	0.72
Census Tract 9545.06	0.46	0.08	0.49	0.85	0.46
Census Tract 9546.01	0.14	0.22	0.40	0.65	0.27
Census Tract 9546.02	0.13	0.55	0.21	0.46	0.26
Census Tract 9547	0.33	0.54	0.46	0.65	0.47
Census Tract 9548	0.59	0.59	0.23	0.51	0.53

Source: CDC/ATSDR Social Vulnerability Index 2022 Database Louisiana, Accessed on June 3, 2024.

Table D: 2-3. Percent of Population Meeting Medium-High or High Levels of Vulnerability by Theme and Census Tract for Tangipahoa Parish.

Category	Percent of Population Included
Theme 1: Medium-high or high	52%
Theme 2: Medium-high or high	67%
Theme 3: Medium-high or high	41%
Theme 4: Medium-high or high	61%
Theme 5: Medium-high or high	56%

Category	Percent of Population Included
Overall: At least one theme rated medium-high or high	94%
Overall: At least one theme rated high	46%

Source: CDC/ATSDR Social Vulnerability Index 2022 Database Louisiana, Accessed on June 3, 2024.

Table D: 2-4 and Figures D: 2-6, 2-7, 2-8, and 2-9 summarize CEJST and SVI data relative to the plans in the final array. Overall, the proposed TSP (Plan 3b) and the NED plan include EJ areas to a similar proportion as the overall prevalence of flood hazard in the Parish (No action plan) (Table 2-4).

Table D: 2-4. Percent of Structures in Plans Occurring in Environmental Justice Areas as Identified With CEJST and CDC/ATSDR SVI data.

Environmental Justice Category	NED	Plan 3a	Plan 3b	Plan 3c	Total eligible Structures (No Action)
CEJST	7%	10%	9%	9%	7%
SVI Theme 1: High	2%	4%	4%	3%	3%
SVI Theme 2: High	8%	8%	13%	11%	13%
SVI Theme 3: High	3%	4%	4%	3%	3%
SVI Theme 4: High	1%	3%	3%	3%	3%
SVI Theme 5: High	2%	4%	4%	4%	3%
SVI Theme 1: Medium High - High	18%	19%	25%	25%	24%
SVI Theme 2: Medium High - High	89%	84%	83%	80%	75%
SVI Theme 3: Medium High - High	3%	5%	4%	4%	4%
SVI Theme 4: Medium High - High	47%	51%	52%	54%	53%
SVI Overall: Medium High - High	18%	19%	25%	25%	24%
SVI at least one Theme: High	9%	10%	14%	13%	14%
SVI at least one Theme: Medium-High - High	99%	99%	99%	99%	97%

Source: CDC/ATSDR Social Vulnerability Index 2022 Database Louisiana, Accessed on June 3, 2024.

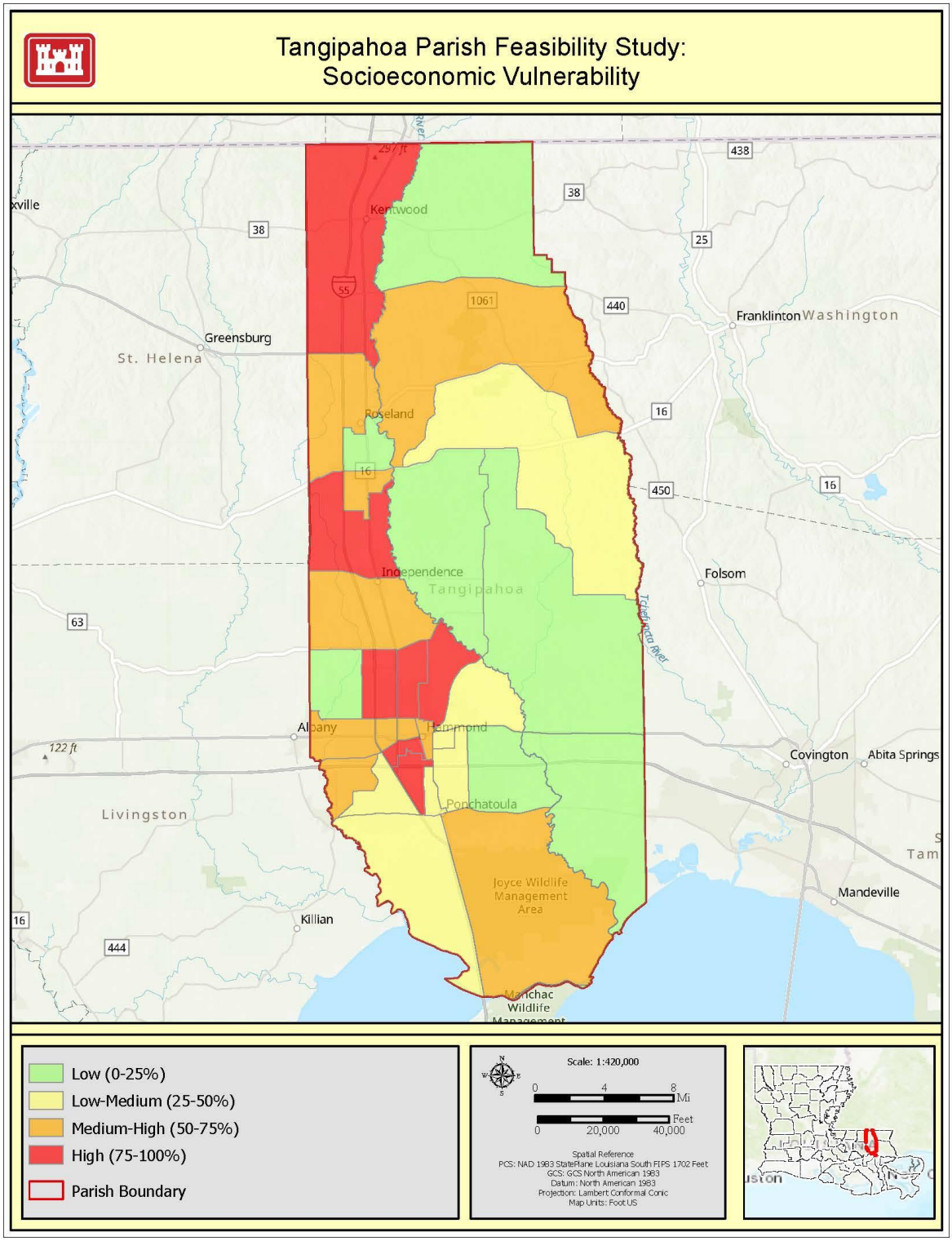

Figure D: 2-1. Theme 1 - Level of Vulnerability by Census Tract Within the Study Area.

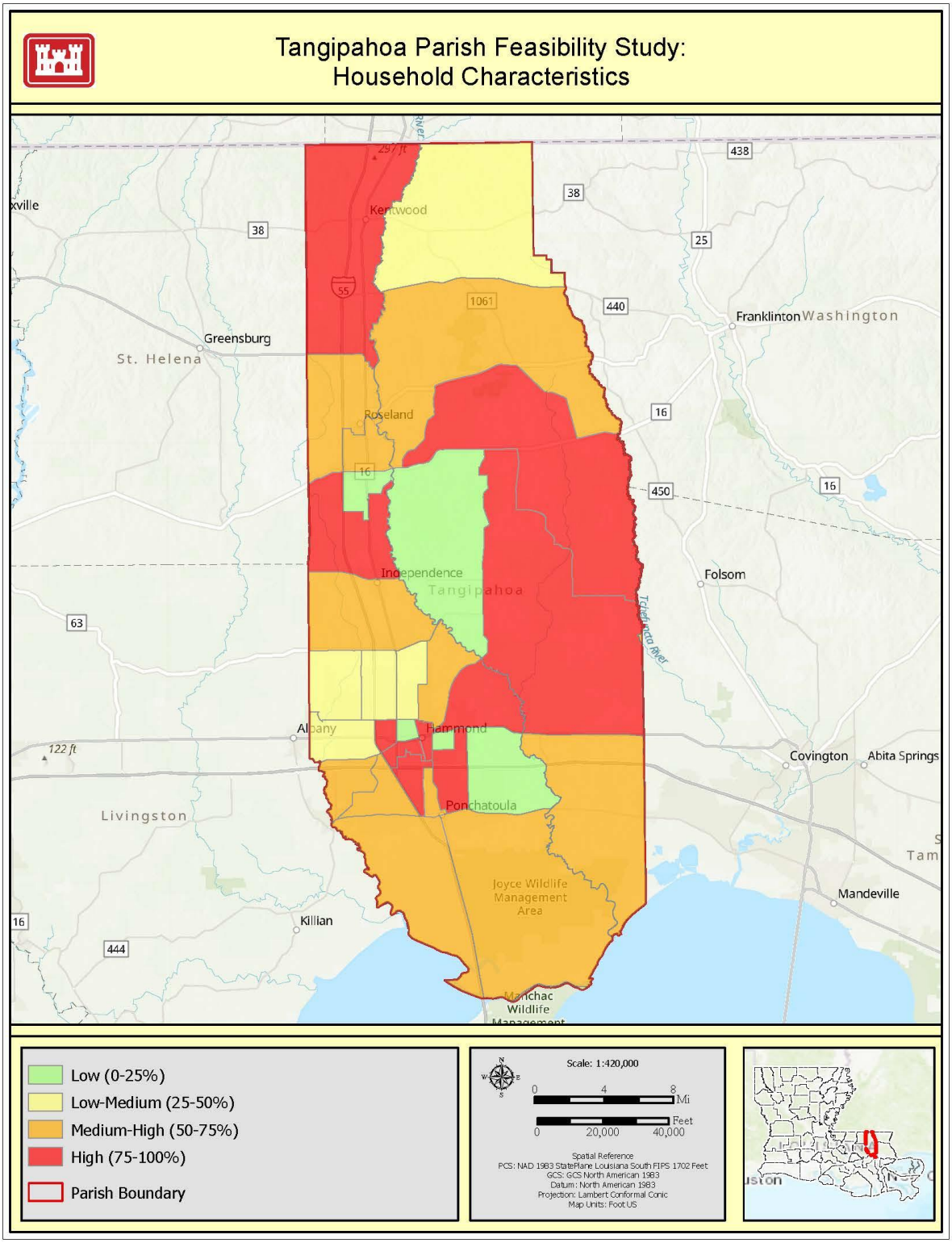

Figure D: 2-2. Theme 2- Level of Vulnerability by Census Tract Within the Study Area.

