SECTION 3.0
AFFECTED ENVIRONMENT

3.1 INTRODUCTION

This section describes environmental, cultural, and socioeconomic conditions in the project area and the surrounding region that could be affected by implementing the proposed action, and it provides information that serves as a baseline from which to identify and evaluate environmental, cultural, and socioeconomic changes resulting from implementing the proposed action and alternatives. Such information has been provided in sufficient detail to understand the effects of the alternatives on the socioeconomic, cultural, and natural environment. It depicts conditions as they exist or in accordance with the most recent available data. The effects of the proposed action and alternatives are discussed in Section 4.

3.1.1 Project Area

The TIMED legislation approved in 1989 provides for constructing a direct highway connection from I-12 to Bush (Burk-Kleinpeter 2002). Previous studies identified the project area as Bush connected to I-12, bounded by LA 41 and LA 21 to the east and west, respectively. For the purpose of the EIS, the project area is entirely within St. Tammany Parish, Louisiana, and roughly bounded by LA 21, US 190, I-12, US 11, and LA 41. It encompasses an area of approximately 245 square miles and includes the incorporated areas of Abita Springs, Pearl River, and portions of the cities of Slidell and Covington (Figure 3-1). The unincorporated areas of Bush, Hickory, Talisheek, and Waldheim are in the project area.

3.1.2 Regional Geographic Setting and Location

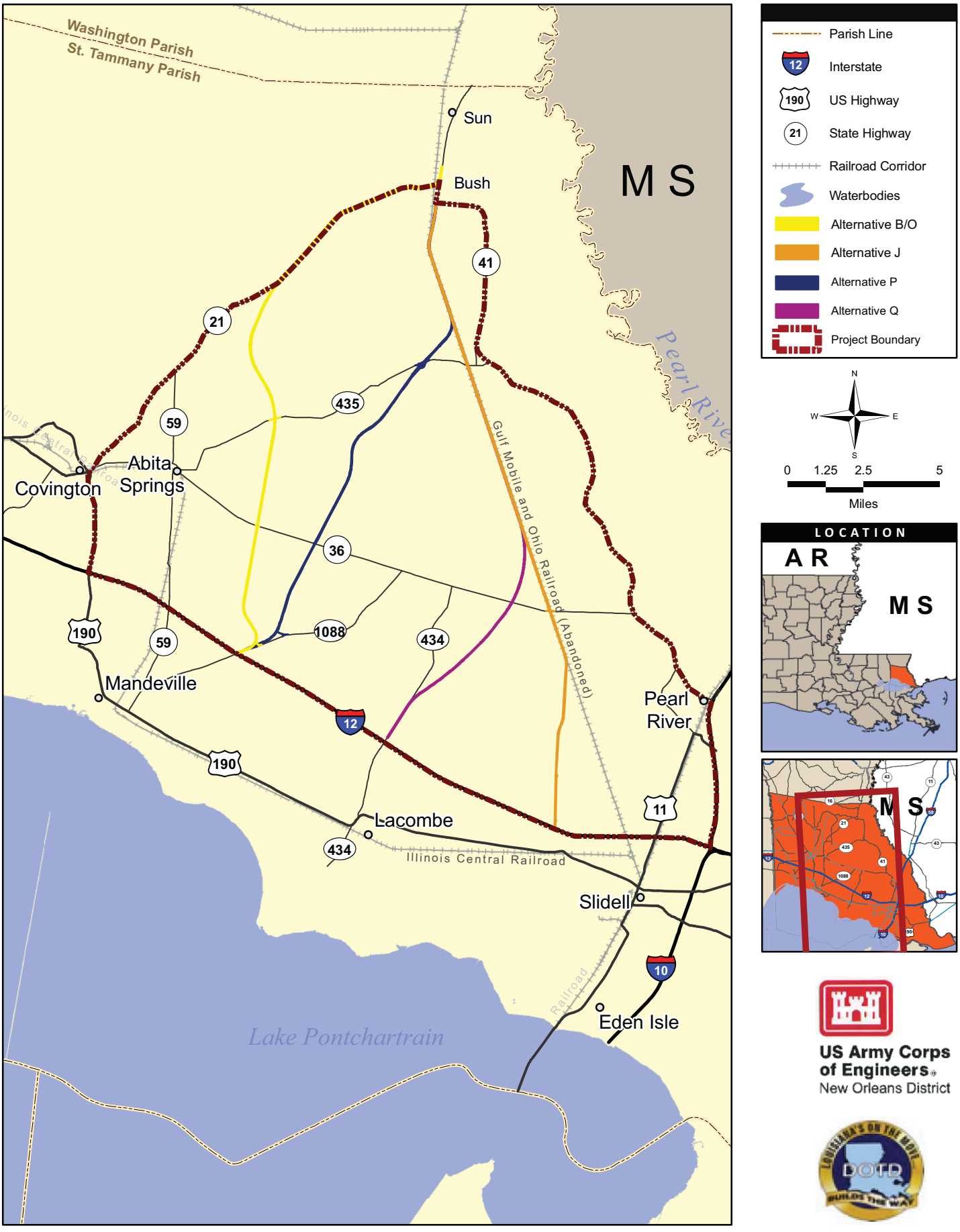
St. Tammany Parish is in southeastern Louisiana and is one of the seven parishes in the New Orleans-Metairie-Kenner, Louisiana, Metropolitan Statistical Area as defined by the Office of Management and Budget (OMB) for use in federal statistical activities (OMB 2009). It is one of the fastest growing suburban parishes in the New Orleans area and the entire state, serving as a bedroom community to the neighboring economic centers in Orleans and Jefferson Parishes (CH2MHill 2003). The parish is bordered by Washington Parish to the north; Hancock and Pearl River Counties, Mississippi, to the east; Lake Pontchartrain to the south; and Tangipahoa Parish to the west.

St. Tammany Parish consists of four physiographic regions: (1) forested terrace uplands, used mainly for woodland, wildlife habitat, and pastureland; (2) broad terraces or Gulf Coast flatwoods, used mainly for woodland and wildlife habitat; (3) narrow floodplains of major streams, used for woodland and wildlife habitat; and (4) marshes and swamps, used mainly for recreation and as habitat for wetland wildlife (USDA NRCS 1990). The elevation in the parish ranges from approximately 200 feet above sea level on the terrace uplands to about 5 feet below sea level in the former marsh and swamps that have been drained near Lake Pontchartrain (USDA NRCS 1990).

3.1.3 Overview and History

St. Tammany Parish was inhabited by Indians before being claimed as part of the Mississippi Valley Territories for France in 1682. Archaeological evidence suggests that prehistoric Tchefuncta, Marksville, Troyville, Coles Creek, and Plaquemine-Historic cultures inhabited the

Figure 3-1 - Project area



area (USDA NRCS 1990). By the time the first French explorers arrived in the region, the nations of Muskegon peoples were firmly established in the area. Included among those tribes were the Bayougoula who resided along the north shore of Lake Pontchartrain—surviving by relying on food harvested from the lakes, the Acolapissa who lived primarily along the Pearl River, and the comparatively large Houma who often served as the dominant tribal group in the area (Hyde 2005). Evidence exists to suggest that the Chitimacha also resided in the region at times amid the shifting territories common to the tribes of the period.

During the 1700s and early 1800s, the area encompassing St. Tammany Parish was under French, British, and then Spanish control until the United States annexed the area in 1810. After the Civil War, emerging industries, advanced lumber and forestry policies, and improved cross-lake shipping helped the parish to grow economically and socially. The construction of the Lake Pontchartrain Causeway in 1956 helped to accelerate the migration of residents away from the New Orleans area to St. Tammany Parish. As a result, the population in the parish has steadily climbed in the past 50 years and turned St. Tammany Parish into one of the most prosperous parishes in Louisiana.

3.1.4 Climate

St. Tammany Parish has a semi-tropical marine climate; warm and humid with mild winters and hot summers. Average temperatures in the winter and summer are 58 degrees Fahrenheit (°F) and 81 °F, respectively, and total annual average precipitation is 62.66 inches (SRCC 2010). Table 3-1 presents climate averages from 1971-2000. St. Tammany Parish is north of Lake Pontchartrain on the Gulf Coast and has suffered extensive property damage from tropical storms, floods, and hurricanes. Since 1965, the parish has received 20 Presidential Disaster Declarations, more than any other parish in the state, and 12 declarations have been from tropical storms or hurricanes (St. Tammany Parish 2009a).

Table 3-1.
Average temperature and precipitation, 1971–2000

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Ann.
Max Temp[a]	61.2	64.3	71.0	77.2	84.2	89.3	91.1	91.0	87.6	80.0	70.9	63.6	77.6
Min Temp[a]	40.2	42.8	50.2	56.3	64.5	70.7	73	72.4	68.3	57.1	49.0	42.2	57.2
Avg Temp[a]	50.7	53.6	60.6	66.8	74.4	80.0	82.1	81.7	78.0	68.6	60.0	52.9	67.5
Precip Avg[b]	6.42	5.03	5.94	4.76	5.76	4.27	6.55	5.85	5.16	3.1	5.13	4.69	62.66

Source: SRCC 2010
Notes:
a. Temperature reported in degrees Fahrenheit.
b. Precipitation reported in inches.

3.2 LAND USE AND LAND COVER

Land use refers to human use of the land for economic production (residential, commercial, industrial, recreational, or other purposes) and for natural resource protection, and it generally describes what is practiced, permitted, or planned on the land. Land cover, an increasingly important attribute of land use, describes what is physically on the ground. It is defined as the type of material that covers the earth's surface at a specific location at a specific time. For example, the land use in an area might be cropland, but the land cover at a specific location in the

area might be an agricultural crop, bare soil, grass, or trees. Similarly, in an area used for single-family residences, the land cover at a specific location might be concrete, grass, or trees. Furthermore, land cover can change dramatically in a short period while land use remains the same. The following sections address land use and land cover in the project area.

3.2.1 Historic Land Cover

St. Tammany Parish was once a vast virgin forest of pine in the north and cypress/tupelo gum in the south (USDA NRCS 1990). Most of the virgin forests were cut during the *cut out-get out* period around the turn of the 20th century. After that, no attempts at artificial regeneration were made, and the second growth forests were strictly a product of nature. In addition, all inhabitants of the area, including Indians and settlers, historically used the land for agricultural purposes.

3.2.2 Existing Land Use/Land Cover

Although a variety of land uses exist within St. Tammany Parish, the majority of the project area is rural in nature and consists of pine forests, pine savannas, farmlands, and numerous waterbodies. Most of the agricultural activity in the project area is north of LA 36, within a rough triangular section bounded by LA 36, LA 21, and LA 41. Residential neighborhoods and single-family homes have developed mainly off the major thoroughfares such as LA 41 between Pearl River and Hickory, LA 21 between Covington and Waldheim and again, on LA 21 closer to the community of Bush, along portions of LA 434, LA 435 and LA 59, and along either side of Interstate 12, between US 59 and US 11.

Commercial uses have developed along the transportation corridors of US 11 and US 59 and are typically identified as small clusters of gas stations, convenience stores, small restaurants, and strip malls. Scattered commercial activity can also be found along LA 21 between Waldheim and Bush and along portions of LA 41 between Pearl River and Bush. Major retail activity is closer to the larger urban areas of Covington and Slidell. Light industrial uses are mainly along LA 59, US 11, and along portions of the Tammany Trace, where the abandoned Gulf Mobile and Ohio Railroad corridor intersects with I-12.

The I-12 to Bush project area occupies approximately 157,061 acres of St. Tammany Parish (USDA NRCS 2007). A geographic information system (GIS) was used to map land use patterns for the project area. On the basis of most recent available data, 14 land use types were identified in the project area: developed, open space; developed, low intensity; developed, medium intensity; developed, high intensity; barren land; evergreen forest; mixed forest; shrub/scrub; grassland/herbaceous; pasture/hay; cultivated crops; forested wetlands; emergent herbaceous wetlands; and open water. The land use and approximate land coverage is listed in Table 3-2 and illustrated in Figure 3-2.

Table 3-2.
St. Tammany Parish land use types

Land use	Acres	Percentage
Developed, Open Space	12,626	8.0%
Developed, Low Intensity	3,465	2.2%
Developed, Medium Intensity	1,088	0.7%
Developed High Intensity	172	0.1%
Barren Land	171	0.1%
Evergreen Forest	67,247	42.8%
Mixed Forest	209	0.1%
Shrub/Scrub	41,473	26.4%
Grassland/Herbaceous	5,287	3.4%
Pasture/Hay	4,190	2.7%
Cultivated Crops	1,069	0.7%
Forested Wetlands	18,937	12.1%
Emergent Herbaceous Wetlands	541	0.3%
Open Water	586	0.4%

Source: USDA NRCS 2007

3.2.2.1 Developed, Open Space

Developed open space covers approximately 12,626 acres (8%) of the project area. These areas are a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20 percent of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes (NLCS 2001).

3.2.2.2 Developed, Low Intensity

Developed, low intensity covers approximately 3,465 acres (2.2%) of the project area. These areas are a mixture of constructed materials and vegetation. Impervious surfaces account for 20-49 percent of total cover and most commonly include single-family housing units (NLCD 2001).

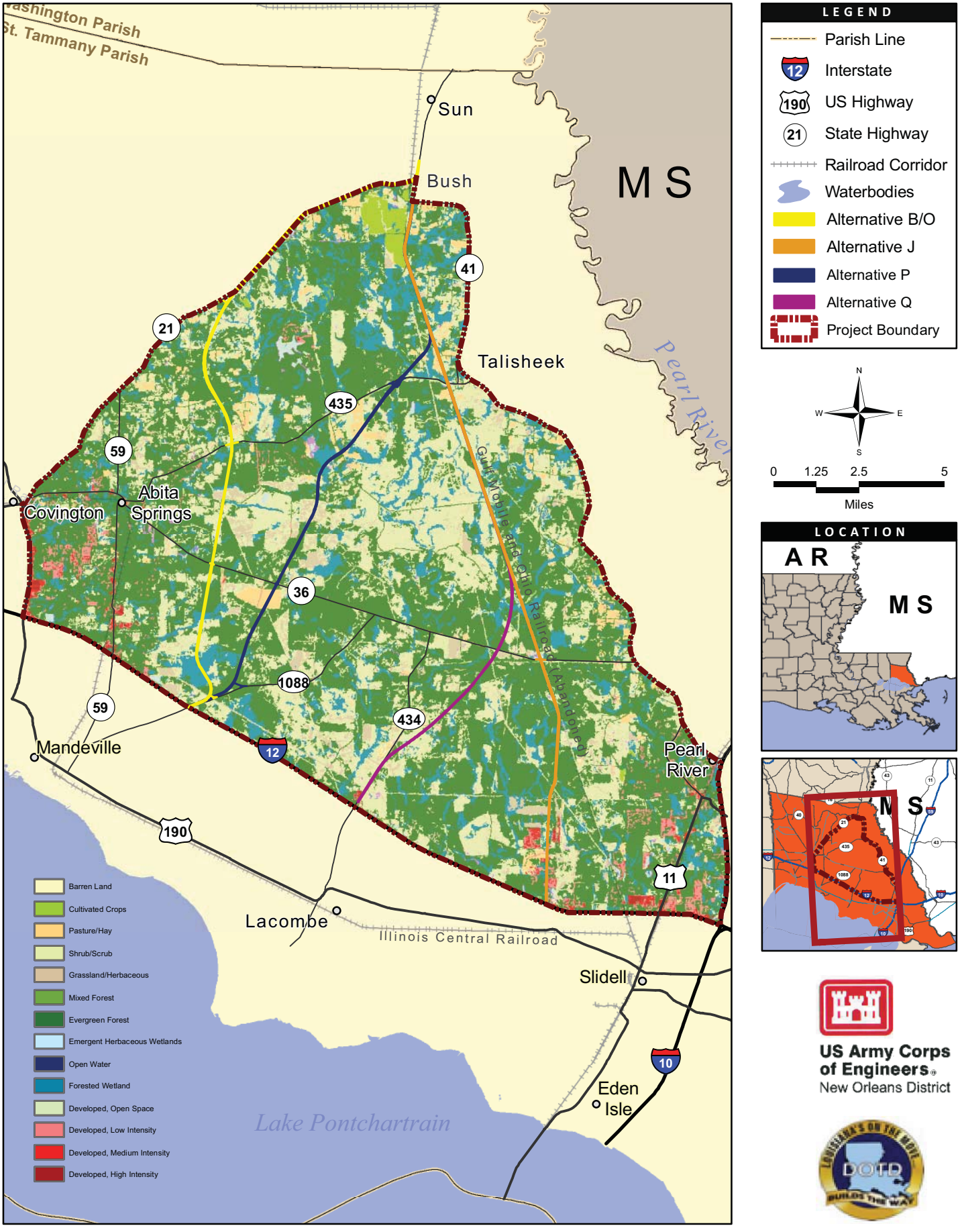
3.2.2.3 Developed, Medium Intensity

Developed, medium intensity covers approximately 1,088 acres (0.7%) of the project area. These areas are a mixture of constructed materials and vegetation. Impervious surfaces account for 50-79 percent of the total cover and most commonly include single-family housing units (NLCD 2001).

3.2.2.4 Developed, High Intensity

Developed, high intensity covers approximately 172 acres (0.1%) of the project area. These areas include highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80 to100 percent of the total cover (NLCD 2001).

Figure 3-2 - St. Tammany Parish land use



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3.2.2.5 Barren Land

Barren land occupies approximately 171 acres (0.1 percent) of the project area, including areas of bedrock, rock slides, strip mines, gravel pits, and other accumulations of earthen material where vegetation is less than 15 percent of land cover (NLCD 2001).

3.2.2.6 Evergreen Forest

Evergreen forest covers approximately 67,247 acres (42.8 percent) of the project area. The areas are dominated by trees generally greater than 5 meters tall, and greater than 20 percent of total vegetation cover (NLCD 2001).

3.2.2.7 Mixed Forest

Mixed forest covers approximately 209 acres (0.1 percent) of the project area. The areas are dominated by trees generally greater than 5 meters tall and greater than 20 percent total vegetation cover. Neither deciduous nor evergreen species are greater than 75 percent of total tree cover (NLCD 2001).

3.2.2.8 Shrub/Scrub

Shrub/scrub occupies approximately 41,473 acres (26.4 percent) of the project area. Those areas are dominated by shrubs less than 5 meters tall with a shrub canopy typically greater than 20 percent of total vegetation. That class includes true shrubs, young trees in an early successional stage, or trees stunted from environmental conditions (NLCD 2001).

3.2.2.9 Grassland/Herbaceous

Grassland/herbaceous land covers approximately 5,287 acres (3.4 percent) of the project area. The areas are dominated by grammanoid or herbaceous vegetation, generally greater than 80 percent of total vegetation. The areas are not subject to intensive management such as tilling, but they can be used for grazing (NLCD 2001).

3.2.2.10 Pasture/Hay

Pasture/Hay land covers approximately 4,190 acres (2.7 percent) of the project area. They are areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20 percent of total vegetation (NLCD 2001).

3.2.2.11 Cultivated Crops

Cultivated crops cover approximately 1,069 acres (0.7 percent) of the project area. They are areas used for production of annual crops, such as corn, soybeans, vegetables, tobacco, and cotton, and perennial woody crops such as orchards or vineyards. Crop vegetation accounts for greater than 20 percent of total vegetation. That includes all land being actively tilled (NLCD 2001).

3.2.2.12 Forested Wetlands

Forested wetlands cover approximately 18,937 acres (12.1 percent) of the project area. It should be noted that this acreage has not been verified via jurisdictional wetland determinations, and the total amount of forested wetlands is potentially greater than that calculated using USDA NRCS data. Forested wetlands are areas where forest or shrub vegetation account for greater than 20 percent of vegetative cover, and the soil or substrate is periodically saturated or covered with water (NLCD 2001).

3.2.2.13 Emergent Herbaceous Wetlands

Emergent herbaceous wetlands cover approximately 541 acres (0.3 percent) of the project area. They are areas where perennial herbaceous wetland vegetation accounts for greater than 80 percent of vegetative cover, and the soil or substrate is periodically saturated or covered with water (NLCD 2001).

3.2.2.14 Open Water

Open water covers approximately 586 acres (0.4 percent) of the project area, which is generally considered areas of open water with less than 25 percent cover of vegetation or soil (NLCD 2001).

3.2.3 Zoning

The St. Tammany Parish Zoning map indicates that 66 different zoning classifications are in the parish (Figure 3-3). On the basis of comprehensive rezoning, St. Tammany Parish has three residential districts and nine commercial districts. Comprehensive rezoning approvals for St. Tammany Parish began in 2007 and were completed in late March 2010 when the council unanimously approved the remaining zoning for the unincorporated areas in the parish's northwestern and northeastern sections (Harvey 2010).

The parish has five classifications in residential zoning—Estate (E1-E4), Suburban (A-1–A-3), Single Family Residential (A-4–A-4a), Two Family Residential (A5), and Multiple Family Residential (A-6–A-8). Permitted uses include dwellings, household agricultural activities, and utility services associated with residential development.

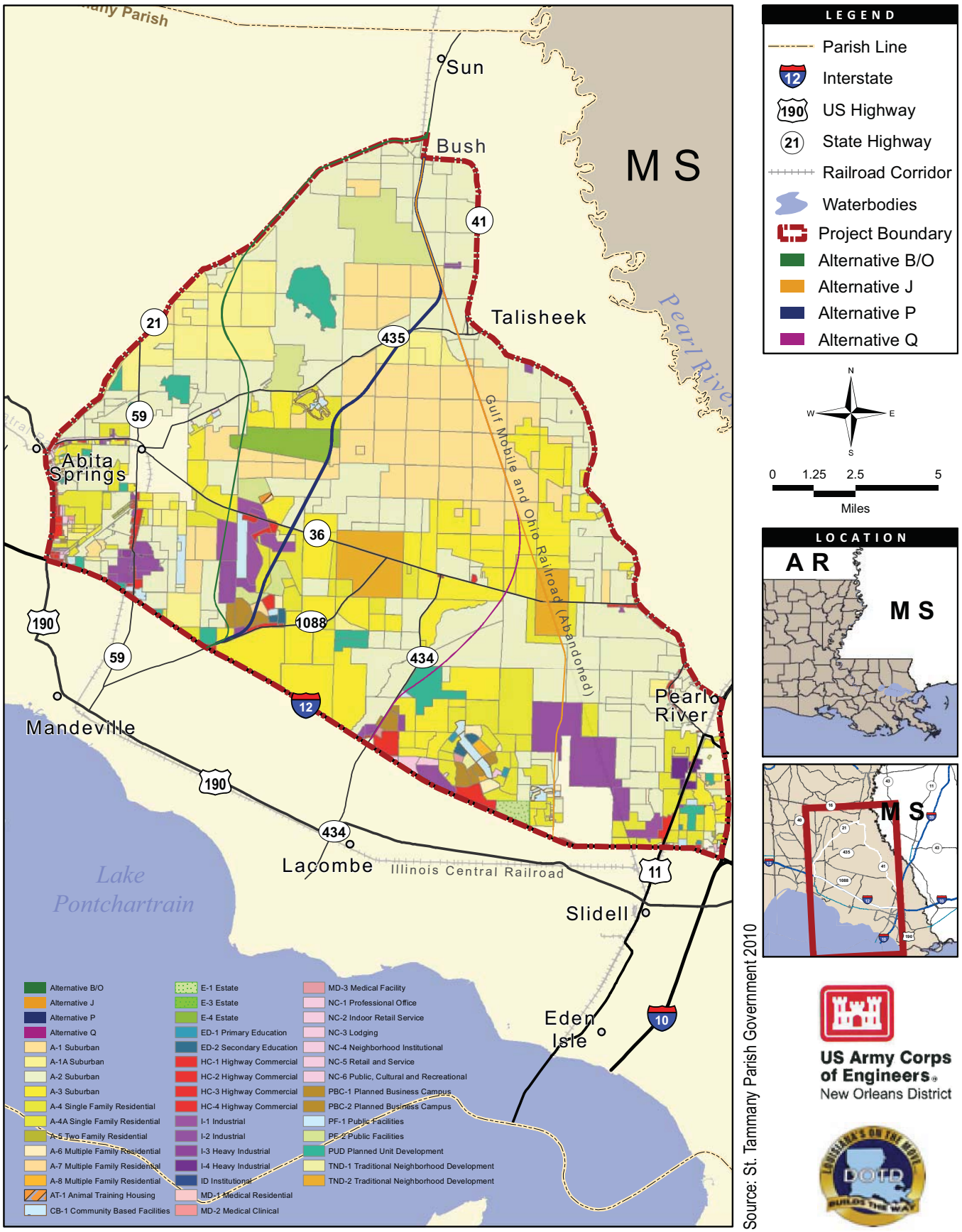
Commercial zoning is divided into three groups: Neighborhood (NC-1–NC-6), Institutional (ID, MD1- MD3, PF-1–PF-3), and Heavy Commercial districts (I-1–I-4, HC-1–HC-5, PBC-1–PBC-2, AT-1, and RBG). Neighborhood districts are designed to allow small-scale businesses to be near residential communities. Businesses include professional offices, small retail, restaurants, bed and breakfast homes, recreation, and parks. Institutional districts permit local hospitals, clinics, nursing homes, veterinarians, laboratories, public and private primary, secondary and higher educational facilities, churches, government offices, and riverboat gambling. Heavy Commercial districts permit moderate and large businesses along major arterial and collector roads to minimize conflict with nearby residential uses and include body shops, office warehouses, storage yards, manufacturing facilities, landfills, asphalt and concrete plants, bulk storage, banks, lodging, nightclubs, and associated facilities.

The project area is designated as suburban (St. Tammany 2010b). Suburban District A-3 provides a single-family residential environment on moderately sized lots served by central utilities in locations convenient to commercial and employment centers (St. Tammany 2009d). Most of the areas permitted as A-4 single-family residential zoning are along I-12 to the north and west of Slidell, between Covington and Abita Springs. One large tract of estate zoned land is east of Abita Springs between LA 435 and LA 436 (St. Tammany 2010b).

Parish zoning maps indicate industrial zoning is limited southeast of Abita Springs, northwest of US 11, and a combination of heavy commercial and industrial zoned districts along I-12 from L434 to US 11. Neighborhood commercial districts are near urban areas along connecting roads in Abita Springs and along I-12 between LA 434 and US 11.

Traditional Neighborhood Development (TND) zoning district is designed to encourage mixed-use, compact development and facilitate the efficient use of services. A TND district diversifies and integrates land uses in close proximity; provides for daily recreational and shopping needs of

Figure 3-3 - St. Tammany Parish zoning



Source: St. Tammany Parish Government 2010

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the community; and is designed to be sustainable, long-term communities providing economic, environmental, and social equity for its residents. Parish maps indicate two zoned areas for TND are in the southern half of the project area at the intersection of LA 1088 and LA 36 and the intersection of Rheusaw Parker Road near the southeastern project boundary.

3.2.3.1 Overlay Zoning

Overlay Zoning is considered special district zoning throughout the parish and is designed for flexible land development if certain areas are not developed using the underlying zoning in a specified period:

- *Planned Unit Development.* Encourages creative design and orderly development to preserve and protect scenic features of the site. Such districts are authorized in all zoning areas except estate districts.
- *Mobile Home Overlay.* Provides areas where mobile homes can be placed on individual lots as permitted uses to provide various settings for mobile home living. Mobile homes are permitted in residential districts except in the Money Hill and Hillcrest areas as long as the homes adhere to the requirements in a given zone (Harvey 2010).
- *Rural Overlays.* Permits agricultural uses, encourages maintenance of the countryside to preserve forests, and undeveloped land and allow residents to retain their traditional ways of life. Crop farming and forest and pasture management are the most common rural activities and single-family residences are permitted. Within the project area, the rural overlay is along LA 21 and LA 41 and a large cluster between LA 435 and LA 436.
- *Planned Corridor Overlay.* Provides additional regulations along LA 21 and Gause/Military Road to protect the scenic quality along the corridors. Permitted uses are determined by the underlying zoning, and include additional signage, lighting, landscape, parking, and setback regulations.
- *Municipal Interface Overlay.* Allows some coordination and joint reviews between the parish government and participating municipalities.
- *Slidell Airport Overlay.* Protects the airspace around Slidell Airport. This area is outside the project boundary.

3.2.4 Future Land Use

As one of the fastest growing areas in Louisiana for the past two decades, St. Tammany Parish continues to face challenges associated with an accelerated growth rate. In recognition of the need for planned growth to minimize negative effects on the environment, economy, and quality of life, St. Tammany Policy Jury approved the comprehensive citizen-based planning process aimed to develop a 25-year plan to guide parish growth (CH2MHill 2003). The following plans were developed to stimulate future planned economic growth by prioritizing transportation, socioeconomic, and environmental needs of the parish.

3.2.4.1 New Directions 2025

The comprehensive plan for St. Tammany Parish, called *New Directions 2025* (ND 2025), was initiated in December 1998. The parish council prepared and adopted the vision statement in early 2000. Subsequently, a *Phase I Transportation Plan Report* was prepared and adopted by the ND 2025 steering committee in August 2001. At the same time, preparations for developing a parish-wide 2025 Land Use Plan began, building on all previous work done by citizens, parish staff, and consultants up to that time (Taimerica 2004).

The Critical and Sensitive Areas element of ND 2025 evaluates environmental issues and provides recommendations focusing on protecting open spaces and establishing conservation areas and wildlife corridors. Goals consist of preserving 30 percent of the parish area through conservation or public green spaces and maintaining a minimum of 20 percent as natural areas with indigenous plantings. The plan also designates a system of publicly owned and maintained green spaces in the parish to conserve trees and provide compatible outdoor recreation activities (CH2MHill 2003). Note that this element of the ND 2025 was not coordinated with the USACE and does not take into account avoidance and minimization of impacts to the natural environment.

The *Circulation Plan* and *Major Thoroughfare Plan* are undertaken in conjunction with the broader ND 2025 effort. The action plan for the Transportation element involves integrating transportation modes to offer people choice in mobility and considers the full range of issues from construction, improvement, maintenance, and operation of transportation facilities and their interrelationship. Those components are as follows:

- Parish-wide road and traffic circulation
- Mass transit
- Recreational, bicycle, and pedestrian traffic
- Port, aviation, and railway
- Regional transportation linking the parish to neighboring cities, parishes, and states

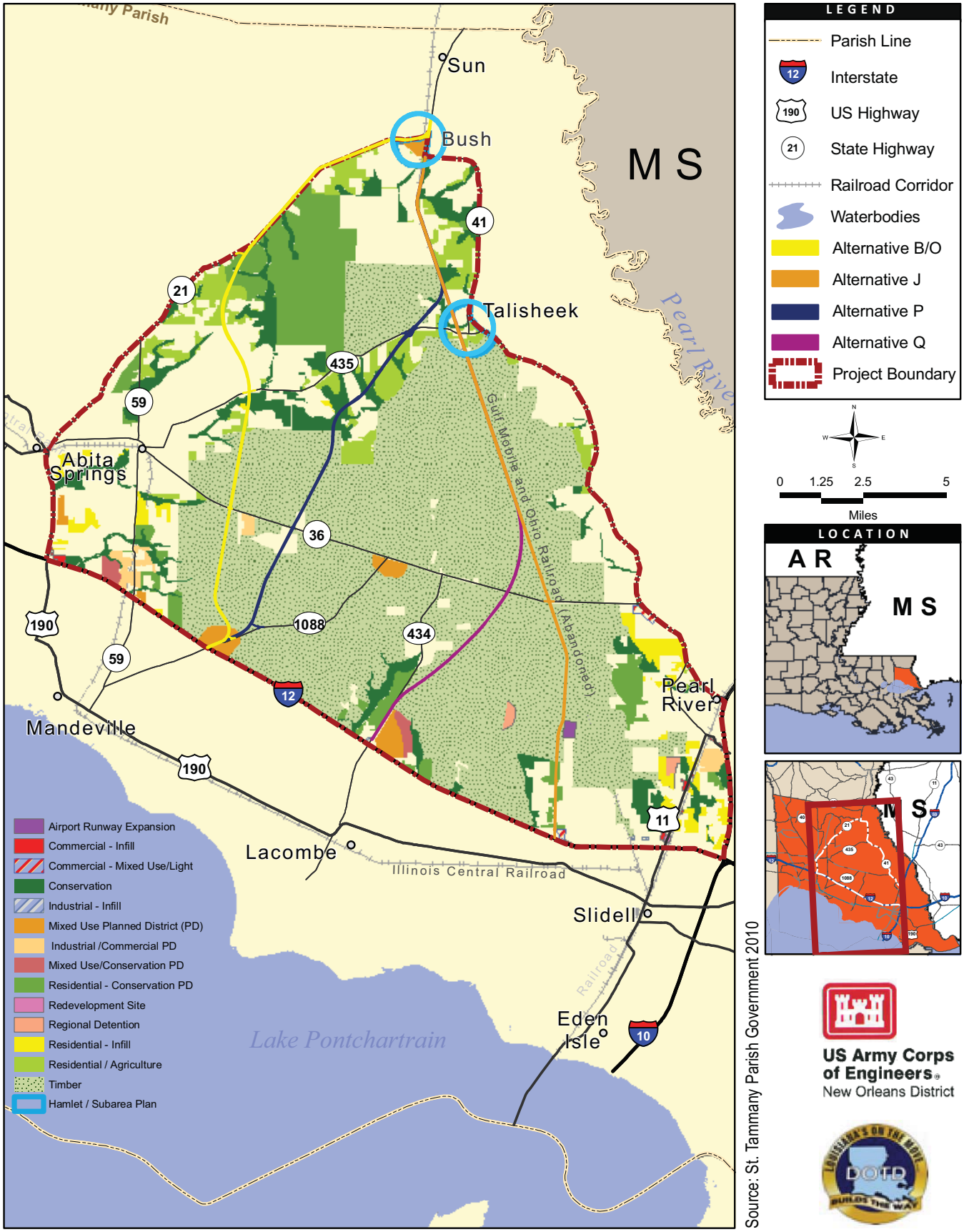
The *Transportation Element Plan* is a compilation of capacity-increase data from the RPC Transportation Improvement Program, East St. Tammany/Slidell Metropolitan Area, RPC Metropolitan Transportation Plan, and LADOTD State Transportation Improvement Program. Regional bike paths are proposed along LA 21, 36, 40, and 41, 435, 1072, and 1077. The network of bicycle routes would provide connections for unmotorized vehicles between Abita Springs, St. Tammany, Hickory, Talisheek, Lacombe, Waldheim, Folsom, and Covington. RPC capacity increases for fiscal years (FY) 2004–2020 are designated for LA 59 from Mandeville to Abita Springs. Proposed Alternative P is also identified as a connection from I-12 to LA 41. LADOTD proposes one capacity increase between FY 2004–2020 on LA 36 between Covington and Abita Springs (St. Tammany 2001).

3.2.4.2 Strategic Plan for Economic Development

The *Strategic Plan for Economic Development* in St. Tammany Parish estimates the current and future land use for the parish on the basis of existing zoning regulations and conceptual land use framework set forth in the ND 2025 planning process. The principles consist of *node* development focused on towns and cities; commercial development along existing and future highway corridors and all protected and developed area will remain as designated. Future land use maps depict generalized land use and are broadly defined as commercial, industrial, residential, residential/agriculture, agriculture, and conservation (Figure 3-4).

In the project area, future land use patterns indicate nodes of growth in Bush, Talisheek, and Hickory, along LA 41 at the intersection of LA 21, LA 435, and LA 36, respectively. Additional nodes were designated for residential development in Waldheim on LA 21, Alton on US 11 and a commercial/mixed use district at the intersection of I-12 and LA 434. Those nodes are designated as Small Area Plans and reflect the special characteristics or growth pressures the areas face requiring more detailed planning for stable future development (Taimerica 2004). The project area will remain predominantly in timber management, and along major corridors near existing towns and cities, the areas will focus on residential development (St. Tammany 2010c).

Figure 3-4 - St. Tammany future land use



Source: St. Tammany Parish Government 2010

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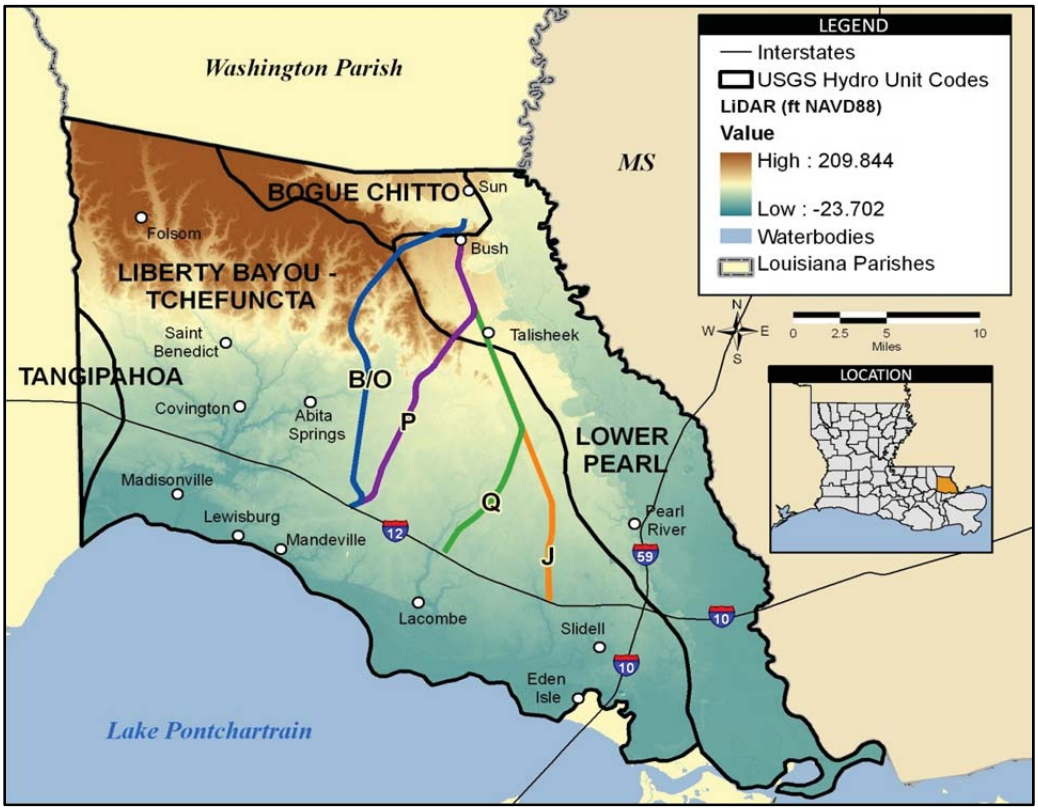
3.2.4.3 Metropolitan Transportation Plan

The RPC is a collaboration among five parishes in south Louisiana—Jefferson, Orleans, Plaquemines, St. Bernard, and St. Tammany and includes the secretary of LADOTD (City Planning 2004). The RPC conducts studies and implements projects of regional impact and serves as a conduit for federal highway and planning dollars. The RPC is the designated Metropolitan Planning Organization for the East St. Tammany/Slidell Urbanized Area. The organization is mandated to consider projects and strategies that support economic vitality; increase safety, accessibility, and mobility of users; protect the environment; promote energy conservation; enhance the integration and connectivity; and emphasize the preservation of the existing transportation system (RPC 2006). In addition to the RPC's planning role, the commission prioritizes federal aid funds for use on roadways of regional significance and acts as a clearinghouse for all federal highway funds (City Planning 2004).

3.3 WATER RESOURCES

3.3.1 Watershed Characterization and Drainage Patterns

Watershed characteristics such as watershed size, overland slope, soil types, land cover, and man-made obstructions all affect drainage patterns and flooding in the project area. According to the U.S. Geological Survey (USGS) Hydrologic Unit Codes (HUCs), St. Tammany Parish has four major watersheds: the Bogue Chitto, Lower Pearl, Tangipahoa, and Liberty Bayou-Tchefuncta (Figure 3-5). Those watersheds are quite expansive and extend up into Washington Parish and Mississippi. Within those major watersheds are smaller subbasins that drain into the tributaries and eventually discharge into Lake Pontchartrain, Lake Maurepas, and the Pearl River.



Sources: USGS 2005; LSU CADGIS Research Laboratory 2010

Figure 3-5. USGS hydrologic codes and LiDAR for St. Tammany Parish.

The project area is predominantly in the Liberty Bayou-Tchefuncte watershed, which covers more than 50 percent of the parish. That watershed can be broken down into the basins of Bayou Liberty, Bayou Lacombe, Bayou Vincent, Bayou Chinchuba, and Tchefuncte-Abita-Ponchitolawa. The northernmost portion of the proposed alternative routes drain into the Lower Pearl watershed. A total of 19 basins are studied as part of this EIS (Figure 3-7). The combined drainage area of the basins is 145.3 square miles (93,018 acres). The basins were delineated into 424 smaller subbasins to capture the drainage pattern adequately.