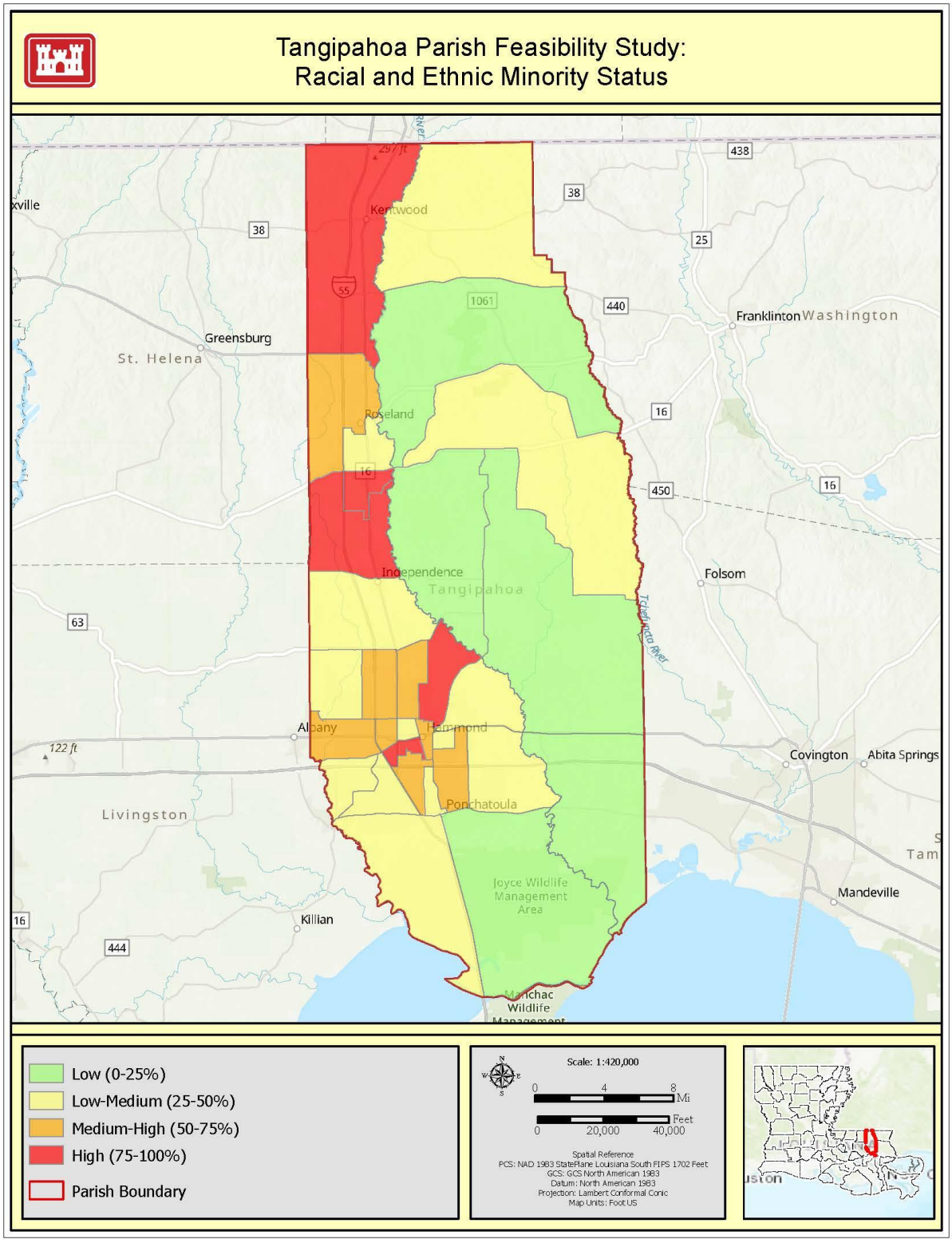

Figure D: 2-3. Theme 3 - Level of Vulnerability by Census Tract Within the Study Area.

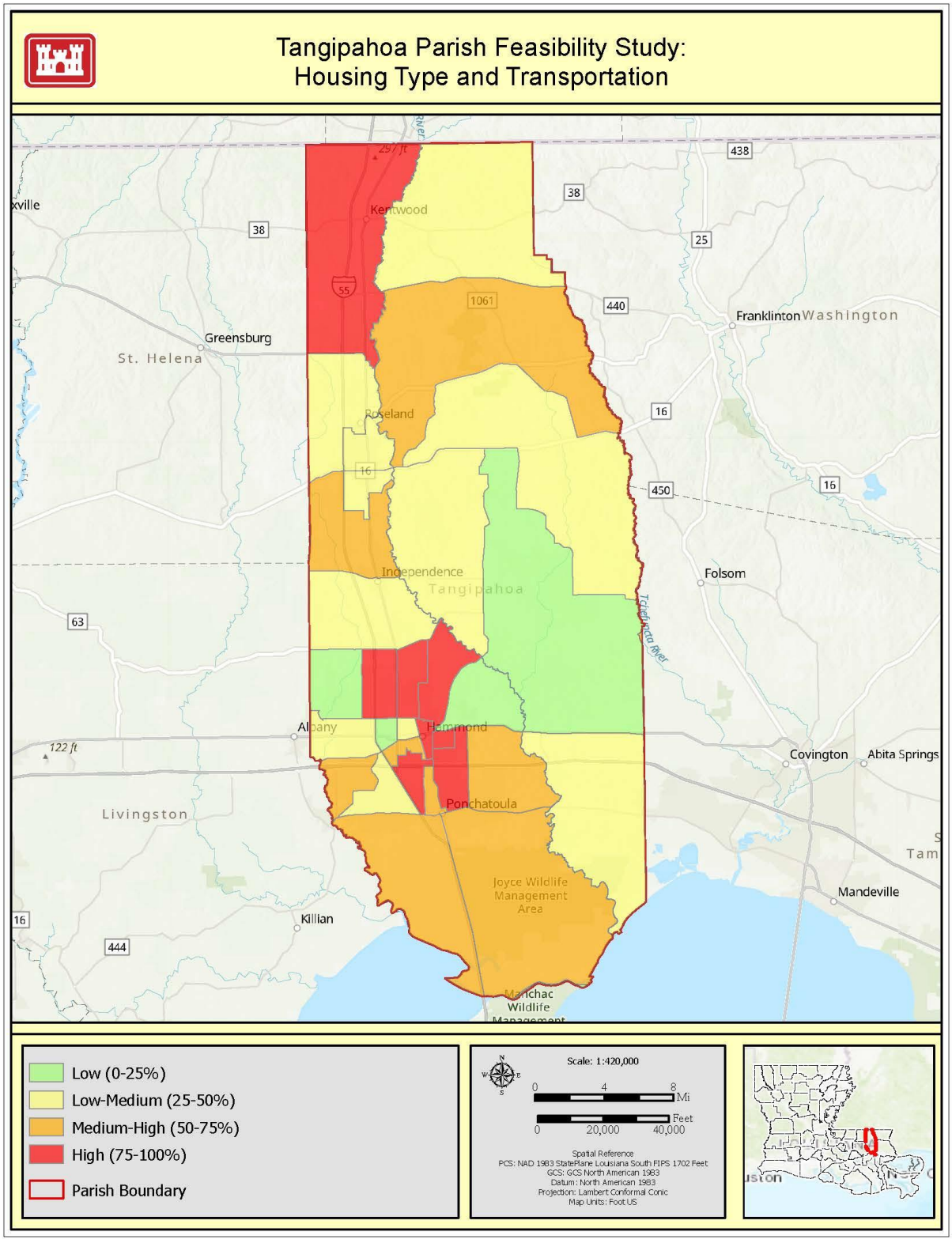

Figure D: 2-4. Theme 4 - Level of Vulnerability by Census Tract Within the Study Area.

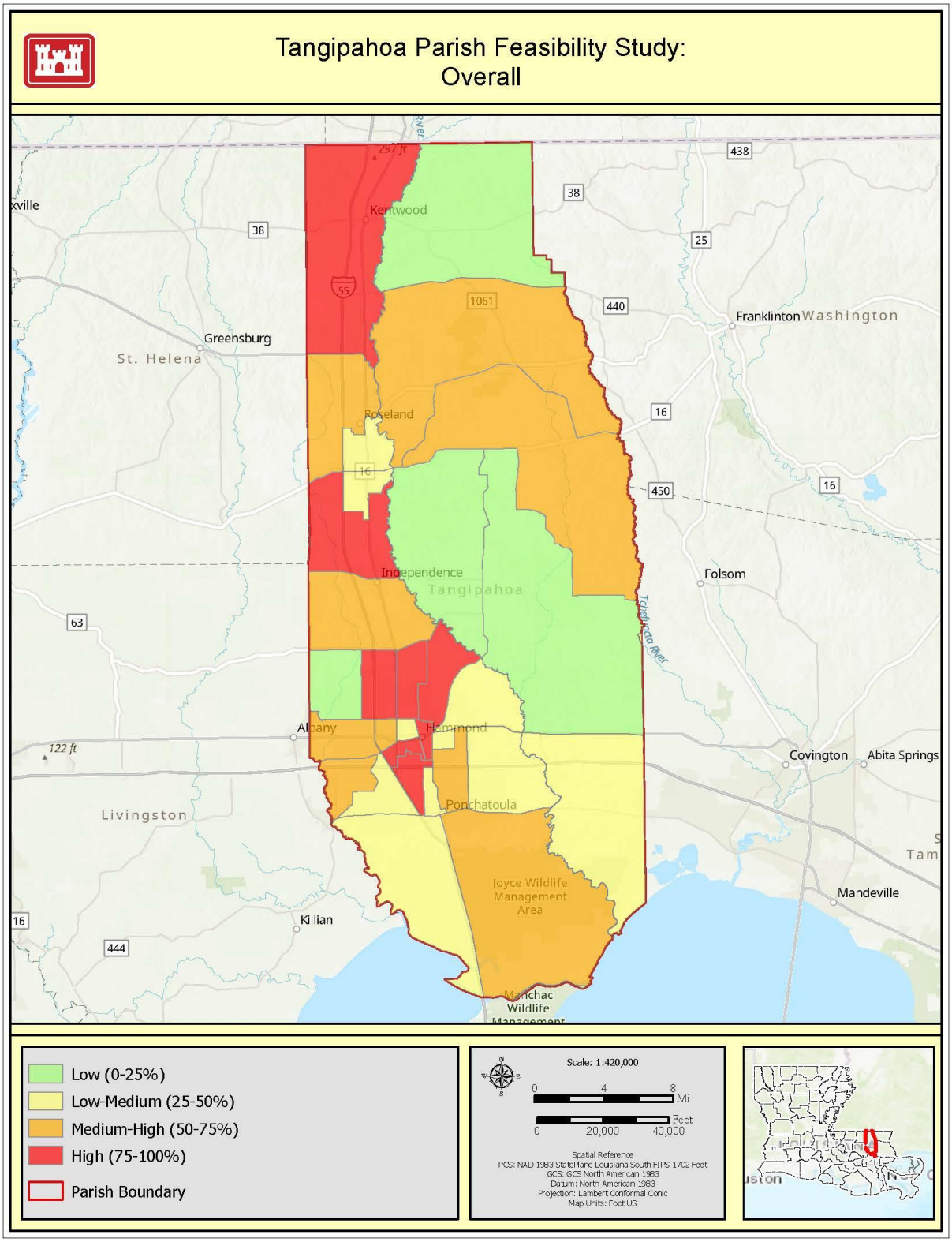

Figure D: 2-5. Theme 5 - Level of Vulnerability by Census Tract Within the Study Area.