St. Tammany Parish has a generally flat overland slope where water tends to pond where it falls and run off more slowly, resulting in localized flooding conditions. The flat topography often makes it difficult to identify the natural drainage paths. The drainage paths are often interrupted by man-made obstructions such as developments and roadways. Much of the runoff in the project area occurs as sheet flow through the broad flats of land and enters tributaries that discharge into the larger channels of Abita River, Big Branch Bayou, Long Branch, Ponchitolawa Creek, Bayou Lacombe, Bayou Liberty, Talisheek Creek, Simmons Creek, E. Fork Little Boque Falaya, Long Branch, Southwind Branch, Little Creek, Boque Chitto River, and Little Brushy Branch (named channels identifiable on topographic maps). The total length of those major channels along with their tributaries is approximately 372 miles. Figure 3-6 shows the flow direction, channel network, and flow direction of the major channels.

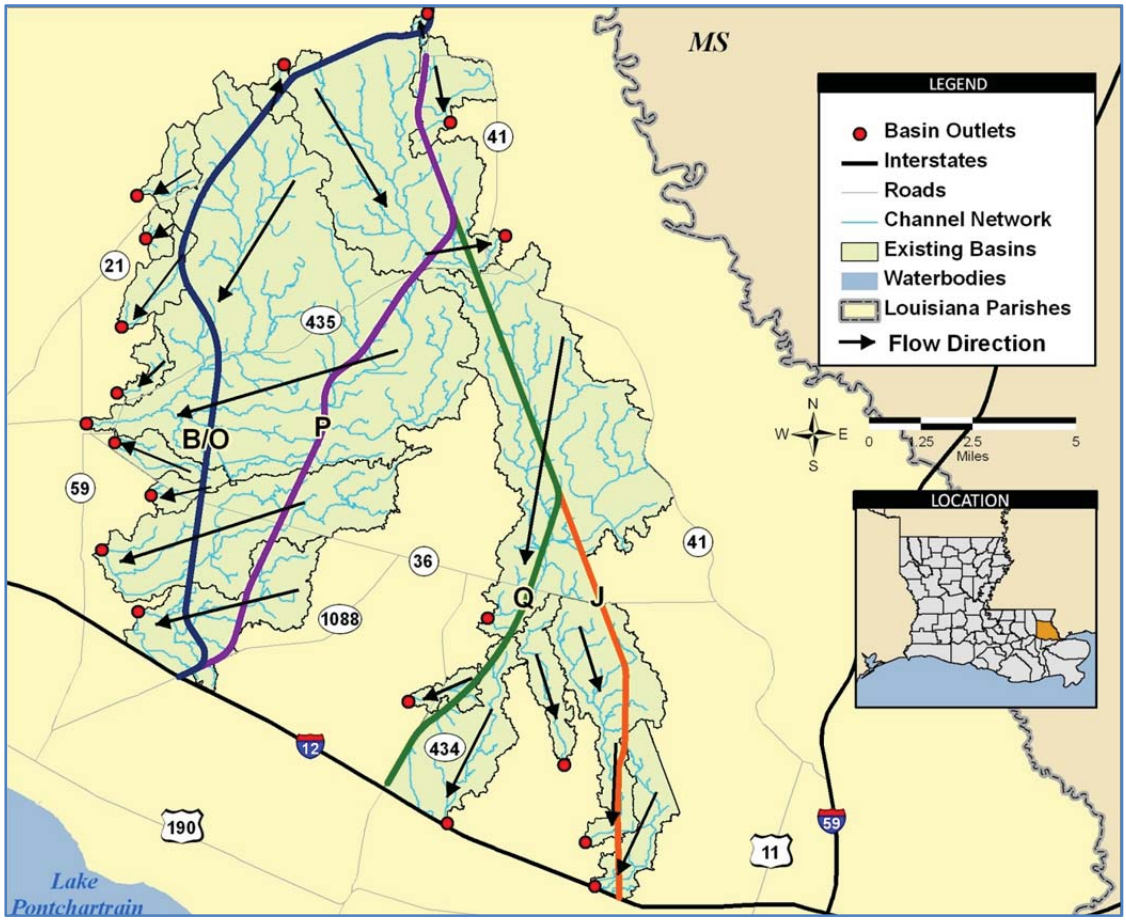
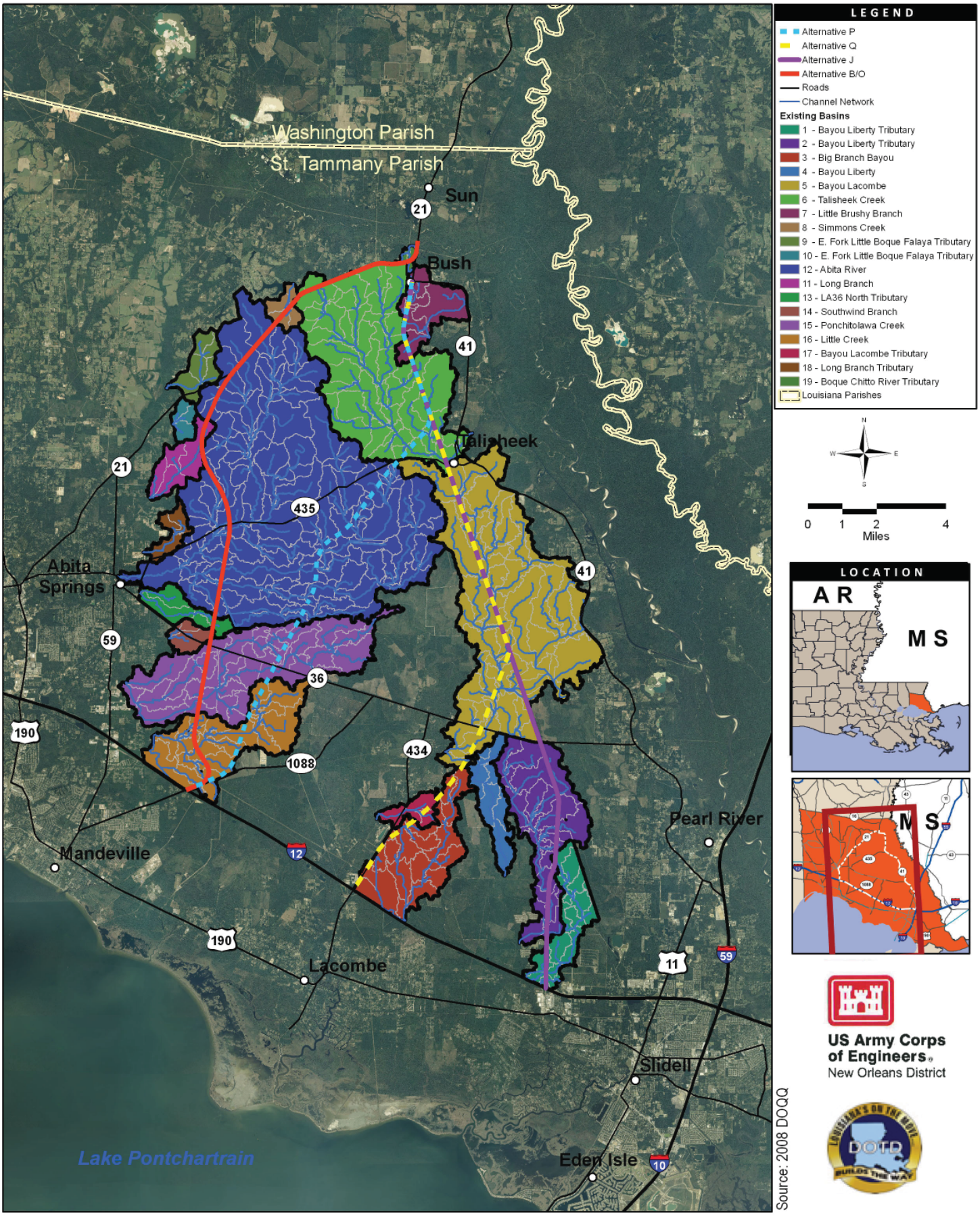


Figure 3-6. Flow direction, channel network, and subbasin outlets.

Figure 3-7 - Hydrologic drainage basins



Watershed runoff is also dependent on the soil type and land cover in the watershed. Soils are classified into hydrologic soil groups (HSGs) to indicate the minimum rate of infiltration obtained for bare soil after prolonged wetting. According to the Natural Resources Conservation Service (NRCS) Soil Survey Geographic database, the majority of the soil in the area of the proposed alternative routes is classified as HSGs C and D (Table 3-3). Soils classified as group C are sandy clay loam, and have low infiltration rates when thoroughly wetted. Soils classified as group D are clay loam, silty clay loam, sandy clay loam, silty clay, or clay, and have high runoff potential with very low infiltration rates. Such soil classifications are consistent with those observed for St. Tammany Parish.

Table 3-3.
Hydrologic soil groups

HSG	Percent of watershed	Percent of parish
B	5%	5%
C	56%	56%
D	39%	39%

Source: NRCS 2010

Land use and land cover data (NOAA 2006) indicates that the land in the project area is predominantly variations of forest, shrub/scrub, and wetlands. A breakdown of land use land cover data is in Table 3-4. The development and growth that is occurring in St. Tammany Parish is causing areas that were once fields and forest to quickly become pavement and rooftops, causing an increase in the amount of stormwater runoff.

Table 3-4.
2005 Land use land cover data

Land use land cover description	Percent of watershed	Percent of parish
Developed	3%	7%
Cultivated	1%	1%
Pasture/Hay/Rangeland	7%	6%
Forest	44%	20%
Shrub/Scrub	31%	13%
Wetland	13%	28%
Water	1%	25%

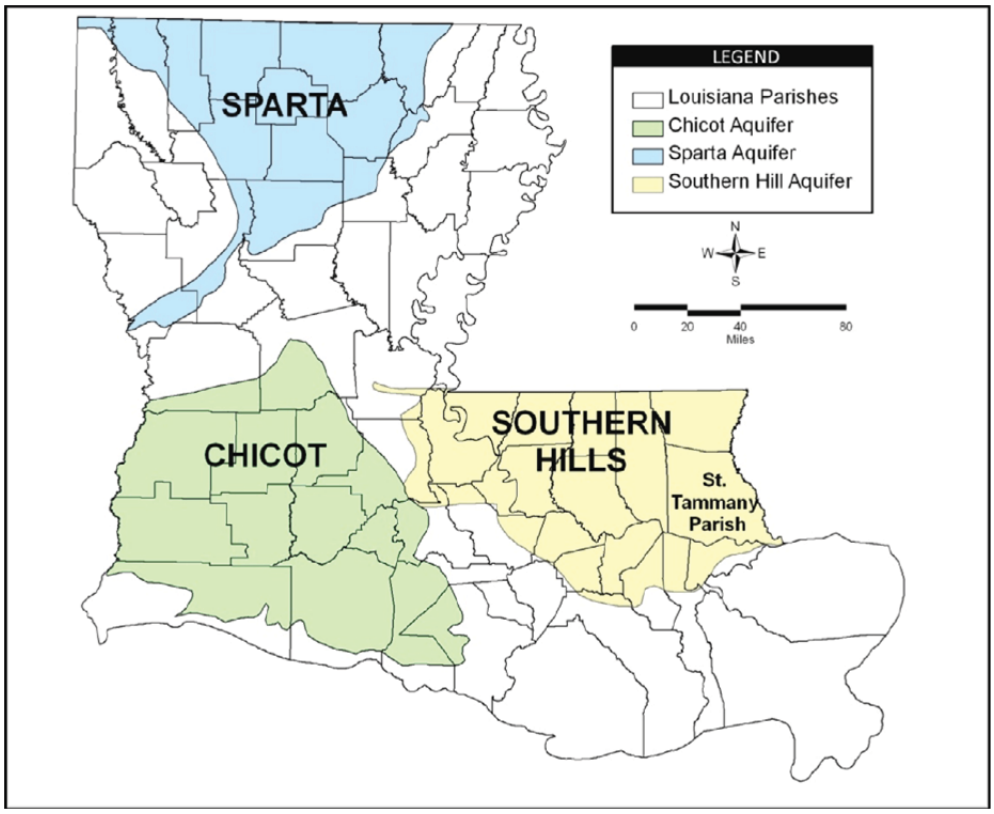
Source: NOAA 2006

3.3.1.1 Hydrogeology/Groundwater

The three major aquifers in Louisiana are the Chicot aquifer, Sparta aquifer, and Southern Hills aquifer (Figure 3-8). St. Tammany Parish is part of the Southern Hills aquifer, which accounts for approximately 20 percent of the state's total groundwater usage and is the primary source of water for 10 parishes in southeastern Louisiana. Most of the water drawn from the Southern Hills aquifer system is used for public water supply and industrial uses (C.H. Fenstermaker and Associates, Inc. 2002).

The Southern Hills aquifer is a mixture of the aquifer systems spanning the three major geologic ages represented in the area. The Chicot Equivalent is made up of the Pleistocene (2.588 million

to 12,000 years ago)-aged aquifers. The aquifers in the Pliocene (5.33 to 2.588 million years ago) are referred to as the Evangeline Equivalent system; and the Jasper Equivalent is of the Miocene (23.03 to 5.33 million years ago)-aged aquifers (USEPA 2009). That collection of aquifers extends from slightly west of the Mississippi River eastward to the Mississippi state line along the Pearl River and south of the east-west portion of the Mississippi-Louisiana border. The



Source: C.H. Fenstermaker and Associates, Inc. 2002

Figure 3-8. Major aquifers in Louisiana.

aquifers overlay each other at varying depths below ground level. St. Tammany Parish has a predominantly moderate recharge potential; however, a small portion of the parish shows high recharge potential (the northern portion of the parish) and low recharge potential (the southern portion of the parish).

The Chicot Equivalent aquifer system includes the *400-foot* and *600-foot* sands of the Baton Rouge area, the Gramercy, Norco, and Gonzales-New Orleans aquifers, the *1,200-foot* sand of the New Orleans area, and the shallow-sand and upper-Ponchatoula aquifer of the Tangipahoa-St. Tammany Parish area. The units of the Chicot Equivalent aquifer system range from around 50 to 1,100 feet in thickness increasing toward the south. The Chicot Equivalent aquifer system consists of beds of fine to coarse sand and gravel separated by clay layers. The aquifer system contains freshwater to up to 1,000 feet below land surface, with localized areas containing saltwater. Water levels in the Chicot Equivalent aquifer system typically range from 50 to 100 feet below land surface. Typical well depths are from 60 to 1,000 feet below land surface and yield 500 to 1,000 gallons per minute (C.H. Fenstermaker and Associates, Inc. 2002).

The Evangeline Equivalent aquifer system includes the *800-foot, 1,200-foot, 1,500-foot,* and *1,700-foot* sands of the Baton Rouge area; and the lower Ponchatoula, Big Branch, Kentwood, Abita, Covington, and Slidell aquifers of the Tangipahoa, St. Tammany, and Washington Parish

area. The units of the Evangeline Equivalent aquifer system range from around 50 feet to 1,000 feet in thickness, increasing toward the south. The Evangeline Equivalent aquifer system consists of beds of fine to medium sand, separated by clay layers. The *1,500-foot* sand in Baton Rouge area has saltwater encroachment. Water levels in the Evangeline Equivalent aquifer system typically range from 80 feet above land surface to 120 feet below land surface, except for the Baton Rouge area, where the water level is below 80 feet. Typical well depths are from 300 to 2,000 feet below land surface and yield 200 to 4,000 gallons per minute (C.H. Fenstermaker and Associates, Inc. 2002).

The Jasper Equivalent aquifer system includes the *2,000-foot,* and *2,800-foot* sand of the Baton Rouge area, and the Tchefuncta, Hammond, Amite, and Ramsay aquifers of the Tangipahoa, St. Tammany, and Washington Parish area. The units of the Jasper Equivalent aquifer system range from around 1,200 feet to 2,350 feet in thickness, increasing toward the south. The Jasper Equivalent aquifer system consists of beds of fine to coarse sand. The aquifer system contains freshwater to up to 3,500 feet below land surface in Tangipahoa Parish, with saltwater encroachment detected in some areas. Water levels in the Jasper Equivalent aquifer system typically range from 40 feet above land surface to 150 feet below land surface, except for the Baton Rouge area, where water levels are below 60 feet. Typical well depths are from 560 to 3,350 feet below land surface and yield 200 to 3,400 gallons per minute (C.H. Fenstermaker and Associates, Inc. 2002).

3.3.2 Water Quality

The project area is within the Lake Pontchartrain Basin. Water quality in the Lake Pontchartrain Basin has been an issue since the early 1960s, and the decline in the Lake Pontchartrain's water quality continued over the next few decades. In 1989 the Louisiana Legislature created the Lake Pontchartrain Basin Foundation (LPBF). The mission of the LPBF is to coordinate the restoration and preservation of the water quality and habitats of Lake Pontchartrain and the entire 10,000 square miles of Lake Pontchartrain Basin. With the continued efforts of the LPBF and numerous restoration programs, the lake's health has improved significantly. As part of those efforts, a water quality monitoring system has been established, which allows monitoring of both the health of the Lake and its tributaries and provides a way to identify the sources of pollution (Dufrechou 2007).

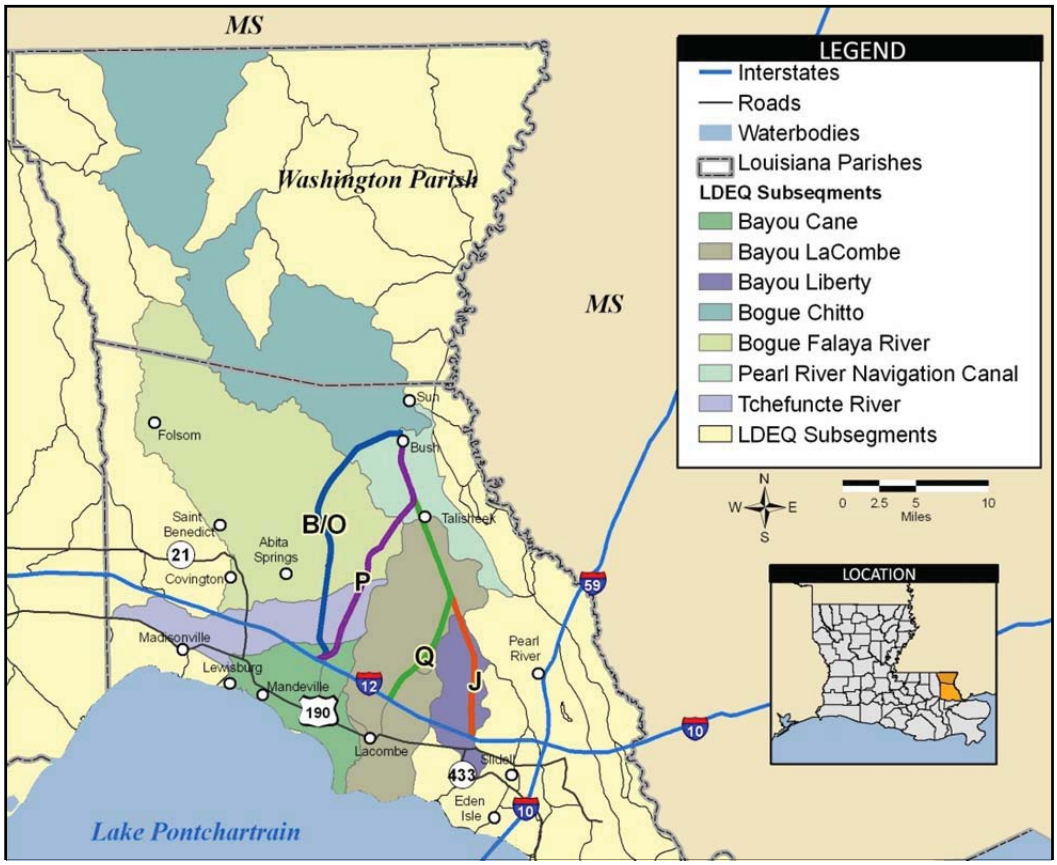
The Louisiana Department of Environmental Quality (LDEQ) performs water quality assessments to meet the requirements of the Federal Water Pollution Control Act commonly known as the CWA section 303(d) and 305(b). Section 303(d) requires the state to list impaired waterbodies and to develop a total maximum daily load (TMDL) for those waterbodies. CWA section 305(b) requires the states to provide the following data:

- A description of the water quality of all navigable waters in the state
- An assessment of the status of waters of the state with regard to their support of recreational activities and fish and wildlife propagation
- An assessment of the state's water pollution control activities toward achieving the CWA goal of having waterbodies that support recreational activities and fish and wildlife propagation
- An estimate of the costs and benefits of implementing the CWA
- A description of the nature and extent of nonpoint sources of pollution and recommendations for programs to address nonpoint source pollution

Those data are then reported to EPA every two years (even years) as part of the Louisiana Water Quality Inventory: Integrated Report (IR). The most recent report fully approved and posted by EPA is the 2006 IR. The final draft of the 2008 IR was submitted to EPA Region 6 on August 25, 2009; it is still in the review process and has not been posted on the EPA website. The 2010 IR is available for public comments and has not been submitted to EPA.

The data presented below refers to that presented as part of the 2006 IR (data collected from January 1, 1998, through September 23, 2005) and the 2008 IR (data collected from January 1, 2004, through October 30, 2007). Data from the 2010 IR are not included because they are considered provisional and still under review.

Three main watersheds in the project area are the Bogue Chitto, Lower Pearl, and Liberty Bayou–Tchefuncta watersheds. The overall status of all watersheds in the project area is impaired. A map showing the locations of the LDEQ-assessed watersheds is in Figure 3-9.



Source: LDEQ 2004

Figure 3-9. LDEQ water quality assessed watersheds.

Bogue Chitto River—State Line to Pearl River Navigational Channel

The Bogue Chitto River (from the Mississippi State line to the Pearl River Navigation Channel) watershed is approximately 53 square miles. The watershed showed no changes to the status, probable source, or causes of impairments from the 2006 IR to the 2008 IR. Water quality attainment information and probable sources contributing to the impairments are in Tables 3-5 and 3-6, respectively.

Table 3-5.
Water quality attainment—Bogue Chitto River (state line to Pearl River Navigational Channel)

Designated use	Designated use group	Status
Fish and Wildlife Propagation	Fish, Shellfish, and Wildlife Protection and Propagation	Impaired (2006 & 2008)
Outstanding Natural Resource Waters	Exceptional Recreational or Ecological Significance	Impaired (2006 & 2008)
Primary Contact Recreation	Recreation	Good (2006 & 2008)
Secondary Contact Recreation	Recreation	Good (2006 & 2008)

Table 3-6.
Probable sources contributing to impairment—Bogue Chitto River

Probable source	Probable source group	Causes of impairment
Atmospheric Deposition—Toxics (2006 & 2008)	Atmospheric Deposition	Mercury
Natural Sources (2006 & 2008)	Natural/Wildlife	Turbidity
Silviculture—Harvesting (2006 & 2008)	Silviculture (Forestry)	Turbidity
Source Unknown (2006 & 2008)	Unknown	Mercury
Sources Outside State Jurisdiction or Border (2006 & 2008)	Other	Turbidity

Pearl River Navigational Channel below Lock 3

The Pearl River Navigation Channel (below Lock 3) watershed is approximately 16 square miles. The status of the watershed did not change from the 2006 IR to the 2008 IR. However, the 2008 IR included an additional probable source (natural source) and cause of impairment (pH, Low). Water quality attainment information and probable sources contributing to the impairments are in Tables 3-7 and 3-8, respectively.

Table 3-7.
Water quality attainment—Pearl River Navigation Channel (below Lock 3)

Designated use	Designated use group	Status
Fish and Wildlife Propagation	Fish, Shellfish, and Wildlife Protection and Propagation	Impaired (2006 & 2008)
Primary Contact Recreation	Recreation	Good (2006 & 2008)
Secondary Contact Recreation	Recreation	Good (2006 & 2008)

Table 3-8.
Probable sources contributing to impairment—Pearl River Navigation Channel (below Lock 3)

Probable source	Probable source group	Cause of impairment
Atmospheric Deposition—Toxics (2006 & 2008)	Atmospheric Deposition	Mercury
Source Unknown (2006 & 2008)	Unknown	Mercury
Natural Sources (2008)	Natural/Wildlife	pH, Low

Bogue Falaya River—Headwaters to Tchefuncte River

The Bogue Falaya River (headwaters to Tchefuncte River) watershed is approximately 29 square miles. The status of primary contact recreation changed from Impaired in the 2006 IR to Good in the 2008 IR. The other statuses remained the same. In the 2008 IR, the causes of impairments such as fecal coliform due to on-site treatment systems, package plants or other permitted small flow discharges, and sanitary sewer overflows were removed from the probable sources contributing to impairments. Water quality attainment information and probable sources contributing to the impairments are in Tables 3-9 and 3-10, respectively.

Table 3-9.
Water quality attainment—Bogue Falaya River (headwaters to Tchefuncte River)

Designated use	Designated use group	Status
Fish and Wildlife Propagation	Fish, Shellfish, and Wildlife Protection and Propagation	Impaired (2006 & 2008)
Outstanding Natural Resource Waters	Exceptional Recreational or Ecological Significance	Good (2006 & 2008)
Primary Contact Recreation	Recreation	Impaired (2006) Good (2008)
Secondary Contact Recreation	Recreation	Good (2006 & 2008)

Table 3-10.
Probable sources contributing to impairment—Bogue Falaya River (headwaters to Tchefuncte River)

Probable source	Probable source group	Cause of impairment
Atmospheric Deposition—Toxics (2006 & 2008)	Atmospheric Deposition	Mercury
On-Site Treatment Systems (2006)	Natural/Wildlife	Chloride
Package Plant or Other Permitted Small Flow Discharges (2006)	Municipal Discharges/Sewage	Fecal Coliform
Sanitary Sewer Overflows (Collection System Failures) (2006)	Municipal Discharges/Sewage	Fecal Coliform
Source Unknown (2006 & 2008)	Municipal Discharges/Sewage	Fecal Coliform
Atmospheric Deposition—Toxics (2006 & 2008)	Unknown	Mercury

Bayou Lacombe—Headwaters to U.S. Hwy 190

The Bayou Lacombe (headwaters to US 190) watershed is approximately 13 square miles. The status of the outstanding natural resource waters changed from Good in the 2006 IR to Impaired in the 2008 IR. The other statuses remained the same. The 2008 IR has additional probable sources contributing to impairment such drainage filling/loss of wetlands, habitat modifications, littoral/shore area modifications, site clearance, and other unknown source. Those sources cause impairment to water quality by impacting the levels of chloride, total dissolved solids, and turbidity. Water quality attainment information and probable sources contributing to the impairments are in Tables 3-11 and 3-12, respectively.

Table 3-11.
Water quality attainment—Bayou Lacombe (headwaters to US Hwy 190)

Designated use	Designated use group	Status
Fish and Wildlife Propagation	Fish, Shellfish, and Wildlife Protection and Propagation	Impaired (2006 & 2008)
Outstanding Natural Resource Waters	Exceptional Recreational or Ecological Significance	Good (2006) Impaired (2008)
Primary Contact Recreation	Recreation	Good (2006 & 2008)
Secondary Contact Recreation	Recreation	Good (2006 & 2008)

Table 3-12.
Probable sources contributing to impairment—Bayou Lacombe (headwaters to US Hwy 190)

Probable source	Probable source group	Cause of impairment
Drought-Related Impacts (2006)	Natural/Wildlife	Chloride
Naturally Occurring Organic Acids (2008)	Natural/Wildlife	pH, Low
On-Site Treatment Systems (2006 & 2008)	Municipal Discharges/Sewage	Dissolved Oxygen
Drainage Filling/Loss of Wetlands (2008)	N/A	Chloride, Total Dissolved Solids, Turbidity
Habitat Modification—Other than Hydromodification (2008)	N/A	Chloride, Total Dissolved Solids
Littoral/Shore Area Modification (Non-Riverine) (2008)	N/A	Chloride, Total Dissolved Solids
Source Unknown (2008)	Unknown	Turbidity
Site Clearance (Land Development or Redevelopment) (2008)	N/A	Turbidity

Bayou Lacombe—US Hwy 190 to Lake Pontchartrain

The Bayou Lacombe (US Hwy 190 to Lake Pontchartrain) watershed is approximately 7 square miles. The status of primary contact recreation changed from Impaired in the 2006 IR to Good in the 2008 IR. The other statuses remained the same. In the 2008 IR, the causes of impairments such as fecal coliform due to on-site treatment systems were removed from the probable sources contributing to impairments; other causes were added, such as chloride, sulfates, and total dissolved solids, because of drainage filling/loss of wetlands, habitat modification, and littoral/shore area modifications. Water quality attainment information and probable sources contributing to the impairments are in Tables 3-13 and 3-14, respectively.

Table 3-13.
Water quality attainment—Bayou Lacombe (US Hwy 190 to Lake Pontchartrain)

Designated use	Designated use group	Status
Fish and Wildlife Propagation	Fish, Shellfish, and Wildlife Protection and Propagation	Impaired (2006 & 2008)
Outstanding Natural Resource Waters	Exceptional Recreational or Ecological Significance	Good (2006 & 2008)
Primary Contact Recreation	Recreation	Impaired (2006) Good (2008)
Secondary Contact Recreation	Recreation	Good (2006 & 2008)

Table 3-14.
Probable sources contributing to impairment—Bayou Lacombe (US Hwy 190 to Lake Pontchartrain)

Probable source	Probable source group	Cause of impairment
On-Site Treatment Systems (2006)	Municipal Discharges/Sewage	Fecal Coliform
Source Unknown (2006 & 2008)	Unknown	Dissolved Oxygen
Drainage Filling/Loss of Wetlands (2008)	N/A	Chloride, Sulfates, Total Dissolved Solids
Habitat Modifications—Other than Hydromodifications (2008)	N/A	Chloride, Sulfates, Total Dissolved Solids
Littoral/Shore Area Modifications (Non-Riverine) (2008)	N/A	Chloride, Sulfates, Total Dissolved Solids

Bayou Cane—Headwaters to US Hwy 190

The Bayou Cane (headwaters to US Hwy 190) watershed is approximately 1 square mile. The status of primary contact recreation changed from Impaired in the 2006 IR to Good in the 2008 IR. The other statuses remained the same. Probable sources and causes of impairments were added to the 2008 IR. Some of the probable sources are drainage filling/loss of wetlands, habitat modifications, littoral/shore area modifications, and other unknown sources. The causes of the impairments are chloride, sulfates, total dissolved solids, and turbidity. Water quality attainment information and probable sources contributing to the impairments are in Tables 3-15 and 3-16, respectively.

Table 3-15.
Water quality attainment—Bayou Cane (headwaters to US Hwy 190)

Designated use	Designated use group	Status
Fish and Wildlife Propagation	Fish, Shellfish, and Wildlife Protection and Propagation	Impaired (2006 & 2008)
Outstanding Natural Resource Waters	Exceptional Recreational or Ecological Significance	Impaired (2006 & 2008)
Primary Contact Recreation	Recreation	Impaired (2006) Good (2008)
Secondary Contact Recreation	Recreation	Good (2006 & 2008)

Table 3-16.
Probable sources contributing to impairment—Bayou Cane (headwaters to US Hwy 190)

Probable source	Probable source group	Cause of impairment
Drought-Related Impacts (2006)	Natural/Wildlife	Chloride
On-Site Treatment Systems (2006 & 2008)	Municipal Discharges/Sewage	Fecal Coliform, Dissolved Oxygen
Site Clearance (Land Development or Redevelopment) (2006 & 2008)	Construction	Turbidity
Drainage Filling/Loss of Wetlands (2008)	N/A	Chloride, Sulfates, Total Dissolved Solids, Turbidity
Habitat Modifications—Other than Hydromodifications (2008)	N/A	Chloride, Sulfates, Total Dissolved Solids
Littoral/Shore Area Modifications (Non-Riverine) (2008)	N/A	Chloride, Sulfates, Total Dissolved Solids
Source Unknown (2008)	Unknown	Turbidity

Bayou Cane—US Hwy 190 to Lake Pontchartrain

The Bayou Cane (US Hwy 190 to Lake Pontchartrain) watershed is approximately 2 square miles. The status of primary contact recreation, secondary contact recreation, and outstanding natural resource waters changed from an impaired status to a good status from the 2006 IR to the 2008 IR. The status of fish and wildlife propagation remained impaired. Causes of impairments such as fecal coliform and turbidity were removed in the 2008 IR as probable causes of impairments. Water quality attainment information and probable sources contributing to the impairments are in Tables 3-17 and 3-18, respectively.

Table 3-17.
Water quality attainment—Bayou Cane (US Hwy 190 to Lake Pontchartrain)

Designated use	Designated use group	Status
Fish and Wildlife Propagation	Fish, Shellfish, and Wildlife Protection and Propagation	Impaired (2006 & 2008)
Outstanding Natural Resource Waters	Exceptional Recreational or Ecological Significance	Impaired (2006) Good (2008)
Primary Contact Recreation	Recreation	Impaired (2006) Good (2008)
Secondary Contact Recreation	Recreation	Impaired (2006) Good (2008)

Table 3-18.
Probable sources contributing to impairment—Bayou Cane (US Hwy 190 to Lake Pontchartrain)

Probable source	Probable source group	Cause of impairment
On-Site Treatment Systems (2006 & 2008)	Municipal Discharges/ Sewage	Fecal Coliform (2006), Dissolved Oxygen (2006 & 2008), Turbidity (2006)
Package Plant or Other Permitted Small Flows Discharges (2006 & 2008)	Municipal Discharges/ Sewage	Fecal Coliform (2006), Dissolved Oxygen (2006 & 2008), Turbidity (2006)

Bayou Liberty—Headwater to LA 433

The Bayou Liberty (headwater to LA 433) watershed is approximately 13 square miles. The status of the designated uses did not change from the 2006 IR to the 2008 IR. Probable sources and causes of impairments were added to the 2008 IR. Some of the probable sources are drainage filling/loss of wetlands, habitat modifications, and littoral/shore area modifications. Water quality attainment information and probable sources contributing to the impairments are in Tables 3-19 and 3-20, respectively.

Table 3-19.
Water quality attainment—Bayou Liberty (headwater to LA 433)

Designated use	Designated use group	Status
Fish and Wildlife Propagation	Fish, Shellfish, and Wildlife Protection and Propagation	Impaired (2006 & 2008)
Primary Contact Recreation	Recreation	Good (2006 & 2008)
Secondary Contact Recreation	Recreation	Good (2006 & 2008)

Table 3-20.
Probable sources contributing to impairment—Bayou Liberty (headwater to LA 433)

Probable source	Probable source group	Cause of impairment
Atmospheric Deposition—Toxics (2006 & 2008)	Atmospheric Deposition	Mercury
On-Site Treatment Systems (2006 & 2008)	Municipal Discharges/Sewage	Dissolved Oxygen
Package Plant or Other Permitted Small Flows Discharges (2006 & 2008)	Municipal Discharges/Sewage	Dissolved Oxygen
Source Unknown (2006 & 2008)	Unknown	Mercury
Drainage Filling/Loss of Wetlands (2008)	N/A	Chloride, Sulfates, Total Dissolved Solids
Habitat Modifications—Other than Hydromodifications (2008)	N/A	Chloride, Sulfates, Total Dissolved Solids
Littoral/Shore Area Modifications (Non-Riverine) (2008)	N/A	Chloride, Sulfates, Total Dissolved Solids

Lower Tchefuncte River—Bogue Falaya River to LA 22

The Lower Tchefuncte River (Bogue Falaya River to LA 22) watershed is approximately 8 square miles. The status of the designated uses did not change from the 2006 IR to the 2008 IR. Probable sources and causes of impairments were added to the 2008 IR. Some of the probable sources are on-site treatment systems, package plant or other small flow discharges, and drought related impacts. Water quality attainment information and probable sources contributing to the impairments are in Tables 3-21 and 3-22, respectively.

Table 3-21.
Water quality attainment—Lower Tchefuncte River (Bogue Falaya River to LA 22)

Designated use	Designated use group	Status
Fish and Wildlife Propagation	Fish, Shellfish, and Wildlife Protection and Propagation	Impaired (2006 & 2008)
Outstanding Natural Resource Waters	Exceptional Recreation or Ecological Significance	Good (2006 & 2008)
Primary Contact Recreation	Recreation	Good (2006 & 2008)
Secondary Contact Recreation	Recreation	Good (2006 & 2008)

Table 3-22.
Probable sources contributing to impairment—Lower Tchefuncte River (Bogue Falaya River to LA 22)

Probable source	Probable source group	Cause of impairment
Atmospheric Deposition—Toxics (2006 & 2008)	Atmospheric Deposition	Mercury
Source Unknown (2006 & 2008)	Unknown	Mercury, Total Dissolved Solids (2008)
On-Site Treatment Systems (2008)	Municipal Discharges/Sewage	Dissolved Oxygen
Package Plant or Other Permitted Small Flows Discharges (2008)	Municipal Discharges/Sewage	Dissolved Oxygen
Drought-related Impacts (2008)	Natural/Wildlife	Total Dissolved Solids

3.3.3 Stormwater Management

Stormwater management in St. Tammany Parish is enforced through the use of the parish and local municipalities' ordinances and drainage regulations. The use of floodplain maps and Federal Emergency Management Agency (FEMA) regulations are also used as stormwater management tools in St. Tammany Parish.

St. Tammany Parish has implemented ordinances such as the Subdivision Regulatory Ordinance No. 499 to regulate the development in the parish. Section 40-037.0 of the parish's subdivision regulations has specific drainage requirements for new development to meet. Items such as specifications for subsurface drainage, maintenance responsibility, and fill are just some of the items detailed in the ordinance used for stormwater management (St. Tammany Parish 2009a).

Section 40-061.01 requires that a hydrological study for all new subdivisions be completed with the appropriate retention/detention facility designs. St. Tammany Parish requires that all drainage structures are designed to reduce peak runoff rate for all storm events up to the 100-year storm. The peak runoff rate for the 25-, 50-, and 100-year storms must be reduced by 25 percent. At no time may the runoff rate exceed that of the predevelopment conditions (St. Tammany Parish 2009a).

Although the parish has those regulations, some of the other municipalities in St. Tammany Parish, such as Sun do not have subdivision regulations. Also, areas such as Abita Springs and Pearl River do not require new development to provide retention/detention (St. Tammany Parish 2009a).

The parish also implements a Flood Hazard Area Ordinance that meets all the National Flood Insurance Program's floodplain regulatory requirements. In some flood hazard areas, the parish's ordinances are higher than the minimum requirements. Folsom, Abita Springs, Sun, and Pearl River's Flood Damage Prevention Ordinances also meet the minimum requirements (St. Tammany Parish 2009a).

Recommendations for proposed watershed protection regulations and enforcement of FEMA standards have been made as part of the St. Tammany Parish—Natural Hazards Mitigation Plan (April 2009); and the parish and local municipalities are working to implement many of those recommendations (St. Tammany Parish 2009a).

3.4 ECOLOGICAL AND BIOLOGICAL RESOURCES

3.4.1 Vegetative Communities

Vegetative communities in the project area are identified by the Louisiana Natural Heritage Program (LNHP) in *The Natural Communities of Louisiana* (LNHP 2009). Figure 3-10 identifies the natural communities in the project area. Table 3-23 lists the natural communities and approximate land coverage in the project boundaries.

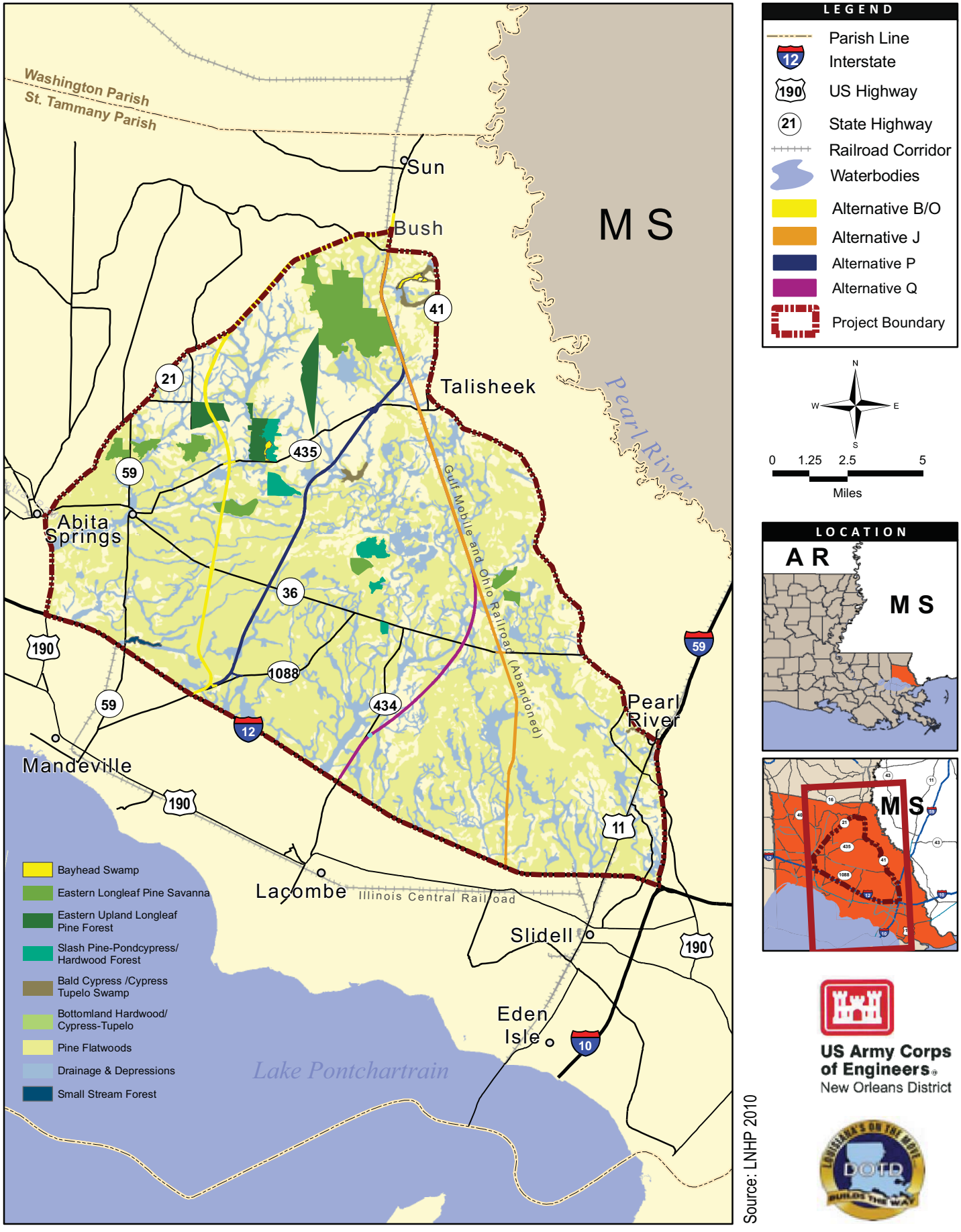
Abita Creek flatwoods and Talisheek Mitigation Banks contain the largest protected swaths of bayhead swamps in the Florida Parishes (Lester 2005). Approximately 71,386 acres of bayhead swamp, longleaf pine savanna, flatwood, hillside seepage bog, slash pine-pondcypress/hardwood, and riparian forest are in the project area (LNHP GIS Database 2010; St. Tammany Parish GIS Office 2010).