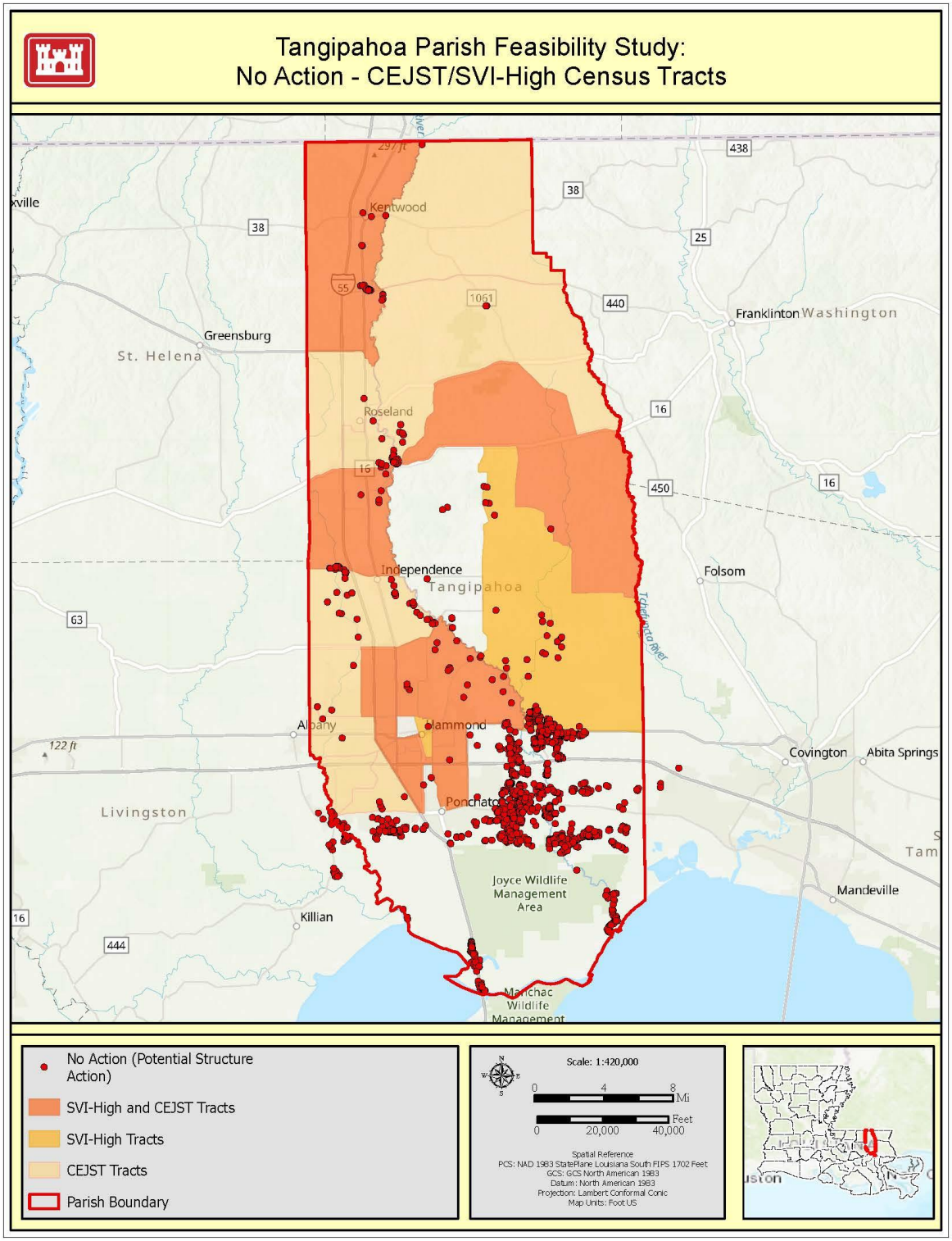

Figure D: 2-6. Floodprone Structures in the Parish Under the Future Without Project Condition (No Action) Relative to SVI Census Tracts or CEJST Areas.

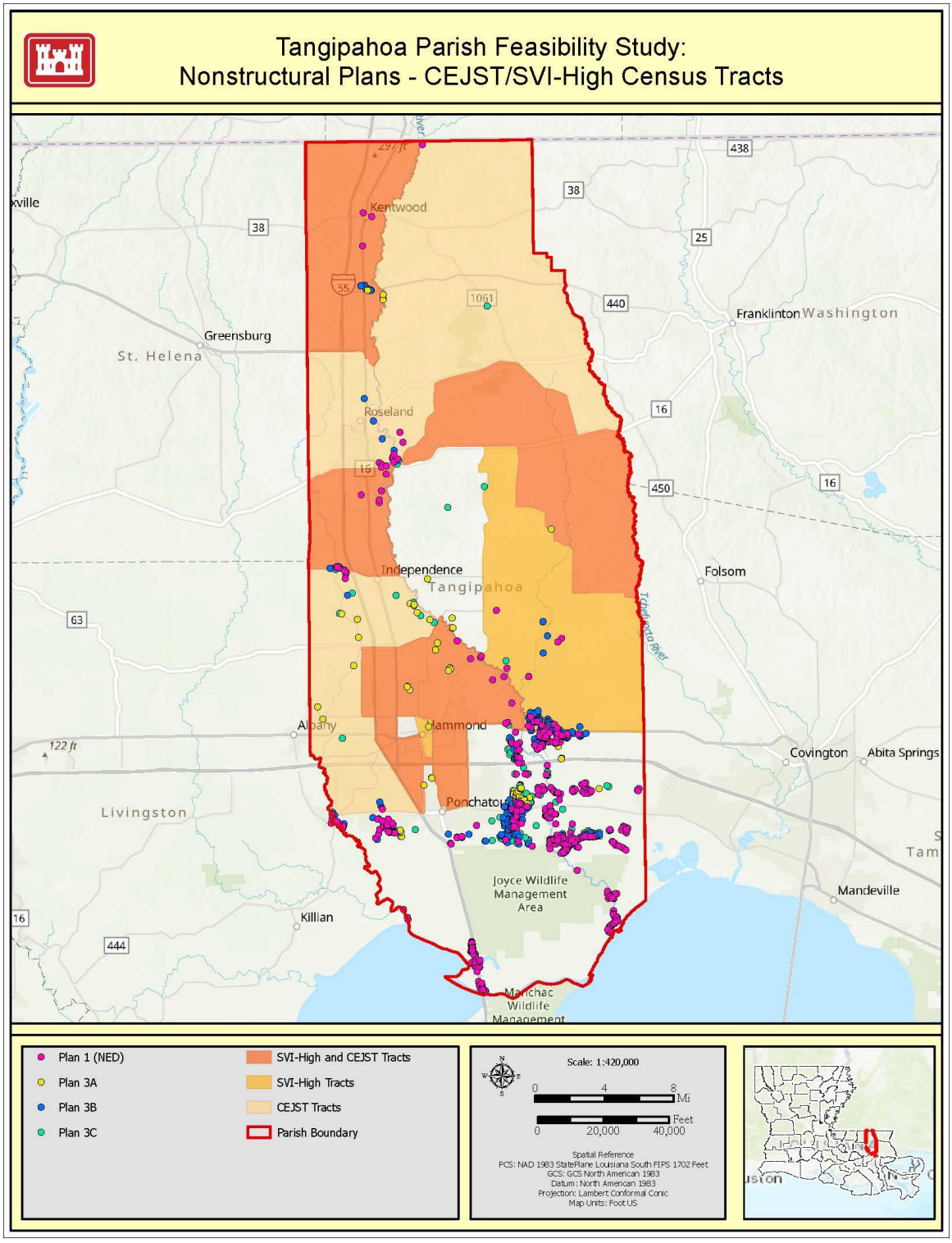

Figure D: 2-7. Floodprone Structures Included in Incremental Nonstructural Plans in the Study Area Relative to SVI Census Tracts or CEJST Areas.

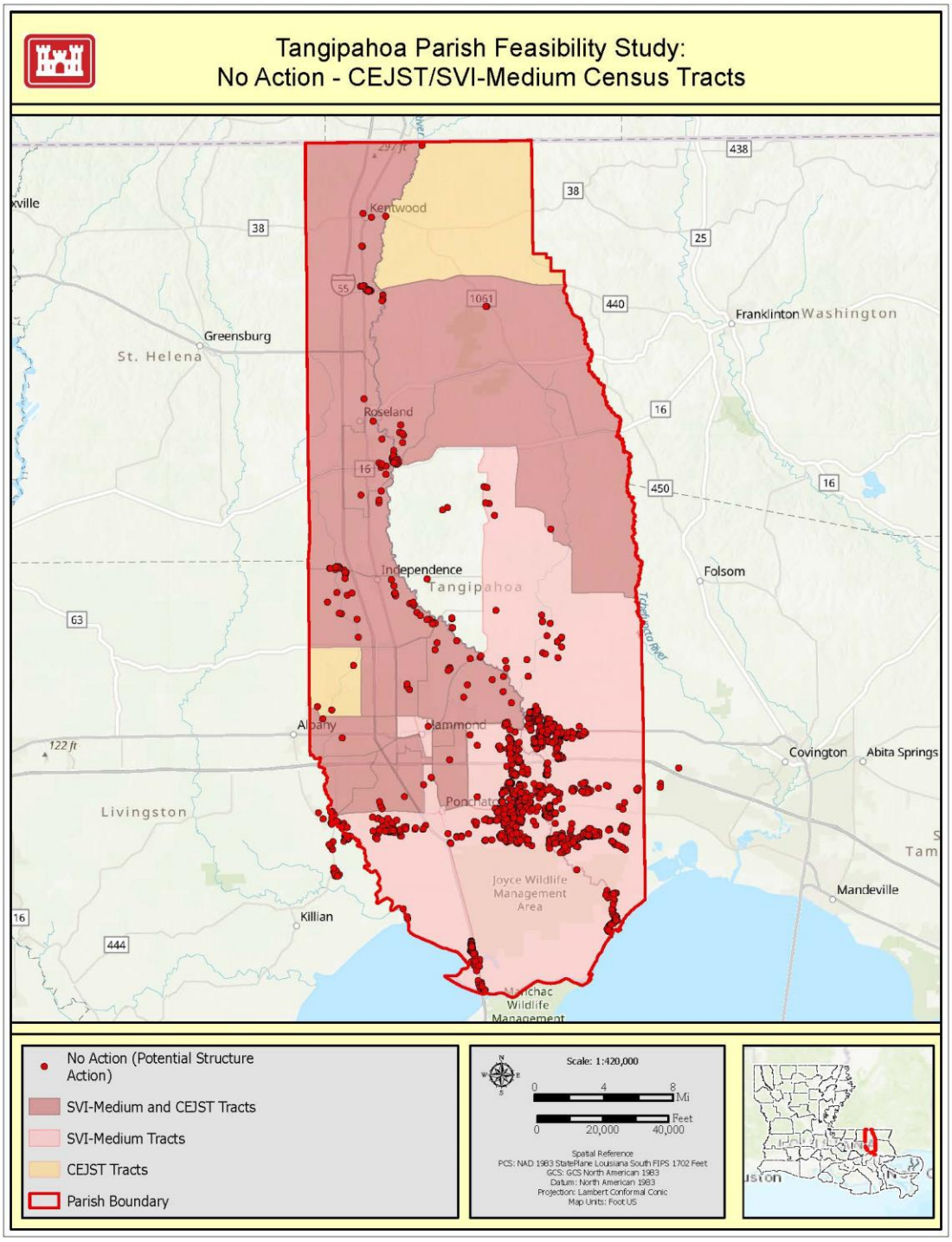

Figure D: 2-8. Floodprone Structures in the Parish Under the Future Without Project Condition (No Action) Relative to SVI Census Tracts or CEJST Areas.