Table 3-23.
Natural communities in the project area

Community	Acres
Bayhead Swamp	128
Eastern Hillside Seepage Bog (Pitcher Plant Bog)	30
Eastern Longleaf Pine Savanna	5,386
Eastern Upland Longleaf Pine Forest Longleaf Pine	1,263
Pine Flatwoods	40,911
Slash Pine-Cypress/Hardwood Forest	19,675
Small Stream Forest	92
Tupelo-Black Gum Swamp	3,901

Source: LNHP GIS Database 2010

Figure 3-10 - Natural communities



3.4.1.1 Bayhead Swamp

Bayhead swamps occur at the heads of creeks or branches, at the base of slopes, in depressions of pine flatwoods, and along borders of swamps. Soils are deep and mucky, typically moist, saturated, or inundated throughout the growing season. Sweet bay (*Magnolia virginiana)* is typically the dominant overstory tree; black gum is also prevalent. Laurel oak (*Quercus laurifolia*), red maple (*Acer rubrum*), sweet gum (*Liquidambar styraciflua*), water oak (*Q. nigra*), bald cypress (*Taxodium distichum*), pond cypress (*T. ascendens*), slash pine (*Pinus elliottii*), and longleaf pine (*P. palustris*) might also be present in the community. The bayhead swamp vegetative community ranges from a shrub-dominated swamp to a mature forest with a primary midstory and understory of evergreen shrubs. Ferns and other herbaceous plants are generally sparse but are on the dryer areas of the forest floor. During extreme drought, fire can invade the swamp and have a significant effect on the plant community structure.

3.4.1.2 Eastern Hillside Seepage Bog (Pitcher Plant Bog)

Eastern hillside seepage bogs, also known as pitcher plant bogs, are open mostly treeless, herb-dominated natural wetlands of hilly, sandy uplands historically dominated by longleaf pine of the East Gulf Coastal Plain. The bogs occur on the Pleistocene high terraces in Washington and St. Tammany Parishes arising commonly on mid to low slopes on saturated nutrient poor soils (Lester 2005).

The bogs are persistently wet from seepage and vary in size from less than one acre to as much as 10 acres (rare). The bogs are typically underlain by an impervious clay layer that, when conditions are suitable, causes groundwater to constantly seep to the soil surface. The herbaceous groundcover is dense, continuous, and floristically rich, dominated by sedges, grasses, and grass-like plants and many unusual forbs, including pitcher plants (*Sarracenia* spp.) and a variety of orchid species. Hillside bogs evolved with frequent growing-season fire events because fire deters invasion by shrubs and trees and stimulates flowering and seed production of indigenous bog herbs (Lester 2005).

Hillside seepage bogs are naturally small and historically were embedded within longleaf pine forests. Presettlement extent of seepage bogs in Louisiana is estimated at less than 2,000 acres with 10–25 percent remaining in Washington and St. Tammany Parishes. Such present-day bogs are most often found surrounded by commercial timberlands—too wet and unfavorable for commercial tree production—or along power line and pipeline ROWs where management practices have minimized the presence of shrubs and other woody vegetation (Lester 2005).

Minimal protection is offered for the bogs, and The Nature Conservancy's (TNC's) Abita Creek Mitigation Bank contains a seepage bog of approximately 8 acres. One small, privately owned bog, less than one acre, is registered with the Louisiana Natural Areas Registry Program, and a one-acre bog owned by a commercial timber company designated as a *special site* by the company. No bogs are known on federal or state lands in the project area. A large, 20-acre bog containing at least five species of state rare and globally rare plant species is privately owned; the status of the bog is unknown (Lester 2005).

3.4.1.3 Eastern Longleaf Pine Savanna

Eastern longleaf pine savannas are floristically rich, herb-dominated wetlands scattered with longleaf pines. The ecosystem has historically dominated the Gulf Coast Plain flatwood regions of southeast and southwest Louisiana. Wet savannas occupy poorly drained and seasonally saturated/flood depressions and low flats. Longleaf pine is dominant, but also prevalent are slash pine, sweet bay, black gum, live oak (*Q. virginiana*), blackjack oak (*Q. marilandica*), and laurel oak. Herbaceous vegetation is predominantly a mixture of grasses but also has flowering plants

from the *Liliaceae*, *Asteraceae*, *Orchidaceae* families, and several varieties of mosses. Fire is an important factoring in controlling species occurrence and encouraging diversity.

Historically, the eastern Florida Parishes were dominated by extensive stands of longleaf pine savanna; however, less than one percent remains because of land conversion, development, and timber production. TNC manages approximately 4,200 acres of longleaf pine savanna on Abita Creek, Lake Ramsey, and Talisheek Mitigation Banks. Abita Creek Flatwoods and Talisheek Pine Wetlands are in the northern area of the project southwest of the town of Bush. LDWF also maintains approximately 800 acres in Lake Ramsey wildlife management area (WMA) west of the project area. Additional preserves and refuges in the area protect an additional 7,000 acres of mixed pine flatwoods and remnant savannas east of the project area (Lester 2005).

3.4.1.4 Eastern Upland Longleaf Pine Forest

Evergreen upland longleaf pine forests occur in the hilly uplands of the central and eastern Florida Parishes and are dissected by small to large branch or creek bottoms. Longleaf pine is the dominant overstory species and, where fire has frequently occurred, is often the only canopy species. Where fire has not occurred, a much more diverse canopy exists and includes shortleaf pine (*P. echinata*), loblolly pine (*P. taeda*), black gum, sweet gum, red maple, and a variety of oak tree species. More frequent fires increase the diversity of herbaceous flora in the forest.

Habitat for the federally listed, endangered gopher tortoise (*Gopherus polyphemus*) exists in the sandy soils and herbaceous understory of the forest. Today, approximately 1–5 percent of the original upland longleaf pine forest remains because of historical development and land conversion. LDWF owns and manages several longleaf pine forests outside the project area (Lester 2005).

3.4.1.5 Pine Flatwoods

Pine flatwoods are in depressions surrounded by relatively flat terrain with a high water table and found in a mosaic with other flatwoods, savannas, and bayhead swamps (LNHP 2008). Soil moisture is relatively balanced during the spring and fall seasons, dryer in the summer, and more saturated in the winter. The community is also closely integrated with eastern longleaf pine savannas on the gently rolling landscape of southern and eastern St. Tammany Parish (CH2MHill 2003). Longleaf pine and slash pine are co-dominant species found in the Florida parishes region of Louisiana. Midstory plantings are dominated by small trees, and evergreen shrubs interspersed with flowering herbaceous perennials and grasses. Pine flatwoods share a similar vegetative community with pine savannas, but flatwoods tend to have a denser canopy and a thicker midstory and understory resulting in a lower floristic diversity.

The majority of the project area is pine flatwoods crossed by numerous small streams and rivers bordered by bayhead swamps and bottomland hardwood flatwoods. In the project area, a significant acreage of wetlands occupies broad flats incised by small creeks and drains. The western portion of the project area drains to the Abita River, the central area drains south to Bayou Lacombe, and the extreme southeastern portion drains to Bayou Liberty. The broad flats are integral in reducing downstream flooding by storing stormwater and releasing it slowly to waterways surrounded by existing development. Stormwater filtered in the upper reaches of the pine flatwoods is critical in maintaining water quality in the Lake Pontchartrain Basin (CEMVN 2008).

The plant species occurring in the community are predominantly categorized by the USFWS as obligate wetland or facultative wetland species, making the region vital because the majority of the plants cannot exist in other communities. Flatwoods and savannas are noted for their unique insectivorous plants and orchids endemic to the communities. The diversity of insect fauna is

dependent on the unique varied hydrology, host plant diversity, and microhabitats in the ecosystem that function as upland and wetland habitat (CEMVN 2008).

The pine flatwood/savanna ecoregion provides a multitude of wet and dry areas and encourages a rich diversity of mammal, reptile, amphibian, and bird movement in and throughout the habitat (CEMVN 2008). Flatwoods provide foraging area for wading birds and foraging, nesting, and travel corridors for a number of mammals. Many resident songbird populations have declined in the past 30 years because of habitat alteration. Pine flatwoods are also considered essential foraging and nesting habitat for the federally listed endangered red-cockaded woodpecker (*Picoides borealis*).

3.4.1.6 Slash Pine-Cypress/Hardwood Forest

Slash pine-cypress/hardwood forests are commonly within a mosaic with pine flatwoods and savannas between the higher, dryer flatwoods and the lower, wetter bayhead swamps. Soils are typically saturated throughout the year, and shallow, standing water is present in late fall, winter, early spring, and after rains during the growing season. The overstory is dominated by slash pine, bald cypress, and pond cypress. Other hardwoods include sweet bay, black gum, red maple, sweet gum, and water oak. The understory is dense and typically comprises a mix of small evergreen trees and shrubs. Ferns and mosses are common throughout the forest floor. Fires can occur during extreme periods of drought.

The community can vary considerably depending on minor variations in topography, soils, and hydrologic and fire regimes. The forests have evolved with ground fires from lightning to maintain community biodiversity. Recurring ground fires maintain the pine community while excluding hardwoods. Approximately 10–25 percent of the habitat remains, and protected communities are in Abita Creek and Talisheek Mitigation Banks. Unprotected communities might exist in areas owned by commercial timberlands and developers, but the acreage is unknown (Lester 2005).

3.4.1.7 Small Stream Forest

Riparian forests or small stream forests occur along small rivers and large creeks in southern Louisiana. Such relatively narrow wetland forests are seasonally flooded for brief periods and the vegetative community often resembles hardwood slope forests also known as beech-magnolia forests. Spruce pine (*P. glabra*), bald cypress, loblolly pine, southern magnolia (*M. grandiflora*), beech (*Fagus grandifolia*), black gum, sweet gum, red maple, swamp white oak (*Q. michauxii*), white oak (*Q. alba*), water oak, laurel oak, cherrybark oak (*Q. falcata var pagodaefolia*), sycamore (*Platanus occidentalis*), river birch (*Betula nigra*), shagbark hickory (*Carya ovata*), white ash (*Fraxinus americana*), water ash (*F. caroliniana*), cherry laurel (*Prunus caroliniana*), winged elm (*Ulmus alata*), and yellow poplar (*Liriodendron tulipifera*) are commonly found along the water's edge. Midstory and understory plants include a variety of evergreen and deciduous shrubs and small trees.

Approximately 50–75 percent of small stream forests have been lost in Louisiana from historical agricultural conversion and timber harvesting. Today, habitat loss is more directly attributed to urban development. The Louisiana Natural and Scenic River System program has helped to protect some remaining habitat (Lester 2005).

3.4.1.8 Tupelo–Black Gum Swamp

Tupelo-black gum swamps are forested, alluvial swamps that grow intermittently on exposed soils and often occur at higher elevations than bald cypress-tupelo swamps or bald cypress swamps. Soils are inundated or saturated by surface water or groundwater on a semi-permanent basis throughout the growing season, except during periods of extreme drought. Dominant

overstory species include one or more species of gums (*Nyssa* spp.). Commonly associated species are bald cypress, swamp red maple (*A. rubrum var. drummondii*), black willow (*Salix nigra*), pumpkin ash (*F. profunda*), water elm (*Planera aquatica*), water locust (*Gleditisia aquatica*), swamp privet (*Forestiera acuminata*), and laurel oak. Plant community composition is dependent on flooding regime, and the understory is typically sparse because of the long seasonal inundation and low light intensity. In St. Tammany Parish, tupelo-black gum swamp habitat is concentrated in the southern region of the parish along Lake Pontchartrain.

3.4.2 Wildlife and Fisheries

The largely rural character of the project area and its diversity of vegetative communities and habitats can support a wide variety of resident, transient, and migratory wildlife. Pine flatwoods and other natural communities of the project area provide critical regional woodland, open-land, scrub/shrub, and wetland habitats that support nongame and game wildlife and the related activities of hunting/trapping, fishing, and birding. Transitional areas between the different vegetative communities also provide critical edge habitat that offers forage, cover, roosting, nesting, and corridor resources to many types of wildlife. A searchable online database accessible from the Louisiana Wildlife Federation's Web site lists more than 50 species of mammals, more than 120 species of reptiles and amphibians, more than 260 species of birds, and a sampling of the hundreds of invertebrates (insects and spiders, including more than 100 butterfly species) that are found in St. Tammany Parish (eNature 2010).

3.4.2.1 Wildlife

Common mammals likely to be found in the project area are gray squirrel (*Sciurus carolinensis*) and fox squirrel (*S. niger*), eastern cottontail rabbit (*Sylvilagus floridanus*), swamp rabbit (*S. aquaticus*), opossum (*Didelphis virginiana*), raccoon (*Procyon lotor*), beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), nutria (*Myocastor coypus*), numerous small rodents [mice (*Mus musculus*), moles (*Scalopus*), shrews (*Tupia* spp.), skunk (*Mephitis mephitis*), mink (*Mustela vison*) and weasel (*mustela nivalis*)], otter (*Lutra Canadensis*), red fox (*Vulpes vulpes*), white-tailed deer (*Odocoileus virginianus*), feral pigs (*Sus scrofa*), black bear (*Ursus americanus*) and several species of bats (CEMVN 2008; eNature 2010; USDA NRCS 1990). Common amphibians and reptiles of the project area are numerous species of frogs, toads, newts, and salamanders; the American bullfrog (*Rana catesbeiana*); numerous aquatic and terrestrial snakes and turtles, and the American alligator (*Alligator mississippiensis*).

Wet pine flatwoods/savannas are an important habitat for a number of rare amphibians and reptiles including the flatwoods salamander (*Ambystoma cingulatum*), gopher frog (*R. captio*), pine woods tree frog (*Hyla femoralis),* oak toad (*Bufo quercicus),* box turtle (*Terrapene carolina),* eastern diamondback rattlesnake (*Crotalus adamanteus),* black racer (*Coluber constrictor),* pine snake (*Pituophis melanoleucus*), southern hognose snake (*Heterodon simus*) and gopher tortoise (*G. polyphemus*) (CEMVN 2008). The federally listed endangered gopher tortoise (*G. polyphemus*) and threatened ringed map turtle (*Graptemys oculifera*) are found in the project area and are discussed in Section 3.4.5.

The wetter areas of the pine flatwoods provide aquatic habitat for adult tree frogs and other juvenile and adult amphibian populations. A variety of minnow, mosquitofish (*Gambusia affinis*), and other small fish inhabit the area when seasonal water elevations can support them. Such fish are a vital link as a food source for higher fish and wildlife species. Standing water levels allow small fish to escape predation and reproduce throughout the area. As water levels recede, the fish retreat to the bayhead swamps where they are exploited by larger fish, wading birds, turtles, alligators, and other fish-eating animals (CEMVN 2008).

Several species of amphibian and reptiles associated with longleaf habitats are listed or being considered for listing as threatened or endangered. The eastern diamondback rattlesnake (*C. adamanteus*) is the flagship species representing the imperiled longleaf forest's call for conservation. Flatwoods salamander (*A. cingulatum*), gopher frog (*R. captio*), pine snake (*P. melanoleucus*), and southern hognose snake (*H. simus*) are being considered for listing as threatened or endangered. The gopher tortoise (*G. polyphemus*) is federally listed as threatened.

3.4.2.2 Birds

Migratory and resident bird species supported by habitats of the project area include Henslow's sparrow (*Ammodramus henslowii*), Bachman's sparrow (*A. aestivalis*), loggerhead shrike (*Lanius ludovicianus*), brown-headed nuthatch (*Sitta pusilla*), American woodcock (*Scolopax minor*), wood duck (*Aix sponsa*), turkey (*Meleagris gallopavo),* herons, egrets, ibises, raptors (including the great horned owl [*Bubo virginianus*]), and a variety of songbirds, including yellow-billed cuckoo (*Coccyzus americanus)*, wood thrush (*Hylocichla mustelina),* pine warbler (*Dendroica pinus),* hooded warbler (*Wilsonia citrine)*, white-eyed vireo (*Vireo griseus*)*,* and red-headed woodpeckers (*Melanerpes erythrocephalus*). Those songbirds have exhibited substantial population declines over the past 30 years from habitat loss and urban development (CEMVN 2008). A bird observation checklist for the Abita Creek and Flatwoods Mitigation Bank has 65 bird species that are considered abundant or common and another 36 bird species that are uncommon at the mitigation bank but possible to see or hear (TNC 2010a). Bachman's sparrow (*A. aestivalis*) is being considered for listing as threatened or endangered. The federally listed endangered red-cockaded woodpecker (*P. borealis*) is found in the project area and is discussed in Section 3.4.5.4 (CEMVN 2008).

3.4.2.3 Invertebrates

Common flying insects, many of which also live part of their lives as aquatic larvae and nymphs, in the area are dragonflies, damselflies, mayflies, lacewings, butterflies, moths, bees, wasps, flies, and mosquitoes. Numerous invertebrates inhabit plant and leaf surfaces, including grasshoppers, crickets, katydids, roaches, thrips, true bugs, cicadas, aphids, whiteflies, scales, a wide variety of beetles, caterpillars, galls, maggots, fruit flies and the diverse arthropod predators of herbivorous species. Decaying and live wood supports springtails, silverfish, wood roaches, earwigs, termites, bark lice, bark beetles, boring beetles, wood boring caterpillars, wood boring Hymenoptera, and their associated predators. Along with aquatic nymphs of flying insects, wet pine flatwoods/ savannah sheet flow wetlands support aquatic lepidopterans, water bugs, backswimmers, water striders, diving beetles, and whirligig beetles during the wet season, and during the dry season the organisms move into drying pools of the wet pine flatwoods/savanna. Arachnids of the wet pine flatwoods/savanna are web-building spiders, hunting spiders, water spiders, daddy-longlegs, mites, and ticks. Other invertebrates present are millipedes, centipedes, snails, and slugs (CEMVN 2008).

3.4.2.4 Aquatic Species

The numerous streams, creeks, drains, ponds, and wetlands of the project area support abundant populations of freshwater fish. The project area is in Louisiana's Pontchartrain water quality management basin (Lester 2005). The project area in St. Tammany Parish is in the northern half of that basin and does not have any brackish or saltwater fisheries or habitats. The Pontchartrain Basin, and the Pearl Basin to the east, support the highest aquatic species diversity in southeast Louisiana, with 109 species of freshwater fishes, 35 species of mussels, and 13 species of crawfish (Lester 2005). Dominant fish species of the wet pine flatwoods/savanna are the gulf starhead topminnow (*Fundulus nottii)*, blackspotted topminnow (*F. olivaceous*), golden topminnow (*F. chrysotus*), and three poeciliids: the mosquitofish (*G. affinis),* the least killifish

(*Heterandria formosa),* and the sailfin molly (*Mollienesia latipinna).* Those fish are an essential link between the primary producers and higher trophic level fish and wildlife species (CEMVN 2008). The small, soft-finned fishes typically feed on plant and animal tissue such as periphyton, insect larvae, and vascular plant detritus. The small fish species, in turn, then become food for sport fish, wading birds, and foraging mammals. The seasonal pattern of fish–habitat interaction in the wet pine flatwoods/savanna follows the hydrologic cycle. Beginning in June, standing water levels allow small fish to escape predation and proliferate throughout abundant feeding and nursery grounds provided by the shallow sheet flow wetlands. The increased habitat range accommodates a population boom in species capable of a life cycle in mere inches of water. As water levels recede, fish retreat to the bayhead swamps and area drains and streams, where they become an abundant food supply in shallow, isolated areas for larger fishes, wading birds, turtles, alligators, and piscivorous mammals (CEMVN 2008). Larger freshwater fish that could occur in streams or pools of the project area include bluegill (*Lepomis macrochirus*); redear (*L. microlophus*); white and black crappie (*Pomoxis annularis* and *P. nigromaculatus*), also called Sac-a-lait in south Louisiana; several species of catfish, and largemouth bass (*Micropterus salmoides*) (LDWF 2010a).

LDWF's *Wildlife Action Plan* identifies 19 aquatic species of conservation concern in the Pontchartrain Basin, consisting of 3 crustaceans [ribbon crawfish (*Procambarus bivittatus*), plain brown crawfish (*P. shermani*), and flatwoods digger (*Fallicambarus oryktes*)], 6 freshwater fish [gulf sturgeon (*Acipenser oxyrinchus desotoi*), paddlefish (*Polyodon spathula*), flagfin shiner (*Pterronotropis signipinnis*), river redhorse (*Moxostoma carinatum*), broadstripe topminnow (*F. euryzonus*), gulf logperch (*Percina caprodes*)], 8 mussels (rayed creekshell (*Anodontoides radiatus*), elephant-ear (*Elliptio crassidens*), southern pocketbook (*Lampsilis ornata*), southern hickorynut (*Obovaria jacksoniana*), Alabama hickorynut (*Obovaria unicolor*), Mississippi pigtoe (*Pleuorbema beadleianum*), inflated heelsplitter (*Potamilus inflatus*), southern rainbow (V*illosa vibex*)], and 2 reptiles [alligator snapping turtle (*Macroclemys temminckii*)), Mississippi diamond-backed terrapin (*Malaclemys terrapin*)] (Lester 2005).

3.4.3 Threatened and Endangered Species and Habitats

The ESA was passed in 1973 to protect and recover imperiled species and the ecosystems on which they depend. Together, the USFWS and the National Marine Fisheries Service (NMFS) manage the ESA. The USFWS is responsible for administering protection and recovery for terrestrial and freshwater organisms, and the NMFS is responsible for non-bird marine organisms (USFWS 2009).

Under the ESA, species may be listed as endangered or threatened. An *endangered* species is one in danger of extinction throughout all or a significant portion of its range. A *threatened* species has a high probability of becoming endangered in the near future throughout all or a significant portion of its range. All species of plants and animals, except pest insects, are eligible for listing as endangered or threatened. The ESA protects threatened and endangered species and their habitats by prohibiting the *take* of a listed species (USFWS 2009).

Take is defined as, "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct." The term *harm* includes significant habitat modification or degradation by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Plants are not restricted from take but collection and malicious harm is prohibited on federal land (USFWS 2009).

LDWF provided a list of federally threatened or endangered species, and a consultation was conducted with USFWS. The USFWS provided comments to the USACE in a letter, dated December 16, 2008, and identified four threatened and endangered species and their habitat in the

project area. USFWS requested that the EIS address primary and secondary effects on those habitats and sensitive wetland habitats and fire management practices on wetland mitigation bank sites. Table 3-24 below outlines the list of species or their habitat that might exist in the proposed project area. Figure 3-11 illustrates the potential locations of threatened and endangered species or their potential habitat in the proposed project area. A detailed Threatened and Endangered Species report is included as Appendix C.

Table 3-24.
Federally listed species of potential occurrence in the project area

Common/scientific name	Status	Date listed	Parish	Habitat
Plants				
Louisiana quillwort *(Isoetes louisianensis)*	E	1992	St. Tammany, Washington	Sand and gravel bars on accreting riverbends
Reptiles				
Gopher tortoise (*Gopherus polyphemus)*	T	1987	Washington	Pipeline and powerline ROWs
Ringed map turtle (*Graptemys oculifera)*	T	1986	St. Tammany, Washington	Moderate current rivers, clear water w/ logs & sandy banks
Birds				
Red-cockaded woodpecker (*Picoides borealis*)	E	1970	St. Tammany, Washington	Open, park-like mature stands of pine trees with open understory

Source: CEMVN 2008

Currently, there is a proposed ruling by the USFWS to designate critical habitat for the federally listed Mississippi gopher frog (*Rana capito sevosa*). One of the areas proposed for critical habitat would is located within the I-12 to Bush project vicinity, specifically within the Alternative J proposed alignment.

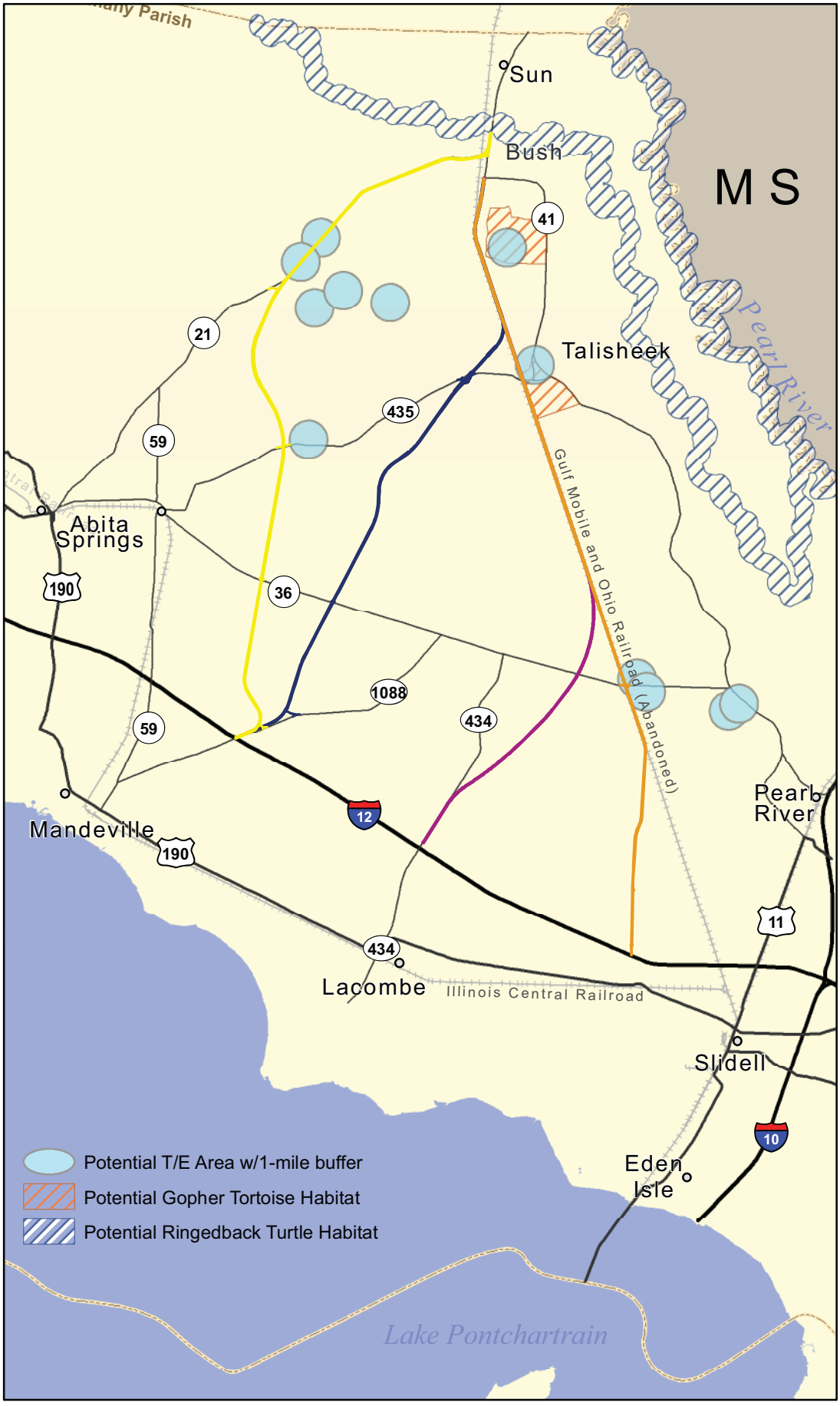
3.4.3.1 Louisiana quillwort (Isoetes louisianensis)

The Louisiana quillwort, federally listed as endangered, is known to occur in St. Tammany and Washington parishes in southeastern Louisiana (USFWS 1996), 10 counties in Mississippi, and 2 counties in Alabama (U.S. Department of Interior 2008). The Louisiana quillwort grows on sand and gravel bars on the accreting sides of blackwater streams and overflow channels in riparian and bayhead forests of pine flatwoods and upland longleaf pine communities (USFWS 1996).

The Louisiana quillwort is included in the family of primitive, seedless plants related to ferns (USFWS 1996). It is a small, semi-aquatic facultative evergreen plant with spirally arranged leaves (sporphylls) arising from a globose, two-lobed corm. The flexible hollow leaves are transversely septate and measure approximately 0.12 inch wide and 16 inches long.

Major threats to the species are habitat loss through hydrologic modifications of stream habitat and land use practices that significantly alter stream water quality and hydrology. The Louisiana quillwort appears to be dependent on a special hydrologic regime resulting from the presence of small springs scattered at the base of banks or bluffs. The plant's survival could be directly or indirectly affected by construction activities that destroy their colonies or reduce their habitat via water quality degradation or changes in stream morphology (U.S. Department of Interior 2008).

Figure 3-11 - Federally listed threatened and endangered species of potential occurrence



LEGEND

- Parish Line
- Interstate
- US Highway
- State Highway
- Railroad Corridor
- Waterbodies
- Alternative B/O
- Alternative J
- Alternative P
- Alternative Q
- Project Boundary

N W E S

0 1.25 2.5 5

Miles

LOCATION

Source:USEPA 2001

US Army Corps of Engineers
New Orleans District

According to the 1996 USFWS Recovery Plan for the Louisiana quillwort, the Louisiana quillwort has been identified in four locations in the Tchefuncta River watershed in St. Tammany Parish. More than 1,500 plants were observed along a 0.6-mile section of a tributary to the Bogue Falaya, and 50 plants were identified at Little Bogue Falaya River southeast of Barkers Corner. In the Abita River drainage basin, approximately 400 plants were identified along a 0.3-mile section of Abita Creek, 18 plants at a site on Coon Creek, and 2 additional at Ten-Mile Creek. Another area was identified at Bayou Chinchuba, which drains directly to Lake Pontchartrain (USFWS 1996), but that area is outside the project boundary.

No critical habitat has been identified for Louisiana quillwort, but appropriate habitat exists in the project area.

3.4.3.2 Gopher Tortoise (Gopherus polyphemus)

The gopher tortoise is a federally listed threatened species known to inhabit the Ben's Creek WMA in Washington Parish and pipeline and powerline ROWs. The gopher tortoise is associated with areas that have well-drained, sand or gravel soils appropriate for burrow establishment, ample sunlight for nesting, and understory vegetation suitable for foraging (i.e., grasses and forbs). Gopher tortoises prefer an open longleaf pine-scrub oak community that is thinned and burned every few years (U.S. Department of Interior 2008).

The gopher tortoise is a dark-brown to grayish-black terrestrial turtle with elephantine hind feet, shovel-like forefeet, and the front of the shell projects out under the throat. The shell of an adult tortoise is approximately 5.9 to 14.6 inches long. Gopher tortoise hatchlings are yellowish-orange with a soft shell and are 1.5 to 2 inches long at hatching (USFWS 1990).

The gopher tortoise is the only native tortoise found in the southeastern United States. Historically, the population was identified in the longleaf pine hills of northern Mobile, Washington, and southeastern Choctaw Counties in Alabama, in 14 counties in southeastern upland area of Mississippi, and in the southeastern upland ridges in St. Tammany, Washington, and Tangipahoa Parishes in Louisiana (USFWS 1990). Habitat degradation through fire suppression and land conversion to agriculture or urbanization have contributed to the decline of the species. Habitat decline has generally concentrated the remaining gopher tortoise population along pipeline and power line ROWs within their range in Louisiana.

No critical habitat has been identified for the gopher tortoise within the 250-ft ROW of any of the four proposed alternatives, but appropriate habitat might exist in the project area (see Appendix C). The gopher tortoise has been sighted at six locations in the project area (CEMVN 2008).

3.4.3.3 Ringed Map Turtle (Graptemys oculifera)

The federally listed threatened ringed map turtle (*Graptemys oculifera*), also known as the ringed sawback turtle, is endemic to the Pearl River system. In Louisiana, it inhabits the Bogue Chitto River south of Franklinton, and the Pear River north of LA 190 in St. Tammany and Washington Parishes.

The shell of the adult turtle is curved with spine-like projections and range in color from light olive to dark green. The head is dark brown to black with yellow stripes with a prominent yellow bar on the chin that extends to the back of the jaw. The spines on the shell are black and typically flanked by curved yellow or orange bars. Ringed map male turtles are approximately 4.2 inches long while females are significantly larger and can be up to 8.5 inches long (Jones 2009).

The ringed map turtle is found in riverine habitats with moderate currents, channels wide enough to permit sunlight penetration for several hours each day, numerous logs for basking, and large sandy banks. Nesting typically occurs on sandbars from May to July where 1 to 10 eggs are laid

(Jones 2009). Habitat loss through water quality degradation, damage and destruction of exposed sandbars and basking areas has contributed to the decline of this species (U.S. Department of Interior 2008).

As of 2005, a habitat recovery plan had not been completed for the ringed map turtle, and critical habitat had not been identified. The nearest identified habitat on Bogue Chitto River is outside the project boundary (NatureServe 2009).

3.4.3.4 Red-Cockaded Woodpecker (Picoides borealis)

The red-cockaded woodpecker (*P. borealis*) is a federally listed endangered species endemic to open, mature and old-growth pine ecosystems in the southeastern United States. Most recent counts estimate that 14,068 red-cockaded woodpeckers live in 5,627 known active clusters across 11 states (USFWS 2003). The red-cockaded woodpecker is widely distributed but considered local throughout the southeastern coastal states from eastern Texas to southern Maryland including Arkansas, Tennessee, Kentucky, and Oklahoma. Today fewer than 400 known active colonies remain in Louisiana, and nearly all colonies are in the four districts of the Kisatchie National Forest (LDWF 2004).

In the existing Gulf Coast Prairies and Marshes ecoregion, one population unit and habitat is in Big Branch Marsh National Wildlife Refuge. The area is not designated as a recovery unit because the habitat and population is small, but considerations should be made to ensure its conservation (U.S. Department of Interior 2008). Big Branch Marsh National Wildlife refuge is south of the project area and outside of the project boundary.

Red-cockaded woodpeckers are relatively small adults measuring 7.8 to 9 inches, weighing 1.4 to 1.9 ounces, and are slender, long-tailed, and small-billed. They are black and white with a coarsely barred back, black crown, while their breast and bellies are white to grayish-white with spots on their sides changing to bars on the flanks (Chadwick 2005). They are distinguishable from other ladder-back woodpeckers because of their all-white cheek pattern and cooperative breeding strategy (LDWF 2005a). Their outer tail feathers are white with black bars, and the central tail feathers are black. Adult plumage is similar between sexes, with the exception of a red cockade, or splotch, on the upper edge of the white auriculars on males. Those characteristics can be difficult to distinguish in the field (Chadwick 2005).

Red-cockaded woodpeckers are a cooperatively breeding species, living in family groups that typically consist of a breeding pair with one or two male helpers. Cooperative habitation is highly dependent on the availability of live pines with cavities, with longleaf pine being the preferred tree species because of its ability to produce resin long term (USFWS 2003). Red-cockaded woodpeckers are considered a keystone species for southern pine forests by creating cavities that will be abandoned and then inhabited by any of almost 30 species living in the forest (USFWS 2010a).

The red-cockaded woodpecker nests in open, park-like stands of mature (i.e., older than 60 years) pine trees containing little hardwood understory or midstory. The woodpeckers can tolerate small numbers of overstory hardwood or large midstory hardwood trees at low densities found naturally in many southern pine forests, but they are not tolerant of dense hardwood midstories resulting from fire suppression. A cluster is a set of cavity trees and foraging area within 200 feet of those trees. Ideal foraging habitat is defined as pine and pine-dominant pine-hardwood stands older than 30 years continuous to and within one-half mile of a cluster (CEMVN 2008). Clusters are needed for colonies to nest and forage successfully.

Critical habitat has not been designated for the red-cockaded woodpecker. In 2006, field surveys were conducted along proposed Alternative P and suitable foraging habitat was identified for the

red-cockaded woodpecker; however no known cavity trees exist near Alternative P (Neel-Schaffer, Inc. 2007b).

During field surveys of the proposed alternative alignments in March, April, and May 2010, no red-cockaded woodpecker habitat was observed in ROWs for the four proposed alternatives (see Appendix C).

3.4.4 State-Listed Species

The LNHP maintains a database of rare, threatened, and endangered species of plants, animals, and natural communities in Louisiana. Those species might not coincide with the federal list of threatened and endangered species, but they do represent those that could be in jeopardy, with known or perceived threats, or population declines. A complete list of species identified in St. Tammany Parish with their corresponding state and global ranking, state and federal status is included in Appendix C (LNHP 2008).

LNHP personnel conducted a database search for known occurrences of the state-protected plants and animals in the study area. The locations of 2 birds, 13 reptiles, 7 amphibians, 2 fish, 10 invertebrates, and 225 plants have been confirmed in the project area (Burk-Kleinpeter 2002).

3.4.5 Sensitive Terrestrial and Aquatic Habitats

3.4.5.1 State-Designated Imperiled, Rare, and Local Natural Communities

The LNHP has designated several natural communities in St. Tammany Parish as imperiled, rare, local, or secure throughout the state. State designations were developed on the basis of the known number of communities that remain throughout the state (LNHP 2008). The communities in Table 3-25 in bold are in the project area and descriptions and ranges are included in Section 3.4.1, *Vegetative Communities*.

3.4.5.2 Natural and Scenic Rivers

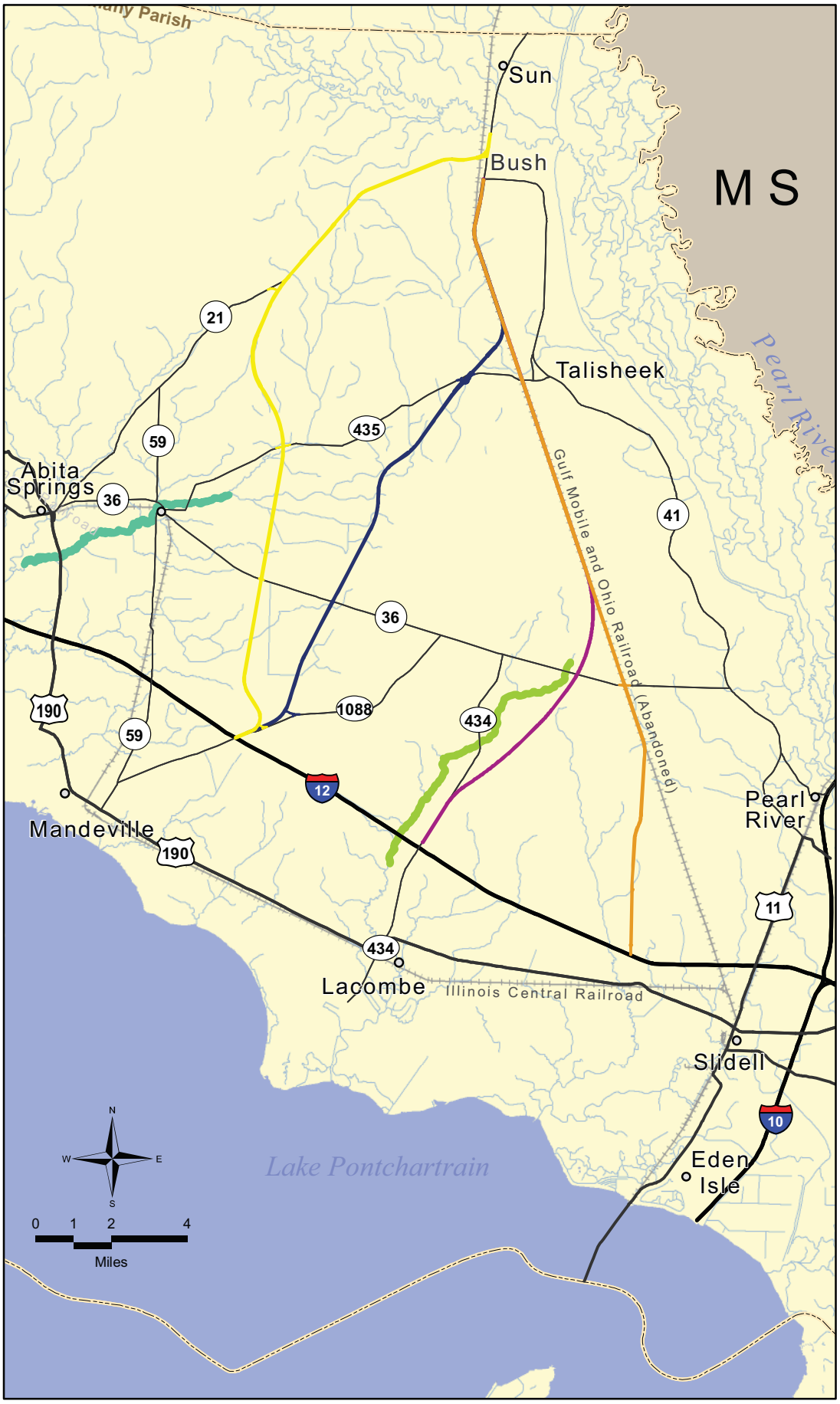
In 1970 the Louisiana Legislature established the Louisiana Natural and Scenic Rivers System. The system is administered for the, "purpose of preserving, protecting, developing, reclaiming, and enhancing the wilderness qualities, scenic beauties, and ecological regime of certain free-flowing streams or segments thereof." An additional goal is preserving aesthetic, scenic, recreational, fish, wildlife, ecological, archaeological, geological, botanical, and other natural and physical features and resources found along those streams or segments (Louisiana Scenic Rivers Act 1988).