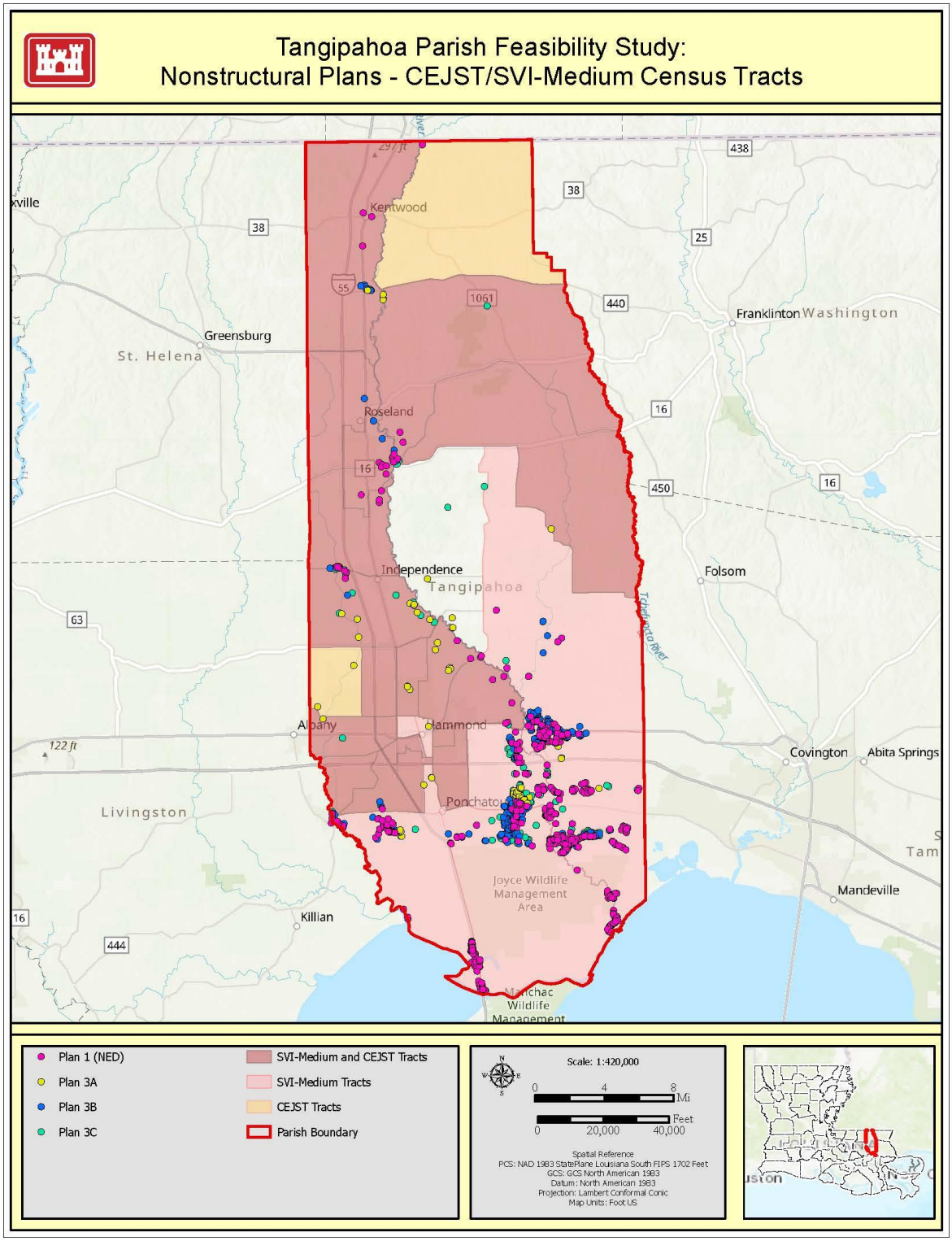

Figure D: 2-9. Floodprone Structures Included in Incremental Nonstructural Plans in the Study Area Relative to SVI Census Tracts or CEJST Areas.

2.4 EJSCREEN

The EJSCREEN tool, developed by EPA, uses environmental indicators to help identify environmental risks to communities. EPA selected the 13 environmental indicators for use in the version 2.2 of EJSCREEN:

1. Air pollution
    a. Particulate matter 2.5 in air (annual average)
    b. Ozone level in air (average of top ten daily maximum 8-hour ozone concentrations)
    c. Diesel particulate matter level in air
    d. Air toxics cancer risk (lifetime cancer risk from inhalation of air toxics)
    e. Air toxics respiratory hazard index (ratio of exposure concentration to health-based reference concentration)
    f. Toxic releases to air
2. Traffic proximity and volume: average annual daily traffic
3. Lead paint indicator: percent of housing units built before 1960, as an indicator of potential exposure to lead
4. Proximity to waste and hazardous chemical facilities or sites: Number of significant industrial facilities and/or hazardous waste sites nearby, and distance from those:
    a. National Priorities Lists (NPL) sites
    b. Risk Management Plan (RMP) Facilities.
    c. Hazardous waste treatment, storage, and disposal facilities (TSDFs)
5. Wastewater discharge indicator: proximity to toxicity-weighted wastewater discharges.

If an EJ area's exposure to the environmental indicators is above the 80th percentile in the state or the nation and the Federal action exacerbates any of those environmental risks, a potential disproportionate impact may occur. Specifically, a disproportionate impact occurs when a proposed project impacts a much higher percentage of minority and low-income populations than other communities located within the project area or when the benefits and impacts are not evenly distributed between EJ and non-EJ communities. According to EPA, environmental indicators above the 80th percentile in the state or nation indicate that one could expect environmental concerns.

The EJ study area includes the Parish of Tangipahoa, Louisiana. Environmental indicators for the ART study area are presented in Table D: 4-4. One of the indexes (i.e. Ozone) is just above the 80th percentile compared to Louisiana. Much of the construction activities associated with the tentatively selected plan will not exacerbate the environmental concerns as identified by EPA's EJScreen tool. However, best management practices would be used to avoid and reduce temporary impacts to human health and safety. For more information on air quality, refer to Section 3.3.7 of the EA.

Table D: 2-5. EJSCREEN Environmental Indicators for Study Area.

SELECTED VARIABLES	VALUE	STATE AVERAGE	PERCENTILE IN STATE	USA AVERAGE	PERCENTILE IN USA
Particulate Matter (µg/m^3)	8.37	8.62	36	8.08	54
Ozone (ppb)	61.1	59.8	81	61.6	50
Diesel Particulate Matter (µg/m^3)	0.216	0.247	54	0.261	50
Air Toxics Cancer Risk* (lifetime risk per million)	32	32	10	25	52
Air Toxics Respiratory HI*	0.38	0.38	1	0.31	31
Toxic Releases to Air	1,100	15,000	44	4,600	61
Traffic Proximity (daily traffic count/distance to road)	40	86	53	210	35
Lead Paint (% Pre-1960 Housing)	0.091	0.22	40	0.3	33
Superfund Proximity (site count/km distance)	0.039	0.076	54	0.13	35
RMP Facility Proximity (facility count/km distance)	0.46	0.62	62	0.43	75
Hazardous Waste Proximity (facility count/km distance)	0.42	1.1	47	1.9	47
Underground Storage Tanks (count/km^2)	1.3	2.2	56	3.9	51
Wastewater Discharge (toxicity-weighted concentration/m distance)	0.0028	49	53	22	57

2.5 EJ OUTREACH AND MEETINGS

Outreach efforts focused on civic and faith-based organizations that serve residents in areas of EJ concern, including local churches, libraries, nonprofits, and community centers. Initial calls were made to 224 churches, the Parish library system (6 libraries), two community centers, eight Head Start child centers, four senior centers, and three nonprofit organizations. A one-page summary of the outreach effort and study purpose was shared during this outreach for dissemination to the residents whom the civic and faith-based organizations serve. In addition, the libraries agreed to make the public meeting

presentation available to patrons interested in learning more about the project and how to provide feedback on flood hazard in the Parish.

EJ outreach meetings were conducted for the Tangipahoa Parish feasibility study on September 13 and 14, 2023 to inform and engage residents about the flood risk reduction measures, which included a range of nonstructural and structural plans. 35 people attended the meeting in Amite City and 100 people attended the meeting in Hammond.

Attendees shared their experiences and concerns related to flood hazards within the Parish. Comments and questions fell into the overarching categories of flood hazard description, flood map updates/insurance, impacts of development, impacts from adjacent studies, impacts from development on local flooding, local drainage and maintenance concerns, and requests for snagging and clearing of large and small drainages. The number of comments per category can be found in the table below:

Table D: 2-6: Feedback and Question Categories from Tangipahoa Attendees at EJ/Public Meetings September 2023.

Category	Occurrences
Drainage maintenance requests or concerns	9
Impact of development on flood hazard	6
Flood hazard description	5
Flood map updates/Insurance	1
Potential impacts from adjacent studies	1
Snagging and clearing requests	2

Local drainage and maintenance issues combined with clearing and snagging captured nearly half of all comments/questions received. Local drainage and maintenance are outside the scope for this study, but the PDT did evaluate a number of measures related to drainage maintenance (clearing and snagging) along channels with discharges greater than 800 cubic feet per second for the 10% annual exceedance probability (AEP) event (10-yr flood). The next most common question was related to the impacts of development on flood hazard within the Parish. Recommendations for the Parish to consider related to development is provided in Appendix E- Plan Formulation. Additional discussion on other public meetings held for the project is provided in section 6 of this appendix.

SECTION 3
HTRW

3.1 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE ASSESSMENT

The U.S. Army Corps of Engineers regulations (ER-1165-2-132) and Division policy requires procedures be established to avoid projects occurring in hazardous, toxic, and radioactive waste (HTRW) contaminated areas when practicable. This is accomplished by early identification of potential problems in reconnaissance, feasibility, and PED phases before any land acquisition begins. These HTRW investigations follow the standard practices for conducting Phase I Environmental Site Assessment's (ESA) published by the American Society for Testing and Materials (ASTM) since these practices are industry standard and closely follow the requirements outlined in ER-1165-2-132.

During the feasibility phase, an initial HTRW screening was performed on proposed structural measures, however, those measures have been screened out. Due to the large number of nonstructural measures and large area of interest, it is not practicable to perform a HTRW assessment at this time. During the PED phase a HTRW investigation, following the methods outlined by ASTM E1527-21, will be performed for the areas in which nonstructural measures will occur. This will include a records review, physical site visit, and communications with persons knowledgeable of the proposed nonstructural measure when practicable.

SECTION 4
Cultural Resources

USACE has determined that the proposed action constitutes an Undertaking as defined in 36 CFR § 800.16(y) and has the potential to cause effects on historic properties. Initial research identified 31 historic properties listed within the National Register of Historic Places in the Parish. These include 4 historic districts, 26 individual buildings and one other site. Additionally, 132 prehistoric and historic archaeological sites have been previously recorded as a result of approximately 75 cultural resources investigations. Some of these listed, or potentially eligible, historic properties may have been adversely affected by the initially proposed structural measures. Those measures, however, have been screened out in favor of non-structural measures. None of the listed historic properties will be affected by these measures. Therefore, the primary concern is the unknown and unevaluated structures to be affected to the proposed action. Due to the large number of these structures, it is not practicable to perform a NRHP evaluation of them at this time.