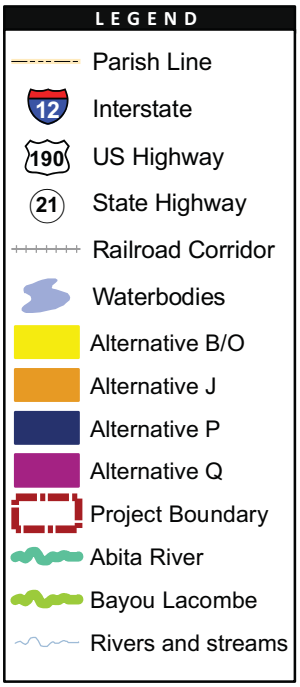
Approximately 3,000 miles of natural and scenic rivers have been designated in Louisiana including rivers, streams, bayous, or their associated segments. Such areas are protected and certain activities are prohibited or require permit authorization to minimize environmental impacts (LDWF 2005b).

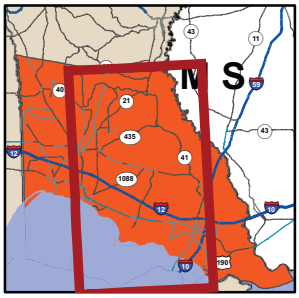
St. Tammany Parish has nine natural and scenic river designations, more than any other parish in Louisiana. Scenic river designations in the project area are shown in Figure 3-12 and as follows (LDAF 2007):

- Abita River—from its headwaters to its entrance into the Bogue Falaya River
- Bayou Lacombe—from its headwaters to Lake Pontchartrain

Figure 3-12 - Scenic river designations







Source: LDWF 2005b

US Army Corps of Engineers
New Orleans District

Table 3-25.
Sensitive natural communities

Community type	State rank
Bayhead swamp	**S3**
Bottomland hardwood forest	S4
Coastal live oak-hackberry forest	S1S2
Cypress-tupelo swamp	S4
Eastern hillside seepage bog	**S2**
Eastern longleaf pine savanna	**S2**
Eastern upland longleaf pine forest	**S1S2**
Hardwood slope forest	S3S4
Intermediate marsh	S3S4
Pine flatwoods	**S3**
Slash pine/post oak forest	S3S4
Slash pine-pondcypress/hardwood forest	**S2S3**
Small stream forest	**S3**

Source: LNHP 2008

State ranks:

S1: Critically imperiled in Louisiana because of extreme rarity (5 or fewer known extant populations) or because of some factors making it especially vulnerable to extirpation.

S2: Imperiled in Louisiana because of rarity (6–20 known extant populations) or because of some factors making it very vulnerable to extirpation.

S3: Rare and local throughout the state or found locally (even abundantly at some locations) in a restricted region of the state, or because of other factors making it vulnerable to extirpation (21–100 known extant populations).

S4: Apparently secure in Louisiana with many occurrences (100–1,000 known extant populations).

S5: Demonstrably secure in Louisiana (1,000+ known extant populations) (LNHP 2008).

3.4.5.3 Sensitive and Protected Sites

St. Tammany Parish has been a focus of conservation, preservation, and restoration for the past 30 years, and the USACE, USFWS, TNC, and private interests have been fundamental in protecting large swaths of valuable wetlands throughout the area. Figure 3-13 identifies the location of such sites in the project area, and Table 3-26 provides the managing agencies and acreage protected.

Abita Creek Flatwoods Mitigation Bank. Abita Creek Flatwoods Mitigation Bank is 964.5 acres and approximately 4.5 miles northwest of Abita Springs on LA 435 in the proposed project area. The mitigation bank is dominated by longleaf pine savannas, longleaf flatwoods, bayhead swamps, slash pine/pond cypress woodlands, and riparian forests. Twenty-four LNHP-identified species of rare, threatened, or endangered plants have been identified in the mitigation bank, including the federally listed Louisiana quillwort. TNC of Louisiana is restoring degraded areas of savanna through selective timber cutting and prescribed burns (TNC 2010a). Abita Creek Flatwoods Mitigation Bank is sponsored and managed by the Louisiana TNC, and was approved by the USACE as a mitigation bank on May 2, 1992, with 850 acres (Vicksburg USACE 2010). The expansion of the mitigation bank was approved on June 2, 2009, for a total area of 964.5 acres (RIBITS 2010).

Figure 3-13 - Sensitive areas

Table 3-26.
Protected sites in the project area

Name	Authority	Size (acres)
Mitigation banks		
Abita Creek Flatwoods Mitigation Bank	USACE	964.5
Bayou Lacombe Mitigation Bank	USACE	4,556
Dolly-T Mitigation Bank	USACE	1,630
Mossy Hill Mitigation Bank	USACE	2,752
Talisheek Pine Wetlands Mitigation Bank	USACE	3,060
Military posts		
Camp Villere	U.S. Army	1,500

Sources:USACE 2010a

Bayou Lacombe Mitigation Bank. Bayou Lacombe Mitigation Bank is 4,556 acres and approximately 5 miles east of Abita Springs and 3 miles south of the town of Talisheek, Louisiana. The area is a pine flatwood and savanna habitat with hardwood flats interspersed (RIBITS 2010). Bayou Lacombe Mitigation Bank is sponsored and managed by St. Tammany Mitigation Services, LLC, and Wayne Wandell, and approved by the USACE as a mitigation bank on July 23, 2001, with an acreage of 3,800. The expansion of the mitigation bank was approved on May 6, 2009, for an additional 756 acres.

Dolly-T Mitigation Bank. Dolly-T is a 1,630-acre wetland mitigation bank adjacent to the southern boundary of Talisheek Pine Wetlands Mitigation Bank and adjoins the western boundary of the abandoned Gulf Mobile and Ohio Railroad. The mitigation bank is dominated by undisturbed pine wetland habitat. Dolly-T Mitigation Bank was approved by the USACE Vicksburg District on January 24, 2011 (RIBITS 2011).

Mossy Hill Mitigation Bank. Mossy Hill is a 2,752-acre wetland mitigation bank adjacent to the existing Talisheek Pine Wetlands Mitigation Bank. Mossy Hill Mitigation Bank is sponsored and managed by Talisheek, LLC, and Katherine Birnie (RIBITS 2010), approved by the USACE as a mitigation bank on March 5, 2010, with an acreage of 2,262. An addendum, pending USACE approval, has been submitted to expand the mitigation bank in the southeast corner by adding approximately 211 acres. Over the next 10 years, TNC and Ecosystem Investment Partners plan to remove nonnative vegetation and re-grade the land to restore the area's natural hydrology. Longleaf pine seedlings will be planted to encourage reforestation (Advocate 2010).

Talisheek Pine Wetlands Mitigation Bank. Talisheek Pine Wetlands Mitigation Bank is 3,060 acres and is southeast of Bush, Louisiana. The mitigation bank supports the largest tract of undisturbed pine wetlands in southeast region of the state. The federally listed threatened gopher tortoise and state-listed rare mud salamander have been observed in the mitigation bank. Talisheek Pine Wetlands Mitigation Bank is sponsored and managed by Louisiana TNC and was approved by the USACE as a mitigation bank on September 4, 1997. TNC is restoring natural habitat by removing select pine trees, restoring natural hydrology, and conducting prescribed burns (TNC 2010c).

Camp Villere. Camp Villere is a Louisiana Army/Air National Guard camp near Slidell, Louisiana. The Louisiana Army National Guard and the Northwestern State University Cultural Resource Office have initiated a multiyear agreement to develop and implement an Integrated Cultural Resource Management Program for the cultural resources in the guard properties.

Developing the plan requires surveys and evaluations of all guard properties to determine if locations, sites, buildings, and objects on those properties are of historical or cultural significance. Among the properties being evaluated are all armories throughout the state, Camp Villere, Camp Beauregard, Jackson Barracks, and the Region IV Noncommissioned Officer Training Academy in Ball. In 1996 the Louisiana National Guard signed a Management Agreement with TNC covering 1,500 acres at Camp Villere, part of the East Gulf Coastal Plain ecoregion (Pike 2005).

3.4.6 Wetlands

Wetlands are defined as, "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas" (USACE 1987).

The USACE uses three characteristics to determine if an area is a wetland:

- *Hydrology*. Wetland hydrology is determined by the sum total of wet characteristics through inundation or has saturated soils for a sufficient duration to support hydrophytic vegetation (USACE 1987).
- *Hydric Soils.* Soils are formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part. Such soils support hydrophytic vegetation.
- *Hydrophytic Vegetation*. Wetlands feature a community of macrophyte plant species that occur in areas where inundation or soil saturation is either permanent or of sufficient frequency and duration to exert a controlling influence on the plant species present (USACE 2008).

3.4.6.1 Wetland Functions in the Project Area

Wetlands provide social, ecological, and economic benefits. To assess a specific wetland, the functions and the values must be understood and quantified. A wetland function is defined as a process or series of processes that take place in a wetland, and its value is determined on the basis of the benefits the wetland provides to the environment or people. Wetland processes include water quality enhancement, water storage, transformation of nutrients, growth of living matter, and wildlife habitat. The ability to perform a function is influenced by the characteristics of the wetland and the physical, chemical, and biological processes in it (USACE 2010b). The value of a wetland function can range from economic benefits as a commercial fishery or timber source where a monetary value can be assigned, or it can have aesthetic beauty or provide hurricane protection where placing a monetary value is difficult to determine (Novitzki et al. 1995).

3.4.6.1.1 Fish and Wildlife Habitat

The pine savanna/flatwood wetland ecosystem in the project area is noted for its high degree of plant species richness. These wetlands are best known for their insectivorous plants and orchids, many of which are endemic to these areas. Small-scale plant species diversity in this ecosystem is among the highest of any habitat and unequaled in Louisiana. These areas are considered extremely important since most of these native plants cannot exist in any other wetland type and are considered rare due to their limited range and potential habitat loss. These wetlands support at least 24 species of rare plants, including pitcher plant, Louisiana quillwort, yellow butterwort, pale and many-flowered grass-pink orchids, and coastal plain false-foxglove.

Pine savanna/flatwoods provide essential forested habitat for wildlife, tree canopy for canopy-dependent species, and a habitat that seasonally functions as both a wetland and upland. As a result, these wetlands allow for an abundant diversity of vertebrate and invertebrate fauna. Hydric

flatwoods serve as wading bird foraging areas, foraging, denning, and travelways for a number of mammals. Two animal species of conservation concern are present and include Bachman's and Henslow's Sparrows. These species use the pine savanna wetlands for the first 2 years after a prescribed fire burn. They feed on the seeds of toothache grass and other grasses and sedges that are stimulated to flower and fruit after burning.

Wet pine savanna/flatwoods provide essential habitat to the breeding cycle of numerous aquatic and wetland-dependent animals. The amphibian life-cycle is well-adapted to the hydrologic cycle of the pine savanna/flatwoods, providing both aquatic habitat for young and adults and upland habitat for more terrestrial species adult forms. Fish occur in wetter areas within the pine savanna/flatwoods when seasonal water elevations can support them. These fish are a fundamental link between the primary producers and higher trophic level fish and wildlife species.

Wetlands in the project area also support mammals such as gray and fox squirrels, raccoon, eastern cottontail, opossum, and white-tailed deer. Louisiana black bear has been documented in the vicinity of the Talisheek Mitigation Bank in the last decade. Within the vicinity of the mitigation bank, there are approximately 7,000 acres of potential black bear habitat west of Alternatives J, P, and Q. To the south of the Talisheek Mitigation Bank there are approximately 10,000 acres of conservation lands west of Alternatives J and Q that provide potential habitat.

3.4.6.1.2 Water Quality and Flood Control

Wetlands in the project area play an important by acting as natural filters that help maintain water quality by retaining sediment and contaminants and removing or transforming nutrients. The wetlands accomplish this function by trapping suspended soils and chemical contaminants, such as pesticides and heavy metals that may be adsorbed to the suspended particles, preventing the contaminants from moving into deep water or groundwater aquifers where they can enter the food chain. Deposition of sediments can lead to removal of contaminants through burial, chemical breakdown, or temporary assimilation into plant material.

In addition, nutrients can be removed and /or transformed through wetland processes. Wetlands accomplish this function by storage of nutrients in sediment or plant substrate, transformation of inorganic nutrients to organic forms, and transformation and subsequent removal of nitrogen as a gas. The location of these wetlands, coupled with the ability of wetland vascular plants to remove nutrients from waters and sediments during the growing season and release them later in the growing season when light or temperatures will not support algal growth, assists in maintaining the water quality in adjoining aquatic systems. Filtering of these substances by wetlands prevents potential adverse impacts to the natural ecosystem that could, in turn, harm plant and animal species that use these areas as habitat.

Drainage in St. Tammany Parish depends on gravity flow to channel rainwater runoff into conveyances such as rivers, streams, bayous, and ponds, eventually reaching Lake Pontchartrain and Lake Borgne. Wetlands in the project area are part of a vast natural wetland system that serves the entire parish to prevent flooding by storing water runoff in flood plains, forests and water systems to meter the flow of runoff. The wetlands provide excellent surface water storage due to their very low hydraulic gradients (<0.5 percent slope). Storage of flood waters in wetlands helps protect residential homes and businesses in the project area by reducing the potential of flooding during large storm events.

3.4.6.2 Wetland Systems in the Project Area

Wetlands in St. Tammany Parish are regulated by the USACE New Orleans District with the exception of a small portion of the northeastern area of the parish regulated by the Vicksburg

District, per CWA section 404. TNC, LDWF, and private interests have made a concerted effort to enhance existing, valuable wetland habitat in St. Tammany Parish through mitigation banks, and wildlife refuges. Those areas are described in Section 3.4.4 *Sensitive Terrestrial and Aquatic Habitats*.

The following paragraphs describe wetland systems in the study area on the basis of the Cowardin et al. (1979) classification system. All wetland communities in the study area are classified as lacustrine, palustrine, or riverine.

Lacustrine systems consist of wetlands and deepwater habitats with all following characteristics: (1) in a topographic depression or dammed river channel; (2) lacking trees, shrubs, or persistent emergents with greater than 30 percent aerial coverage; and (3) total area exceeding 20 acres. Lacustrine waters can be tidal or nontidal.

Palustrine systems consist of all nontidal wetlands dominated by trees, shrubs, or persistent emergents (greater than 30 percent aerial coverage), and all such wetlands that occur in tidal areas where salinity because of gulf-derived salts is below 0.5 parts per thousand (ppt). For the purposes of this EIS, vegetated palustrine wetlands are defined by the following criteria: (1) vegetation characterized by a predominance of species tolerant of soils saturated for at least short periods during the growing season; (2) presence of hydric soils; and (3) surface flooded or saturated at least for short periods during the growing season. The palustrine system also includes wetlands lacking vegetation such as above, but with all following characteristics: (1) total area less than 20 acres; (2) water depth in the deepest part of the basin less than 6.5 feet at low water; and (3) salinity because of gulf-derived salts less than 0.5 ppt. Palustrine wetlands can be shoreward of lakes, river channels, or estuaries; on river floodplains; in isolated catchments; or on slopes. They can also occur as islands in lakes or rivers.

The riverine system includes all wetlands and deepwater habitats contained in a channel, with two exceptions: (1) wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichen, and (2) habitats with water containing ocean-derived salts in excess of 0.5 percent. In the riverine system, water is usually moving, but not always flowing. Palustrine wetlands, emergent wetlands, scrub-shrub wetlands, and forested wetlands can occur adjacent to the riverine system, often on a floodplain.

The Cowardin classification system used for National Wetland Inventory mapping requires the presence of a positive wetland indicator for any parameter (hydrology, hydric soils, and hydric vegetation), while the USACE guidelines require, under normal situations, a positive wetland indicator to be present for all three of those parameters. While all the areas and acreages identified using National Wetland Inventory data are potential wetlands, some areas might not meet the criteria to be classified by the USACE as a jurisdictional wetland. It should be noted that NWI data may not be accurate for the pine flatwood habitats in the project area. Observations in the field have indicated significantly more wetlands in the project area than identified by the NWI. The wetland data provided by GIS mapping is an estimate of potential jurisdictional wetlands in the project area. Wetland delineations were performed for the areas within the proposed rights-of-way along the entire length of each alternative to provide current and detailed information on wetlands that could be directly affected by the project.

Figure 3-14 illustrates the areas of potential jurisdictional wetlands as identified by the NWI and Table 3-27 lists the wetland communities and their estimated acreage occurring in the project area (USGS 2009).

Figure 3-14- St. Tammany Parish wetlands inventory

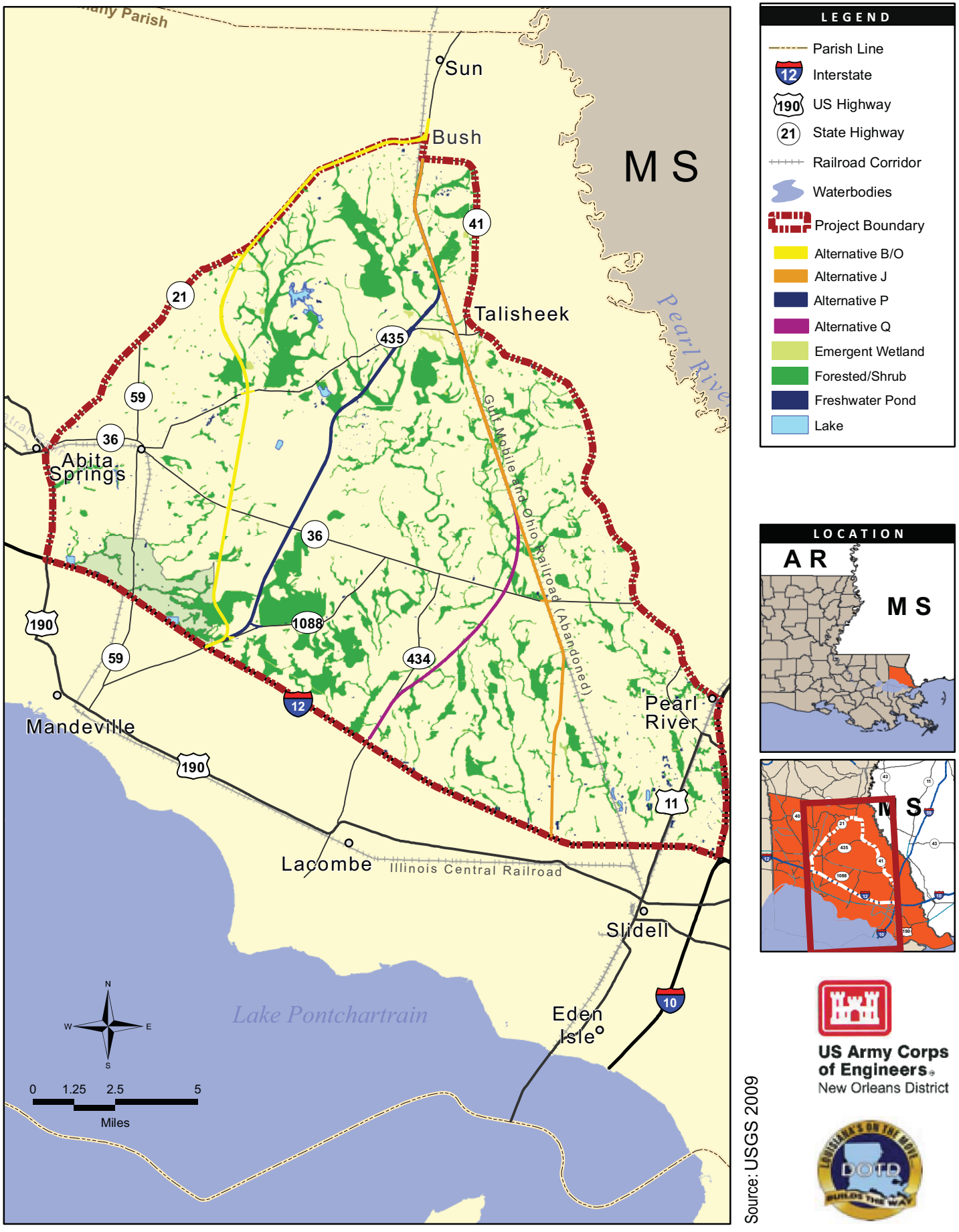


Table 3-27.
Potential jurisdictional wetlands by type

Wetland system	Acres	Percent
Freshwater Emergent Wetland	502	0.3%
Forested/Shrub Wetland	23,737	15.1%
Freshwater Pond	484	0.3%
Lake	392	0.3%
Riverine	14,667	9.4%
Total in the project area	**25,114**	**16.0%**

Source: USGS 2009

It should be noted that the potential jurisdictional wetlands identified by NWI appears to underestimate the wetland acreage in the project area. Based on USACE wetland delineations in the project area, many areas mapped with the Stough soil type have been identified during jurisdictional determinations to be wetlands. These areas are typically not accounted for in the NWI data.

Wetland delineations were conducted for each alternative to determine the amount of direct effects from construction of a four-lane divided highway. The wetland delineations determined that there are larger areas of wetlands along these routes than previously mapped by USGS. For Alternative B/O, approximately 385 acres of jurisdictional wetlands could be directly affected by construction (Tetra Tech 2010a). For Alternative J, approximately 373 acres of jurisdictional wetlands could be directly affected by construction (Tetra Tech 2010b). For Alternative P, field investigations indicate the presence of approximately 358 acres of jurisdictional wetlands that could be directly affected by construction (Tetra Tech 2011). For Alternative Q, approximately 305 acres of jurisdictional wetlands could be directly affected by construction (Tetra Tech 2010c).

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3.5 GEOLOGY AND SOILS

3.5.1 Geologic setting and topography

St. Tammany Parish is in the Gulf Coastal Plain physiographic province. More specifically, St. Tammany Parish can be described by four general physiographic areas: forested terrace uplands; broad terraces, also known as Gulf Coast Flatwoods; narrow floodplains of major streams; and marshes and swamps (USDA NRCS 1990). In the project area, topography is generally flat to broadly rolling, incised by many small streams and drains. Elevations range between about 125 feet mean sea level (msl) in the northern portion of the project area near LA 21 and Money Hill, to 30 to 25 feet msl along I-12 (CEMVN 2008; USGS 1983). The project area is in the general geologic setting of Louisiana's Pleistocene Terraces, consisting largely of alluvial deposits of sand, gravel, and mud underlying raised, flat surfaces with varying degrees of tilt and dissection, that were raised as the coastal plain tilted in response to downwarping of the crustal floor of the Gulf of Mexico (LGS 2010).

The northwest part of St. Tammany Parish consists of the Terrace Upland, which has the highest elevations and the oldest and most dissected land surfaces in the parish. The Terrace Upland is underlain by the late Tertiary age or very early Pleistocene age deposits of the Citronelle Formation. In southeastern Louisiana, at least two, but possibly four, Pleistocene age terraces have been identified. The Terrace Upland was formed by the accumulation of sediments along the major streams and the Gulf Coast during interglacial stages (Earth Search 2006).

The southern portion of the project area is in the Prairie Terrace, and the northern portion of the project area is in the High Terrace. The Prairie Terrace is in the southeastern part of the parish, continues outside the parish to both the east and the west, and extends up the valley of streams and rivers such as the Pearl and the Bogue Chitto. Elevation in the Prairie Terrace ranges from near sea level in the south to approximately 70 feet msl in the north. The Prairie Terrace most likely was deposited during the Sangamon interglacial stage approximately 75,000 to 125,000 years ago. However, recent evidence suggests that the Prairie Terrace formation was composed of two major interglacial stages, the Sangamon and the Middle Wisconsin or Farmdalian. As a result, the Prairie Terrace is one terrace formed by two discrete alluvial sequences of notably different age (Earth Search 2006).

The High Terrace occurs in the northwestern part of the parish and is the oldest, highest, and most dissected part of the parish. The area is part of the Citronelle Formation dating to the late Pliocene or early Pleistocene approximately 2,000,000 years ago. The sediments that compose the Citronelle Formation allegedly come from the western slopes of the Appalachian Mountains in the eastern United States. Elevation in the High Terrace ranges from approximately 200 feet msl in the north to about 70 feet msl in the south (Earth Search 2006).

3.5.2 Soils

Soils of St. Tammany Parish are generally of alluvial origin. Five dominant soil associations are in the vicinity of the project area on terraces, uplands, and floodplains. The soil associations in the project area consist of the 13 soil types listed in Table 3-28 (CEMVN 2008). Figure 3-15 illustrates the distributions of the soil associations relative to the alternative corridor locations in the project area.

Table 3-28.
Soils in the project area

Map symbol	Map unit name	Setting: local landform	Setting: parent material	Slope (%)	Natural drainage class	Perme-ability	Depth to water table (in.)	Surface texture	Subsurface clay horizon	Flooding or ponding	Prime farmland soil
Hydric soils											
AR	Arat silty clay loam	Swamps	Semifluid loamy backswamp deposits	0-1%	VPD	ML to MH	0	Silty clay loam	Silt loam	Frequent/ Frequent	Yes
Bg	Brimstone-Guyton silt loam	Ridges	Loamy fluviomarine deposits of late Pleistocene age	0-1%	PD	ML to MH	0–18	Silt loam	Silt loam	None/ None	Yes
Gt	Guyton silt loam	Broad stream terraces	Loamy alluvium of Holocene age	0-1%	PD	ML to MH	0–18	Silt loam	Silty clay loam	None/ None	Yes
Gy	Guyton silt loam, occasionally flooded	Broad flats, drainageways; floodplains; depressions	Loamy alluvium of Holocene age	0-1%	PD	ML to MH	0–18	Silt loam	Clay loam and Silty clay loam	Occasional/ None	No
Mt	Myatt fine sandy loam	Broad flats or stream terraces	Pleistocene fluviomarine deposits	0-1%	PD	MH to H	0–12	Fine sandy loam	Sandy clay loam	None/ None	No
My	Myatt fine sandy loam, frequently flooded	Depressional areas on stream terraces; narrow drainageways; Floodplains	Pleistocene fluviomarine deposits	0-1%	PD	MH to H	0–12	Fine sandy loam	Sandy clay loam	Frequent/ None	No
OB	Ouachita/Bibb soils, frequently flooded	*(Both soils generally are together in a mapped area, with Ouachita generally on convex ridges and Bibb in low positions between ridges)*									
	Ouachita soils	Natural levees/ ridges	Loamy alluvium	0-2%	WD	MH	> 80	Silt loam	None	Frequent/ None	No
	Bibb soils	Swales and floodplains	Loamy alluvium	0-2%	PD	MH to H	6–12	Loam	None	Frequent/ None	No
St	Stough fine sandy loam	Ridges on stream terraces; depressions	Pleistocene loamy fluviomarine deposits	0-1%	SPD	MH	6–12	Fine sandy loam	None	None/ None	Yes
Nonhydric soils											
Aa	Abita silty loam, 0 to 2 percent slopes	Flats	Silty marine deposits	0-2%	SPD	ML to MH	18 to 36	Silt loam	Silt loam	None/ None	Yes
Ab	Abita silt loam, 2 to 5 percent slopes	Flats	Silty marine deposits	2-5%	SPD	ML to MH	18 to 36	Silt loam	Silty clay loam	None/ None	Yes
Ca	Cahaba fine sandy loam, 1 to 3 percent slopes	Terraces; variable	Local braided stream loamy alluvium	1-3%	WD	MH to H	> 80	Fine sandy loam	Sandy clay loam	None/ None	Yes

Table 3-28.
(continued)

Map symbol	Map unit name	Setting: local landform	Setting: parent material	Slope (%)	Natural drainage class	Perme-ability	Depth to water table (in.)	Surface texture	Subsurface clay horizon	Flooding or ponding	Prime farmland soil
Lt	Latonia fine sandy loam	Stream terraces; depressions	Sandy marine deposits	0-2%	WD	H	> 80	Fine sandy loam	None	None/ None	Yes
Pr	Prentiss fine sandy loam, 0 to 1 percent slopes	Interfluves; depressions	Pleistocene fluviomarine deposits	0-1%	MWD	MH	18–30	Fine sandy loam	None	None/ None	Yes
Pt	Prentiss fine sandy loam, 1 to 3 percent slopes	Interfluves; depressions	Pleistocene fluviomarine deposits	1-3%	MWD	MH	18–30	Fine sandy loam	None	None/ None	Yes
Rt	Ruston fine sandy loam, 3 to 6 percent slopes	Hillslopes; variable	Pleistocene loamy fluviomarine deposits	3-6%	WD	MH to H	> 80	Fine sandy loam	Sandy clay loam	None/ None	Yes
Sa	Savannah fine sandy loam, 1 to 3 percent slopes	Fluviomarine terraces; variable	Loamy fluviomarine deposits	1-3%	MWD	MH	12–30	Fine sandy loam	Clay loam	None/ None	Yes
Sh	Savannah fine sandy loam, 3 to 6 percent slopes	Fluviomarine terraces; variable	Loamy fluviomarine deposits	3-6%	MWD	MH	12–30	Fine sandy loam	Clay loam	None/ None	Yes

Sources: CEMVN 2008; USDA NRCS 1995 as cited in Burk-Kleinpeter, Inc. 2002; USDA NRCS 2010a.
Natural drainage class abbreviations:
PD = poorly drained; MWD = moderately well-drained; SPD = somewhat poorly drained; WD = well drained
Permeability abbreviations (as Ksat [saturated hydraulic conductivity], or the capacity of the most limiting layer to transmit water):
ML to MH = moderately low to moderately high (0.06 to 0.20 inches per hour); MH to H = moderately high to high (0.60 to 2.00 inches per hour); MH = moderately high (0.20 to 0.60 inches per hour); H = high (2.00 to 6.00 inches per hour)

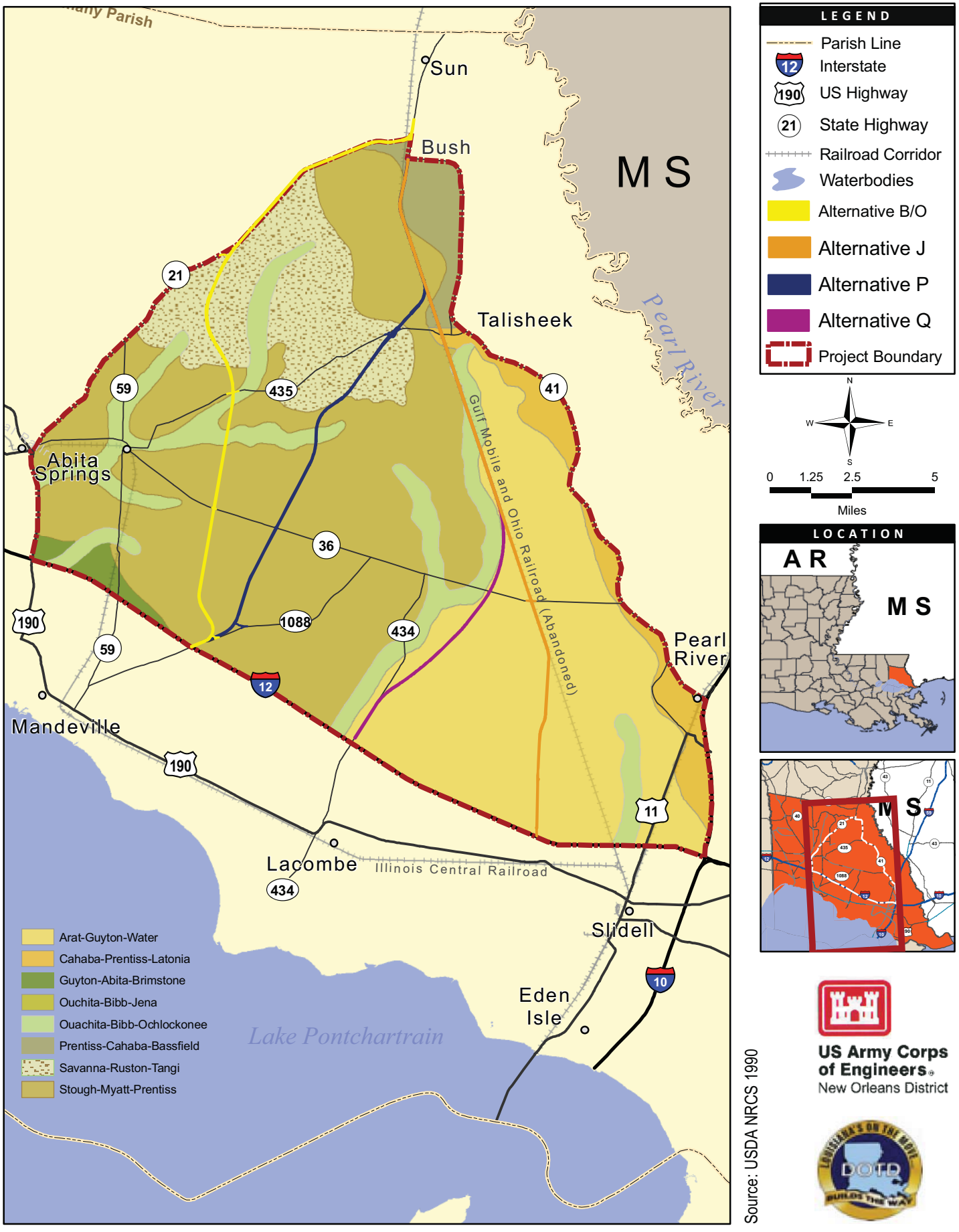
Abita silt loam, 0-2 percent slopes and Abita silt loam, 2-5 percent slopes. The Abita series consists of somewhat poorly drained, slowly permeable soils that formed in loamy sediments. The soils are on low, broad streams or marine terraces of Pleistocene age.

Arat silty clay loam. The Arat series consists of very poorly drained, slowly permeable, very fluid mineral soils. The soils formed in loamy alluvium in low, broad backswamp areas along major streams.

Brimstone-Guyton silt loam. The Brimstone series consists of poorly drained, slowly permeable soils that have high levels of sodium in the subsoil. The soils formed in loamy sediments on low, broad terraces of late Pleistocene age.

Cahaba fine sandy loam. The Cahaba series consists of deep, well-drained, moderately permeable soils that formed in loamy and sandy alluvium. They are on nearly level to sloping stream terraces in the Coastal Plain.

Figure 3-15 - Soils



Source: USDA NRCS 1990

US Army Corps of Engineers
New Orleans District

Guyton silt loam and Guyton silt loam, occasionally flooded. The Guyton series consists of very deep, poorly drained and very poorly drained, slowly permeable soils that formed in thick loamy sediments. The soils are on Coastal Plain local stream floodplains and in depressional areas on late Pleistocene age terraces.

Latonia fine sandy loam. The Latonia series consists of deep, well-drained, moderately rapidly permeable soils. They formed in marine or alluvial sediments that are loamy in the upper part and sandy in the lower part. They are on marine or stream terraces of the Southern Coastal Plain and Gulf Coast Flatwoods.

Myatt fine sandy loam and Myatt fine sandy loam, frequently flooded. The Myatt series consists of deep, poorly drained, moderately slowly permeable soils on stream terraces and upland flats of the Coastal Plain.

Ouachita and Bibb, frequently flooded. The Ouachita series consists of deep, well-drained, moderately slowly permeable soils that formed in loamy alluvium. The level, to nearly level, soils are found on floodplains and natural levees along streams in the Western Coastal Plains. The Bibb series consists of very deep, poorly drained, moderately permeable soils that formed in stratified loamy and sandy alluvium. The soils are on floodplains of streams in the Coastal Plain.

Prentiss fine sandy loam, 0 to 1 percent slope and Prentiss fine sandy loam, 1 to 3 percent slope. The Prentiss series consists of deep, moderately well-drained, moderately permeable soils with a fragipan. They formed in loamy marine or fluvial sediments. They are on nearly level to sloping terraces and uplands of the Southern Coastal Plain Major Land Resource Area.

Ruston fine sandy loam, 3 to 6 percent slope. The Ruston series consists of well-drained, moderately permeable soils that formed in loamy marine or stream sediment. The soils are on the terrace uplands.

Savannah fine sandy loam, 1 to 3 percent slope and Savannah fine sandy loam, 3 to 6 percent slope. The Savannah series consists of moderately well-drained, moderately slowly permeable soils with a fragipan. They formed in loamy marine or fluvial terrace deposits. They are on uplands and terraces that range from nearly level to moderately steep in the Southern Coastal Plain.

Stough fine sandy loam. The Stough series consists of deep, somewhat poorly drained soils that formed in loamy sediments of fluvial or marine origin. Permeability is moderately slow. The nearly level to gently sloping soils are on terraces and uplands of the Southern Coastal Plain.

Eight of the project area soils are hydric soils (Table 3-29). Parent material for the entire project area soils consists of alluvial deposits, including some areas of fluviomarine deposits characteristic of areas originally near the mouth of a river and formed by the combined action of river and sea. The project area's hydric soils are found in mostly flat and low-lying areas, and nonhydric soils occur in both flat and slightly sloped areas. The project area's hydric soils are mostly poorly drained, while the nonhydric soils are moderately well drained to well drained.

Table 3-29.
Hydric soils in the project area

Map symbol	Map unit name	Area in project area (acres)	Proportionate extent in project area
AR	Arat silty clay loam	590	0.4%
Bg	Brimstone-Guyton silt loam	202	0.1%
Gt	Guyton silt loam	1,546	1.0%
Gy	Guyton silt loam (occasionally flooded)	1,314	0.8%
Mt	Myatt fine sandy loam	33,111	21.1%
My	Myatt fine sandy loam (frequently flooded)	24,400	15.5%
OB	Ouchita/Bibb soils (frequently flooded)	3,464	2.2%
St	Stough fine sandy loam	50,178	32.0%

Permeability ranges from a rating of moderately low to moderately high (0.06 to 0.20 inches per hour) to high (2.00 to 6.00 inches per hour). Depth to seasonally high water table ranges from 0 to 18 inches in the project area's hydric soils (with the exception of pockets of Ouachita soils), to 12 to more than 80 inches in the project area's nonhydric soils. Silt loam to sandy loam surface textures in most of the project area's soils are underlain by subsurface argillic (clay) horizons in eight of the 13 soil types, which inhibits subsurface drainage (USDA NRCS 2010c).

Table 3-30 summarizes main uses and limitations of the project area's soils (USDA NRCS 2010c). All the project area's soils are well suited or moderately well suited to woodland use, which is the main use of 10 of the 13 project area soils. Wetness and periodic flooding contribute to limitations on soil suitability for those uses rated as *poorly suited* (PS) and *not suited* (NS), as well as to limitations that can be overcome with various management and design adaptations where the soils are rated as *moderately well suited* (MWS) or *well suited* (WS). In addition, the limitations on the use of Abita silt loam (2 to 5 percent slopes) (Ab), Arat silty clay loam (AR), Brimstone-Guyton silt loam (Bg), Guyton silt loam (Gt), Guyton silt loam (occasionally flooded) (Gy), and Ruston fine sandy loam (3 to 6 percent slopes) (Rt) soils have the notation that the soils have low strength for roads.

3.5.3 Prime Farmland

The U.S. Department of Agriculture (USDA) defines prime farmland as, "land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and that is available for these uses" (USDA NRCS 2010b). Prime farmland has the combination of soil properties (such as fertility, acidity/alkalinity, permeability, moisture-holding capacity, low erodibility), growing season, and moisture supply (natural and irrigated) to produce high crop yields economically if managed well according to acceptable farming practices. Urban land, public land, or water areas are not considered prime farmland. In its 1990 Soil Survey of St. Tammany Parish, USDA identified 13 of the 16 soils in the project area as components of prime farmland (USDA NRCS 1990). Table 3-31 reports the extent of such soils in St. Tammany Parish and in the project area.