Accordingly, USACE proposes to develop a project-specific Programmatic Agreement (PA) pursuant to 36 CFR § 800.14(b)(3) to provide a framework for addressing this complex Undertaking and establish protocols for continuing consultation with the LA State Historic Preservation Officer (LA SHPO), Tribal Governments, and other stakeholders. The PA would identify consulting parties, define applicability, establish review timeframes, stipulate roles and responsibilities of stakeholders, summarize Tribal consultation procedures, consider the views of the SHPO/ Tribal Historic Preservation Officer and other consulting parties, afford for public participation, develop programmatic allowances to exempt certain actions from Section 106 review, provide the measures USACE will implement to develop an Area of Potential Effects (APE) in consultation with external stakeholders, outline a standard review process for plans and specifications as they are developed, determine an appropriate level of field investigation to identify and evaluate historic properties and/or sites of religious and cultural significance within the APE, streamline the assessment and resolution of Adverse Effects through avoidance, minimization, and programmatic treatment approaches for mitigation, establish reporting frequency and schedule, provide provisions for post-review unexpected discoveries and unmarked burials, and incorporate the procedures for amendments, duration, termination, dispute resolution, and implementation. LA SHPO and five tribal nations with a stated interest in the Parish were notified of the proposed PA. To date, LA SHPO has indicated a willingness to work on its development with USACE.

SECTION 5
Greenhouse Gas emissions

5.1 GREENHOUSE GAS EMISSIONS ANALYSIS

On January 9, 2023, the Council on Environmental Quality updated National Environmental Policy Act (NEPA) Guidance on Consideration of Greenhouse Gas (GHG) Emissions and Climate Change, directing Federal agencies to incorporate GHG and climate change considerations into the NEPA process, including assessing emissions and reducing impacts or incorporating climate resiliency considerations into alternatives. The guidance includes a "rule of reason" prescribing the depth of GHG analysis should be commensurate with the amount of GHG emissions. The components that are analyzed within GHG are Carbon dioxide (CO_2), Methane (CH_4), and Nitrous Oxide (N_20). Primary sources of CO_2 can be natural sources like decomposition of organic material and anthropogenic sources like burning of fossil fuel (DOE, 2023). For CH4, emissions can come from a variety anthropogenic process including flora and fauna sources (Crutzen, 1986). For N_20, the majority of the point source revolves around agricultural processes: fertilization (UCANR, 2023). For GHG, CO_2 is the primary contributor to GHG and climate change, followed by CH_4 and N_20.

Within this evaluation, five plans for the Tangipahoa Parish, Louisiana were considered for GHG emissions. Plan 1: No action, Plan 2: NED, Plan 3a, Plan 3b, and Plan 3c. The GHG emissions were calculated using the type, quantity, horsepower, total hours, and associated emission factors of the equipment. The social cost of greenhouse gas emissions (SC-GHG) were calculated for each project alternative by summing the individual emissions from the major greenhouse gas pollutants CO_2, CH_4, and N_2O, and then multiplying by the social cost of each pollutant for the year in which they were generated using the tables from the Interagency Working Group on Social Cost of Greenhouse Gases (IWGSC) report as established by Executive Order 13990 to provide interim updated social costs values, with a 3% discount rate (IWG, 2021)

Plan 0: No Action
If the proposed plans are not constructed, there would be indirect emissions from the no action plan. The emissions would be from the flood events within the project area and repair to the structures impacted: 0.1 AEP with 675 structures, 0.04 AEP with 347 structures, and 0.02 AEP with 315 structures. For computing GHG emissions for the No Action, evacuation of residents and business owners and repair of impacted areas were evaluated based on average frequency of occurrence during the period of analysis (50 years). Recurring costs of evacuations and repair for the 0.1, 0.04, and 0.02 AEP events were estimated to occur 5, 2, and 1 time during the period of analysis. The actual frequency of occurrence could vary from these estimates. However, evaluating this the same across plans allows us to compare relative differences in estimates of GHG emissions across plans.

Plan 1 (Nonstructural NED Plan):
There would be direct and indirect emissions from the Plan 1: Nonstructural Plan. The different components for Plan 1were evaluated along with the residual structures at 0.1, 0.04, and 0.02 AEP events not captured in Plan 2. Nonstructural measures (elevations and

floodproofing) for 597 structures are proposed under this plan. Assessment of emissions from the remaining floodprone structures not captured in the plan at 0.1, 0.04, and 0.02 AEP followed the methodology from the No Action (evacuation and repair).

Plan 3a:
There would be direct and indirect emissions from the Plan 3a: Nonstructural Plan. The different components for Plan 3a were evaluated along with the residual structures at 0.1, 0.04, and 0.02 AEP events not captured in Plan 3a. Nonstructural measures (elevations and floodproofing) for 675 structures are proposed under this plan. Assessment of emissions from the remaining floodprone structures not captured in the plan at 0.1, 0.04, and 0.02 AEP followed the methodology from the No Action (evacuation and repair).

Plan 3b:
There would be direct and indirect emissions from Plan 3b: Nonstructural Plan. The different components for Plan 3b were evaluated along with the residual structures at 0.1, 0.04, and 0.02 AEP events not captured in Plan 3b. Nonstructural measures (elevations and floodproofing) for 1,088 structures are proposed under this plan. Assessment of emissions from the remaining floodprone structures not captured in the plan at 0.1, 0.04, and 0.02 AEP followed the methodology from the No Action (evacuation and repair).

Plan 3c:

There would be direct and indirect emissions from Plan 3c: Nonstructural Plan. The different components for Plan 3c were evaluated along with the residual structures at 0.1, 0.04, and 0.02 AEP events not captured in Plan 3c. Nonstructural measures (elevations and floodproofing) for 1,234 structures are proposed under this plan. Assessment of emissions from the remaining floodprone structures not captured in the plan at 0.1, 0.04, and 0.02 AEP followed the methodology from the No Action (evacuation and repair).

Comparison of the No Action Plan, Plan 1, Plan 3a, Plan 3b, and Plan 3c were compared in Table D: 5-1. The No Action plan is estimated to produce the lowest total greenhouse gas emissions over the period of analysis. Estimated emissions produced by the respective plans increases proportionally with the number of structures included in each plan.

Table D: 5-1. Total GHG Emissions by Project Alternative (metric tons).

Emission	CO_2	CH_4	N_2O	CO_2e
Plan 0: No Action	530.53	0.05	0.88	794.16
Plan 1: NED	442.72	0.04	2.83	1,286.96
Plan 3a:	451.37	0.05	3.10	1,377.49
Plan 3b:	471.81	0.05	3.64	1,557.72
Plan 3c:	804.15	0.08	4.63	2,186.39

Table D: 5-2 depicts the potential social costs that the five plans could have due to GHG emissions. The No Action plan is estimated to produce the lowest total social costs of greenhouse gases over the period of analysis. Estimated total social costs of greenhouse gases by the respective plans increases proportionally with the number of structures included in each plan. The total social costs of gases produced during construction from the proposed alternative (3b) and the NED plan is $103,419 and $39,515.

Table D: 5-2. Total Social Costs of Greenhouse Gases by Alternative (2026 Dollars).

Emission	CO_2	CH_4	N_2O	Total
Plan 0: No Action	30,240.03	90.49	18,489.49	48,820.01
Plan 1: NED	25,234.96	79.77	59,415.21	84,729.94
Plan 3a:	25,728.10	81.75	65,183.68	90,993.53
Plan 3b:	26,893.04	86.45	76,439.53	103,419.02
Plan 3c:	45,836.33	143.09	97,266.37	143,245.79

SECTION 6
Public Involvement and Coordination

6.1 PUBLIC INVOLVEMENT

Pre-scoping open houses were conducted for the Tangipahoa Parish feasibility study on February 15 and 16, 2023 to inform and engage residents about flood related hazards and issues in the Parish. The meetings were held in Hammond and Kentwood in an attempt to reduce overall travel distance for potential participants in the meetings. Sixteen people from the Parish attended the Hammond meeting and 7 people attended the Kentwood meeting.

Attendees shared their experiences and concerns related to flood hazards within the Parish after listening to an overview on the study purpose. Large maps of the Parish were brought to each meeting for participants to write down comments and concerns and attach them to a location or region in the Parish. In total, 56 comments/concerns were received. Some comments contained multiple concerns or comments. The participant generated comments and questions fell into several overarching categories (provided in table D: 6-1). The most frequently documented categories included: identification of specific flood hazard areas in the Parish, followed by drainage maintenance requests or concerns, and impacts of development on flooding. The number of comments per category can be found in the table below:

Table D: 6-1. Feedback and Question Categories from Tangipahoa Attendees at EJ/Public Meetings February 2023.

Category	Occurrences
Drainage Maintenance Request or Concerns	13
Flood Hazard Area Identified	30
Flood Map Updates/Insurance	2
Impact of Development	9
Impacts from Adjacent Studies	0
Dissatisfaction with Governing Bodies	3
Snagging and Clearing	5
Infrastructure Damage	6
Erosion	5
Flood hazard monitoring	2

The comments above were then used by the PDT to refine the comprehensive list of measures that could be utilized to develop alternatives that would address flood hazards in the Parish (See Appendix E Plan Formulation for a complete list of measures developed for consideration during the study).

A second set of meetings were held in September of 2023 to gain additional feedback and input from Parish residents. Those meetings were held as Environmental Justice/Public meetings and were discussed in section 2 of this appendix.

6.2 AGENCY COORDINATION

6.2.1 Draft Coordination Act Report

USFWS provided a draft letter report with analysis of potential impacts on fish and wildlife resources and recommendations to minimize impacts if the proposed plan is approved and implemented. Recommendations from the CAR have been incorporated into the draft report for public review. The draft letter report will be provided to Louisiana Department of Wildlife and Fisheries for review and comment. Their recommendations will be incorporated into the final coordination act report and incorporated into the final EA. Coordination will continue with federal and state agencies through feasibility level design and development of a final EA. If the project is approved, coordination would continue through pre-construction engineering design (PED) to ensure that any staging/work areas designed, constructed, and utilized would avoid or minimize impacts associated with fish and wildlife resources. Should staging areas impact fish and wildlife resources, those impacts would be fully mitigated. ESA section 7 consultation would be completed prior to the signing of the FONSI.

Draft Fish and Wildlife Coordination Act

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Louisiana Ecological Services
200 Dulles Drive
Lafayette, Louisiana 70506

August 1, 2024

Colonel Andy Pannier
District Commander
U.S. Army Corps of Engineers
1222 Spruce Street
St. Louis, MO 63103-2833

Dear Colonel Pannier:

The U.S. Army Corps of Engineers (USACE), St, Louis District, is preparing a Draft Integrated Feasibility Report and Environmental Assessment (EA) for the Tangipahoa Parish, Louisiana Feasibility Study (FS). The non-federal sponsor (NFS) for the Study is the Coastal Protection and Restoration Authority (CPRA) of Louisiana. The objectives of this Study are to evaluate the feasibility of reducing the severity of flood damages caused by heavy rainfall, riverine flooding, and tropical storms and hurricanes for communities located within Tangipahoa Parish, Louisiana.

This study is authorized by Subtitle B, Section 201 (14) of the Water Resources Development Act of 2020. The study is authorized in accordance with the annual reports submitted to the Congress in 2019, pursuant to Section 7001 of the Water Resources Reform and Development Act of 2014 (33 U.S.C. 2282d). The study was funded by the Disaster Relief Supplemental Appropriations Act (DRSAA) of 2022, (P.L. 117-43), Division B, Subdivision 1, Title IV, as a high-priority study of projects in States with a major disaster declared due to Hurricane Ida pursuant to the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C 5121 et seq). The study was authorized for inclusion as a DRSAA study in April 2022.