Table 3-30.
Use and suitability of soils in the project area

Map symbol	Map unit name	Fertility/ exchangeable aluminum levels	Main uses/ (minor uses)	Limitations/ concerns on main use	Soil use suitability[a]					
					Woodland[a]	Pasture	Crops	Urban	Recreation[a]	Wildlife habitat
Hydric soils										
AR	Arat silty clay loam	Low/ High	Woodland habitat for wildlife (hunting)	Wetness, strength, and flooding	WS	NS	NS	NS	NS	WS
Bg	Brimstone-Guyton silt loam	Low/ High	Woodland (home sites, pastures)	Wetness, excessive sodium in subsoil, and low fertility	MWS	MWS	PS	PS	PS	WS
Gt	Guyton silt loam	Low/ High	Woodland or pasture (Commercial or residential sites; vegetable crops)	Moderate seedling mortality (low fertility and wetness); wetness inhibits equipment use	WS	WS	MWS	PS[b]	PS[b]	WS to MWS
Gy	Guyton silt loam (occasionally flooded)	Low/ High	Woodland (Homesites)	Severe seedling mortality; flooding and wetness inhibit equipment use	MWS	MWS	PS	PS[b]	PS[b]	WS to MWS
Mt	Myatt fine sandy loam	Low/ High	Woodland (Commercial or residential sites; crops)	Severe seedling mortality; wetness inhibits equipment use	WS	WS	MWS	PS	PS	WS to MWS
My	Myatt fine sandy loam (frequently flooded)	Low/ High	Woodland (Pasture)	Flooding and wetness; equipment use limitations and seedling mortality if drainage is not provided	MWS	PS	PS	NS	NS	MWS
OB	Ouachita/Bibb soils (frequently flooded)	Low/ High	Woodland (Pasture)	Flooding and wetness; moderate equipment use limitations and severe seedling mortality	MWS	PS	PS	NS	NS	WS
St	Stough fine sandy loam	Low/ High	Woodland (Commercial or residential sites; crops)	Wetness in winter and spring	WS	WS	MWS	PS	MWS	WS
Nonhydric soils										
Aa	Abita silt loam, 0 to 2 percent slopes	Low/ High	Woodland (commercial or residential sites, crops)	Wetness and slow permeability	WS	WS	MWS	NS	MWS	WS
Ab	Abita silt loam, 2 to 5 percent slopes	Low/ High	Woodland (commercial or residential sites, crops)	Wetness, slow permeability, moderate shrink-swell, low for roads	WS	WS	MWS	NS	MWS	WS

Table 3-30.
(continued)

Map symbol	Map unit name	Fertility/ exchangeable aluminum levels	Main uses/ (minor uses)	Limitations/ concerns on main use	Soil use suitability[a]					
					Woodland[a]	Pasture	Crops	Urban	Recreation[a]	Wildlife habitat
Ca	Cahaba fine sandy loam (1 to 3 percent slopes)	Low/ Moderately high	Pasture or Urban (Woodland, vegetable crops)	Few for pasture; erosion hazard in steeper areas	WS	WS	MWS	WS	WS	WS
Lt	Latonia fine sandy loam	Low/ High	Woodland (Pasture or commercial/ residential)	Few	WS	WS	MWS	WS	WS	WS
Pr	Prentiss fine sandy loam (0 to 1 percent slopes)	Low/ High	Woodland (Commercial or residential)	Few	WS	WS	MWS	MWS	MWS	WS
Pt	Prentiss fine sandy loam (1 to 3 percent slopes)	Low/ High	Woodland (Commercial or residential)	Few	WS	WS	WS	MWS	MWS	WS
Rt	Ruston fine sandy loam (3 to 6 percent slopes)	Low/ Moderately high	Woodland (Pasture or homesites)	Few	WS	WS	MWS	MWS[b]	WS	WS
Sa	Savannah fine sandy loam (1 to 3 percent slopes)	Low/ High	Pasture (Woodland, crops, or homesites)	Low fertility	WS	WS	MWS	MWS	MWS	WS
Sh	Savannah fine sandy loam (3 to 6 percent slopes)	Low/ High	Pasture (Woodland, crops, or homesites)	Slope and low fertility	WS	WS	MWS	MWS	MWS	WS

Sources: CEMVN 2008; USDA NRCS 1990

Use suitability abbreviations:

MWS = moderately well suited; NS = not suited; PS = poorly suited; WS = well suited

Notes:

a. Woodland use refers to soil suitability for timber production; Recreation use refers to development for intense recreation such as playgrounds or campsites.

b. Limitations include low strength for roads.

Table 3-31.
Prime farmland soils in the project area

Map symbol	Map unit name	Hydric soil	Area in St. Tammany Parish (acres)	Proportionate extent in St. Tammany Parish	Area in project area (acres)	Proportionate extent in project area
Aa	Abita silt loam, 0 to 2 percent slopes	No	15,642	2.2%	1,639	1.04%
Ab	Abita silt loam, 2 to 5 percent slopes	No	1,295	0.2%	3	< 0.1%
Bg	Brimstone-Guyton silt loam	Yes	8,935	1.2%	202	0.1%
Gt	Guyton silt loam	Yes	16,300	2.9%	3,498	1.0%
St	Stough fine sandy loam	Yes	92,700	16.5%	64,046	31.95%
Ca	Cahaba fine sandy loam (1 to 3 percent slopes)	No	11,100	2.0%	6,188	1.43%
Lt	Latonia fine sandy loam	No	7,600	1.4%	6,175	3.5%
Pr	Prentiss fine sandy loam (0 to 1 percent slopes)	No	36,900	6.6%	23,091	11.5%
Pt	Prentiss fine sandy loam (1 to 3 percent slopes)	No	3,200	0.6%	1,647	0.7%
Rt	Ruston fine sandy loam (3 to 6 percent slopes)	No	5,100	0.9%	20	< 0.1%
Sa	Savannah fine sandy loam (1 to 3 percent slopes)	No	52,900	9.4%	16,840	6.0%
Sh	Savannah fine sandy loam (3 to 6 percent slopes)	No	25,900	4.6%	7,495	2.5%

Sources: USDA NRCS 1990; 1995 (as cited in Burk-Kleinpeter 2002), 2010c.

3.6 AIR QUALITY

EPA Region 6 and LDEQ, Air Quality Assessment Division, regulate air quality in Louisiana. The Clean Air Act (42 U.S.C. 7401-7671q), as amended, gives EPA the responsibility to establish the primary and secondary National Ambient Air Quality Standards (NAAQS) (40 CFR Part 50) that set acceptable concentration levels for six criteria pollutants: fine particles (PM_{10} and $PM_{2.5}$), sulfur dioxide (SO_2), carbon monoxide (CO), nitrous oxides (NO_x), ozone (O_3), and lead. Short-term standards (1-, 8-, and 24-hour periods) have been established for pollutants that contribute to acute health effects, while long-term standards (annual averages) have been established for pollutants that contribute to chronic health effects. Each state has the authority to adopt standards stricter than those established under the federal program; however, Louisiana accepts the federal standards.

Federal regulations designate Air-Quality Control Regions (AQCRs) that are in violation of the NAAQS as *nonattainment* areas, and those in accordance with the NAAQS as *attainment* areas. St. Tammany Parish, and therefore the proposed activity, is in the Southern Louisiana-Southeast Texas Interstate Air Quality Control Region (AQCR 106) (40 CFR 81.53; USEPA 2010a). EPA has designated St. Tammany as in attainment for all criteria pollutants (USEPA 2010b).

On June 20, 2007, EPA proposed to strengthen the 8-hour O_3 NAAQS. By the end of 2010, EPA expects to makes final designations of attainment and nonattainment areas on the basis of 2006–2008 data. The most recent data indicate that St. Tammany Parish would remain an attainment area under the newly proposed 8-hour NAAQS.

LDEQ monitors levels of criteria pollutants at representative sites in each region throughout Louisiana. For reference purposes, Table 3-32 shows the maximum monitored concentrations of

criteria pollutants in AQCR 106. The reported maximum of 0.086 parts per million (ppm) for the 8-hour level exceed the standards of 0.08 ppm within the region. However, the 3-year average of the fourth highest daily maximum 8-hour average O_3 concentrations over each year has not exceeded 0.08 ppm; hence, the attainment status. Notably, Iberville Parish, where the concentrations were monitored, is expected to become nonattainment under the proposed 8-hour standard.

Table 3-32.
NAAQS and monitored air-quality concentrations for AQCR 106

Pollutant and averaging time	Primary NAAQS	Secondary NAAQS	Monitored data	Monitoring station location
CO				
8-Hour Maximum[a] (ppm)	9	--	2.9	Baton Rouge
1-Hour Maximum[a] (ppm)	35	--	1.9	
NO_2				
Annual Arithmetic Mean (ppm)	0.053	0.053	0.013	Baton Rouge
Ozone				
8-Hour Maximum[b] (ppm)	0.08	0.12	0.086	Iberville Parish
$PM_{2.5}$				
Annual Arithmetic Mean[c] ($\mu g/m^3$)	15	15	12	Marrero
24-Hour Maximum[d] ($\mu g/m^3$)	65	65	29.7	Iberville Parish
PM_{10}				
Annual Arithmetic Mean[e] ($\mu g/m^3$)	50	50	31	Port Allen
24-Hour Maximum[a] ($\mu g/m^3$)	150	150	68	
SO_2				
Annual Arithmetic Mean (ppm)	0.03	--	0.009	St Bernard's Parish
24-Hour Maximum[a] (ppm)	0.14	--	0.10	
3-Hour Maximum[a] (ppm)	0.5	--	0.26	

Sources: USEPA 2010a; 40 CFR 50.1-50.12

Notes: ppm = parts per million; $\mu g/m^3$= micrograms per cubic meter

a. Not to be exceeded more than once per year.

b. The 3-year average of the fourth-highest daily maximum 8-hour average O_3 concentrations over each year must not exceed 0.08 ppm.

c. The 3-year average of the weighted annual mean $PM_{2.5}$ concentrations must not exceed 15.0 $\mu g/m^3$.

d. The 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor must not exceed 65 $\mu g/m^3$.

e. The 3-year average of the weighted annual mean PM_{10} concentration at each monitor within an area must not exceed 50 $\mu g/m^3$.

3.6.1 Transportation Conformity

In November 1993, EPA promulgated two sets of conformity rules to implement section 176(c) of the Clean Air Act—Transportation Conformity Rules (58 *Federal Register* [FR] 62188) and General Conformity Rules (58 FR 63214). The Transportation Conformity Rules are applicable to highways and mass transit projects in nonattainment areas and establish the criteria and procedures for determining that transportation plans, programs, and projects that are funded under 23 U.S.C., or the Federal Transit Act, conform to the State Implementation Plan of the Clean Air Act. Projects adopted, accepted, approved, or funded by the FHWA or the Federal Transit Authority must be included in a conforming transportation improvement plan. St. Tammany Parish and all areas associated with the proposed action are in full attainment for all criteria pollutants. Therefore, the Transportation Conformity Rules do not apply [40 CFR 93.102(b)].

In addition, the work proposed by LADOTD in their application for a Department of the Army permit, if authorized, would not be expected to exceed de minimis levels of direct emissions of a

criteria pollutant or its precursors and are exempted by 40 CFR 93.153. Any later indirect emissions would not be within the USACE's continuing program responsibility, and the USACE cannot practicably control them. For those reasons, a formal conformity determination would not be required for this project.

3.6.2 Climate and Greenhouse Gases

The existing climate is hot in the summer and cool in the winter. The warmest month is July, with an average maximum temperature of 91.1 °F, while the coldest month is January with an average minimum temperature of 40.2 °F. The annual average precipitation in St. Tammany is 60.1 inches. Rainfall is evenly distributed throughout the year. The wettest month of the year is July with an average rainfall of 7.1 inches (Idcide 2010).

Greenhouse gases (GHG) are components of the atmosphere that contribute to the greenhouse effect and global warming. Some GHG occur naturally in the atmosphere, while others result from human activities such as burning fossil fuels. Federal agencies, states, and local communities address global warming by preparing GHG inventories and adopting policies that will result in a decrease of GHG emissions. Six gases are GHGs: carbon dioxide (CO_2), NO_x, methane, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (UNFCC 2007). Although GHG (CO_2, methane, and NO_x) occur naturally in the atmosphere, human activities have changed their atmospheric concentrations. On a global scale, fossil fuel combustion added approximately 30 $x10^9$ tons (27 $x10^9$ metric tons) of CO_2 to the atmosphere in 2004, of which the United States accounted for about 22 percent (USEPA 2007a). Since 1900 the earth's average surface air temperature has increased by about 1.2 to 1.4 °F. The warmest global average temperatures on record have all occurred in the past 15 years, with the warmest two years being 1998 and 2005 (USEPA 2007b).

Federal agencies, states, and local communities address global warming by preparing GHG inventories and adopting policies that will result in a decrease of GHG emissions. CEQ recently released draft guidance on when and how Federal agencies should consider GHG emissions and climate change in NEPA. The draft guidance includes a presumptive effects threshold of 25,000 metric tons of carbon dioxide equivalent emissions from an action (CEQ 2010).

3.7 NOISE

A quantitative, computer-based analysis of the effects of the proposed action on ambient noise levels was performed following the procedures of LADOTD and FHWA. The analysis consisted of evaluating effects on potentially noise-sensitive sites along the project corridor extending from Bush to I-12. The general procedure used to assess these effects include determining noise levels through computer modeling and assessing effects by comparing future modeled noise levels to LADOTD and FHWA criteria.

3.7.1 Noise Fundamentals

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air, and are sensed by the human ear. Noise is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is otherwise intrusive. Human response to noise varies, depending on the type and characteristics of the noise, distance between the noise source and the receptor, receptor sensitivity, and time of day. Noise can interfere with communication, produce awakenings from sleep or, in some cases, damage hearing. Noise is often generated by activities essential to a community's *quality of life*, such as construction or vehicular traffic.

Sound varies by both intensity and frequency. Sound levels, described in decibels (dB), are used to quantify the sound intensity. The dB is a logarithmic unit that expresses the ratio of a sound

pressure level to a standard reference level. A scale relating sounds encountered in daily life to their approximate dB values is provided in Table 3-33. Hertz (Hz) are used to quantify sound frequency. The human ear responds differently to different frequencies. The *A-weighing* of sound, described in a-weighted decibels (dBA), approximates that frequency response to better describe the perception of sound by humans.

Table 3-33.
Common sound levels

Outdoor	Sound level (dBA)	Indoor
ATV	100	Subway train
Tractor	90	Garbage disposal
Noisy restaurant	85	Blender
Downtown (large city)	80	Ringing telephone
Freeway traffic	70	TV audio
Normal conversation	60	Sewing machine
Rainfall	50	Refrigerator
Quiet residential area	40	Library

Source: Harris 1998

The dBA noise metric describes steady noise levels. Although very few noises are, in fact, constant. Therefore, a noise metric, equivalent sound level (L_{eq}) has been developed. L_{eq} represents the average sound energy over a given period presented in dB (e.g., one-hour L_{eq} [$L_{eq}(h)$]). FHWA and LADOTD use the $L_{eq}(h)$ descriptor to estimate the degree of nuisance or annoyance arising from changes in traffic noise.

3.7.2 Regulatory Overview

In general, LADOTD has adopted the FHWA-established Noise Abatement Policy (LADOTD 2009; 23 CFR Part 772). The policy outlines criteria associated with proposed construction of new highways or the physical alteration of existing highways, which increases the number of through lanes. The proposed project meets both of those criteria; therefore, those policies have been used to assess the level of effects with respect to noise. The noise-abatement policy established Noise Abatement Criteria (NAC) that provide a benchmark to assess the level at which noise becomes a clear source of annoyance for different land uses (Table 3-34). Category B, which represents moderately sensitive land uses, best describes the majority of the receptors in the area. The NAC for residential use (category B) is 66 dBA.

Traffic noise effects can occur under two separate conditions: (1) when noise levels are unacceptably high, or (2) when a proposed highway project would substantially increase the existing noise environment. A traffic noise effect occurs when the predicted levels equal or exceed the NAC (e.g., greater than 66 dBA for category B and C), or when predicted traffic noise levels exceed the existing noise levels by more than 10 dBA. The level of impact under NEPA for the alternatives in this EIS (i.e., negligible, minor, moderate, or significant) is determined on the basis of the total number of receptors that exceed the NAC, the relative increase in noise for identified receptors, and the ability to incorporate, by design, noise-reduction measures into the proposed highway (i.e. barriers or berms). In the final design stages, proposed abatement systems would be reviewed for reasonableness and feasibility.

Table 3-34.
LADOTD Noise Abatement Criteria

Activity category	Description of activity category	NAC $L_{eq}(h)$
A	Land for which serenity and quiet are of extraordinary significance and serve an important public need, and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose	56 (exterior)
B	Residential	66 (exterior)
C	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.	66 (exterior)
D	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.	51 (interior)
E	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.	71 (exterior)
F	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.	N/A
G	Undeveloped lands that are not permitted.	N/A

Sources: LADOTD 2011; 23 CFR Part 772

3.7.3 Existing Conditions

Land uses and the human activities associated with them have different sensitivities to changes in ambient noise levels. To characterize those parameters, aerial maps and a visual survey of the project corridor were performed. In general, the area is typically rural, and the properties along the project corridor are typically residential. A majority of the project runs through relatively undeveloped portions of St. Tammany Parish.

Existing sources of noise are similar throughout the parish and include local road traffic, high-altitude aircraft overflights, and natural noises such as wildlife vocalizations and leaves rustling. The only predominant ongoing source of noise associated with the project areas are existing roadways such as I-12, LA 21, LA 434, LA 1088, and Airport Road. Given the lack of other anthropogenic noises, vehicles on the roadways are likely audible for a mile or more particularly during quiet periods. The noise environment in communities and towns throughout the parish are a mixture of quiet residential and light commercial. Some individual residences, multifamily dwellings, churches, and schools are within 1,000 feet of many of the primary arterials. They are chiefly in the communities and towns throughout the study area such as Bush, Talisheek, Abita Springs, and Lacombe.

Because of the rural nature of the area, existing noise levels at locations of interest are predominantly from primary and secondary roadways; therefore, the existing noise levels were modeled, not measured. Existing noise levels for existing roadways, interchanges, and sections that are collocated with and would need to be widened or altered under any of the four alternatives were predicted using the FHWA highway traffic noise prediction model, Traffic Noise Model 2.5. The model uses the number and type of vehicles on an existing or planned roadway, their speeds, and the physical characteristics of the road (e.g., curves, hills, depressed, elevated). Each existing

roadway was modeled, assuming no special noise abatement measures would be incorporated, and the roadway sections were assumed at-grade. The noise predictions in this report are for the traffic conditions in 2010. It was assumed that the peak-hour volumes and corresponding speeds for trucks and automobiles would result in the noisiest conditions. During all other periods, the noise levels would be less than those indicated here.

Receptors were identified at representative locations (i.e., residential neighborhoods, parks, churches, schools, hospitals, libraries) (Figure 3-16). The vast majority of potential noise receptors associated with the project area are residential. Noise predictions were made for locations just adjacent to existing houses on the side facing the existing nearby roadway. Noise predictions of $L_{eq}(h)$ for representative receptors near roadways of interest in the study area are outlined in Table 3-34. A detailed breakdown of the representative receptors and the modeling results are in Appendix D. Receptors near the LA 1088/I-12 and LA 434/I-12 interchanges are primarily on the south side of the interstate. The noise from I-12 dominates the existing noise at those locations. Several existing residences are within 100 feet of Airport Road near I-12, and existing traffic noise during peak periods exceeds the NAC for category B of 66 dBA. Other primarily undeveloped areas in St. Tammany Parish would have existing sound levels less than those shown in Table 3-35.

Table 3-35.
Existing peak period sound levels for roadways in the study area

Area of interest	Peak period	Number of receptors	Sound level $L_{eq}(h)$ (dBA)			Number of existing receptors above NAC (66 dBA for category B)
			Maximum	Minimum	Median	
LA 21 near Bush	AM	49	65.8	40.3	52.3	0
	PM		65.7	40.2	52.1	0
LA 1088 and I-12	AM	85	61.0	36.9	50.6	0
	PM		60.9	36.9	50.6	0
LA 434 and I-12	AM	22	63.4	43.5	47.2	0
	PM		64.1	43.6	47.3	0
Airport Road and I-12	AM	27	66.1	43.2	51.8	3
	PM		67.1	43.4	52.1	6

Figure 3-16 - Noise receptors in the project area

3.8 RECREATIONAL RESOURCES

Tourism in Louisiana generates $8.3 billion in annual spending in Louisiana businesses and more than $5 billion in employee wages. Louisiana hosts approximately 23.3 million visitors each year to sustain more than 124,000 direct jobs in a variety of sectors (LDRCT 2010). In Louisiana, nature-based tourism, rural areas, ranked slightly higher (35.5 percent) than tourists visiting New Orleans (35 percent) (Louisiana Sea Grant 2006). St. Tammany Parish's rural character and nearby location north of New Orleans makes the parish a popular tourist destination.

St. Tammany Parish has seen an increase in tourism because the economic downturn in 2008, with a 70 percent increase in tourists along the north shore and a 37 percent increase in tourists visiting Tammany Trace (Alexander-Bloch 2009). The parish ranked 9th in 2008 in the state with $195 million spent by travelers, up 10 percent from 2007 (RDUSTA 2009). The parish was featured in *National Geographic's* May/June 2009 issue as the destination for Great Long Weekends, America Coast to Coast for Louisiana (National Geographic 2009).

3.8.1 Nature-Based Recreation

Nature-based tourism in Louisiana includes bird watching, hiking, walking, canoeing, and photography. Several wetland mitigation banks, wildlife refuges, and state parks are in the project area of the parish and allow public access in support of these activities. Those areas include Abita Creek Flatwoods Mitigation Bank, Talisheek Pine Wetlands Mitigation Bank, and Bogue Chitto National Wildlife Refuge. Four swamp-touring agencies are in and near Slidell just east of the project boundary.

Birding is popular throughout Louisiana, and St. Tammany is along the Mississippi Flyway through which migratory birds pass twice a year. Migratory birds include the scarlet tanager, indigo bunting, ruby-throated hummingbirds, and a host of waterfowl species. Resident birds include the red-cockaded woodpecker; great blue and snowy herons; great egret; white ibis; numerous hawk species; and many others. The federally listed endangered red-cockaded woodpecker draws in birdwatchers throughout the year with suitable habitat scattered throughout the parish. Those and many other bird species can be seen in one of the north shore's forests of preserves such as Big Branch Marsh, Pearl River, and Northlake Nature Center south of the project area. The birds can also be seen in Abita Flatwoods Mitigation Bank in the project area (STTCC 2010).

Tammany Trace is Louisiana's first trail to be a part of the National Rail-Trail Network. The Tammany Trace is a scenic recreational corridor composed of a paved trail, a parallel equestrian trail, and other recreational facilities. Annually, the 28-mile trail services 270,000 pedestrians, bicyclists, equestrians, rollerbladers, and joggers by providing continuous, safe neighborhood connections to work, school, and other recreational areas. The trail links five communities—Covington, Abita Springs, Mandeville, Lacombe, and Slidell—and serves as a wildlife conservation and educational learning center (Tammany Trace 2010).

3.8.2 Hunting and Fishing

Consumptive uses such as hunting and fishing are popular throughout Louisiana and the rural character of St. Tammany make the area ideal for hunting and fishing. Fishing and crabbing are accessible throughout the majority of St. Tammany Parish from the banks of many bayous and rivers. Most charter fishing businesses operate out of the Slidell area and offer light tackle guide services (STTCC 2010).

Louisiana is known as Sportsman's Paradise because of the wide range of hunting and trapping opportunities for hunting waterfowl, deer, and resident small-game. Waterfowl hunting seasons vary between early September and late February, and hunting is permitted on state-managed areas

and private land. Deer hunting is permitted typically October 1 through January 31. Resident small-game hunting of quail, rabbit, and squirrel is permitted in the fall months; squirrel hunting is also permitted in May except in National Wildlife Refuges, some WMAs, and USACE areas (LDWF 2009).

Trapping animals for fur is also permitted; that season opens statewide in late November. Animals permitted for trapping are beaver, bobcat, coyote, gray fox, mink, muskrat, nutria, opossum, river otter, red fox, raccoon, and skunk (LDWF 2009).

3.8.3 Recreation Districts

St. Tammany Parish council divided the parish into 16 recreation districts to maintain and operate parish-owned recreational facilities (St. Tammany Parish Recreation District 2009). Recreation Districts #1, 2, 4, 5, 7, 10, 11, and 16 are within the project area as shown in Figure 3-17 (St. Tammany Parish 2009b). Each recreation district operates as a free standing government agency and operates and maintains community recreation centers including ball parks, sports fields, gymnasiums, convention centers, boat launches, and parks in or near cities and towns in the recreation district. Recreation District #2 operates a baseball/softball field complex approximately 0.4 miles south of the LA 21/LA 41 intersection on the west side of Watts Thomas Road. This complex consists of four baseball/softball fields and is used year-round.

Abita Springs Golf and Country Club and Money Hill Golf and Country Club are both in the project area. Abita Springs Golf Course is open to the public and 5 miles northeast of Abita Springs. Money Hill is a private golf course 5 miles east of Abita Springs and has twice been named the number one golf course in Louisiana by *Golf Digest*; the Ron Garl-designed, 18-hole course has tree-lined fairways with five finishing holes playing into, around and over a 150-acre lake (STTCC 2010).

Lowe Davis Road is often used as a recreational pathway for bicyclists, walkers, and joggers. Recreational users of the road cite its light traffic, good road conditions, and topography as reasons why it is a favorite route for training purposes. Lowe Davis Road is often used during organized cycling events, such as the Tour de Cure and various training rides.

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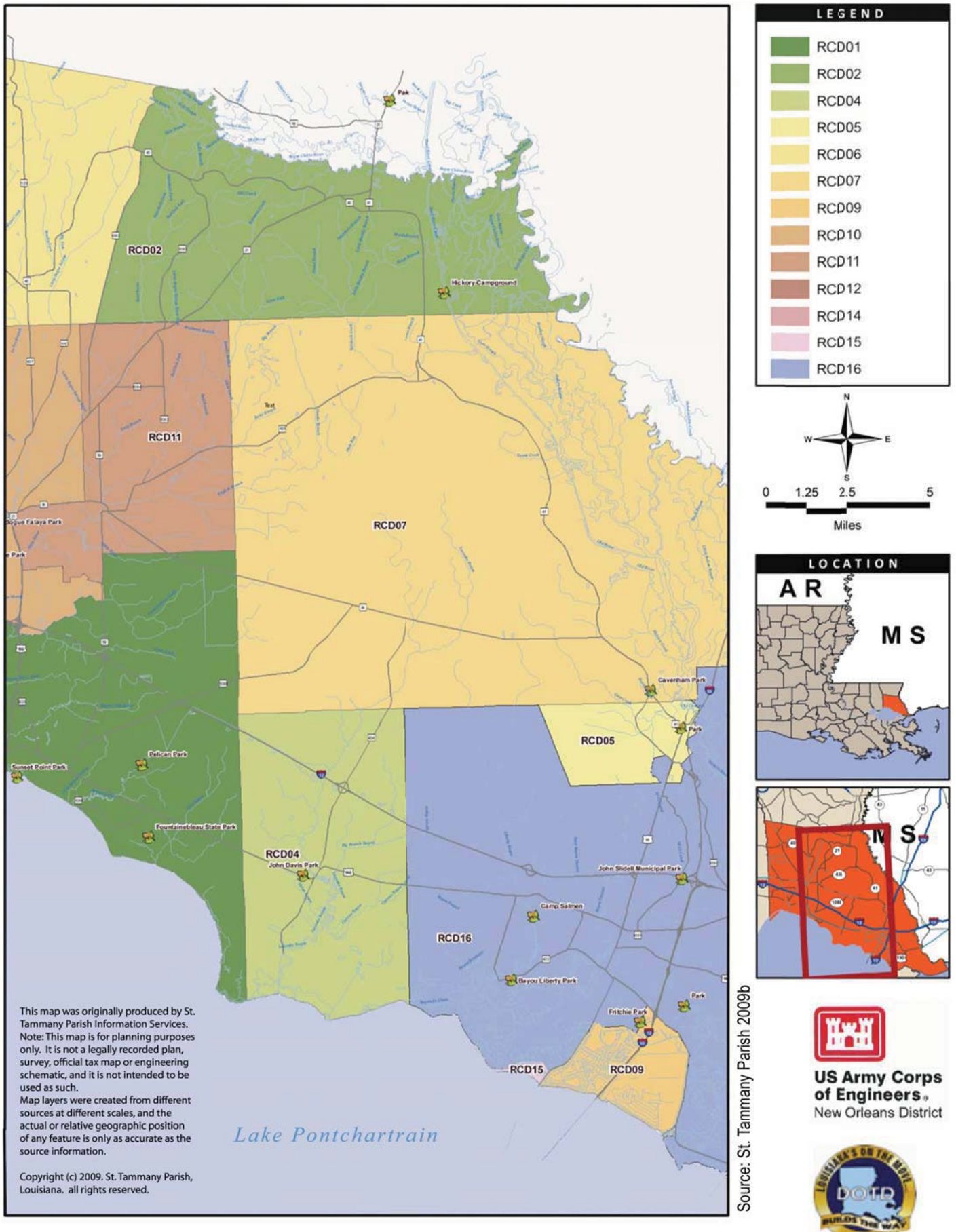
Figure 3-17 - Recreation districts



Source: St. Tammany Parish 2009b

US Army Corps of Engineers
New Orleans District

3.9 TRAFFIC AND TRANSPORTATION

The project area is roughly bounded by LA 59 and LA 21 to the east, I-12 to the south, and the abandoned Gulf Mobile and Ohio Railroad to the west. LA 435 and LA 36 cross the area in an east-west direction connecting to LA 41 just east of the project area, as shown in Figure 3-18. Capacity analysis was conducted for existing traffic conditions for the base year of 2010 to determine existing congestion and delays in the project area (Urban Systems 2011).

3.9.1 Existing Traffic Volumes

Traffic volume data were collected to determine the base year traffic conditions. Twenty-four-hour volume counts and peak period turning movement counts were collected in the study area in January–April 2010. The resulting average daily traffic volumes and a.m. and p.m. peak existing volumes are presented in further detail in the Traffic Study Report (Urban Systems 2011) in Appendix E.

3.9.2 Capacity Analysis

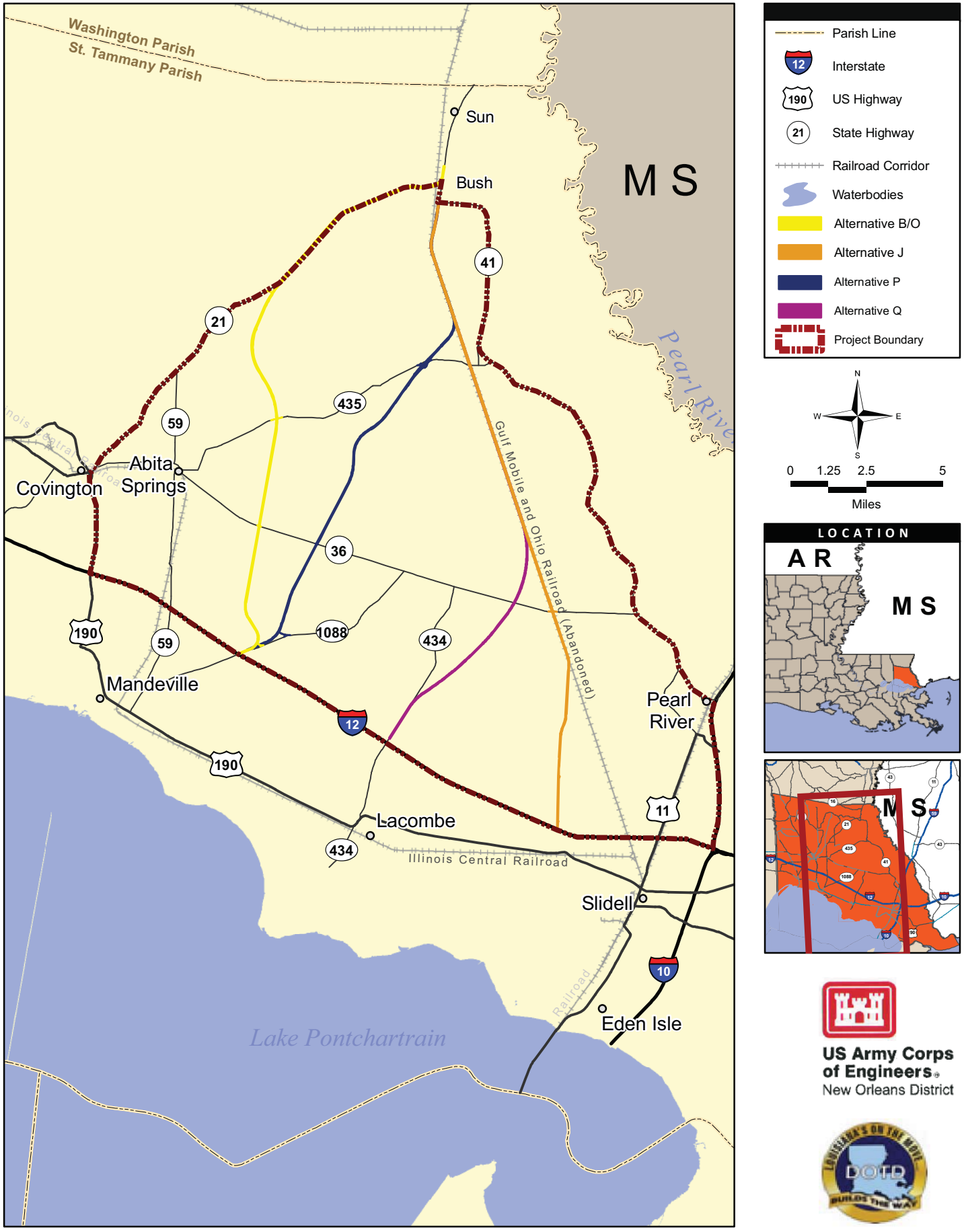
Capacity analysis was performed to determine operational conditions in the peak periods for the existing roadways and to model future scenarios. Such an analysis is the industry standard for traffic studies to determine the relative difference in operational conditions.

Roadway characteristics and peak hour volumes were entered into Highway Capacity Software (version 5.4) for the two-lane highway segments to determine the expected LOS and volume-to-capacity ratios. Intersection geometry, turning movement volumes, and traffic control parameters were also entered into Highway Capacity Software for the signalized and unsignalized intersections to determine the expected LOS and delay conditions. Similarly, Signalized and Unsignalized Intersection Design and Research Aid was used to determine the expected LOS and delay conditions at the roundabout in the study area.

LOS is a qualitative measure rated as operating under capacity (LOS A) to over capacity (LOS F) by describing operational conditions in a traffic stream, generally described in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety. Several roads and intersections in the project area are identified as LOS E or F.

- **LOS E** *at its highest density value describes traffic operation at capacity*. Operations at this level are volatile, there being virtually no usable gaps in the traffic stream. Vehicles are spaced at approximately six car lengths, leaving little room to maneuver in the traffic stream at speeds that are still over 49 miles per hour. Any disruption to the traffic stream, such as vehicles entering from a ramp or a vehicle changing lanes, can establish a disruption wave that propagates throughout the upstream traffic flow. At capacity, the traffic stream has no ability to dissipate even the most minor disruption, and any incident can be expected to produce a serious breakdown with extensive queuing. Maneuverability in the traffic stream is extremely limited, and the level of physical and psychological comfort afforded the driver is poor.

Figure 3-18 - Major roads



- **LOS F** *describes breakdown in vehicular flow*. Such conditions generally exist in queues forming behind breakdown points. Such breakdowns can occur for a number of reasons. At capacity, the traffic stream has no ability to dissipate even the most minor disruption, and any incident can be expected to produce a serious breakdown with extensive queuing. Maneuverability in the traffic stream is virtually nonexistent, and the level of physical and psychological comfort afforded the driver is poor.

Signalized intersection analysis was based on the existing traffic signal phasing and timing as presented in LADOTD's traffic signal inventories. Although the timing could be modified over time to service the increased traffic volumes, cycle lengths and timing were kept constant in the analysis.

The LOS and capacity analysis results are presented in Table 3-36 for the roadway segments, Table 3-37 for the unsignalized intersections, and Table 3-38 for the signalized intersections. The results indicate the LOS varies significantly throughout the study area. The existing delays are predominantly in the western portion of the study area, with the exception of the I-12 at Airport Road/Northshore Boulevard interchange in Slidell.

Existing delays in the western portion of the study area would be expected primarily on the LA 21 and LA 59 corridors. On the basis of traffic count data collected, capacity constraints for existing roadways were identified at locations where LOS is rated E or F:

- Unsignalized intersection at LA 59 and LA 21
- Unsignalized intersection at LA 59 and LA 36
- Northbound signalized intersection at LA 21 and US 190
- Southbound signalized intersection at LA 21 and LA 36
- Eastbound signalized intersection at LA 59 and Harrison Road
- Westbound signalized intersection at LA 59 and I-12
- Southbound signalized intersection at LA 59 and I-12
- LA 36 between LA 21 and LA 59
- LA 59 between LA 36 and I-12
- Airport Road north of I-12

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Table 3-36.
AM and PM peak LOS—roadway segments

Roadway segment	AM peak LOS	PM peak LOS
LA 40 between LA 1083 and LA 21	D	D
LA 41 between LA 40 and LA 435	C	C
LA 21 between LA 40 and LA 1083	D	D
LA 21 between LA 1084 and LA 1083	D	D
LA 21 between LA 59 and LA 1084	D	D
LA 21 between LA 36 and LA 1082	D	D
LA 59 between LA 21 and LA 36	D	D
LA 59 between LA 36 and I-12	**E**	**E**
LA 435 between LA 1083 and Peg Keller	D	D
LA 435 between White Oaks and LA 41	C	C
LA 1083 between LA 1084 and LA 435	C	C
LA 1083 between LA 21 and LA 1084	C	C
LA 1084 between LA 21 and LA 1083	C	D
LA 36 between LA 21 and LA 59	**E**	**E**
LA 36 between LA 435 and LA 1088	C	C
LA 36 between LA 434 and LA 41	C	C
LA 36 between LA 1088 and LA 434	C	C
LA 1088 between LA 36 and I-12	C	C
LA 434 between LA 36 and I-12	D	D
Airport Road north of I-12	**E**	**E**

Source: Urban Systems 2011

Table 3-37.
Peak LOS—unsignalized intersections

Intersection	Direction	AM peak LOS	PM peak LOS
LA 1083 at LA 40	Northbound	A	A
	Westbound	A	A
LA 21 at LA 40 (west int.)	Northbound	C	C
	Southbound	D	C
	Eastbound	A	A
	Westbound	A	A
LA 21 at LA 40 (east int.)	Northbound	D	C
	Southbound	B	C
	Eastbound	A	A
	Westbound	A	A
LA 21 at LA 41	Northbound	A	A
	Eastbound	C	D
LA 40 at LA 41	Southbound	B	B
LA 40 at LA 41	Eastbound	A	A
LA 41 at LA 435 (north int.)	Northbound	A	A
	Eastbound	A	A
LA 41 at LA 435 (south int.)	Northbound	A	A
	Eastbound	A	A
LA 21 at LA 1083 (west int.)	Northbound	B	C
	Westbound	A	A

Table 3-37.
(continued)

Intersection	Direction	AM peak LOS	PM peak LOS
LA 21 at LA 1083 (east int.)	Southbound	B	B
	Eastbound	A	A
LA 21 at LA 1084	Southbound	A	A
	Westbound	C	C
LA 1083 at LA 1084	Northbound	A	A
	Southbound	A	A
	Eastbound	A	A
	Westbound	A	A
LA 1083 at LA 435	Southbound	B	B
	Eastbound	A	A
LA 435/LA 59 at LA 36	Overall	B	B
	Northbound	B	C
	Southbound	B	B
	Eastbound	B	C
	Westbound	B	B
LA 36 at LA 59	**Southbound**	**E**	D
	Eastbound	A	A
LA 21 at LA 59	**Northbound**	**F**	B
	Westbound	A	A
I-12 at LA 1088 (WB)	Northbound	N/A	N/A
	Westbound	N/A	N/A
I-12 at LA 1099 (EB)	Southbound	N/A	N/A
	Eastbound	N/A	N/A
I-12 at LA 434 (WB)	Northbound	A	A
	Westbound	B	C
I-12 at LA 434 (EB)	Southbound	A	A
	Eastbound	C	D
LA 36 at LA 1088	Northbound	B	A
	Westbound	A	A
LA 36 at LA 434	Northbound	B	B
	Westbound	A	A
LA 36 at LA 41	Northbound	A	A
	Eastbound	B	B

Source: Urban Systems 2011

Table 3-38.
Peak LOS—signalized intersections

Intersection	Direction	AM peak LOS	PM peak LOS
LA 21 at LA 36	Overall	D	C
	Northbound	B	C
	Southbound	**E**	B
	Westbound	D	C
US 190 at LA 21 (east int.)	Overall	D	C
	Northbound	**F**	C
	Eastbound	C	D
	Westbound	A	B
LA 59 at Harrison Ave	Overall	C	C
	Northbound	A	B
	Southbound	B	C
	Eastbound	**E**	C
I-12 at LA 59 (WB)	Overall	C	B
	Northbound	A	A
	Southbound	B	B
	Westbound	**E**	D
I-12 at LA 59 (EB)	Overall	D	C
	Northbound	B	B
	Southbound	**E**	A
	Eastbound	C	**E**
I-12 at Airport Road (WB)	**Overall**	D	**F**
	Northbound	A	A
	Southbound	B	B
	Westbound	**F**	**F**
I-12 at Airport Road. (EB)	Overall	C	C
	Northbound	C	D
	Southbound	B	B
	Eastbound	C	**E**

Source: Urban Systems 2011

The LOS, volume-to-capacity ratios, and delays vary significantly throughout the study area. The existing delays are predominantly on the western portion of the study area, with the exception of the I-12 at Airport Road/Northshore Boulevard interchange in Slidell. That interchange has been the subject of numerous studies because of the congested conditions.