This draft letter report contains an analysis of the impacts on fish and wildlife resources that would result from project implementation and provides recommendations to minimize those impacts. This draft letter report has been prepared by the U.S. Fish and Wildlife Service (Service) under the authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) and does not constitute the final report of the Secretary of the Interior as required by section 2b of that act. The Service also provides comments within this report under the following authorities: the National Environmental Policy Act of 1969, as amended, the Endangered Species Act of 1973 (ESA, 87 Stat. 884, as amended; 16 U.S.C. 661 et seq.), the Migratory Bird Treaty Act (MBTA, 40 Stat. 755, as amended; 16 U.S.C. 703 et seq.), and the Bald and Golden Eagle Protection Act (BGEPA, 54 Stat. 250, as amended, 16 U.S.C. 668a-d). A copy of this report will be provided to the Louisiana Department of Wildlife and Fisheries for review, and their comments will be included in our final report.

STUDY AREA

The study and project areas are Tangipahoa Parish, Louisiana. This parish is located in southeast Louisiana and is bordered by Lake Pontchartrain to the south, the state of Mississippi to the north and four parishes (Washington, St. Tammany, East Feliciana, and Livingston) to the east and west.

Tangipahoa Parish is located within the Lake Pontchartrain basin. The primary drainage sub-basins within this portion of the Lake Pontchartrain basin are the Tangipahoa, Natalbany, and Manchac Pass, with Tangipahoa draining most of the parish from north to south. These drainage basins drain directly into Lake Pontchartrain. The largest city within the study area is Hammond with a population of approximately 22,000.

Tangipahoa is one of the top horticultural crop-producing parishes in Louisiana, with approximately 1,000 acres of commercial nursery crop, vegetable, and fruit production. Livestock, poultry, and associated products comprise over 50 percent of the value of all farm products sold. Fruits, vegetables, and horticultural and forest products are next in order of value followed by miscellaneous field crops, such as corn, sorghums, hay, cotton, and legumes. Strawberries are the major fruit crop. Nearly all of the strawberries grown in Louisiana are produced in this basin. Pine forests in the basin provide a large source of pulpwood and saw timber.

FISH AND WILDLIFE RESOURCES

Tangipahoa Parish is located within the East Gulf Coastal Plain (EGCP) and Mississippi River Alluvial Plain ecoregions. This EGCP supports a variety of natural habitats including Eastern longleaf pine flatwoods savanna, Eastern upland longleaf pine woodland, mixed hardwood-loblolly pine/hardwood slope forest, shortleaf pine/oak-hickory woodland, bottomland hardwood forest, small stream forest, slash pine-pond cypress/hardwood woodland, live oak-pine-magnolia forest, bayhead swamp/forested seep cypress-tupelo-black gum swamp, spruce pine-hardwood flatwood, batture, coastal live oak-hackberry forest, Southern mesophytic hardwood forest, canebrake, EGCP flatwoods pond, xeric sandhill woodland, and Eastern hillside seepage bog. The Mississippi River Alluvial Plain is known primarily for bottomland hardwood forests as well as associated cypress-tupelo-black gum swamps (Holcomb et al. 2015).

The Tangipahoa River originates in the high Pleistocene Terrace where the terrain is steep to gently rolling, streambanks are steep, and floodplains narrow. As the river flow south through the Prairie Terrace, the terrain becomes relatively flat. Near the mouth of the river, the floodplain widens as the river flows through alluvial deposits from the Mississippi River. As the slope of the river gradually diminishes it becomes tidally influenced.

Federal trust species such as wading birds, waterfowl, and neotropical migrants all utilize the project area. Many of those species (i.e., little blue heron [*Egretta caerulea*], wood thrush [*Hylocichla mustelina*], prothonotary warbler [*Protonotaria citrea*], worm-eating warbler [*Helmitheros vermivorum*], Louisiana waterthrush [*Parkesia motacilla*], and painted bunting [*Passerina ciris*]) have exhibited substantial population declines over the last 30 years, primarily as the result of habitat loss and fragmentation.

The southern portion of the study area contains a narrow band of fresh to brackish marsh along the north shore of Lake Pontchartrain. Fresh marsh is characterized by a salinity range of less than 0.5

parts per thousand. Vegetation commonly found in fresh marsh includes bulltongue (*Sagittaria lancifolia*), sawgrass (*Cladium mariscus*), maiden cane (*Panicum hemitomon*), cattail (*Typha latifolia*), smartweed (*Polygonum punctatum*), alligator weed (*Alternanthera philoxeroides*), and spikerush (*Eleocharis* spp.). Intermediate marsh is characterized by a salinity range of 0.5 to 5.0 parts per thousand. Common species found in intermediate marsh include saltmeadow cordgrass (*Spartina patens*), bull tongue, southern bulrush (*Scirpus californicus*), and common reed (*Phragmites australis*). Brackish marsh is characterized by a salinity range of 5.0 to 18.0 parts per thousand. Vegetation common to this marsh type includes saltmeadow cordgrass, Olney's bulrush (*Scirpus americanus*), saltgrass (*Distichlis spicata*), saltmarsh cordgrass (*Spartina alterniflora*), and black rush (*Juncus roemerianus*).

Forested wetlands, mainly swamps, occur on the Mississippi River alluvial deposits bordering Lake Pontchartrain and Lake Maurepas. Within the study area, wooded swamps also occur within the lower areas adjacent to bayous and rivers. Bald cypress (*Taxodium distichum*) and water tupelo (*Nyssa aquatica*) are the dominant tree species in the swamps.

As the frequency of flooding decreases away from Lakes Pontchartrain and Maurepas, bottomland hardwoods become the predominant cover type. Bottomland hardwoods are intermittently flooded wooded areas; this cover type is also commonly found along the bayous and rivers in the study area. Predominant tree species present in bottomland hardwood forests include water oak (*Quercus nigra*), overcup oak (*Quercus lyrate*), Nuttall oak (*Quercus texana*), swamp chestnut oak (Quercus michauxii), sugarberry (*Celtis laevigata*), sycamore (*Platanus occidentalis*), red maple (*Acer rubrum* var. *drummondii*), green ash (*Fraxinus pennsylvanica*), bitter pecan (*Carya aquatica*), and sweetgum (*Liquidambar styraciflua*).

Riparian is a term used to describe an area immediately adjacent to a stream, bayou, river, or lake. Wooded swamp and bottomland hardwood cover types may both be found in the riparian zone. Riparian habitat is usually defined and evaluated as a separate cover type because of its specific values to fish and wildlife.

The upper portion of the study area once supported predominately longleaf and slash pine (*Pinus elliottii*). These forests were cleared during the late 1800s and early 1900s. Partially because of poor sandy soils, these forests did not readily regenerate and supported only wiregrass (*Aristida stricta*), sedges (Cyperaceae), gallberry (*Ilex glabra*), and wax myrtle (*Myrica cerifera*). Today, commercial forestry interests have replanted much of the area to loblolly (*Pinus taeda*) and slash pine. Longleaf pine has regenerated on the better soils. Mixed pine/hardwoods and bottomland hardwoods are present in the river and stream bottoms. In addition to pine and pine/hardwood communities, pine flatwoods are found in the study area. The pine flatwoods are wetlands with acidic and often nutrient-poor soils and a high-water table. Vegetation present in these areas include longleaf, slash, loblolly, spruce pine (*Pinus glabra*), water oak, sweetbay (*Magnolia virginiana*), red maple, sweetgum, and black gum (*Nyssa sylvatica*).

Pine savannahs are also found within the study area. Historically, pine savannahs burned regularly, maintaining a grassland state with scattered longleaf pine and thick herbaceous ground cover. Plant species diversity in pine savannahs is extremely high and many of the species in flatwoods are endemic to that community. When the frequency of fire is reduced, slash pine, sweetbay, black gum, live oak (*Quercus virginiana*), blackjack oak (*Quercus marilandica*) and wax myrtle (*Myrica cerifera*) will invade pine savannahs. The great diversity of herbaceous vegetation found in these

areas includes bluestems (*Andropogon* spp.), panic grasses (*Panicum* spp.), toothache grass (Ctenium aromaticum), plume grasses (*Saccharum* spp.), beak-rushes (*Rhynchospora* spp.), pitcher plants (*Nepenthes* spp.), sundews (*Drosera* spp.), and a number of orchid species (Family: Orchidaceae).

The fresh and low-salinity waters of the study area, including area streams and rivers, support many commercially and recreationally important fishes and shellfishes. Freshwater sport fishes include largemouth bass (*Micropterus salmoides*), black crappie (*Pomoxis nigromaculatus*), white crappie (*Pomoxis annularis*), bluegill (*Lepomis macrochirus*), redear sunfish (*Lepomis microlophus*), warmouth (*Lepomis gulosus*), channel catfish (*Ictalurus punctatus*) and blue catfish (*Ictalurus furcatus*). Blue catfish, channel catfish, yellow bullhead (*Ameiurus natalis*), freshwater drum (*Aplodinotus grunniens*), bowfin (*Amia calva*), common carp (*Cyprinus carpio*), buffaloes (*Ictiobus* spp.), and gars (*Lepisosteidae* spp.) are the primary freshwater fishes of commercial importance.

The low-to-moderate salinity waters and marshes of the study area also provide habitat for many estuarine-dependent fishes and shellfishes. Some species are permanent residents while others are present only during early life stages. The latter species utilize the highly productive, low-to-moderate salinity portions of the study area as nursery habitat, moving to more saline waters as they mature. These include southern flounder (*Paralichthys lethostigma*), sand seatrout (*Cynoscion arenarius*), Atlantic croaker (*Micropogon undulatus*), black drum (*Pogonias cromis*), red drum (*Sciaenops ocellata*), striped mullet (*Mugil cephalus*), Gulf menhaden (*Brevoortia patronus*), blue crab (*Callinectes sapidus*) and white shrimp (Litopenaeus setiferus). Decaying plant material (detritus) is carried by surface runoff and tidal action from the study area wetlands into the adjacent estuarine waters, thereby substantially contributing to the detritus-based food web that supports a high level of estuarine-dependent finfish and shellfish productivity.

The study area marshes provide habitat for a number of wildlife species. Migratory waterfowl including mallard (*Anas platyrhynchos*), gadwall (*Mareca strepera*), American widgeon (*Mareca americana*), green-winged teal (*Anas carolinensis*), Northern shoveler (*Spatula clypeata*), Northern pintail (*Anas acuta*), mottled duck (*Anas fulvigula*) and lesser scaup (*Aythya affinis*) utilize the study area. Wading birds expected to occur in the marshes of the study area include great egret (*Ardea alba*), great blue heron (*Ardea herodias*), Louisiana heron (*Egretta tricolor*), green heron (*Butorides virescens*), and white ibis (*Eudocimus albus*). Pied-billed grebe (*Podilymbus podiceps*), black-necked stilt (*Himantopus mexicanus*), and common snipe (*Gallinago gallinago*) are also present. Mammals expected to occur in the marshes of the study area include white-tailed deer (*Odocoileus virginianus*), swamp rabbit (*Sylvaligus aquaticus*), muskrat (*Ondatra zibethicus rivalicius*), nutria (*Myocaster coypus*), raccoon (*Procyon lotor*), river otter (*Lutra canadensis*), mink (*Mustela vison*) and opossum (*Didelphis virginiana*).

The fresh to brackish marshes which border Lake Pontchartrain also provide floodwater storage. In addition, these marshes help to filter water through sediment trapping, and nutrient and pollutant removal. Water quality deterioration in the Lake Pontchartrain Basin is also at least partially blamed on the loss of that basin's wetlands and their associated waste-assimilation capacity.

Riparian and forested portions of the study area provide valuable foraging and breeding habitat to a variety of migratory birds such as warblers, wrens, woodpeckers, vireos, summer tanagers, and kinglets. Wood ducks breed in riparian zones and adjacent bottomland hardwood forests and cypress swamps then utilize the vegetated portions of the channels and flooded swamps for brood-

rearing habitat. Raptors such as red-shouldered hawks (*Buteo lineatus*), Mississippi kites (*Ictinia mississippiensis*), barred owls (*Strix varia*), Eastern screech owls (*Megascops asio*), and great horned owls (*Bubo virginianus*) nest and forage in forested tracts within the study area. Eastern cottontail (Sylvilagus floridanus), swamp rabbit, grey squirrel (*Sciurus carolinensis*), fox squirrel (Sciurus niger), white-tailed deer, raccoon, opossum, and mink are common to abundant in riparian and forested cover types.

Forested wetlands of the study area also provide floodwater storage and perform important water quality functions such as reduction of excessive dissolved nutrient levels and other pollutants, and removal of suspended sediments. Riparian zones are particularly valuable as travel corridors and other habitats for wildlife, and also contribute to fishery resources through detrital input, water shading, and as a source of limbs and other debris that provide instream cover.

Mixed pine/hardwood habitats provide moderate to high value habitat for game species such as white-tailed deer, squirrels, Eastern turkey (Meleagris gallopavo), Eastern cottontail, mourning dove (*Zenaida macroura*), bobwhite (Colinus virginianus), and American woodcock (*Scolopax minor*). They also provide habitat for a number of songbirds and raptors.

THREATENED AND ENDANGERED SPECIES

Within the study area, four threatened or endangered species are known to occur (Table 1). Information regarding those species and their preferred habitats are provided below.

Table 1. List of threatened and endangered species known to occur within the project area.

Species	Species Group	Status
West Indian manatee	Mammal	Threatened
Gulf Sturgeon	Fish	Threatened
Gopher Tortoise	Reptile	Threatened
Pearl River Map Turtle	Reptile	Threatened
Red-cockaded Woodpecker	Bird	Endangered

West Indian Manatee

The threatened West Indian manatee (*Trichechus manatus*) is known to regularly occur in Lakes Pontchartrain and Maurepas and their associated coastal waters and streams. It also can be found less regularly in other Louisiana coastal areas, most likely while the average water temperature is warm. Based on data maintained by the Louisiana Wildlife Diversity Program, approximately 84 percent of reported manatee sightings (1990-2019) in Louisiana have occurred from the months of June through December. Manatee occurrences in Louisiana are increasing, and they have been regularly reported in the Amite, Blind, Tchefuncte, and Tickfaw rivers and in canals and bayous within the adjacent coastal marshes of southeastern Louisiana including Bayou Lafourche. Manatees may also infrequently be observed in the Mississippi River and coastal areas of southwestern Louisiana. Threats to this species include collisions with boats and barges, entrapment in flood control structures, poaching, habitat loss, and pollution. Cold weather and outbreaks of red tide may also adversely affect these animals.

Gulf Sturgeon

The Gulf sturgeon (*Acipenser oxyrhynchus desotoi*), federally listed as a threatened species, is an anadromous fish that occurs in many rivers, streams, and estuarine and marine waters along the northern Gulf coast between the Mississippi River and the Suwannee River, Florida. In Louisiana, Gulf sturgeon have been reported at Rigolets Pass, rivers and lakes of the Lake Pontchartrain Basin, the Pearl River System, the Amite River, and adjacent estuarine and marine areas. Spawning occurs in coastal rivers between late winter and early spring (i.e., March to May). Adults and sub-adults may be found in those rivers and streams until November, and in estuarine or marine waters during the remainder of the year. Gulf sturgeon less than two years old appear to remain in riverine habitats and estuarine areas throughout the year, rather than migrate to marine waters. Habitat alterations such as those caused by water control structures and navigation projects that limit and prevent spawning, poor water quality, and over-fishing have negatively affected this species.

Gopher Tortoise

In Louisiana, the threatened, gopher tortoise (*Gopherus polyphemus*) occurs in Washington, Tangipahoa, and St Tammany Parishes. The gopher tortoise is the only native tortoise found in the southeastern United States. This species is associated with areas that have well-drained, sandy soils appropriate for burrow establishment, ample sunlight for nesting, and understory vegetation suitable for foraging (i.e., grasses and forbs). The burrow opening is semicircular or "half-moon" in shape and a low mound of bare soil will be immediately in front of the mouth of an active burrow. Suitable soil types for gopher tortoises include Latonia and Bassfield (highly suitable), Cahaba, Ruston, and Smithdale (less suitable), and Abita, Malbis, Angie, and Prentiss (marginal).

Gopher tortoises prefer "open" longleaf pine-scrub oak communities that are thinned and burned every few years. Habitat degradation (lack of thinning or burning on pine plantations), predation, and conversion to agriculture or urbanization have contributed to the decline of this species. That habitat decline has concentrated many remaining gopher tortoise populations along pipeline and power line rights-of-way (ROW) within their range. Tortoise burrows also can be found along road ROW's, and other marginal habitats, including fence rows, orchard edges, golf course roughs and edges, old fields, and pasturelands. Tortoises are often pushed into these areas due to adjacent habitat becoming unsuitable.

Pearl River Map Turtle

The threatened Pearl River map turtle (*Graptemys pearlensis*) is a freshwater turtle with a pronounced keel with knobs, and an olive brown carapace with a diagnostic continuous black stripe on the mid-line. The usual size of this species ranges from 2.5 to 4.2 inches in males, and 7.3 to 9.3 inches in females. This species was previously classified with the Pascagoula Map Turtle (*G. gibbonsi*) but was determined to be a distinct species in 2010. They can be differentiated by the continuous black stripe on the dorsal mid-line of *G. pearlensis* versus the discontinuous black stripe of *G. gibbonsi*.

This map turtle occurs in small to medium sized permanent streams with a sand and mud substrate. It also occurs in large to medium-sized rivers, especially those with an abundance of mollusks, sandy banks, sandbars, deep pools, and logs or other suitable basking sites. It may venture into shallow water or onto sandy beaches at night, but usually clings to submerged objects just below the surface of the water. Nests are in sandy banks or sand bars. Adult females depend largely on mollusks, especially clams and snails, while males and juveniles feed mostly on insects and other arthropods.

This species is highly vulnerable to the negative effects of water pollution and sedimentation on its freshwater mollusk prey. In the Columbia reach of the Pearl River drainage, downstream of the Monticello pulp mill, *G. pearlensis* has declined relative to that of the Ringed Map Turtle (*G. oculifera*) over the past seventeen years, perhaps because of a decline in the mussel population associated with diminished water quality. Exploitation for the pet trade, particularly in the Lower Pearl River drainage in Louisiana, may also be a significant threat. Raccoons and crows also predate the nests of this species.

Red-cockaded Woodpecker

The proposed project would be located in a parish known to be inhabited by the endangered red-cockaded woodpecker (RCW, *Picoides borealis*). RCWs roost and forage year-round and nest seasonally (i.e., April through July) in open, park-like stands of mature pine trees containing little hardwood component, a sparse midstory, and a well-developed herbaceous understory. RCWs can tolerate small numbers of overstory and midstory hardwoods at low densities found naturally in many southern pine forests, but they are not tolerant of dense midstories resulting from fire suppression or from overstocking of pine. Trees selected for cavity excavation are generally at least 60 years old, although the average stand age can be younger. The collection of one or more cavity trees plus a surrounding 200-foot-wide buffer of continuous forest is known as a RCW cluster. RCW foraging habitat is located within one-half mile of the cluster and is comprised of pine and pine-hardwood stands (i.e., 50 percent or more of the dominant trees are pines) that are at least 30 years of age and have a moderately low average basal area (i.e., 40 – 80 square feet per acre is preferred).

At-Risk Species

The Service's Southeast Region has defined "at-risk species" as those that are: 1) proposed for listing under the Endangered Species Act (ESA) by the Service; 2) candidates for listing under the ESA, which means the species has a "warranted but precluded 12-month finding"; or 3) petitioned for listing under the ESA, which means a citizen or group has requested that the Service add them to the list of protected species. Petitioned species include those for which the Service has made a substantial 90-day finding as well as those that are under review for a 90-day finding. As the Service develops proactive conservation strategies with partners for at-risk species, the states' Species of Greatest Conservation Need (defined as species with low or declining populations) will also be considered.

The Service's goal is to work with private and public entities on proactive conservation to conserve these species, thereby precluding the need to federally list as many at-risk species as possible. While not all species identified as at-risk will become ESA listed species, their potentially reduced populations warrant their identification and attention in project planning. Listed below are species currently designated as "at-risk" that may occur within the proposed study area.

Table 2. List of at-risk species known to occur within the project area.

Species	Species Group
Southern Snaketail	Insect
Tricolored Bat	Mammal
Alabama Hickorynut	Mussel
Alligator Snapping Turtle	Reptile
Eastern Diamondback	Reptile

Southern Snaketail

The Southern snaketail is a dragonfly (order Odonata) with a green thorax which bears two lateral black stripes. Its head has segments of yellow, white, brown, and green. The abdomen is brown with yellow and white markings. Total length is 43.5-46.0 mm, depending on sex. The compound eyes in males are blue above and gray below. Adults are characterized by the most extensive dark markings of the subgenus Ophionurus and may be easily distinguished from most of its related species by the brown band along the interpleural interface on the thorax. It may be a subspecies of *O. incurvatus*. *O. australis* has been considered among the rarest of the Odonata.

The Southern snaketail typically inhabits medium-sized freshwater streams with gravel substrate. For example, the type locality (Tangipahoa River) averaged less than 10 m wide with a few pools reaching a depth of 2 m. The substrate was primarily a mixture of sand and pea-gravel eroded from local deposits. Good water quality and a stable stream flow is required. Threats may include gravel mining, siltation, pesticides, flood scour, clear cutting/deforestation, perturbation of stream flow, and a naturally occurring limited range of the species.

Alabama Hickorynut

The Alabama hickorynut (*Obovaria unicolor*) is a 1.2- to 2-inch-long freshwater mussel with round or elliptical shape. The outer shell (periostracum) is smooth and brown to yellow brown, with rays. This species is a long term brooder that is gravid from June through August of the following year. Like other freshwater mussels, the Alabama hickorynut releases its larvae (glochidia) into the water column, where they parasitize a fish (glochidial host) to transform into a juvenile mussel. Once the glochidia are ready, they release from the host to find a suitable substrate. Suitable glochidial host fishes for this species include the naked sand darter (*Ammocrypta beani*), southern sand darter (*Ammocrypta meridiana*), Johnny darter (*Etheostoma nigrum*), Gulf darter (*Etheostoma swaini*), blackbanded darter (*Percina nigrofasciata*), dusky darter (*Percina sciera*), and redspot darter (*Etheostoma artesiae*). These are small fish that live along the bottoms of clear streams.

The Alabama hickorynut inhabits sand and gravel substrates in moderate currents in large streams. However, the presence of moderate gradient pool and riffle habitats in a variety of stream and river sizes may contain this species. In Louisiana, the Alabama hickorynut is known to occur in the Tangipahoa watershed. Habitat modification and destruction due to siltation and impoundment threaten this species. It is also negatively affected by the pollution of streams and rivers.