Existing delays in the western portion of the study area would be expected primarily on the LA 21 and LA 59 corridors. Delays would also be expected at the I-12 at Airport Road interchange. Those conditions would be expected to worsen in the implementation and design years. Significant delays at the intersections of the major routes throughout the area would be expected by the design year of 2035.

3.9.3 Safety

The crash rate for each roadway segment in the study area network was calculated and compared to the statewide average for its classification. Of all the roadway segments within the study area network, 2.92 of 74.71 miles may be considered candidates for further study by the LADOTD District Office during an annual review of locations with the highest potential for improvement.

A location may include a segment, intersection, or spot having at least 5 crashes per year and twice the statewide average for its classification. The most recent list of locations with the highest potential for improvement was reviewed for any other intersections, segments, or spots that may require further analysis, but no locations within the study area network were identified (Table 3-39).

Table 3-39.
Project area existing crash data

Route	Control section	Length	Classification	ADT	VMT	Crashes ('05-'09)	Crash Rate[a]	State average	Candidate for further study?
US 190	013-11	2.9	6-lane urban	56600	59,911,100	1,322	4.41	2.79	No
US 190	013-11	0.16	4-lane div urban	56600	3,305,440	107	6.47	2.79	Yes
US 190-X	013-10	0.28	4-lane urban	22500	2,299,500	30	2.61	3.46	No
LA 21	030-01	2.21	2-lane urban	13900	11,212,435	124	2.21	2.34	No
LA 21	030-01	12.25	2-lane rural	8700	38,899,875	271	1.39	1.08	No
LA 59	281-03	3.11	2-lane urban	17200	19,524,580	403	4.13	2.34	No
LA 59	281-03	1.42	2-lane urban	15700	8,137,310	63	1.55	2.34	No
LA 36	280-01	0.41	2-lane urban	9300	1,391,745	16	2.30	2.34	No
LA 59	852-09	1.39	2-lane urban	5200	2,638,220	16	1.21	2.34	No
LA 59	852-09	1.6	2-lane rural	5200	3,036,800	17	1.12	1.08	No
LA 435	281-04	0.58	2-lane urban	5300	1,122,010	0	0.00	2.34	No
LA 435	281-04	9.39	2-lane rural	5300	18,164,955	135	1.49	1.08	No
LA 435	281-04	1.51	2-lane rural	1140	628,311	11	3.50	1.08	Yes
LA 41	058-02	6.76	2-lane rural	5300	13,077,220	39	0.60	2.08	No
US 11	018-04	0.07	4-lane urban	11900	304,045	10	6.58	3.46	No
US 11	018-04	3.35	2-lane urban	11900	14,550,725	148	2.03	2.34	No
LA 41	058-01	1.25	3-lane urban	4300	1,961,875	50	5.10	2.34	Yes
LA 41	058-01	1.5	2-lane urban	9600	5,256,000	28	1.07	2.34	No
LA 41	058-01	2.34	2-lane rural	9600	8,199,360	94	2.29	2.08	No
LA 41	058-01	9.97	2-lane rural	8300	30,204,115	101	0.67	2.08	No
LA 41	058-01	0.61	2-lane rural	4100	912,865	1	0.22	2.08	No
LA 434	852-12	5.56	2-lane rural	4200	8,523,480	67	1.57	2.08	No
LA 36	280-03	6.09	2-lane rural	3300	7,335,405	31	0.85	2.08	No

Source: LADOTD 2012

Note: Crash rates were calculated using non-intersection crashes only

3.10 UTILITIES

Utilities in the project area service the residents and businesses of St. Tammany Parish, and transmission lines traverse the parish to service other regions of the state. Utilities consist of water supply, wastewater, stormwater, solid waste, hazardous waste, telecommunications, and energy. The primary public utility providing water and sewer service is St. Tammany Utilities; however, the rural character of the project area limits the network of collection and distribution systems providing water, sewer, and gas services.

3.10.1 Water and Wastewater

St. Tammany Utilities provides public water and wastewater services to many of the subdivisions in St. Tammany Parish (Figure 3-19). In rural areas, subdivisions have private wells for water and individual septic or private wastewater treatment systems. Private water and sewer providers in the project area are as follows (ATT 2010):

- Coast Waterworks, Inc.
- H20 Systems
- Louisiana Water Service, Inc.
- Williams Waterworks, Inc.

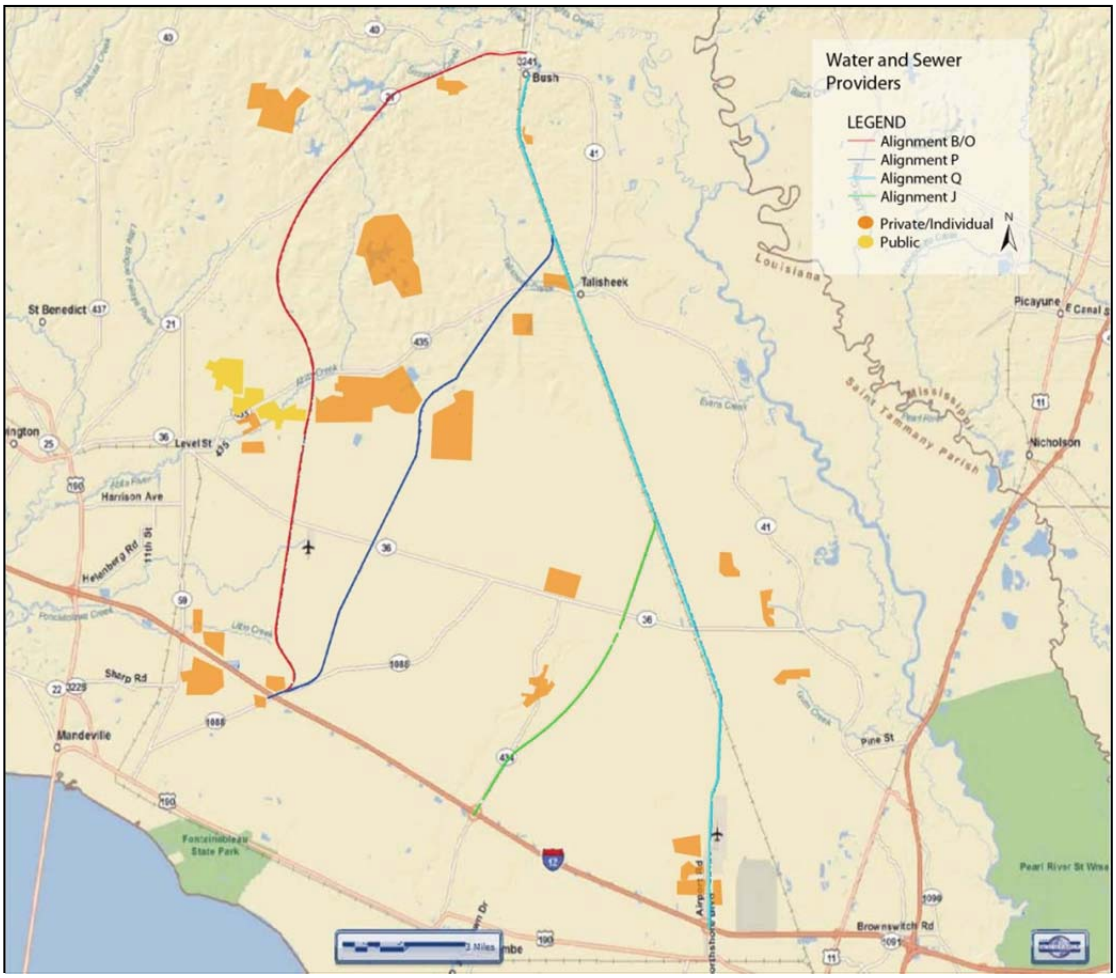

Figure 3-19. Water and sewer service providers in St Tammany Parish.

3.10.2 Electrical

The existing electrical facilities are predominantly overhead service and transmission lines. Cleco Power, LLC, and Washington-St. Tammany Electric Cooperative, LLC (WSTE) are the primary electrical service providers in the area, with WSTE owning the majority of the lines. Most of the electrical power poles are joint pole facilities with telephone and cable lines. Cleco and WSTE have facilities along the same roadways in portions of St. Tammany Parish in the following areas:

- *Cleco Power, LLC*. Coverage is primarily in the southern part of the Parish.
- *Washington-St. Tammany Electric Cooperative, LLC (WSTE)*. This is the primary provider of electrical service in the area. Its coverage services rural areas of the parish and facilities extend along many of the rural roadways in the parish (Figure 3-20).

Figure 3-20. LA 435: Looking westbound near Talisheek.

Overhead lines run parallel to LA 36, LA 435, LA 41, LA 21, LA 1083, and LA 1088. The I-12/ LA 434 interchange has overhead and buried fiber optic lines.

3.10.3 Telephone, Cable, and Internet

Service lines for the telephone, cable, and Internet services are typically on joint power poles with the electrical service lines. Individual service lines with service poles often extend from the main joint service lines to provide the service connections to residents and subdivision. The following companies provide wired telephone, cable, and Internet service in the parish:

- AT&T
- Cable Television Programming
- Charter Business
- Executone Systems Co. of Louisiana, Inc.
- Freedom Communications
- Intelcom
- NuVox

3.10.4 Oil and Gas

Oil and gas transmission lines traverse the project area, and pipelines range from 6 to 30 inches in diameter. The following companies own and operate facilities in the area (Figure 3-21):

- Southern Natural Gas Co. (SNG)
- Koch Gateway Pipeline Co. (KGP)
- Exxon-Mobile Pipeline Co. (EMP)
- Gulf South Pipeline Co. LP (GSP)
- WFS-NLG Pipeline Company, LLC (WFS)

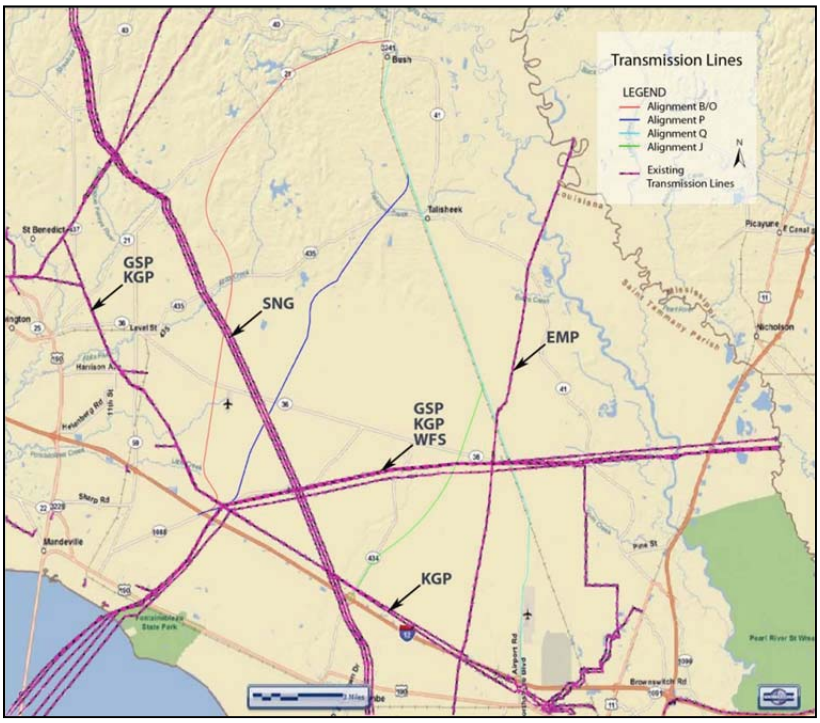

Figure 3-21. Oil and gas transmission lines.

3.10.5 Drainage

The southern area of the project is generally flat and consists of wetlands and floodplains; roadways have multiple drainage culverts to drain the flows that generally run in a southwesterly direction. LA 36, for example, has a cross drain culverts at 500- and 1,000-foot intervals along the roadway.

3.11 SOCIOECONOMICS

The analysis of socioeconomic resources that could be affected by the project is divided into six subsections: demographics; economic development (which includes employment and income analysis); housing stock; quality of life characteristics (education, public safety [law enforcement and fire protection]) and health care; environmental justice; and protection of children. For purposes of the socioeconomic analysis, the appropriate socioeconomic region of influence (ROI) is two Louisiana parishes—St. Tammany and Washington. Details of the socioeconomic study, including methodology and modeling, are provided in the Economic Study Report (Appendix F).

St. Tammany Parish is bordered by the Pearl River to the east, Lake Pontchartrain to the south, Tangipahoa Parish on the west, and Washington Parish to the north. St. Tammany Parish is part

of the New Orleans-Metairie-Kenner, Louisiana metro statistical area (MSA). As noted in Table 3-40, St. Tammany Parish had a land area of approximately 854 square miles in 2000. St. Tammany Parish is primarily urbanized. An urbanized area is a densely settled area with a census population of at least 50,000 (USCB 2010cc).

Washington Parish is bordered by the Pearl River to the east, St. Tammany Parish to the south, Tangipahoa Parish on the west, and several Mississippi counties to the north. Washington Parish is not a part of a MSA. Washington Parish is primarily rural. A rural area is an area where the population and housing units are outside urbanized areas (USCB 2010cc). Washington Parish has a land area of 670 square miles.

Table 3-40 summarizes some of the geographical data of the ROI and two comparison areas, Louisiana and the United States.

Table 3-40.
Geographic characteristics of ROI and comparison areas, 2000

	United States	Louisiana	St. Tammany Parish	Washington Parish	ROI
Land area (square miles)	3,537,438	43,562	854	670	1,524
Population living in urban area (percent)	79.0%	72.6%	74.7%	37.6%	67.7%
Population living in rural area (percent)	21.0%	27.4%	25.3%	62.4%	32.3%

Sources: USCB 2009h, 2010dd; Tetra Tech 2010d

As shown in Table 3-41, in 2008 there were 267 persons per square mile in St. Tammany Parish, which is approximately three times the persons per square mile in the nation and more than two and half times the persons per square mile in Louisiana. Such densities reinforce the classification of the parish as primarily urbanized as discussed above. The 2008 population per square mile in Washington Parish, 68 persons, is approximately 68 percent of the national and 67 percent of the state persons per square mile.

Table 3-41.
Population densities, ROI and comparison areas, 2000

	United States	Louisiana	St. Tammany Parish	Washington Parish	ROI
Land Area (square miles), 2000	3,537,438	43,562	854	670	1,524
Persons Per Square Mile, 2000	80	103	224	66	154
Population Per Square Mile, 2008	86	101	267	68	180

Sources: USCB 2009h; Tetra Tech 2010d

3.11.1 Demographics

Demographic characteristics are variables that can be used to present a profile of a community's human population. Characteristics of the population analyzed in this section are the trends in population growth (or decline); general racial and ethnic characteristics of the population; general demographic characteristics such as average, family size, median age of the parish resident, levels of education attainment of adult residents and travel time to work of commuting ROI residents; and the economic status of individuals (prevalence of poverty). Demographics variables are analyzed because demographics of an area can change, often dramatically, if, for example, there

is an infusion or exodus of employment opportunities, a change in physical environment, or other phenomena that alter the community's character.

3.11.1.1 Population Growth and Decline

The change in the number of people living in an area is an important demographic consideration. The magnitude of population growth in the ROI has varied widely over the past two decades. Table 3-42 traces the population growth in the ROI and, for comparison purposes, Louisiana and the United States.

As Table 3-42 shows, the ROI population increased by an annual average of 2.1 percent in the 18-year period of 1990–2008, a rate approximately 10 times as fast as Louisiana and approximately twice as fast as the United States.

Table 3-42.
Historical population levels and rates of change, ROI and comparison areas, 1990 - 2008

Population			
Location	**1990**	**2000**	**2008**
St. Tammany Parish	144,508	191,268	228,456
Washington Parish	43,185	43,926	45,430
ROI total	187,693	235,194	273,886
Louisiana	4,219,973	4,468,976	4,410,796
United States	248,709,873	281,421,906	304,059,724
Average annual change in population			
	1990–2000	**2000–2008**	**1990–2008**
St. Tammany Parish	2.8%	2.2%	2.6%
Washington Parish	0.2%	0.4%	0.3%
ROI total	2.3%	1.9%	2.1%
Louisiana	0.6%	–0.2%	0.2%
United States	1.2%	1.0%	1.1%

Sources: USCB 2009h, 2010i; Tetra Tech 2010d

In the 1990s, the state's population grew at half the rate of the United States. The collapse of the gas and oil industry along the Mississippi Gulf and in the greater New Orleans area resulted in an exodus of workers and their families as they sought employment elsewhere. Some of the migrating population relocated to St. Tammany and Washington Parishes. The annual population growth rate in the ROI in that decade was almost four times the rate of the state's annual population growth.

Review of annual rates of population change during the 2000s yields widely varying numbers. For the purposes of this EIS, the recent demographic history of the ROI can best be segmented into two phases: 2000–2005 and 2006–present.

Population growth in the ROI during the first half of the 2001–2010 decade is primarily attributable to St. Tammany Parish's growth as a bedroom community of greater New Orleans. The loss of population, 251,993 persons, a loss of 5.6 percent, in 2005–2006 for the state (USCB 2009i), was the result of the net exodus of persons displaced because of Hurricane Katrina. Some of the individuals uprooted from the hurricane relocated to St. Tammany Parish, which experienced a rate of population increase nearly three times the national average. Population

growth in St. Tammany Parish from 2006 to 2008 is also the result of the infusion of persons working in other parts of the New Orleans metro area (Orleans, Jefferson, Plaquemines, and St. Bernard parishes) and those locating to St. Tammany Parish from Chevron's relocating its headquarters from New Orleans to Covington in 2008 (SSN 2008). Washington Parish grew at a rate of 0.4 percent, well below the national average in 2000–2008. Overall, the ROI experienced a 1.9 percent population increase in 2000–2008.

The rate of population growth projected for St. Tammany and Washington Parishes and their rates of projected employment opportunities vary over time and between the parishes. Table 3-43 presents rates of projected population growth for several periods and the rate of projected employment opportunities for those same periods in the two parishes and for the United States. St. Tammany Parish's population is expected to grow at rates well above the national average from 2010 to 2045, as was the case from 2008 to 2010. Population projections for Washington Parish, however, reflect rates of growth mirroring national rates until 2015 and then growth rates in the parish would be expected to be slower than the national projections from 2015 to 2035.

Table 3-43.
Change in population and employment, ROI and comparison area, 2008–2045

Population	**2008–2010**	**2010–2015**	**2015–2025**	**2025–2035**	**2035–2045**
St. Tammany Parish	6%	13%	20%	13%	11%
Washington Parish	2%	5%	8%	6%	9%
United States	2%	5%	10%	9%	9%
Employment	**2008–2010**	**2010–2015**	**2015–2025**	**2025–2035**	**2035–2045**
St. Tammany Parish	–6%	7%	10%	9%	11%
Washington Parish	–5%	1%	0%	5%	12%
United States	–5%	4%	5%	7%	10%

Source: REMI 2010

St. Tammany Parish is projected to experience a higher than national rate of growth in employment opportunities from 2010 to 2045. Washington Parish is projected to have little growth in employment opportunities until 2025 and then a lower rate of growth than national averages in employment from 2025 to 2055.

The U.S. Census Bureau provides population counts and population estimates for seven towns and cities in the ROI: Abita Springs, Covington, Mandeville, Pearl River, and Slidell, in St. Tammany Parish; and Bogalusa and Franklinton, in Washington Parish. Population levels and average annual rates of growth for the communities and the comparison areas are detailed in Table 3-44.

Table 3-44.
Population levels and average annual growth rates for select towns and cities in the ROI, 1990–2008

Population			
Area/year	**1990**	**2000**	**2008**
Abita Springs	1,296	1,957	2,409
Bogalusa	14,280	13,365	12,607
Covington	7,691	8,483	9,155
Franklinton	4,007	3,657	3,748
Mandeville	7,083	10,489	12,421
Pearl River	1,507	1,839	2,193
Slidell	24,124	25,695	27,183
Louisiana	4,219,973	4,468,976	4,410,796
United States	248,709,873	281,421,906	304,374,846
Average annual growth rate			
Area/period	**1990–2000**	**2000–2008**	**1990–2008**
Abita Springs	4. 2%	2.6%	3. 5%
Bogalusa	–0.7%	–0.7%	–0.7%
Covington	1.0%	1.0%	1.0%
Franklinton	–0.9%	0.3%	–0.4%
Mandeville	4.0%	2.1%	3.2%
Pearl River	2.0%	2.2%	2.1%
Slidell	0.6%	0.7%	0.7%
Louisiana	0.6%	–0.2%	0.2%
United States	1.2%	1.0%	1.1%

Sources: USCB 2010j; Tetra Tech 210d

Additional information about the cities and towns in the ROI is not provided in this document because of the absence of more current, uniform data. Detailed socioeconomic data (population, employment and income, housing, quality of life variables including levels of public services, environmental justice, and protection of children) are provided instead, at the parish level. Information used to profile each parish reflects the situation in the cities and towns in each parish.

3.11.1.2 Racial and Ethnic Characteristics of Population

General racial and ethnic characteristics of the residents of the ROI are presented in Table 3-45. The racial and ethnic minority groups are discussed in Section 3.11.5, *Environmental Justice*.

Table 3-45.
Select racial and ethnic characteristics of ROI and comparison areas, 2008

Characteristic	United States	Louisiana	St. Tammany Parish	Washington Parish
White persons	79.8%	64.8%	84.8%	67.5%
Black persons	12.8%	32.0%	12.1%	31.3%
Persons or Hispanic or Latino origin [a]	15.4%	3.4%	3.8%	1.3%

Source: USCB 2009h

[a] Persons of Hispanic or Latino origin may be of any race, so are included in applicable race categories

3.11.1.3 Age, Family Size, Educational Attainment, and Travel Time of Population

Determining the median age of the residents and the average family size in an area is helpful in profiling a community. A change in those demographic attributes would present challenges for governments in planning for infrastructure and facilities to meet to the needs of residents. Table 3-46 presents data about the median age of parish residents and average family size in the parishes of the ROI and in comparison areas. Note that the median age in Louisiana is 34 years, although the median age in both ROI parishes is older than the national median age.

Table 3-46.
Median age and average family size of ROI and comparison areas, 2008

Characteristic	United States	Louisiana	St. Tammany Parish	Washington Parish
Median Age (in years)	35.3	34	36.3	36.1
Average Family Size	3.14	3.16	3.15	3.09

Sources: USCB 2010ii, 2010mm

Demographic profiles of a community often include the adult residents' level of educational attainment. Educational attainment is gathered for individuals 25 and older. Educational attainment is often reflected in the area's wages, occupations, labor pool, and labor participation rates. A well-educated populace is considered an asset in attracting economic development activities (see Section 3.11.2). Table 3-47 summarizes levels of educational attainment for the adult population in the ROI and in two comparison areas.

Table 3-47.
Average education attainment[a] in the ROI and comparison areas, 2000

Educational level	United States	Louisiana	St. Tammany Parish	Washington Parish
High School Graduates, percent	80.4%	74.8%	83.9%	68.2%
Bachelor's Degree or Higher, percent	24.4%	18.7%	28.3%	10.9%

Source: USCB 2009h
Note: a. Persons age 25+ years

Employment opportunities are often a consideration for individuals when choosing where to reside. Average commuting times, expressed in minutes for individuals who travel to a work site, is an important demographic variable related to employment opportunities. Table 3-48 demonstrates that commuting workers in both St. Tammany and Washington Parishes travel longer to and from a worksite than the average commuting worker in either Louisiana or in the nation.

Table 3-48.
Average travel time to work, ROI and comparison areas, 2000[a,b]

	United States	Louisiana	St. Tammany Parish	Washington Parish
Mean Travel Time to Work (minutes)	25.5	25.7	32.1	32.6

Source: USCB 2009h
Notes:
a. Does not include individuals who work from home
b. Workers 16+years

3.11.1.4 Economic Status and Prevalence of poverty of population

The percentage of persons living in poverty statistic can help one determine a community's economic health, plan for the level and type of public services needed in an area, and assess the potential impact of economic stimulus actions. Table 3-49 summarizes the percentage of persons in poverty for both ROI parishes and for the two comparison areas.

Table 3-49.
Persons living in poverty in the ROI and comparison areas, 2007

	United States	Louisiana	St. Tammany Parish	Washington Parish
Persons in poverty, percent	13.0%	18.8%	11.2%	25.5%

Source: USCB 2009h

3.11.1.5 Summary

In summary, as displayed in Tables 3-40 through 3-49, the population characteristics of the residents of St. Tammany and Washington Parishes are generally different from one another. Marked differences exist in the racial composition, ethnic composition, number of persons per square mile, level of educational attainment, and the prevalence of persons living in poverty. The parishes are similar in mean commuting times, median age of residents, and the average family size. In general, the population characteristics of the residents of St. Tammany Parish are more similar to the population characteristics of residents in the nation, and the population characteristics of residents of Washington Parish are more similar to the population characteristics of residents in Louisiana.

3.11.2 Economic Development

The economic status of an area can be determined by reviewing employment statistics (labor force, employment, and unemployment) and various income measures (per capita income and the region's gross domestic product).

3.11.2.1 Employment

Table 3-50 presents employment data for the ROI and a comparison area from 2007 to 2009. The labor force consists of those individuals who are employed and those who are not employed but are actively seeking work. The size of the labor force in the ROI and Louisiana remained relatively stable during the period, growing less than 1 percent in each of the three jurisdictions (Tetra Tech 2010d). The labor force grew at 0.7 percent nationally in that 2-year period (Tetra Tech 2010d). In the ROI, St. Tammany Parish grew by the larger amount, about 0.7 percent or

Table 3-50.
Labor statistics in the ROI and comparison area, 2007–2009

Louisiana	Labor force	Employment	Unemployment	Unemployment rate[b]
2007	2,025,777	1,949,401	76,376	3.8%
2008	2,078,935	1,983,220	95,715	4.6%
2009 (P)[a]	2,035,821	1,889,596	146,225	7.2%
St. Tammany Parish				
2007	116,331	113,009	3,322	2.9%
2008	120,598	116,407	4,191	3.5%
2009 (P)[a]	117,122	111,398	5,724	4.9%
Washington Parish				
2007	15,818	15,000	818	5.2%
2008	16,232	15,247	985	6.1%
2009 (P)[a]	15,875	14,389	1,486	9.4%
ROI				
2007	132,149	128,009	4,140	3.1%
2008	136,830	131,654	5,176	3.8%
2009 (P)[a]	132,997	125,787	7,210	5.4%

Sources: BLS 2010d; Tetra Tech 2010d
Notes:
(P) = Preliminary
a. 2009 values are preliminary (not final) December (not annual) values
b. Unemployment rates are not seasonally adjusted

791 people (Tetra Tech 2010d). The labor force in Washington Parish grew by 0.4 percent or 57 individuals (Tetra Tech 2010d). In that same period, however, the total number of persons employed dropped in the state and in both St. Tammany and Washington parishes (Tetra Tech 2010d). The drop in employment, as a percentage, was most notable in Washington Parish, which saw a 4.1 percent decline in employment, similar to the drop in employment nationally, 4.2 percent (Tetra Tech 2010d). As a result of a nearly unchanged size in the labor force, but a moderate decrease in employment, the unemployment rates in the state and parishes grew from 2007 to 2009, averaging 5.4 percent the ROI and 7.2 percent in Louisiana in December 2009 (BLS 2010c). Washington Parish experienced a very high unemployment rate of 9.4 percent in that month. The national unemployment rate was 9.3 percent in December 2009. Louisiana and St. Tammany Parish weathered the national economic downtown better than most areas because of the large number of jobs in the government and government services industry (which includes school systems) and the health care and social assistance industry, two industries that are relatively resistant to fluctuations in the economy.

Table 3-51 displays information about jobs, by industry sector, in St. Tammany Parish, Washington Parish, and in Louisiana in 2007. Employment in the nonfarm private sector, as opposed to the nonfarm public or government sector, dominates in the ROI. Employment in the nonfarm private sector accounted for 84.5 percent of the jobs in 2007. However, employment in the public sector of government and government enterprises was the single largest industry, as measured by number of jobs, in the ROI. Most of the employment in the government and government enterprises industry, 10.7 percent of all jobs, was at the local government level rather

than in state government, federal civilian government, or in the military. In 2007 public sector jobs were 14.1 percent of all jobs in the ROI. In 2007 the dominance of employment in the government and government services sector was particularly the case in Washington Parish where jobs in the industry accounted for 22.2 percent of all jobs in the parish. Other major industries in the ROI include retail trade (13.7 percent) and construction (10.2 percent), and in St. Tammany Parish, health care and social services (10.1 percent). Farming accounts for 7 percent of the employment in rural Washington Parish but only 0.5 percent of employment in St. Tammany Parish (BEA 2009c). In general, employment by industry ratios in the ROI reflects employment-by-industry ratios in Louisiana.

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Table 3-51.
Total full-time and part-time employment by NAICS industry, 2007 for the ROI and comparison area

Number of jobs, by jurisdiction, by industry				
Title	**Louisiana**	**St. Tammany Parish**	**Washington Parish**	**ROI**
Total employment	2,517,085	114,394	17,628	132,022
Wage and salary employment	2,031,158	80,983	12,236	93,219
Proprietors employment	485,927	33,411	5,392	38,803
Farm proprietors employment	26,622	479	890	1,369
Nonfarm proprietors employment	459,305	32,932	4,502	37,434
Farm employment	34,372	557	1,233	1,790
Nonfarm employment	2,482,713	113,837	16,395	130,232
Private employment	2,091,034	99,101	12,485	111,586
Forestry, fishing, related activities, and other	20,930	546	170	716
Mining	61,370	754	124	878
Utilities	9,655	340	112	452
Construction	208,969	11,624	1,813	13,437
Manufacturing	165,312	2,600	1,256	3,856
Wholesale trade	83,161	3,978	245	4,223
Retail trade	274,233	16,099	2,002	18,101
Transportation and warehousing	95,037	3,058	406	3,464
Information	32,915	2,096	130	2,226
Finance and insurance	86,037	4,856	548	5,404
Professional, scientific, and technical services	132,025	7,499	(D)	N/A
Real estate and rental and leasing	85,985	6,499	302	6,801
Management of companies and enterprises	24,575	1,108	(D)	N/A
Administrative and waste services	145,532	6,612	1,060	7,672
Educational services	41,896	1,380	(D)	N/A
Health care and social assistance	252,607	11,565	(D)	
Arts, entertainment, and recreation	49,534	2,265	105	2,370
Accommodation and food services	173,706	9,173	729	9,902
Other services, except public administration	147,555	7,049	1,168	8,217
Government and government enterprises	391,679	14,736	3,910	18,646
Federal, civilian	31,556	534	108	642
Military	36,247	984	195	1,179
State and local	323,876	13,218	3,607	16,825
State government	111,784	1,363	1,282	2,645
Local government	212,092	11,855	2,325	14,180

Table 3-51.
(continued)

Title	Louisiana	St. Tammany Parish	Washington Parish	ROI
Representation of industry, as percentage of total jobs, by jurisdiction				
Total employment				
Wage and salary employment	80.7%	70.8%	69.4%	70.6%
Proprietors employment	19.3%	29.2%	30.6%	29.4%
Farm proprietors employment	1.1%	0.4%	5.0%	1.0%
Nonfarm proprietors employment	18.2%	28.8%	25.5%	28.4%
Farm employment	1.4%	0.5%	7.0%	1.4%
Nonfarm employment	98.6%	99.5%	93.0%	98.6%
Private employment	83.1%	86.6%	70.8%	84.5%
Forestry, fishing, related activities, and other	0.8%	0.5%	1.0%	0.5%
Mining	2.4%	0.7%	0.7%	0.7%
Utilities	0.4%	0.3%	0.6%	0.3%
Construction	8.3%	10.2%	10.3%	10.2%
Manufacturing	6.6%	2.3%	7.1%	2.9%
Wholesale trade	3.3%	3.5%	1.4%	3.2%
Retail trade	10.9%	14.1%	11.4%	13.7%
Transportation and warehousing	3.8%	2.7%	2.3%	2.6%
Information	1.3%	1.8%	0.7%	1.7%
Finance and insurance	3.4%	4.2%	3.1%	4.1%
Real estate and rental and leasing	3.4%	5.7%	1.7%	5.2%
Professional, scientific, and technical services	5.2%	6.6%	(D)	N/A
Management of companies and enterprises	1.0%	1.0%	(D)	N/A
Administrative and waste services	5.8%	5.8%	6.0%	5.8%
Educational services	1.7%	1.2%	(D)	N/A
Health care and social assistance	10.0%	10.1%	(D)	N/A
Arts, entertainment, and recreation	2.0%	2.0%	0.6%	1.8%
Accommodation and food services	6.9%	8.0%	4.1%	7.5%
Other services, except public administration	5.9%	6.2%	6.6%	6.2%
Government and government enterprises	15.6%	12.9%	22.2%	14.1%
Federal, civilian	1.3%	0.5%	0.6%	0.5%
Military	1.4%	0.9%	1.1%	0.9%
State and local	12.9%	11.6%	20.5%	12.7%
State government	4.4%	1.2%	7.3%	2.0%
Local government	8.4%	10.4%	13.2%	10.7%

Sources: BEA 2009c; Tetra Tech 2010d
Notes:
N/A Not applicable because some data in ROI was not disclosed
NAICS = North American Industry Classification System
(D) Not shown to avoid disclosure of confidential information, but the estimates for this item are included in the totals.

Both St. Tammany Parish and Washington Parishes have large employers. Employer information is listed in Table 3-52. The large employers generally represent the government and government services industry and the retail trade industry; in St. Tammany Parish, it also includes the health

Table 3-52.
Large employers in the ROI[a,b]

Employer	Location	Parish employment
St. Tammany Parish		
St. Tammany Parish School Board	Covington/Slidell	7,716
Central One Bank	Parish-wide	1,800
St. Tammany Parish Hospital	Covington	1,449
Wal-Mart	Parish-wide	1,125
Slidell Memorial Hospital	Slidell	1,004
Chase Bank	Parish-wide	900
Lakeview Regional Medical center	Covington	745
St. Tammany Parish Sheriff's Office	Parish-wide	734
Textron Marine & Land Systems	Slidell	621
Chevron, USA	Covington	550
Home Depot	Parish-wide	500
Southeast Louisiana Hospital	Mandeville	480
Northshore Regional Medical Center	Slidell	448
St. Tammany Parish Government	Parish-wide	470
City of Slidell	Slidell	394
Gilsbar, Inc	Covington	333
Louisiana Medical center	Lacombe	302
Tulane Regional Primate Research Center	Covington	298
Ocshner Clinic Foundation Northshore	Parish-wide	283
Cross Gates Athletic Club	Slidell	275
Pool Corporation	Covington	223
Express Personnel Services	Covington	216
Diversified Foods	Madisonville	211
Trinity Neurologic Rehabilitation Center	Slidell	204
CPU2, LLC	Covington	168
Charter Communications	Slidell	166
Central Progressive Bank	Parish-wide	163
Fairway Medical Center	Covington	163
Whitney National Bank	Parish-wide	155
Washington Parish		
Temple-Inland	Bogalusa	923
The Daily News	Parish-wide	665
Bogalusa School System	Bogalusa	500
LSU-Washington/St. Tammany Regional Medical Center	Bogalusa	450
ClientLogic	Bogalusa	300
City of Bogalusa	Bogalusa	179
Wal-Mart	Parish-wide	160

Sources: STEDF 2009; BCC 2010
Notes:
a. Employers with 150 or more employees
b. Personnel data might not agree with information presented elsewhere in this document because data are derived from different sources that might have different reporting methodology.

care and social assistance industry. In St. Tammany Parish, six of the eight largest employers are classified as in being in the government or government services or the health care and social

assistance industry and, collectively, employ 11,648 individuals, or 75.3 percent of the largest eight employers' work force. In Washington Parish, only 35.5 percent of the employees work for large employers in the government or government services or the health care and social assistance industry. Washington Parish's largest employer, Temple-Inland Corporation, manufactures pulp, paper, boxes, bags, and other paper products.

Economic linkages are established between geographical areas when workers live in one jurisdiction and commute to a worksite in another area. The U.S. Census Bureau has documented worker flow patterns of the commuting individuals (those working from home are not considered commuters). Table 3-53 details where commuting workers living in St. Tammany and Washington Parishes work. In 2000, 87,130 people were living in St. Tammany Parish who commuted to work. Approximately 60.5 percent of those workers traveled to a worksite in St. Tammany Parish. An additional 18.7 percent of the commuters traveled to a worksite in Orleans Parish, and 11.4 percent St. Tammany commuters traveled to Jefferson Parish for work. No other parish in Louisiana or county in another state hosted the worksite for more than 2 percent of the St. Tammany Parish commuting residents. In 2000, 14,663 residents of Washington Parish commuted to work. Approximately 69 percent of those commuters worked in Washington Parish, 14.8 percent commuted to a worksite in St. Tammany Parish, 2.5 percent traveled to Jefferson Parish for work, and 2.3 percent reported to work in Tangipahoa Parish. No other parish in Louisiana or county in another state hosted the worksite for more than 2 percent of the Washington Parish commuting residents.

Table 3-53.
Residence county to worksite county flows, ROI, 2000

Residence parish	Worksite parish	Count	Representation of total commuting workers
Commuting residents of St. Tammany Parish			
St. Tammany Parish	Jefferson Parish, LA	9,928	11.4%
	Orleans Parish, LA	16,327	18.7%
	St. Bernard Parish, LA	839	1.0%
	St. Tammany Parish, LA	52,681	60.5%
	Tangipahoa Parish, LA	1,262	1.4%
	Hancock County, MS	1,224	1.4%
	Other areas	4,869	5.6%
Total commuting workers in St. Tammany Parish		87,130	100.0%
Commuting residents of Washington Parish			
Washington Parish	Jefferson Parish, LA	373	2.5%
	Orleans Parish, LA	279	1.9%
	St. Tammany Parish, LA	2,163	14.8%
	Tangipahoa Parish, LA	335	2.3%
	Washington Parish, LA	10,123	69.0%
	Walthall County, MS	158	1.1%
	Other areas	1,232	8.4%
Total commuting workers in Washington Parish		14,663	100.0%

Sources: USCB 2010bb; Tetra Tech 2010d

County-to-county worker flow patterns also reveal the residence of workers employed at worksites in the ROI parishes. In 2000 approximately 81.7 percent of the jobs in St. Tammany

Parish were held by residents of that parish. Tangipahoa and Washington Parishes, and Pearl River County, Mississippi, each provided between 2.1 to 4.3 percent of the St. Tammany workforce, while all other areas provided less than 1 percent of the workforce (USCB 2010aa). In 2000 approximately 84.5 percent of the jobs in Washington Parish were held by residents of that parish. St. Tammany Parish provided 5 percent of the workforce, while Pearl River County, Mississippi (2.9 percent), Tangipahoa Parish (2.2 percent), and Walthall County, Mississippi (2.3 percent) were the residential jurisdictions of small parts of the Washington Parish workforce. All other parishes in Louisiana and counties in other states provided less than 1 percent of the Washington Parish workforce (USCB 2010aa).

3.11.2.2 Income

Several measures of income can be used to analyze an area's economic health. Commonly used measures include real disposable personal per capita income and GDP. These income measures in St. Tammany and Washington Parishes are presented in Table 3-54. Data for the United States are also presented for comparison. In 2008 the real personal disposable per capita income in St. Tammany Parish was $42,550, about 18 percent higher than the national real disposable personal income of $36,171. Real disposable personal income in Washington Parish, $24,981, was lower than the applicable measure in St. Tammany Parish and hovered near 70 percent of the national value. Per capita income, in St. Tammany and Washington Parishes improved, relative to the national measure, in 1990 to 2008.

Table 3-54.
Income measures in ROI and comparison areas, 1969–2008[a], income measures in ROI, 1990–2008[a,b]

Gross domestic product (GDP)[b]	1990	2000	2008
St. Tammany Parish	$1.9	$3.8	$6.2
Washington Parish	$0.5	$0.6	$0.7
Real disposable per capita income[c]			
St. Tammany Parish	$25,771	$33,097	$42,550
Washington Parish	$15,754	$19,258	$24,981
United States	$26,573	$31,848	$36,171
St. Tammany Parish, of United States	97.0%	103.9%	117.6%
Washington Paris, of United States	59.3%	60.5%	69.1%

Source: BLS 2010a; Tetra Tech 2010d; REMI 2010
Notes:
a. All values are in 2008 inflation-adjusted dollars
b. In billions of dollars
c. In thousands of 2008 inflation adjusted dollars

GDP—the final market value of the goods and services produced by labor and property—is also used to measure the economic health of an area. The GDP in St. Tammany Parish grew by 63 percent (Tetra Tech 2010d) in 2000 to 2008; from $3.8 billion to $6.2 billion, in 2008 inflation-adjusted dollars, for all industries. In the same period, GDP in Washington Parish grew by about 19 percent (Tetra Tech 2010d) from $0.6 billion to $0.7 billion. Nationally, GDP grew at about 21 percent in that period (Tetra Tech 2010d).