Eastern Diamondback Rattlesnake

The eastern diamondback rattlesnake (*Crotalus adamanteus*) is recognized by it large size, dorsal pattern of diamonds, yellowish unpatterned belly, black tail, and rattle at the tip of the tail. The

dorsal pattern has 18-20 diamonds aligned apex to apex down the midline of the back. They reach sexual maturity at 2-6 years and have a gestation period of approximately one year. Females reproduce at 2-to-4-year intervals and may live for 10 years, with a few snakes living 15-20 years.

Eastern diamondback historically occupied a very similar range to long leaf pine forests. This species prefers open canopy long-leaf pine savannahs with herbaceous ground cover. This snake may occur where remnants of its native habitat remain, or where open canopy forests with interspersed grassland support vegetation similar to that which is found in mature open canopy long-leaf pine forest. This species requires large tracts of habitat, and home ranges average 116 and 208 acres, for females and males, respectively.

Threats to this species include killing by humans out of fear, intentional hunting, vehicle strikes, and conversion of suitable habitat to other land uses. Another issue faced by the snake is a lack of any legal protections, except in North Carolina where it is a state endangered species, and Alabama where it is illegal to sell or possess this species without a permit.

Proposed Species

Tricolored Bat

The tricolored bat (*Perimyotis subflavus*), also known as the eastern pipistrelle, is a small bat weighing 4-8 g with a head to tail length ranging from 77-89 mm and wingspan of 220-225 mm. The bat gets its name from their individual hairs being 'tri-colored': brown at tip, yellow in the middle, dark at the base. Overall, the fur appears yellow brown, with reddish forearm skin. This small bat flies slowly with an erratic pattern while foraging, causing it to sometimes be mistaken for a moth.

Tricolored bats appear to inhabit landscapes that are partly open, with large trees and plentiful woodland edges. They are found in a variety of terrestrial habitats, including grasslands, old fields, suburban areas, orchards, urban areas, and woodlands, especially hardwood woodlands. Little is known about daytime summer or maternity roosts. These bats are among the first bats to emerge at dusk each night, and their appearance at tree-top level indicates that they may roost in foliage or in high tree cavities and crevices. They are not often found in buildings or in deep woods, seeming to prefer edge habitats near areas of mixed agricultural use. Hibernation sites are found deep within caves or mines in areas of relatively warm, stable temperatures. However, research is ongoing determining small bat hibernation habitats other than caves and mines.

The main threat to this species is White Nose Syndrome (Pseudogymnoascus destructans), with affected hibernation sites resulting in more than 75 percent decline of bats, with some sites declining by 90 percent. Other threats include habitat modification and destruction including forest and grassland conversion to urban/suburban land use, and mortality during migration from winter hibernaculum to summer roosting habitat due to wind energy development. On September 13, 2022, the Service announced a proposal to list the tricolored bat as endangered under the ESA.

Alligator Snapping Turtle

The alligator snapping turtle (*Macrochelys temminckii*) may be found in large rivers, canals, lakes, oxbows, and swamps adjacent to large rivers. It is most common in freshwater lakes and bayous, but also found in coastal marshes and sometimes in brackish waters near river mouths. Typical habitat is mud-bottomed waterbodies having some aquatic vegetation. The alligator snapping turtle

is slow growing and long lived. Sexual maturity is reached at 11 to 13 years of age (Ernst et al. 1994). Because of this and its low fecundity, loss of breeding females is thought to be the primary threat to the species.

MIGRATORY BIRDS AND BALD AND GOLDEN EAGLE PROTECTION ACT

Bald Eagle

The proposed project area may provide nesting habitat for the bald eagle (*Haliaeetus leucocephalus*), which was officially removed from the List of Endangered and Threatened Species as of August 8, 2007. However, the bald eagle remains protected under the MBTA and BGEPA.

Bald eagles typically nest in large trees located near coastlines, rivers, or lakes that support adequate foraging from October through mid-May. In southeastern Louisiana parishes, eagles typically nest in mature trees (e.g., baldcypress, sycamore, willow, etc.) near fresh to intermediate marshes or open water. Major threats to this species include habitat alteration, human disturbance, and environmental contaminants. Furthermore, bald eagles are vulnerable to disturbance during courtship, nest building, egg laying, incubation, and brooding. Disturbance during these periods may lead to nest abandonment, cracked and chilled eggs, and exposure of small young to the elements. Human activity near a nest late in the nesting cycle may also cause flightless birds to jump from the nest tree, thus reducing their chance of survival.

During project construction, on-site personnel should be informed of the possible presence of nesting bald eagles near the project boundary, and should identify, avoid, and immediately report any such nests to this office. If an active or inactive eagle nest is discovered within 2 miles of the project footprint, the applicant should follow the bald and golden eagle guidelines to determine whether disturbance will occur and/or an incidental take permit is needed.

DESCRIPTION OF TENTATIVELY SELECTED PLAN

Initially, a total of 59 site-specific management measures were identified and compiled from previous reports, NFS, stakeholders, the public, and recommendations from the Project Delivery Team (PDT). These measures were based on the inventory of resources, and forecasting of significant resources that are relevant to the problems and opportunities under consideration. The measures were evaluated by the PDT using a screening process based on the planning objectives, existing data, professional judgment, avoiding constraints, and addressing the opportunities and problems within the study area.

After screening 16 measures, the PDT developed the Initial Array of 16 Alternatives with 43 site-specific management measures. The Initial Array of 16 Alternatives were developed by grouping measures based on hydrologic sub-basins for different areas into alternatives. The PDT then evaluated, screened, and compared measures within the geographic alternatives, including the No Action Alternative. Further screening by the PDT during the planning process led to the development of the Focused Array of 11 Alternatives with 29 measures. Structural alternatives were screened, and the PDT identified the Final Array of Alternatives. After the evaluation of the Final Array, the justified measures within the alternatives were combined into comprehensive parish-wide alternatives that reduce flood risk to multiple subbasins within the study area.

The Final Array of Alternatives include:

No Action Alternative

Plan 1: Plan 1 is the nonstructural NED Plan. Plan 1 would include the elevation of 539 residential structures and flood-proofing of 58 nonresidential structures.

Plan 3a: Plan 3a includes the same structures as the NED Plan but was incrementally expanded for socially vulnerable communities to be inclusive of similar flood characteristics and not be reliant upon the home's value. Plan 3a would include the elevation of 616 residential structures and flood-proofing of 59 nonresidential structures.

Plans 3b: Plan 3b is the total benefits plan and the Tentatively Selected Plan (TSP). Plan 3b includes the same structures as the Plan 3a but was incrementally expanded for socially vulnerable communities and critical infrastructure to be inclusive of similar flood characteristics and not be reliant upon the home's value. Plan 3b would include the elevation of 1,006 residential structures and flood-proofing of 82 nonresidential structures.

The USACE, St. Louis District, is presently pursuing a policy exception for the following USACE Policy: ER 1105-2-100 2-3(f)(1) stating: "The National Economic Development (NED)Plan. For all project purposes except ecosystem restoration, the alternative plan that reasonably maximizes net economic benefits consistent with protecting the Nation's environment, the NED plan, shall be selected. The ASA CW may grant an exception when there are overriding reasons for selecting another plan based upon comprehensive benefits or other Federal, State, local and international concerns." If the policy exception is not granted, the Recommended Plan will default to Plan 1: Nonstructural NED Plan.

Plan 3c: Plan 3c is the largest plan and includes the same structures as the Plan 3b. This plan, however, was expanded across the entire parish to be inclusive of similar flood characteristics and not be reliant upon the home's value, in order to be as inclusive as possible to socially vulnerable structures and communities. Plan 3c would include the elevation of 1,147 residential structures and floodproofing of 87 nonresidential structures.

DESCRIPTION OF IMPACTS

The completion of the nonstructural TSP or the NED Plan would result in minimal or no impacts to fish and wildlife resources.

SERVICE POSITION AND RECOMMENDATIONS

The Service does not object to the TSP provided that the following recommendations are fully addressed.

1. The Service recommends that the USACE complete ESA section 7 consultation prior to the FONSI being signed.

2. Further coordination with the Service is recommended throughout the engineering and design phase to ensure that any staging/work areas designed, constructed, and utilized, avoid

or minimize impacts associated with fish and wildlife resource. Should staging areas impact fish and wildlife resources, those impacts must be fully mitigated.

We appreciate the cooperation of your staff on this project and look forward to our continued coordination to further protect fish and wildlife resources. Should you have any questions regarding our comments, please contact Karen Soileau (337/291-3132) of this office.

Sincerely,

BRIGETTE FIRMIN Digitally signed by BRIGETTE FIRMIN Date: 2024.08.01 15:46:03 -05'00'

Brigette D. Firmin
Field Supervisor
Louisiana Ecological Services Office

cc: LDWF, Baton Rouge, LA
Environmental Protection Agency, Dallas, TX
CEMVN-PM-R, New Orleans, LA
LA Dept. of Energy and Natural Resources (CMD), Baton Rouge, LA

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SECTION 8
List of Acronyms and Abbreviations

ATSDR	Agency for Toxic Substances and Disease Registry
CAR	Coordination Act Report
CDC	Centers for Disease Control and Prevention
CEJST	Climate and Economic Justice Screening Tool
EJ	Environmental Justice
EO	Executive Order
EPA	Environmental Protection Agency
GHG	Greenhouse gases
HTRW	Hazardous, toxic, and radioactive waste
MSA	Metropolitan Statistical Area
NAAQS	National Ambient Air Quality Standards
NCDC	National Climate Data Center
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
LDEQ	Louisiana Department of Environmental Quality
LDNR	Louisiana Department of Natural Resources
LDWF	Louisiana Department of Wildlife and Fisheries
LNHP	Louisiana Natural Heritage Program
PDT	Product Delivery Team
PED	Preconstruction, Engineering and Design
RCW	Red-cockaded Woodpecker
SVI	Social Vulnerability Index
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
ppt	Parts Per Thousand

ESA	Endangered Species Act; Environmental Site Assessment
ROW	Rights-of-Way
NMFS	National Marine Fisheries Service
ORV	Offroad Vehicles
MBTA	Migratory Bird Treaty Act
BGEPA	Bald and Golden Eagle Protection Act
NBEM	National Bald Eagle Management
FPPA	Farmland Protection Policy Act
NRCS	Natural Resource Conservation Service
TDS	Total Dissolved Solids
PCR	Primary Contact Recreation
SCR	Secondary Contact Recreation
FWP	Fish and Wildlife Propagation
ONR	Outstanding Natural Resources
Green Book	EPA Green Book Nonattainment Areas for Criteria Pollutants
WRDA	Water Resources Development Act
ACS	American Community Survey
NED	National Economic Development
TSP	Tentatively Selected Plan
NPL	National Priorities Lists
RMP	Risk Management Plan
TSDFs	Hazardous waste treatment, storage, and disposal facilities
Ppb	Parts Per Billion
AEP	Annual Exceedance Probability
ASTM	American Society for Testing and Materials
NRHP	National Register of Historic Places
PA	Programmatic Agreement
LA SHPO	LA State Historic Preservation Officer
APE	Area of Potential Effects
NEPA	National Environmental Policy Act
SC-GHG	Social Cost of Greenhouse Gas Emissions

IWGSC	Interagency Working Group on Social Cost of Greenhouse Gases
EA	Environmental Assessment
FONSI	Finding of No Significant Impact
DOE	Department of Energy
UCANR	University of California Division of Agriculture and Natural Resources