3.11.3 Housing

Table 3-55 summarizes some housing characteristics for the two ROI parishes and for comparison areas. An analysis of an area's housing inventory includes assessing housing characteristics, which can reflect the economic viability of an area.

Table 3-55.
Housing characteristics, ROI and comparison areas, 2008

	United States	Louisiana	St. Tammany Parish	Washington Parish
Total housing units	**127,762,925**	**1,852,222**	**94,265**	**20,323**
Occupied	112,386,298	1,590,100	84,170	17,001
Owner occupied	75,363,085	1,085,449	66,638	13,034
Renter occupied	37,023,213	504,651	17,532	3,967
Vacant	15,376,627	262,122	10,095	3,322
Median year structure built	1974	1976	1988	1975
Median contract rent (monthly)	$676	$505	$745	$340
Median value owner-occupied unit	$192,400	$123,900	$201,900	$87,300
Housing characteristics, ROI and comparison areas				
	United States	**Louisiana**	**St. Tammany Parish**	**Washington Parish**
Occupied	88.0%	85.8%	89.3%	83.7%
Owner occupied	67.1%	68.3%	79.2%	76.7%
Renter occupied	32.9%	31.7%	20.8%	23.3%
Vacant	12.0%	14.2%	10.7%	16.3%
Mobile homes	6.8%	14.0%	9.3%	20.8%
Median monthly rent of Louisiana median monthly rent	133.9%	100.0%	147.5%	67.3%
Median value owner-occupied unit of Louisiana median value owner occupied unit	155.3%	100.0%	163.0%	70.5%

Sources: USCB 2010o, 2010p, 2010s, 2010t, 2010u; Tetra Tech 2010d

In 2008, 114,588 housing units were in the ROI. Approximately 82.3 percent of the units were in St. Tammany Parish (Tetra Tech 2010d). Of the total units in the ROI, 88.3 percent were occupied by owners or renters, and 13,417 units, or 11.7 percent of the total, were vacant (Tetra Tech 2010d).

Housing in St. Tammany Parish differs markedly from housing in Washington Parish and Louisiana in general. In 2008, 94,265 housing units were in St. Tammany Parish. In 2008 St. Tammany Parish had a lower vacancy rate (10.7 percent) than Washington Parish or Louisiana. Also, occupied units were a higher percentage of owners (79.2 percent) and a lower percentage of renters (20.8 percent), mobile homes represented a smaller percentage of total housing, (9.3 percent), housing units were newer (median year structure built was 1988), contract rents were higher ($745/month), and the median value of an owner-occupied unit ($201,900) was higher than in Washington Parish or, on average, in Louisiana. It is noteworthy that 7.1 percent of the total housing units in the parish were built in 2005 or later, a rate almost two and a half times the national average of 3.0 percent (USCB 2010r).

In 2008 an estimated 20,323 housing units were in Washington Parish. Approximately 83.7 percent of those were occupied by owners or renters. The vacancy rate of 16.3 percent was higher than Louisiana's vacancy rate (14.2 percent). Owner-occupied units represented 76.7 percent of all occupied units, a rate similar to St. Tammany's and higher than Louisiana's rate of owner occupancy (68.3 percent). Mobile homes composed a significant percent (20.8 percent) of the housing stock in the parish (USCB 2010v). The median year housing structures were built, 1975, reflects the state median, 1976, and the national median, 1974, but is 13 years older than the median year of construction in St. Tammany Parish. The average monthly contractual rent, $340, was 45.6 percent of the average contractual rent in St. Tammany Parish (Tetra Tech 2010d) and 67.3 percent of the average monthly contractual rent in Louisiana. The median value of an owner-occupied house was $87,300, approximately 43.2 percent (Tetra Tech 2010d) of the median value of an owner-occupied house in St. Tammany Parish, $201,900.

The ROI hosts a wide range of housing stock. Options vary by type, general characteristics, price, and location. Table 3-56 displays information about the number of new, privately owned residential building permits issued annually for both St. Tammany and Washington parishes 2004–2009. Information for January 2010 is also provided. Construction of new, privately owned residential structures has slowed in recent years in both St. Tammany and Washington parishes. Ignoring years 2006 and 2007—an aberration of intense construction activity because of Hurricane Katrina in August 2005—building activity in St. Tammany Parish has slowed every year since 2004; the number of permits issued in 2009, 596, was approximately 18 percent of the 3,312 permits issued in 2004. After Katrina, from 2006 to 2007 Washington Parish saw a surge of residential home building. The number of building permits the parish issued was approximately four times and two-and-half times, respectively, the number issued in 2004. New residential construction in Washington Parish remains more aggressive than in St. Tammany Parish. Building permits for single-family units accounted for 89.6 percent of the units in St. Tammany Parish, while multifamily units accounted for 10.4 percent of the total in the period of 2004–January 2010 (Tetra Tech 2010d). In Washington Parish, single-family units accounted for 96.3 percent of the units, while multifamily units accounted for the remainder, 3.7 percent, in Washington Parish in that same period (Tetra Tech 2010d).

Table 3-56.
Annual building permits of new privately owned residential buildings,[a] ROI, 2004–2009 and January 2010

Year	St. Tammany Parish	Washington Parish	ROI
2004	3,312	143	3,455
2005	2,109	124	2,233
2006	2,867	601	3,468
2007	2,340	335	2,675
2008	952	105	1,057
2009	596	99	695
January 2010[b]	53	7	60

Sources: USCB 2010a, 2010b, 2010c, 2010d, 2010e, 2010f, 2010g
Notes:
a. Includes single-family and multifamily units
b. Values for January only

3.11.4 Quality of Life

Quality of life encompasses those attributes or resources (man-made or naturally occurring) of a region that contribute to the well-being of its residents. The relative importance of such attributes to a person's well-being is subjective (e.g., some individuals consider educational opportunities

essential to their well-being, others could place a high value on the availability of healthcare services, and still others could hold public safety as their primary quality-of-life concern). NEPA quality-of-life analyses typically address issues relating to potential effects of the proposed action on the availability of public services and leisure activities that contribute to quality of life of the affected ROI's inhabitants. For purposes of this EIS, the affected environment for quality of life includes education, public safety (law enforcement and fire protection), and health care.

3.11.4.1 Education

Public school districts in Louisiana generally overlay parish geographical boundaries. However, three cities and two communities have school districts in their boundaries. One of those cities with its own school district is Bogalusa, in Washington Parish. Thus, three school districts are in the ROI: St. Tammany Parish School District, Bogalusa School District, and Washington Parish School District. In the 2007–2008 school year (the latest year for which all enrollment and funding source information is available) 54 public schools were in the St. Tammany Parish School District (including Florida Parishes Juvenile Detention Center and Southeast Louisiana State Hospital), 8 were in the Bogalusa School District, and 13 were in the Washington Parish School District (including Rayburn Correctional Institute). In 2007–2008, 51,816 students attended public and private schools in the ROI (Tetra Tech 2010d). The three public school systems served 42,909 students (82.8 percent of the 51,816 total students served). The balance, 8,907 students (17.2 percent), attended private schools in the two-parish area (Tetra Tech 2010d). The schools served students in PK (pre-kindergarten) through grade 12. Reliable estimates of the number of homeschooled children are not available. Table 3-57 provides information for the schools in each district including student enrollment and grade levels served by school.

Table 3-57.
Public school enrollment and grade levels, 2007–2008, ROI school districts

St. Tammany Parish School District	Student enrollment[a]	Grade levels
Abita Springs Elementary School	715	PK–3
Abita Springs Middle School	436	4–6
Alton Elementary School	178	PK–5
Bayou Lacombe Middle School	174	4–6
Bayou Woods Elementary School	852	PK–3
Bonne Ecole Elementary School	737	PK–6
Boyet Junior High School	695	7–8
Carolyn Park Middle School	579	4–6
Chahta–Ima Elementary School	328	PK–3
Clearwood Junior High School	591	4–8
Covington Elementary School	536	PK–3
Covington High School	1,514	9–12
Covington Pathways School	26	KG–12
Creekside Junior High	589	6–8
Cypress Cove Elementary School	675	PK–1

Table 3-57.
(continued)

St. Tammany Parish School District	Student enrollment[a]	Grade levels
E. E. Lyon Elementary School	538	PK–3
Fifth Ward Junior High School	539	PK–8
Florida Avenue Elementary School	558	PK–6
Florida Parishes Juvenile Detention Center	89	3–12
Folsom Elementary School	469	PK–5
Folsom Junior High School	215	6–8
Fontainebleau High School	2,302	9–12
Fontainebleau Junior High School	808	7–8
Glynn H. Brock Elementary School	233	PK–5
Honey Island Elementary School	665	2–3
L.P. Monteleone Junior High School	396	7–8
Lake Harbor Middle School	651	4–6
Lee Road Junior High School	777	PK–8
Little Oak Middle School	947	4–6
Madisonville Elementary School	621	PK–3
Madisonville Junior High School	607	4–8
Magnolia Trace Elementary School	842	KG–3
Mandeville Elementary School	509	PK–3
Mandeville High School	1,643	9–12
Mandeville Junior High School	588	7–8
Mandeville Middle School	700	4–6
Northshore High School	1,531	9–12
Operation Jumpstart Alternative School	134	6–12
Pearl River High School	726	9–12
Pine View Middle School	643	4–6
Pontchartrain Elementary School	842	PK–3
Riverside Elementary School	659	PK–5
Salmen High School	807	9–12
Sixth Ward Elementary School	403	PK–5
Slidell High School	1,646	9–12
Slidell Junior High School	783	7–8
Slidell Pathways School	41	KG–12
Southeast Louisiana State Hospital	34	KG–12
St. Tammany Junior High School	454	6–8
Tchefuncte Middle School	858	4–6
W.L. Abney Elementary School	875	PK–5
Whispering Forest Elementary School	535	PK–3
William Pitcher Junior High School	321	7–8
Woodlake Elementary School	679	PK–3
School District Total	**35,293**	
Washington Parish School District	**Student enrollment[b]**	**Grade levels**
Angie Junior High School	182	6–8
Enon Elementary School	380	PK–6
Franklinton Elementary School	493	3–5

Table 3-57.
(continued)

St. Tammany Parish School District	Student enrollment[a]	Grade levels
Franklinton High School	789	8–12
Franklinton Junior High School	608	6–8
Franklinton Primary School	591	PK–2
Mt. Hermon School	519	PK–12
Pine School	596	6–12
Rayburn Correctional Institute	23	10–12
Thomas Elementary School	559	PK–5
Varnado Elementary School	209	PK–5
Varnado High School	179	8–12
Wesley Ray Elementary School	208	PK–5
School District Total	**5,336**	
City of Bogalusa School District	**Student enrollment**	**Grade levels**
Bogalusa High School	540	9–12
Bogalusa Middle School	451	6–8
Byrd Avenue Elementary School	246	KG–3
Denhamtown Elementary School	123	PK
Long Avenue School	0	6–12
Northside School	239	KG–3
Pleasant Hill Elementary School	368	4–5
Superior Avenue Elementary School	313	KG–3
School District Total	**2,280**	

Source: NCES 2010b
Notes:
PK = Pre-kindergarten; KG = Kindergarten
a. Total enrollment figure includes 123 students (89 in Florida Parishes Juvenile Detention Center and 34 in Southeast Louisiana State Hospital) not included in some enrollment statistics used elsewhere in this document
b. Total enrollment figure includes 23 students (Rayburn Correctional Institute) not included in some enrollment statistics used elsewhere in this document

Funding of public schools in Louisiana is derived from federal, state, and local sources. Information detailing funding sources for the three school districts and for Louisiana is presented in Table 3-58.

The largest single source of funding comes from the state's Minimum Foundation Program (MFP). The MFP formula adopted by the State Board of Elementary and Secondary Education and approved by the legislature determines the cost of a minimum standard program of education in public elementary and secondary schools and helps to allocate the funds equitably to parish and city school systems. Funding through the MFP is in the form of a block grant from the state to the parish and city school districts. Districts have the flexibility to spend the funds as they determine to be in the best interest of the district, while satisfying all mandated program requirements. Funds in the MFP are not earmarked for specific purposes but are intended, in combination with other funds available to the parish and city school districts, to provide for the fiscal requirements of operating a school district. In 2007–2008, $205,733,494, or 86.6 percent of the $237,434,266 in state dollars allocated to schools in the ROI were from MFP funds (Tetra Tech 2010d).

Table 3-58.
Total revenue, by source, 2007–2008 for ROI school districts and comparison area

	Revenue source			
	Federal	**State**	**Local**	**Total revenues**
Louisiana	$1,027,689,198	$3,309,297,116	$2,875,434,163	$7,212,420,477
St. Tammany Parish				
St. Tammany Parish District	$49,121,331	$186,469,885	$193,608,182	$429,199,398
Washington Parish				
City of Bogalusa District	$5,243,913	$15,261,120	$7,941,891	$28,446,924
Washington Parish District	$9,127,929	$35,703,261	$10,767,915	$55,599,105
ROI	$63,493,173	$237,434,266	$212,317,988	$513,245,427
	Source as percentage of total revenue			
	% Federal funded	**% State funded**	**% Local funded**	**Student enrollment**
Louisiana	**14.2%**	**45.9%**	**39.9%**	652,441
St. Tammany Parish				
St. Tammany Parish District	11.4%	43.4%	45.1%	35,170
Washington Parish				
City of Bogalusa District	18.4%	53.6%	27.9%	2,280
Washington Parish District	16.4%	64.2%	19.4%	5,313
ROI	12.4%	46.3%	41.4%	42,763

Source: LADOE 2010b

In 2007–2008, federal revenues to the three school systems accounted for 12.4 percent ($63,493,173) of the total revenue available to the ROI school districts ($513,245,427).

Local revenue sources available to school districts include ad valorem taxes, sales and use taxes, and a small portion from miscellaneous taxes. On average, local revenue sources constituted 41.4 percent of 2007–2008 public school funding in the ROI. The relatively smaller school districts of Bogalusa and Washington Parish were more reliant on state sources than the much larger district in St. Tammany Parish.

Table 3-59 presents racial, ethnic, and pupil-to-teacher ratio data for the public schools in the ROI. Some racial and ethnic characteristics of public school students in St. Tammany Parish School District, Bogalusa School District, and in the Washington Parish School District are not reflective of the racial and ethnic characteristics of public school students in Louisiana. Black, non-Hispanic students, the largest racial minority group, represent 68.4 percent of the public school students in the Bogalusa School District, 18.5 percent in St. Tammany Parish, and 34.3 percent in Washington Parish. In Louisiana, 46.0 percent of the public students are Black, non-Hispanic. White, non-Hispanic students compose 76.8 percent of the student population in St. Tammany public schools, 64.4 percent in Washington Parish, and 29.85 percent in the Bogalusa School District. Section 3.11.5, *Environmental Justice*, discusses racial minority and ethnic minority populations in the ROI more fully.

Table 3-59.
Racial and ethnic characteristics of public school students and pupil/teacher ratios, ROI and comparison area, 2007–2008

	Total students	American Indian/Alaskan Native students	Asian Pacific/ Islander students	Black, non-Hispanic students	Hispanic students	White, non-Hispanic students	Pupil/ teacher ratio
Louisiana	680,911	0.8%	1.4%	46.0%	2.7%	49.2%	14.0:1
St. Tammany Parish							
St. Tammany District	35,170	0.4%	1.5%	18.5%	2.8%	76.8%	13.6:1
Washington Parish							
Bogalusa District	2,280	0.1%	0.5%	68.4%	1.2%	29.8%	13.5:1
Washington District	5,313	0.2%	0.2%	34.3%	0.9%	64.4%	14.8:1
ROI (Total) [a]	42,763	0.3%	1.3%	23.2%	2.5%	72.7%	

Sources: NCES 2010d, 2010e, 2010f, 2010g; Tetra Tech 2010d
Note:
a. Excludes the institutionalized students in Rayburn Correctional Institute, Florida Parishes Juvenile Detention, Southeast State Hospital

The students-to-teacher ratios in all three school districts in the ROI are similar to the average in Louisiana.

No approved charter schools, of any type, are in St. Tammany or Washington parishes (LADOE 2010d).

The ROI has 23 private schools—21 in St. Tammany Parish and 2 in Washington Parish. The range of grade level offerings by schools varies. Information about 2007–2008 enrollment and grade level offered in the private schools in the ROI is presented in Table 3-60.

There are 33 colleges and universities within 50 miles of Bush, Louisiana. These postsecondary institutions offer a wide range of academic and both avocational and vocational training opportunities for area adults. The institutions in Table 3-61 are presented in order of increasing geographical distance from the Bush community.

3.11.4.2 Public Safety

Municipal police departments and parish sheriff offices provide law enforcement services in the ROI. Fire protection services in the ROI are provided by fire departments operating in established districts or boundaries of the parishes.

Table 3-62 presents information about law enforcement agencies in the ROI. The St. Tammany Parish Sheriff's Department serves the residents in the parish with the exception of the individuals residing in Covington, Mandeville, Pearl River, and Slidell. Those municipalities maintain their own police departments. The St. Tammany Parish Sheriff's Department had 700 full-time law enforcement employees, 297 of whom were officers, in 2008. St. Tammany Parish is part of an MSA and, therefore, is classified as a *metro county* by the Federal Bureau of Investigation (FBI) (FBI 2008b). Nationally, on average, metro counties have 2.7 officers for each 1,000 residents (FBI 2008b). The St. Tammany Parish Sheriff office has approximately 1.7 officers per 1,000 residents served.

Table 3-60.
Private school enrollment and grade levels, 2007–2008, ROI parishes

Private Schools in St. Tammany Parish	Student enrollment	Grades levels
Calvary Baptist School	374	PK–8
Cedarwood School	357	PK–7
Christ Episcopal School	760	PK–8
Covington Montessori School	32	PK–KG
Early Learning Ctr at Grace Mem Baptist Church	140	PK–KG
First Baptist Christian School	321	1–12
Kehoe—France Northshore	637	PK–8
Mary, Queen of Peace Catholic School	422	PK–7
New Covenant Presbyterian Weekday School	83	PK–KG
New Directions Alternative School	22	6–12
Northlake Christian School	904	PK–12
Northminister Montessori	58	PK–KG
Northside Options	34	7–12
Our Lady of Lourdes Elem School	571	PK–8
Our Lady of The Lake School	N/A	N/A
Pope John Paul II Catholic High School	425	9–12
Slidell Christian Academy	42	PK–8
St. Margaret Mary School	764	PK–8
St. Pauls School	830	8–12
St. Peter Elementary School	699	PK–7
St. Scholastica Academy	781	8–12
Parish Total	8,256	
Private Schools Washington Parish		
Annunciation Catholic School	188	KG–8
Bowling Green School	463	PK–12
Parish Total	651	
ROI Total	8,907	

Source: NCES 2010a
Note: N/A = data are not available or not applicable; PK = Pre-kindergarten; KG = Kindergarten

In St. Tammany Parish, the municipalities of Covington, Mandeville, Pearl River, and Slidell have police departments with full-time law enforcement personnel. Slidell, a Group IV city (a classification by the FBI for cities with a population of 25,000–49,999 residents) had 71 full-time officers, or 2.6 officers per 1,000 residents (Tetra Tech 2010d). Nationally, Group IV cities have 1.8 officers per 1,000 residents (FBI 2008c). Mandeville, a Group V city (10,000–24,999 residents) has 37 full-time officers, or 3.1 officers per 1,000 residents (Tetra Tech 2010d). Nationally, the average for Group V cities is 1.9 officers per 1,000 residents (FBI 2008c). Covington and Pearl River, Group VI cities (fewer than 10,000 residents) had 38 and 10 officers, respectively, or 4.0 and 4.5 officers per 1,000 residents (Tetra Tech 2010d), respectively. Nationally, Group VI cities had an average of 3.5 officers per 1,000 residents (FBI 2008c).

Table 3-61.
Colleges and universities within 50 miles of Bush, Louisiana

College or institution	Private/public	Institution type
Saint Joseph Seminary College	Private	4-year or more
Aveda Institute–Covington	Private	less-than-2-year
Delta College, Inc.	Private	less-than-2-year
Louisiana Technical College–Sullivan Campus	Public	2-year
Vanguard College of Cosmetology	Private	less-than-2-year
Southeastern Louisiana University	Public	4-year or more
Louisiana Technical College–Hammond Area Branch Campus	Public	2-year
Compass Career College	Private	less-than-2-year
University of New Orleans	Public	4-year or more
New Orleans Baptist Theological Seminary	Private	4-year or more
Southern University at New Orleans	Public	4-year or more
Dillard University	Private	4-year or more
John Jay Beauty College	Private	less-than-2-year
Blue Cliff College–Metairie	Private	2-year
Cameron College	Private	2-year
Crescent City Bartending School	Private	less-than-2-year
Delgado Community College	Public	2-year
Louisiana Technical College–Jefferson Campus	Public	2-year
University of Phoenix–Louisiana Campus	Private	4-year or more
Louisiana State University Health Sciences Center at New Orleans	Public	4-year or more
Herzing College	Private	4-year or more
John Jay Beauty College	Private	less-than-2-year
Nunez Community College	Public	2-year
Xavier University of Louisiana	Private	4-year or more
Loyola University New Orleans	Private	4-year or more
Notre Dame Seminary Graduate School of Theology	Private	4-year or more
Tulane University of Louisiana	Private	4-year or more
Stevensons Academy of Hair Design	Private	less-than-2-year
Eastern College of Health Vocations	Private	less-than-2-year
Our Lady of Holy Cross College	Private	4-year or more
ITT Technical Institute–Saint Rose	Private	4-year or more
Gretna Career College	Private	2-year
Louisiana Technical College–Florida Parishes	Public	2-year

Source: NCES 2010c

Table 3-62.
Full-time law enforcement employees in the ROI parishes, cities, and towns and comparison areas, 2008

Jurisdiction	Population served[a]	Total law enforcement employees	Total officers	Officers per 1,000 residents
Louisiana	4,293,435	22,621	17,306	4.0
St. Tammany Parish Sheriff	177,257	700	297	1.7
Washington Parish Sheriff[c]	29,104	110	61	2.1
Cities and towns with police departments	**Population served by agency[a]**	**Total law enforcement employees**	**Total officers**	**Officers per 1,000 residents**
St. Tammany Parish				
Covington	9,553	50	38	4.0
Mandeville	12,047	52	37	3.1
Pearl River	2,220	14	10	4.5
Slidell	27,379	107	71	2.6
Washington Parish[b]				
Bogalusa	12,607	61	39	3.1
Franklinton	3,719	22	16	4.3

Sources: FBI 2008a; FBI 2008b, 2008c; Tetra Tech 2010d

Notes:

a. Population estimates provided as base of FBI statistics; might not agree with values presented elsewhere in this document

b. Angie and Varnado have police departments but no full time law enforcement officers.

c. Excludes residents of Bogalusa and Franklinton and officers in those cities

The Washington Parish Sheriff's Office has responsibility for enforcing the criminal and traffic laws throughout the parish including within all municipalities, even though Angie, Bogalusa, Franklinton, and Varnado have their own police departments (WPSO 2010). In 2008 the Washington Parish Sheriff's department had 110 full-time law enforcement employees, of whom 61 were officers (FBI 2008b). Washington Parish is not part of an MSA and, therefore, is classified as a *non-metro county* by the FBI. On average, non-metro counties have 3.0 officers per 1,000 residents (FBI 2008c). The Washington Parish Sheriff Office has approximately 2.1 officers per 1,000 residents served (Tetra Tech 2010d).

Bogalusa and Franklinton have police departments with full-time law enforcement personnel. Bogalusa, a Group V city has 39 full-time officers, or 3.1 officers per 1,000 residents (Tetra Tech 2010d). Nationally, Group V cities have 1.9 officers per 1,000 residents (FBI 2008c). Franklinton, a Group VI city has 16 full-time officers, or 4.3 officers per 1,000 residents (Tetra Tech 2010d). Nationally, the average for Group VI cities is 3.5 officers per 1,000 residents (FBI 2008c). Angie and Varnado have police departments, but neither has full-time law enforcement officers.

Fire protection services in the ROI are provided by responders in 25 jurisdictions. St. Tammany Parish has 14 departments or districts, and Washington Parish has 11 departments or districts.

Fire protection services in St. Tammany Parish are provided by firefighters assigned to one of 14 fire jurisdictions; 13 fire districts[11] and the Covington Fire Department. Most of the jurisdictions have multiple stations and provide services with a combination of active career and volunteer firefighters. St. Tammany Fire District #1 in Slidell and St. Tammany Fire District #4 in Mandeville have the greatest number of firefighters with 124 and 110 active career firefighters, respectively.

Fire protection services in Washington Parish are provided by firefighters assigned to one of 11 fire jurisdictions; 9 fire districts, the Bogalusa Fire Department, and the Franklinton Volunteer Fire Department. Only the Bogalusa Fire Department is staffed exclusively with active career fighters, and it has the greatest number of active career firefighters, with 36. Washington Fire District #7, the only other district or department in the parish with an active career firefighter, has the most active volunteer firefighters, with 52.

Information for fire districts and departments in the ROI is presented in Table 3-63.

Table 3-63.
Fire protection districts and departments in the ROI, 2008

Fire district or department	Headquarter city	Department by type	Number of stations	Active firefighters, career	Active firefighters, volunteer	Active firefighters, paid per call
St. Tammany Parish						
Covington Fire Department aka Covington VFD	Covington	Mostly volunteer	1	11	30	0
St. Tammany Fire District # 1	Slidell	Mostly career	7	124	10	0
St. Tammany Fire District # 2 aka Madisonville VFD	Madisonville	Mostly volunteer	3	8	31	0
St. Tammany Fire District # 3 aka Lacombe VFD	Lacombe	Mostly career	3	24	3	0
St. Tammany Fire District # 4	Mandeville	Career	4	110	0	0
St. Tammany Fire District # 5 aka Folsom VFD	Folsom	Volunteer	4	0	12	10
St. Tammany Fire District # 6 aka Lee Road VFD	Covington	Volunteer	3	0	41	0
St. Tammany Fire District # 7	Pearl River	Mostly volunteer	4	1	16	0
St. Tammany Fire District # 8 aka Abita Springs VFD	Abita Springs	Volunteer	1	0	12	0
St. Tammany Fire District # 9 aka Bush VFD	Bush	Volunteer	2	0	36	0
St. Tammany Fire District # 10 aka Sun VFD	Sun	Volunteer	2	0	32	0

11 St. Tammany Fire District # 10 has recently absorbed St. Tammany Fire District # 9;. The USFA still lists all 13 districts.

Table 3-63.
(continued)

Fire district or department	Headquarter city	Department by type	Number of stations	Active firefighters, career	Active firefighters, volunteer	Active firefighters, paid per call
St. Tammany Fire District # 11 aka Pearl River VFD	Pearl River	Mostly volunteer	3	15	0	28
St. Tammany Fire District # 12	Covington	Career	4	25	0	0
St. Tammany Fire District # 13	Covington	Volunteer	1	0	33	0
Washington Parish						
Bogalusa Fire Department	Bogalusa	Career	3	36	0	0
Franklinton VFD	Franklinton	Mostly volunteer	1	1	19	0
Washington Parish Fire District # 1 (Bonner Creek)	Franklinton	Volunteer	3	0	30	0
Washington Parish Fire District # 2 (Richardson)	Franklinton	Volunteer	1	0	25	0
Washington Parish Fire District # 3 (Hayes Creek) aka Hays Creek VFD	Franklinton	Volunteer	1	0	15	0
Washington Parish Fire District # 4 (Pine) aka Pine VFD	Franklinton	Volunteer	1	0	24	0
Washington Parish Fire District # 5 (Angie)	Angie	Volunteer	2	0	12	0
Washington Parish Fire District # 6 (Varnado)	Varnado	N/A	N/A	N/A	N/A	N/A
Washington Parish Fire District # 7 (Ben's Ford)	Bogalusa	Mostly volunteer	6	6	52	0
Washington Parish Fire District # 8 (Enon) aka Sixth Ward VFD	Franklinton	Volunteer	2	0	25	0
Washington Parish Fire District # 9 (Mt. Hermon) aka Mt. Hermon VFD	Mt. Hermon	Volunteer	2	0	48	0

Sources: USFA 2010; LASFM 2009; O'Neil 2010; Bobbi Jo 2010; LICC 2010
Notes: aka = also known as; VFD = Volunteer Fire Department

3.11.4.3 Health Care

Information about the number of physicians and dentists in the ROI and in comparison areas is presented in Table 3-64.

In the period of 2005–2008, St. Tammany Parish experienced double-digit percentage increases in the number of physicians and dentists practicing (Tetra Tech 2010d), a much higher rate on average than the nation or state. Despite the increased number of dental and medical practitioners, 12 of the 35 census tracts in the parish are considered to be *medically underserved* by the U.S. Department of Health and Human Services Health Resources and Services Administration (HRSA) (HRSA 2010). Census tracts are small, relatively permanent, statistical subdivisions of a county or parish. Medically underserved areas/populations are areas or populations designated by HRSA as having too few primary care providers, high infant mortality, high poverty, or high

Table 3-64.
Physicians and dentists in private practice, 2005 and 2008, ROI and comparison areas

	United States	Louisiana	St. Tammany Parish	Washington Parish	ROI
Physicians					
Physicians in private practice, 2005	2,092,679	30,526	1,876	76	1,952
Physicians in private practice, 2008	2,254,530	32,028	2,340	67	2,416
Change in number of physicians, 2005–2008	7.7%	4.9%	24.7%	–11.8%	23.3%
Dentists					
Dentists in private practice, 2005	772,439	8,967	705	60	765
Dentists in private practice, 2008	816,638	9,525	816	61	877
Change in number of dentists, 2005–2008	5.7%	6.2%	15.7%	1.7%	14.6%

Sources: BLS 2010e, 2010f; Tetra Tech 2010d

elderly population. In 2008 the parish had 2,340 physicians and 816 dentists in private practice. Thus, in 2008 the parish had 10.2 physicians and 3.6 dentists, per 1,000 parish residents, a higher ratio relative to the state or national ratios.

From 2005 to 2008, Washington Parish experienced a decline in the number of physicians practicing in the parish. The parish had a very modest increase in the number of dentists, at a much lower rate on average than the nation or state (Tetra Tech 2010d). All 10 census tracts in the parish are considered to be medically underserved by the HRSA (HRSA 2010). In 2008 the parish had 67 physicians and 61 dentists in private practice. Thus, in 2008 the parish had 1.5 physicians per 1,000 residents and 1.3 dentists per 1,000 residents. The ratio of physicians-to-residents and the ratio of dentists-to-residents in the parish are much lower than the ratios at the national or state level. The ratios of physicians-to-residents and dentists-to-residents in the aggregate area of the ROI compare favorably to national and state ratios.

Table 3-65 presents information about the ratios of physicians-to-residents and dentists-to-residents in the ROI and comparison areas.

Table 3-65.
Physicians and dentists in private practice per 1,000 residents, 2008, ROI and comparison areas

	United States	Louisiana	St. Tammany Parish	Washington Parish	ROI
Physicians per 1,000 residents	7.4	7.3	10.2	1.5	8.8
Dentists per 1,000 residents	2.7	2.2	3.6	1.3	3.2

Sources: BLS 2010e, 2010f; Tetra Tech 2010d

Information about the hospitals and medical centers in the ROI is presented in Table 3-66.

Table 3-66.
Hospitals in St. Tammany and Washington Parishes, 2006

Hospital	City	Control	Services	Staffed beds[a]	Admissions[b]	Out-patients[c]	Personnel[d,e]
St. Tammany Parish							
Fairway Medical Center	Covington	Private, for-profit	Surgical	21	256	4,881	73
Greenbrier Hospital	Covington	Private, for-profit	Specialty	58	N/A	N/A	N/A
Gulf States Long Term Acute Care of Covington	Covington	Private, for-profit	Long term acute care	58	N/A	N/A	N/A
Lakeview Regional Medical Center	Covington	Private, for-profit	General medical and surgical	168	6,854	52,253	534
Regency Hospital of Covington	Covington	Private, for-profit	Long term acute care	38	N/A	N/A	N/A
St. Tammany Parish Hospital	Covington	Hospital district	General medical and surgical	223	11,479	201,777	1,370
Southeast Louisiana Hospital	Mandeville	State	Psychiatric	162	220	0	N/A
Louisiana Heart Hospital	Lacombe	Private, for-profit	General medical and surgical	58	2,334	N/A	N/A
Doctors Hospital of Slidell	Slidell	Private, for-profit	Specialty	10	N/A	N/A	N/A
Northshore Regional Medical Center	Slidell	Private, for-profit	General medical and surgical	174	N/A	N/A	N/A
Slidell Memorial Hospital	Slidell	Hospital district or authority	General medical and surgical	151	8,379	82,893	682
Southern Surgical Hospital	Slidell	Private, for-profit	Surgical	36	N/A	N/A	N/A
Washington Parish							
Bogalusa Medical Center	Bogalusa	Non-government, not-for-profit	General medical and surgical	66	3,107	71,937	N/A
Gulf States Long Term Acute Care Washington-St. Tammany-Bogalusa Campus	Bogalusa	Private, for-profit	Long-term acute care	14	N/A	N/A	N/A
Riverside Medical Center	Franklinton	Hospital district or authority	General medical and surgical	25	1,184	23,424	198

Source: AHA 2007
Notes:
N/A = Information is not available
a. Number of beds regularly maintained for inpatients; excludes newborn bassinets
b. Number of patients accepted for inpatient service during a 12-month period; does not include newborn
c. A visit by a patient who is not lodged in the hospital while receiving medical, dental, or other service
d. Personnel situations as they existed at the end of the reporting period; includes full-time equivalents of part-time personnel
e. Personnel data might not agree with information presented elsewhere in this document because of reporting methodology

Fifteen hospitals or medical centers are in the ROI; 12 in St. Tammany Parish and 3 in Washington Parish. In the ROI, 7 of the 15 hospitals are *General medical and surgical hospitals* as the phrase is defined by the American Hospital Association. Those general medical and surgical hospitals have a total of 865 staffed beds. The ROI is also home to several specialty hospitals or medical centers, long-term acute care facilities, and one of three of the state's large psychiatric hospitals, Southeast Louisiana Hospital (LAHH 2010). There is a staffed bed in a general medical and surgical hospital for approximately every 317 residents in the ROI (Tetra Tech 2010d).

3.11.5 Environmental Justice

EO 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations* is designed to focus the attention of federal agencies on human health and environmental conditions in minority communities and low-income communities. Environmental justice analyses are performed to identify potential disproportionately high and adverse effects of proposed actions and to identify alternatives that might mitigate such effects. For this environmental justice analysis, data from the 2000 Census, at the census tract level, were used. To gauge the dimension of the concentrations of minority persons and low-income persons, information about a comparison area is provided. The comparison area is Louisiana. Racial minority populations included in the U.S. Census Bureau survey are identified as Black or African American, American Indian and Alaska Native, Asian, Native Hawaiian and other Pacific Islander, and other. Ethnic minority populations include individuals of Hispanic or Latino origin. Persons of Hispanic or Latino origin can be of any race. Information about low-income individuals, individuals living in poverty—as the term poverty is used by the U.S. Census Bureau—is also reported.

Table 3-67 summarizes the rates of poverty, rates of racial minority concentration, and rates of ethnic minority concentration in the United States, Louisiana, St. Tammany Parish, and Washington Parish. Tables 3-68 and 3-69 summarize the rates of poverty, rates of racial minority concentration, and rates of ethnic minority concentration by census tract for St. Tammany and Washington Parishes.

Table 3-67.
Poverty, race, and ethnic characteristics of ROI and comparison areas, 2000

	United States	Louisiana	St. Tammany Parish	Washington Parish
Poverty				
Persons living below poverty level	12.4%	19.6%	9.7%	24.7%
Race				
White alone	75.1%	63.9%	87.0%	67.4%
Black or African American alone	12.3%	32.5%	9.9%	31.5%
American Indian and Alaska Native alone	0.9%	0.6%	0.4%	0.2%
Asian alone	3.6%	1.2%	0.7%	0.2%
Native Hawaiian/Pacific Islander alone	0.1%	0.0%	0.0%	0.0%
Some other race alone	5.5%	0.7%	0.6%	0.1%
Population of two or more races	2.4%	1.1%	1.3%	0.5%
Ethnicity				
Persons of Hispanic or Latino Origin	12.5%	2.4%	2.5%	0.8%

Sources: USCB 2010tt, 2010rr, 2010ss; Tetra Tech 2010d

Table 3-68.
Poverty, race, and ethnic characteristics of St. Tammany Parish, by census tract, 2000

	Census tract									
	401.01	**401.02**	**402.01**	**402.02**	**403.01**	**403.03**	**403.04**	**404**	**405.01**	**405.02**
Poverty										
Persons living below poverty level	10.4%	13.6%	15.8%	8.8%	8.4%	6.5%	2.0%	5.8%	31.5%	12.0%
Race										
White alone	97.7%	95.8%	84.0%	94.5%	91.9%	93.6%	97.5%	94.2%	46.5%	68.4%
Black or African American alone	1.1%	2.2%	13.5%	4.0%	5.5%	3.0%	0.9%	3.7%	51.0%	30.1%
American Indian & Alaska Native alone	0.2%	0.3%	0.6%	0.3%	0.3%	0.2%	0.2%	0.3%	0.3%	0.3%
Asian alone	0.1%	0.2%	0.2%	0.3%	0.4%	1.5%	0.6%	0.4%	0.1%	0.1%
Native Hawaiian/Pacific Islander alone	0.0%	0.0%	0.0%	0.1%	0.0%	0.1%	0.0%	0.0%	0.1%	0.0%
Some other race alone	0.2%	0.5%	0.5%	0.3%	0.8%	0.7%	0.3%	0.3%	0.3%	0.4%
Population of two or more races	0.6%	1.0%	1.1%	0.5%	1.0%	0.8%	0.5%	1.1%	1.7%	0.7%
Ethnicity										
Persons of Hispanic or Latino Origin	1.3%	1.8%	2.8%	2.2%	2.3%	3.1%	1.5%	2.1%	1.1%	0.0%
	Census tract									
	406.01	**406.02**	**406.03**	**407.01**	**407.04**	**407.05**	**407.06**	**407.07**	**407.08**	**408.01**
Poverty										
Persons living below poverty level	3.0%	6.7%	8.9%	7.7%	17.8%	8.4%	13.7%	6.0%	7.4%	12.3%
Race										
White alone	98.4%	95.8%	88.4%	87.3%	75.1%	84.4%	94.6%	87.9%	92.5%	91.5%
Black or African American alone	0.5%	2.2%	8.8%	8.9%	21.7%	11.4%	2.1%	7.9%	3.3%	5.7%
American Indian & Alaska Native alone	0.1%	0.1%	0.3%	0.6%	0.9%	0.3%	0.7%	0.2%	0.4%	0.5%
Asian alone	0.6%	0.4%	0.7%	1.0%	0.1%	1.1%	0.4%	2.3%	2.0%	0.9%
Native Hawaiian/Pacific Islander alone	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Some other race alone	0.1%	0.3%	0.7%	0.6%	0.5%	0.7%	0.5%	0.6%	0.4%	0.2%
Population of two or more races	0.3%	1.1%	1.2%	1.7%	1.7%	2.0%	1.7%	1.0%	1.2%	1.1%
Ethnicity										
Persons of Hispanic or Latino Origin	1.7%	1.8%	3.4%	2.8%	1.6%	3.1%	2.3%	3.1%	2.5%	2.8%
	Census tract									
	408.02	**408.03**	**409**	**410.02**	**410.03**	**410.04**	**411.01**	**411.02**	**411.03**	**411.04**
Poverty										
Persons living below poverty level	10.0%	11.5%	27.1%	6.0%	5.3%	5.2%	4.3%	13.2%	30.9%	9.4%
Race										
White alone	92.8%	77.7%	51.7%	94.4%	92.0%	91.8%	87.5%	69.8%	65.0%	91.2%
Black or African American alone	2.8%	17.4%	44.4%	3.3%	4.7%	4.9%	9.7%	25.4%	31.1%	5.9%
American Indian & Alaska Native alone	0.5%	0.3%	0.5%	0.1%	0.4%	0.5%	0.3%	0.8%	0.8%	0.8%
Asian alone	2.4%	1.2%	0.2%	0.4%	0.9%	0.8%	0.2%	0.5%	0.3%	0.2%
Native Hawaiian/Pacific Islander alone	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.2%	0.0%

Table 3-68. (continued)

	St. Tammany Parish census tracts (continued)									
Some other race alone	0.3%	1.4%	1.3%	0.5%	0.6%	0.4%	0.8%	1.0%	0.9%	0.2%
Population of two or more races	1.1%	2.0%	1.9%	1.2%	1.4%	1.4%	1.5%	2.6%	1.7%	1.7%
Ethnicity										
Persons of Hispanic or Latino Origin	2.4%	4.4%	2.3%	2.1%	3.2%	2.5%	2.5%	2.6%	2.7%	2.5%
	St. Tammany Parish census tracts (continued)									
	Census tract									
	412.02	**412.04**	**412.05**	**412.06**	**413**					
Poverty										
Persons living below poverty level	11.0%	12.4%	4.7%	3.5%	7.6%					
Race										
White alone	67.6%	73.5%	93.6%	94.8%	91.5%					
Black or African American alone	28.5%	20.8%	3.9%	3.1%	5.5%					
American Indian & Alaska Native alone	1.3%	1.5%	0.3%	0.1%	0.4%					
Asian alone	0.2%	0.4%	0.5%	0.7%	0.8%					
Native Hawaiian/Pacific Islander alone	0.0%	0.0%	0.0%	0.0%	0.1%					
Some other race alone	0.2%	1.6%	0.8%	0.4%	0.6%					
Population of two or more races	2.1%	2.1%	0.9%	0.9%	1.1%					
Ethnicity										
Persons of Hispanic or Latino Origin	3.0%	2.5%	2.6%	2.4%	2.1%					

Source: USCB 2010tt, 2010oo, 2010pp; Tetra Tech 2010d

Table 3-69. Poverty, race, and ethnic characteristics of Washington Parish, by census tract, 2000

	Census tract									
	9501	**9502**	**9503**	**9504**	**9505**	**9506**	**9507**	**9508**	**9509**	**9510**
Poverty										
Persons living below poverty level	20.5%	23.7%	34.0%	24.1%	15.5%	19.5%	24.9%	36.6%	36.5%	20.0%
Race										
White alone	61.1%	77.6%	32.5%	75.3%	93.3%	94.1%	88.0%	27.3%	51.3%	66.2%
Black or African American alone	38.2%	22.0%	67.0%	23.7%	5.4%	4.7%	10.3%	71.5%	47.4%	32.0%
American Indian & Alaska Native alone	0.2%	0.1%	0.0%	0.3%	0.2%	0.4%	0.5%	0.2%	0.0%	0.4%
Asian alone	0.0%	0.0%	0.0%	0.1%	0.2%	0.1%	0.5%	0.1%	0.5%	0.4%
Native Hawaiian/ Pacific Islander alone	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Some other race alone	0.0%	0.0%	0.0%	0.3%	0.1%	0.1%	0.0%	0.3%	0.0%	0.4%
Population of two or more races	0.5%	0.3%	0.5%	0.3%	0.8%	0.6%	0.6%	0.7%	0.8%	0.6%
Ethnicity										
Persons of Hispanic or Latino Origin	0.7%	0.9%	0.4%	0.7%	1.2%	0.5%	0.8%	0.6%	0.6%	1.2%

Source: USCB 2010tt, 2010oo, 2010pp; Tetra Tech 2010d

The largest racial minority group in Louisiana and in the two parishes is Black or African American. In Louisiana, 32.5 percent of the residents identified themselves as Black or African American alone (*alone* means being of one race). In St. Tammany Parish, 9.9 percent of residents identified themselves as Black or African American alone, as did 31.5 percent of the residents of Washington Parish (USCB 2010rr). Two census tracts, of the 35 census tracts in St. Tammany Parish, had racial minority populations that were meaningfully (at least 10 percentage points) higher than Louisiana: Census Tract 405.01 (Northeast Covington), which was 51.0 percent Black or African American; and Census Tract 409 (East Central Slidell), which was 44.4 percent Black or African American. Three census tracts, of the 10 census tracts in Washington Parish, had racial minority populations at least 10 percentage points higher than Louisiana: Census Tract 9503 (North of Franklinton), which was 67.0 percent Black or African American; Census Tract 9508 (Northeast Bogalusa), which was 71.5 percent Black or African American; and Census Tract 9509 (Central Bogalusa), which was 47.4 percent Black or African American (USCB 2010oo). No other racial minority group was represented in a census tract, in either parish, at a rate at least 10 points greater than the rate in Louisiana. Figure 3-22 displays the boundary lines of census tracts in both parishes.

Persons of Hispanic or Latino origin represented 2.4 percent of the population in Louisiana in 2000. Persons of Hispanic or Latino origin composed 2.5 percent of the population in St. Tammany Parish and 0.8 percent of the population in Washington Parish (USCB 2010ss). No census tract in either parish had an ethnic minority population at least 10 percentage points higher than the state average (USCB 2010pp).

The prevalence of persons living in poverty varies widely between the two parishes in the ROI. St. Tammany Parish had about 9.7 percent of its population in poverty in 2000, while the rate of poverty in Washington Parish was 24.7 percent. The rate of poverty in Louisiana was 19.6 percent (USCB 2010tt). In St. Tammany Parish, two census tracts had a rate of poverty at least 10 percentage points higher than Census Tract 405.1 (Northeast Covington), which had 31.5 percent rate of poverty among its residents; and 411.03 (Northwest Slidell), which had a poverty rate of 30.9 percent. In Washington Parish, three census tracts had rates of poverty at least 10 percentages points higher than Louisiana: Census Tract 9503 (North of Franklinton), which had a poverty rate of 34.0 percent; Census Tract 9508 (Northeast Bogalusa), which experienced a poverty rate of 36.6 percent; and Census Tract 9509 (Central Bogalusa), which had 36.5 percent of its residents living in poverty (USCB 2010tt).

3.11.6 Protection of Children

EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, directs each federal agency to address disproportionate risks to children that could result from environmental health risks or safety risks of its polices, programs, activities, and standards. Therefore, this section presents data that can be used to analyze the status of the children in the New Orleans MSA, in Louisiana, and for comparison purposes, in the United States. St. Tammany Parish—but not Washington Parish—is part of the New Orleans–Metairie–Kenner, Louisiana MSA. Information as presented below is not available for an area smaller than Louisiana that includes Washington Parish. Table 3-70 presents information about the presence of risk factors of study area of children, the familial and household surroundings, the economic circumstances of the households of which they are a part, and the physical characteristics of their living quarters.

Figure 3-22 - Census tracts in Washington and St. Tammany Parishes

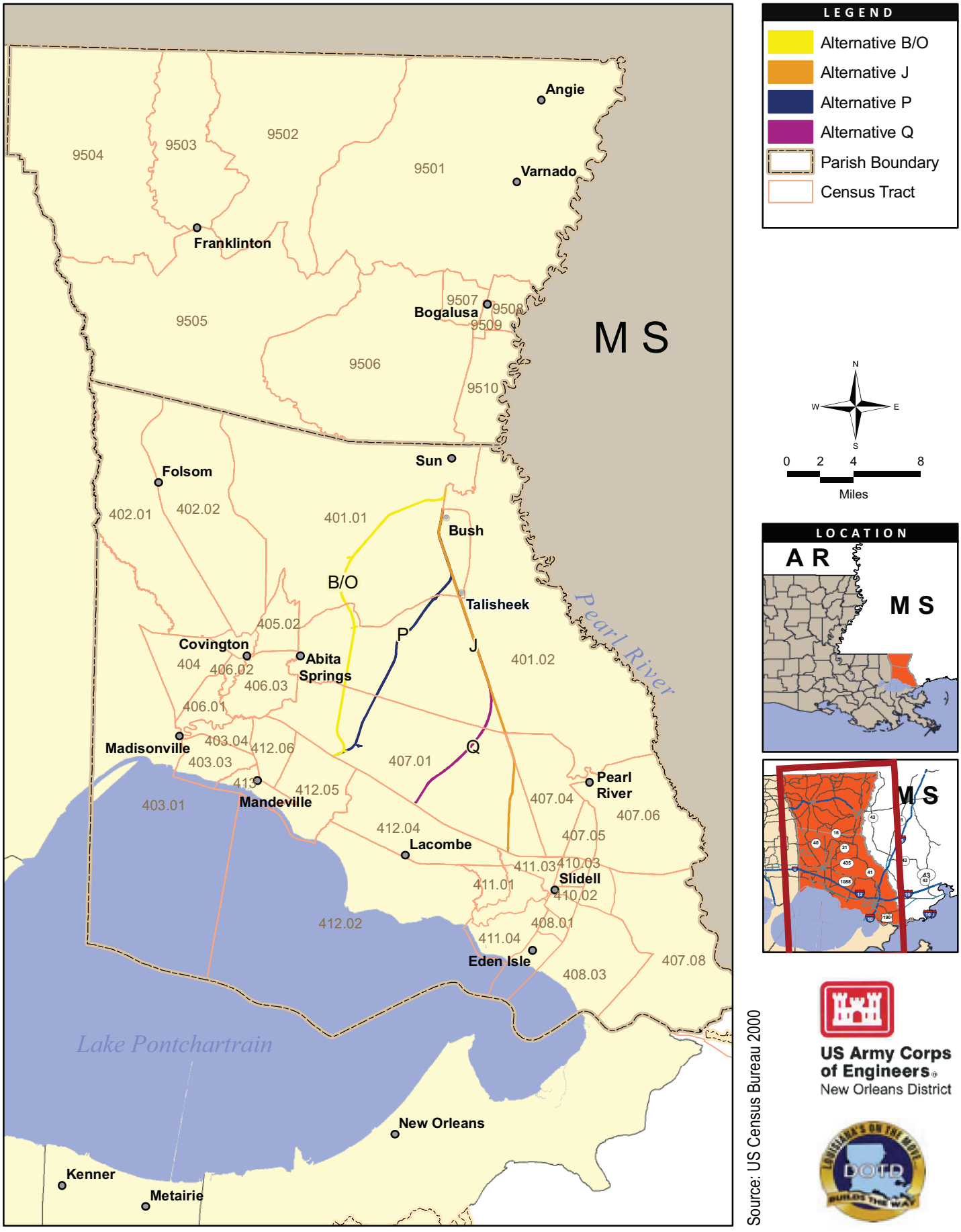


Table 3-70.
Children with risk factors, New Orleans metro area and comparison areas, 2007

	Average number of risk factors	Number of risk factors			
		No risk factors	1 to 2	3 to 7	8 or more
United States	2.2	31.5%	32.5%	33%	3%
Louisiana	2.4	26.1%	33.2%	38.8%	1.9%
New Orleans-Metairie-Kenner, LA MSA	2.2	32%	30.2%	35%	2.8%
		Children having at least one risk factor			
		Individual risk factors	Familial and household risk factors	Economic risk factors	Physical environment risk factors
United States		17.0%	52.0%	27.1%	44.1%
Louisiana		14.8%	56.4%	37.0%	50.5%
New Orleans-Metairie-Kenner, LA MSA		13.6%	55.5%	29.9%	42.0%

Sources: USCB 2009b, 2009c, 2009g; Tetra Tech 2010d

The U.S. Census Bureau tabulates the frequency of the presence of some established risk factors associated with children's health and safety. Data collected in the American Community Survey identify a series of 22 risk factors that can be thought to have an effect on a child's life and, thus, health and safety. Some of the risk factors, if present, can be an indicator of conditions that might negatively affect the overall well-being of the child. This section presents data reflecting the risk factors to children's well-being in the New Orleans MSA, an area that includes a major portion of the ROI. The *individual* risk factors include presence of a disability (excludes children under age 5), presence of multiple disabilities (excludes children under age 5), not enrolled in school (excludes children under age 5), speaks English less than very well (excludes children under age 5), and child is foreign born and in the United States for 5 years or less. The *familial and household* risks include a single parent household, linguistically isolated household, non-English speaking household, parent(s) foreign born and in United States less than 5 years, parent(s) with less than a high school education, cared for a by co-resident grandparent, and cared for by co-resident grandparent for more than 3 years. The *economic* risk factors to children include residing in a household that receives food stamps, receives public assistance other than food stamps, has a household income below the poverty line, has no employed parent in the unit, and has chromic unemployment in the household. Risk factors associated with the *physical environment* (housing) include a child residing in a household that is overcrowded, lacks a complete kitchen, lacks complete plumbing, is rented, and is not a single-family home (USCB 2009a).

Individual risk factors and the familial and household risk factors associated with children in the MSA are at rates that are similar to rates found in children in Louisiana in general, and, on average, across the United States. However, approximately 29.9 percent of the children living in the New Orleans–Metairie–Kenner MSA have at least one economic risk factor, a slightly higher percentage than children nationally (27.1 percent). Children in Louisiana have a much higher exposure rate to economic risk factors, 37.0 percent. Fewer children in the MSA have at least one physical risk factor than in the state (50.5 percent) and the United States (44.1 percent).

Table 3-71 presents data about children in poverty in the ROI and in comparison areas. Children in poverty have health and safety risks. In 2007 approximately 18.2 percent of the nation's children lived in a household where the total household income was below the poverty level. More than one-quarter, 26.6 percent, of the children in Louisiana lived in household categorized as being in poverty. The poverty rate among children in St. Tammany Parish was less than half, 12.2 percent, of the poverty rate among children in the state. More than one-third of the children living in Washington Parish were determined to be in poverty.

Table 3-71.
Children in poverty in the ROI and comparison areas, 2007

United States	Louisiana	St. Tammany Parish	Washington Parish	ROI	Child's age
4,279,045	88,451	1,820	1,485	3,305	Under 5 years
744,585	18,369	414	285	699	5 years
4,187,628	95,581	2,479	1,246	3,725	6 to 11 years
1,951,329	45,266	978	419	1,397	12 to 14 years
700,726	14,582	451	98	549	15 years
1,339,904	28,852	954	413	1,367	16 and 17 years
13,203,217	291,101	7,096	3,946	11,042	Total children in poverty
72,598,398	1,095,369	58,244	11,123	69,367	Total, all children
Percentage of children in poverty					
18.2%	26.6%	12.2%	35.5%	15.9%	

Sources: USCB 2010h; Tetra Tech 2010d

In the ROI, as in the nation and in the state, approximately one-third of persons in poverty are 17 years old or younger. Table 3-72 summarizes the poverty information for the ROI and comparison areas.

Table 3-72.
Poverty status of persons in the ROI and comparison areas, 2007

	United States	Louisiana	St. Tammany Parish	Washington Parish	ROI
Total persons	293,289,504	4,219,002	223,469	43,243	266,712
Total persons in poverty	38,573,393	778,566	22,922	10,709	33,631
Total persons under 17 years in poverty	13,203,217	291,101	7,096	3,946	11,042
Persons in poverty who are children	**34.2%**	**37.4%**	**31.0%**	**36.8%**	**32.8%**

Source: USCB 2010h

3.12 AESTHETIC AND VISUAL RESOURCES

Aesthetics and visual resources are the natural and man-made features of a landscape. They consist of cultural and historic landmarks, landforms of beauty or significance, water surfaces, and vegetation. Together, those features form the overall impression that a viewer receives of an area or its landscape.

Visual environments are key contributors to people's daily experiences and life styles and can significantly affect moods and feelings of well-being. Major public improvement projects and

facilities can have varying degrees and types of effects on the visual environments. The effects can range from very significant to hardly noticeable. Visual environments can be viewed as negative, or they can improve and contribute in a positive way to the appearance and image of communities. Although there is an inherent subjective nature to aesthetic evaluation, this section aims to qualify change by examining what is considered *noticeable* and its integration into the natural environment.

Visual effects on historic resources are protected under federal law through section 106 of the National Historic Preservation Act of 1966 (NHPA), as amended, and implementing regulations at 36 CFR Part 800. Section 3.13 of this EIS addresses cultural resources.

Scenic integrity considers how well a man-made alteration integrates into the original landscape. The less an alteration changes the size, shape, edge effect, and pattern of a natural landscape, the more scenic integrity it possesses. The different grades of scenic integrity are explained in Table 3-73 (USFS 1995).

Table 3-73.
Scenic integrity definitions

High **(Unaltered/Appears Unaltered)** Landscapes where the valued landscape character *is intact* with only minute, if any, deviations. The existing landscape character and sense of place are expressed at the highest possible level.
Moderate **(Slightly to Moderately Altered)** Landscapes where the valued landscape *appears slightly altered*. Noticeable deviations must remain visually subordinate to the landscape character being viewed. Landscapes where the valued landscape character *appears moderately altered*. Deviations begin to dominate the valued landscape character being viewed but they borrow valued attributes such as size, shape, edge effect, and pattern of natural openings, vegetative type changes, or architectural styles outside the landscape being viewed. They should appear only as valued character outside the landscape being viewed but compatible or complementary to the character within.
Low **(Heavily Altered)** Landscapes where the valued landscape character *appears heavily altered*. Deviations may strongly dominate the valued landscape character. They may not borrow from valued attributes such as size, shape, edge effect, and pattern of natural openings, vegetative type changes, or architectural styles within or outside the landscape being viewed.

Source: USFS 1995.

Historically, views in St. Tammany Parish were dominated by longleaf pine woodlands, open savannas, and mixed loblolly pine hardwood forests broken by creek bottoms. Almost all the longleaf pine forests are gone (Griffith 2008). Much of the landscape is now in mixed forest and loblolly pine plantations with some areas cleared for pasture, crops, or timber, or residential and commercial development.

The area of St. Tammany Parish bound to the south by I-12, to the west by Abita Springs and I-59 and LA 21, to the north by the town of Bush, and to the east by LA 41, can be described as rural. The landscape is dominated by cleared land, woodlands, and wetlands. Typical views from the roadways bisecting the area (LA 435, 36, 1088, and 434) are of tall pines with dense underbrush and wetlands formed in depressions along the roadways or of land cleared for pasture, crops, or timber. A few homes are in the area. Residential development in the area is low. Telephone poles and wires and typical road signs border the highways. Low wooden or cement bridges cross creeks and other water features. The area can be described as having moderate scenic quality.

Areas of development of varying intensity occur in Slidell, Lacombe, and Mandeville; Abita Springs; Bush; and Talisheek (Figure 3-23). Proceeding northwest from Slidell along I-12, higher density development is visible at the interchanges of I-12 and Northshore Boulevard/Airport Road (Slidell); I-12 and LA 434 (Lacombe); and I-12 and I-59 (Mandeville).

Those areas are typical of development surrounding highway exits. Hotels, restaurants, and other commercial establishments are there. The Slidell Airport is just north of I-12 on Airport Road. The areas can be described as having low scenic quality. Nearby are some residential and recreational developments (e.g., golf course) that can be described as having moderate scenic quality.

Proceeding north from Mandeville and I-12 on I-59 through Abita Springs, the area is typical of development surrounding a town. Residential, commercial, institutional (e.g., schools) and recreational developments are in the area. It can be described as having low to moderate scenic quality.

Proceeding northeast from Abita Springs to Bush on LA 21, the area is rural, traveling through a corridor with a mixture of wooded areas, wetlands, or undeveloped parcels of land cleared for farming or timbering. The area can be described as having moderate scenic quality. The community of Bush has low residential development and a few commercial establishments (e.g., hardware store, grocery store, and restaurants).

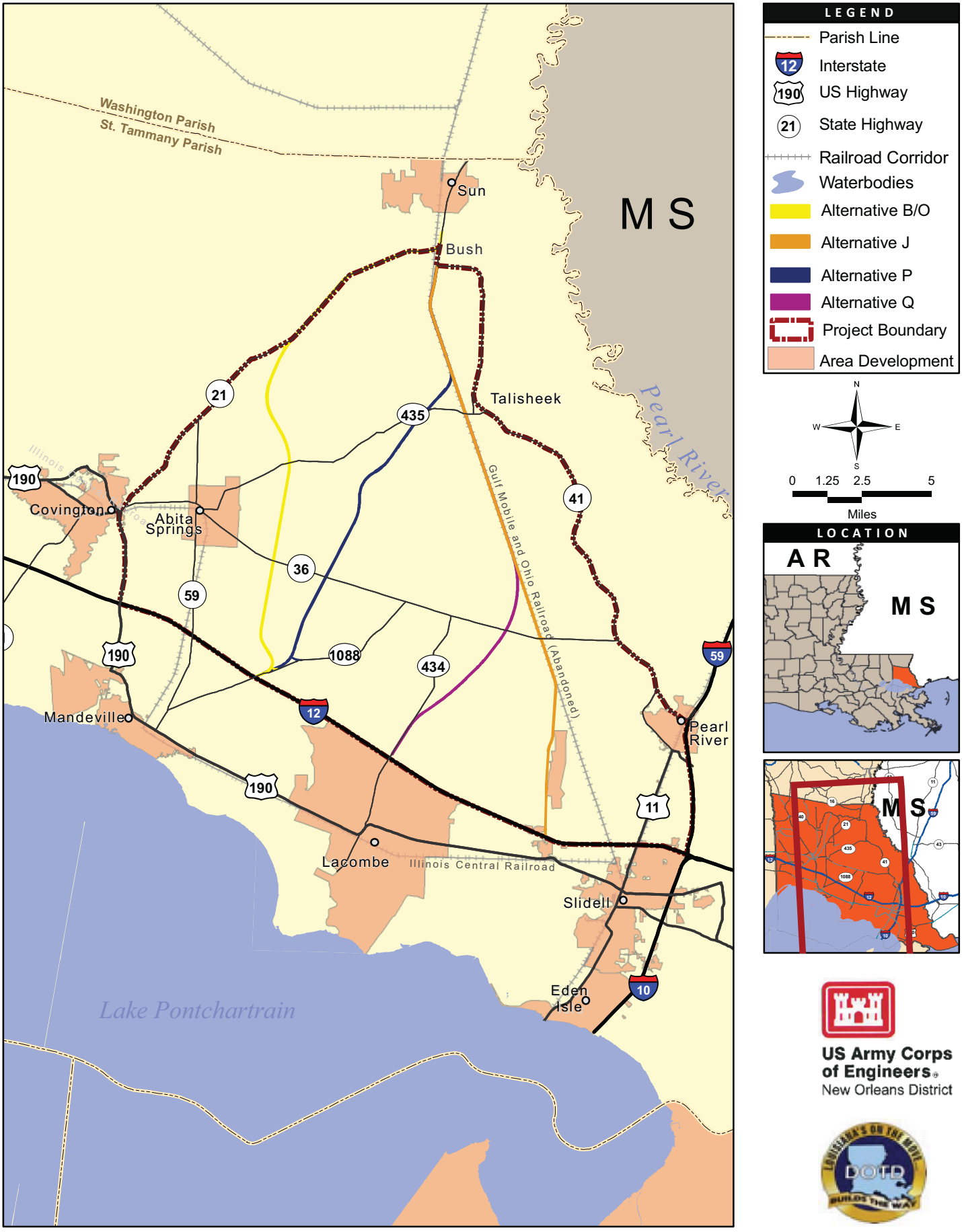
Traveling from Bush heading south on LA 41, the view continues to be rural in nature with a mixture of woodlands or cleared parcels of land for crops, pasture, or timber. Talisheek, at the intersection of LA 41 and LA 435, is very similar to Bush, with low residential development and a few commercial establishments. Continuing south on LA 41 and US 11 to I-12, about 10 miles outside Slidell, the view is of a more suburban environment with planned residential communities, schools, churches, recreational facilities, and commercial establishments. The area can be described as having low to moderate scenic quality.

Areas outside of the roadways are dominated by cleared land, small agricultural operations, pine and hardwood forests, and wetlands. The majority of these areas has little to no development and is heavily used by wildlife. These areas can be described as having high scenic quality.

3.13 CULTURAL RESOURCES

Cultural resources are aspects of the physical environment that relate communities to their culture and history. They provide an identity for the community and link them to their surroundings. Cultural resources include tangible remains of human influenced activities including prehistoric and historic archaeological sites, buildings, structures, objects, or districts. Cultural resources also include intangible aspects of the natural environment, such as landscapes, places, topographic features, or biota that are a part of the traditional way of life and practices associated with community values and institutions.

Figure 3-23 - Areas of development



3.13.1 Prehistoric and Historic Background of the Project Area

3.13.1.1 Prehistoric Period

Prehistory in the United States refers to the time of Native Americans before Europeans arrived in a region. The earliest known human occupation in the Pontchartrain Basin dates to approximately 1800 B.C. when land was actively forming, but most of those sites are most likely deeply buried or reworked by riverine and lacustrine activities. During that period, dramatic climate change caused a shift to warmer and drier conditions, creating a variety of woodland and riverine environments (Earth Search 2006).

Massive earthwork influenced by human construction is evident in northeast Louisiana during the Poverty Point Period and is believed to have been a cultural center during that time. However, it was during the Tchula period when the Tchefuncte people in the Lower Mississippi Valley began extensive use of ceramics and pottery as a mechanism for trade. The sites are few and scattered along the coastline indicating that the Tchefuncte people were predominantly a semi-nomadic group of hunters and gatherers (Earth Search 2006).

The late Marksville period witnessed an increase of cultural diversity in the lower Mississippi Valley and along the coast by the Issaquena culture. The Baytown period lacks diagnostic markers and is generally defined as the interval between the Marksville and Coles Creek periods, and archaeologists often have difficulty distinguishing between the periods. The Coles Creek culture in the lower and central Mississippi Valley is characterized by small ceremonial centers with mounds. More fundamental patterns of economic and social behavioral changes are evident but were slow and evidenced by mound sites, satellite villages, and seasonal camps or shell fishing stations (Earth Search 2006).

The beginning of the Mississippi period is marked by the emergence of the Mississippian culture in the northern part of the lower Mississippi Valley and the Plaquemine culture in the southern part. The late prehistoric culture and chronology is not well understood. The identities and locations of Native American tribes in Louisiana cannot be determined for any period before about 1700 when literate French settlers and visitors began to record their observations regarding aboriginal occupants of the area. Despite those accounts, it remains difficult to sort pre- and post-contact culture traits. That is especially true for the lesser tribes living along the Mississippi River and other areas in southeastern Louisiana. The proto-historic and early historic periods were traumatic for aboriginal society in southeastern Louisiana. The effects of disease and of ever-increasing European population are reflected in the declining aboriginal population and in the migrations by remnants of various tribes (Earth Search 2006).

3.13.1.2 Historic Period

The area of future St. Tammany Parish remained undisturbed and of little interest to Europeans for a century and a half after De Soto's men claimed the Mississippi Valley for Spain. In 1682 Rene Robert Cavalier, Sieur de LaSalle, claimed all territory drained by the Mississippi River for France and named the territory, Louisiana. An unsuccessful attempt by the French in 1684 to establish a colony at the mouth of the Mississippi River resulted in the murder of LaSalle. In 1698 a garrison was placed in Pensacola Bay by the Spanish, and Pierre Le Moyne d'Iberville resumed LaSalle's effort to establish a French colony. The next year, d'Iberville explored the islands of the

Mississippi Sound and eventually entered the mouth of the Mississippi River. He sailed upstream, encountering a number of Native American tribes, including the Mugulasha, Bayogoula, and Houma. During his return, the chief of the Bayogoulas showed Iberville a stream called Ascantia. Today that route is known as Bayou Manchac, the Amite River, Lake Maurepas, and Pass Manchac (Earth Search 2006).

On March 27, 1699, Iberville arrived and camped at "a lake, the shore of which runs west-southwest, which we have named Pontchartrain." It is believed that the campsite was at a prominent point known as Goose Point, which is about 30 miles from Manchac and about 12 miles from the Ringlets. Thus, Iberville and his party were the first known Europeans to set foot on the north shore of Lake Pontchartrain in the area known today as St. Tammany Parish (Earth Search 2006).

With the intrusion of European settlers into Native American land, the Choctaw Indians migrated to the north shore of Lake Pontchartrain and settled between the mouths of Bayou Lacombe and the Tchefuncte River. The Choctaw might have absorbed a small number of Pensacola Indians who were living on the north shore of Lake Pontchartrain in 1725. The Choctaw continued to reside in St. Tammany Parish through the 19th century, but most were removed to Oklahoma in 1903 (Earth Search 2006).

The 1763 Treaty of Paris concluded the seven year's war and the area between the Perdido River, and the Mississippi River became British West Florida. The Revolutionary War period brought heightened tension to the lower Mississippi Valley and West Florida where British, Spanish, and American interests collided. At the end of the century, Spain, France, and England continued to debate the ownership of the *Florida Parishes*—the area between the Mississippi and Pearl rivers. On October 27, 1810, President James Madison issued a proclamation that the entire area south of the Mississippi territory bounded by the Mississippi and Perdido rivers had been conveyed to the United States as part of the Louisiana Purchase. When Louisiana was admitted as a state to the United States in April 1812, the Florida Parishes still were not officially a part of Louisiana until August of that year (Earth Search 2006).

During the Antebellum Period and late 19th Century, St. Tammany Parish remained rural, dominated by small and sparse farms. Boat building along the lakes and bayous and brick making were St. Tammany Parish's major economic activities before the Civil War. Although St. Tammany Parish was relatively unscathed during the Civil War, it suffered economically during the Reconstruction Period. Agricultural production became dominated by truck farming. The number of farms doubled between 1870 and 1880, but farms remained small—less than 150 acres. Brick making remained an important industry after the Civil War, and by 1891 nine major brickyards were in the parish producing an estimated 20 million bricks.

In the late 1870s and 1880s, the virgin pine forests of St. Tammany Parish gained attention, and timber companies began buying large sections of it. A railroad was constructed in 1883, and Slidell quickly developed around it. The north shore also had become a tourist destination in the late 19th and 20th centuries because New Orleans remained unhealthy during the summer months.

The timber boom that began in the late 19th century, continued into the 20th with the expansion of railroads through the parish connecting to Baton Rouge and New Orleans. St. Tammany Parish flourished with timber, brick, boat building, truck farming, and tourist industries; however, the end of World War I signaled a reversal in fortune for the parish. From 1920 to 1960, St. Tammany Parish suffered from dwindling virgin timber sources, lack of civilian support for shipbuilding, and the brick industry demand declined with improved operating efficiency. Tourism also declined with public health and sanitation improvements in New Orleans.

Population declines continued through World War II and remained unchanged until the 1960s when urban flight from New Orleans began to transform small towns on the north shore. The completion of I-10, I-12, and Causeway Bridge over Lake Pontchartrain provided St. Tammany Parish a new identity as a suburban area near the New Orleans metroplex. By 1990 St. Tammany Parish had become predominantly a bedroom community for New Orleans and had attained the highest per capita income and fifth highest density of any parish in the state. In more recent years,

the population growth and concomitant residential and retail development of the parish have accelerated even more dramatically.

3.13.2 Cultural Resources Compliance

Section 106 of the NHPA (16 U.S.C 470) requires federal agencies to take into account the impact of federal activities on historic properties. Historic properties are cultural resources eligible for or are included in the NRHP. To be eligible for inclusion in the NRHP, a cultural resource must demonstrate a significant degree of physical integrity and meet one or more criteria for significance with respect to historical associations, cultural characteristics, and future research potential. The regulations at 36 CFR Part 800 control the implementation of NHPA section 106 by describing the process for identifying and evaluating cultural resources, assessing effects of federal actions on historic properties, and consulting to avoid, reduce, or mitigate adverse effects. The NHPA does not require preservation of historic properties, but it does ensure that federal agency decisions concerning the treatment of those resources result from meaningful consideration of cultural and historic values and identifying options available to protect the resources.

The federal government recognizes its unique relationship with Native American tribal governments and respects tribal sovereignty and self-government. Federal statutes and EOs that establish and define a trust relationship with tribes are as follows:

- NEPA
- The American Indian Religious Freedom Act of 1978 (42 U.S.C. 1996)
- The Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. 3001)
- EO 13007—Indian Sacred Sites (61 FR 26771)
- EO 13175—Consultation and Coordination with Indian Tribal Governments (65 FR 67249)
- The Exe**c**utive Memorandum on Government-to-Government Relations with Native American Tribal Governments (59 FR 22951)

3.13.3 Cultural Resources in the Project Area

The Louisiana Divisions of Archaeology and Historic Preservation and the standing structure files in the Louisiana State Museum indicate five previous cultural resource investigations undertaken in St. Tammany Parish. Of the five conducted, one includes the Phase I investigation of Alternative P conducted for the EA for this project (Bittiscombe et al. 2007). Seventeen archaeological sites (Table 3-74) have been previously recorded, and 56 standing structures older than 50 years (Table 3-75) have been identified in the study area. None are considered eligible for inclusion, and none are included in the NRHP.

Table 3-74.
Previously recorded archaeological sites within one mile of the project area

Site number	Site name	Quad name	Description	Cultural affiliation	Record date	NRHP eligibility
16ST060	Ruckatuhl Place	Bush, LA	Lithic Scatter	Meso-Indian/Archaic		Unknown
16ST061	Herget Place	Industrial, LA-MS	Campsite	historic unknown		Unknown
16ST121		Industrial, LA-MS	Prehistoric scatter	Troyville	6/6/1905	
16ST140	UNO B/L 4	Slidell, LA	Small gazebo with cypress shingles	1920s gazebo	6/8/1988	
16ST166	Power Line Site	Bush, LA		Neoindian	3/3/1995	Not eligible
16ST167	Gum Swamp Site	Bush, LA		Paleo-Indian/Archaic	3/17/1995	Eligible
16ST193		Slidell, LA	Range Target	military (1940s)	5/19/2000	Not eligible
16ST194		Slidell, LA		historic unknown	5/20/2000	Not eligible
16ST195		Slidell, LA	Hooch Camp Site	military (1940s)	5/21/2000	Not eligible
16ST197		Slidell, LA	Military Installation Bldg.	military (1940s)	6/1/2000	Potentially eligible
16ST198		Slidell, LA	Fence line	historic unknown	6/17/2000	Not eligible
16ST199		Slidell, LA	Military Installation Bldg.	military (1940s)	6/18/2000	Potentially eligible
16ST200		Slidell, LA	Railroad Tram	Industrial and Modern	6/18/2000	Not eligible
16ST202	Bob Levy Road Site	Bush, LA		historic unknown	Sep-06	Not eligible
16ST203	Weyerhaeuser Site	Bush, LA		Prehistoric unknown	Sep-06	Not eligible
16ST206	Orth Site	Bush, LA		historic unknown	Sep-06	Not eligible
16ST227	Green Cemetery	Slidell, LA	Cemetery	historic unknown/ Native American	2009	Unknown

Table 3-75.
Standing structures more than 50 years old

Structure number	Structure name	Address	Town	Easting	Northing	Quad
52-123			Bush	221709.5151	3389874.434	Bush, LA
52-125			Bush	222672.4425	3389777.977	Bush, LA
25-127			Bush	220579.0715	3390703.74	Bush, LA
52-129			Bush	220659.0632	3390496.707	Bush, LA
52-134			Bush	223206.4743	3390673.158	Bush, LA
52-135			Bush	223281.7601	3390519.06	Bush, LA
52-140			Bush	223460.5659	3390015.594	Bush, LA
52-141			Bush	222222.3814	3390184.983	Bush, LA
52-144			Bush	219931.488	3390985.634	Bush, LA
52-1344	Fifth Ward High School	Highway 21	Bush	219797.7391	3390605.193	Bush, LA
52-1345	Fifth Ward High School	Highway 21	Bush	219797.7391	3390605.193	Bush, LA
52-1346	Fifth Ward High School	Highway 21	Bush	219797.7391	3390605.193	Bush, LA
52-1348	Redwood Church of God	27593 Highway 40	Bush	218014.4487	3391449.622	Bush, LA
52-1349		Lowingham Road	Bush	217500.313	3390533.156	Bush, LA
52-1350		Lowingham Road	Bush	217403.7153	3390318.301	Bush, LA
52-1351	Waldheim Fire Tower	Highway 21	Bush	214781.1017	3386607.791	Bush, LA
52-1352		81590 Highway 21 / 40	Bush	220365.2666	3390655.993	Bush, LA
52-1353		Highway 40	Bush	221740.3359	3389870.69	Bush, LA
52-1354		29384 Highway 40	Bush	221234.0951	3390167.989	Bush, LA
52-1355		82141 Columbia Road	Bush	220579.5303	3391114.85	Bush, LA
52-1356		Highway 40	Bush	221845.2644	3389850.703	Bush, LA
52-1357		Highway 40	Bush	221859.4205	3389909.83	Bush, LA
52-1358		81535 Highway 41	Bush	222579.7621	3389813.229	Bush, LA
52-1359		Highway 41	Bush	222819.598	3389805.318	Bush, LA
52-1360		81071 Sticker	Bush	223485.8125	3389518.428	Bush, LA
52-1361		Cowart Road	Bush	222338.3871	3388598.126	Bush, LA
52-1362		80129 Watts-Thomas Road	Bush	222187.8224	3388391.094	Bush, LA
52-1364		76131 Highway 41	Talisheek	224896.6502	3381369.027	Industrial, LA-MS
52-1510		81416 Honie Lane	Bush	223229.3071	3390562.725	Bush, LA
52-1511		30438 Esco	Bush	222978.6487	3390317.889	Bush, LA
52-1513	Talisheek Baptist Church	76057 Highway 435 Spur	Talisheek	224043.9135	3381511.307	Bush, LA
52-1514		76039 Highway 435 Spur	Talisheek	224066.4246	3381407.415	Bush, LA
52-1515		76021 Highway 435 Spur	Talisheek	224078.546	3381345.08	Bush, LA

Table 3-75.
(continued)

Structure number	Structure name	Address	Town	Easting	Northing	Quad
52-1516		32005 Highway 435	Talisheek	224127.0283	3381348.543	Bush, LA
52-1517	Talisheek Grocery	32006 Highway 435	Talisheek	224116.64	3381296.597	Bush, LA
52-1518		32194 Highway 435	Talisheek	224791.7905	3381381.468	Industrial, LA-MS
52-1519		32032 Highway 435	Talisheek	224155.2787	3381293.048	Industrial, LA-MS
52-1523		77495 Highway 21	Waldheim	211235.6747	3384493.995	Waldheim, LA
52-1524		77580 Highway 21	Waldheim	211407.9121	3384522.235	Waldheim, LA
52-1525		77531 Highway 21	Waldheim	211316.2003	3384577.504	Waldheim, LA
52-1526		78138 Highway 1083	Waldheim	211639.415	3385391.259	Waldheim, LA
52-1557		23440 Lowe Davis Road	Abita Springs	211299.0927	3380168.343	Waldheim, LA
52-1558		76162 Highway 1083	Waldheim	211535.4204	3382234.588	Waldheim, LA
52-1559		77342 Highway 1083	Waldheim	211369.3284	3384361.181	Waldheim, LA
ESI-2			Bush	221719.7255	3383125.883	Bush, LA
ESI-3			Bush	222660.0572	3385265.87	Bush, LA
ESI-4			Bush	221803.4707	3386375.508	Bush, LA
ESI-5			Bush	221422.2296	3388427.871	Bush, LA
ESI-6			Bush	222518.4741	3388604.711	Bush, LA
ESI-7			Bush	222259.5416	3389458.867	Bush, LA
ESI-8			Bush	222008.6663	3389882.28	Bush, LA
ESI-9			Bush	222032.9346	3389945.239	Bush, LA
ESI-10			Bush	222108.3705	3389979.025	Bush, LA
ESI-11			Bush	222076.9989	3390137.419	Bush, LA
ESI-12			Bush	221940.792	3389946.962	Bush, LA

3.13.4 Pending Investigations and Compliance

The Louisiana State Historic Preservation Office was consulted regarding the proposed alternatives, and cultural resource field studies were conducted for each alternative alignment. If artifacts or archaeological features are encountered during project activities, work would cease in the vicinity of the discovery, and a qualified professional archaeologist would assess the discovery. The applicant would initiate a consultation with the Louisiana State Historic Preservation Office as appropriate. That stipulation would be placed in all relevant construction plans requiring the contractor to adhere to the provision in the *Louisiana Standard Specifications for Roads and Bridges* (2006 edition as amended) section 107.27 *Archaeological and Historical Findings*.

3.14 HAZARDOUS AND TOXIC MATERIALS

LDEQ, in conjunction with EPA, administers specific environmental statutes and regulations governing hazardous material and hazardous-waste management activities in Louisiana. For the purpose of this analysis, the terms hazardous waste, hazardous materials, and toxic substances include those substances defined as hazardous by the Comprehensive Environmental Response, Compensation, and Liability Act also known as Superfund, the Resource Conservation and Recovery Act, or the Toxic Substances Control Act. In general, they include substances that, because of their quantity, concentration, or physical, chemical, or toxic characteristics, can present substantial danger to public health or welfare of the environment when released into the environment.

The routes of the four alignment alternatives are predominantly in undeveloped areas of the parish where timber management and agriculture dominate the landscape. Residential and commercial development exists along transportation corridors that serve communities along each alignment alternative. Commercial development includes gas stations, convenience stores, restaurants and strip malls. In the developed areas, the alignment options would typically tie into existing roadways that would be widened. Alignment Alternatives J, P, and Q would follow varying segments of an abandoned railroad known as the Gulf Mobile and Ohio Railroad corridor. Much of that corridor is used as an unimproved road except in developed areas where sections have been paved.

Along each alignment alternative, the soil, groundwater, or surface water could be affected from improper handling or disposal of hazardous substances or petroleum products. Effects, if any, would be more likely in commercial areas or along the abandoned railroad corridor. A Draft Phase I Environmental Site Assessment prepared in 2006 for Alternative P does not reveal any recognized environmental conditions (Burk-Kleinpeter 2006). Environmental Site Assessments have not been prepared for Alternatives B/O, J, and Q.

A *recognized environmental condition* is defined in American Society of Testing Materials Standard E 1527-05 as the presence of likely presence of any hazardous substances or petroleum products on a property under conditions that indicate a release, a past release, or a material threat of a release of any hazardous substances or petroleum products even under conditions in compliance with laws. The term is not intended to include *de minimus* conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies.