3.7 Historic and Cultural Resources

Cultural resources include prehistoric era and historic era archaeological sites and objects, architectural properties and districts, and traditional cultural properties, which are defined as significant objects or places important to Native American tribes for maintaining their culture (USDOI 1998). Of particular concern are those cultural resources that may be considered eligible for listing on the National Register of Historic Places (NRHP). Any cultural resources listed on or eligible for the NRHP are considered historic properties under the National Historic Preservation Act (NHPA) [16 USC 470].

Prior to taking any action to implement an undertaking, Section 106 of the NHPA requires the NRC as a federal agency to do the following:

- Take into account the effects of an undertaking (including issuance of a license) on historic properties, including any district, site, building, structure, or object included in or eligible for inclusion in the NRHP.

- Afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on such undertaking.

To provide early consultation for the Section 106 process, Entergy contacted the Louisiana State Historic Preservation Office (SHPO) for informal consultation concerning the WF3 LRA and potential effects on cultural resources within the approximately 3,560-acre Entergy Louisiana, LLC property and on historic properties within a 6-mile radius of WF3 (Attachment C). Native American groups recognized as potential stakeholders were also consulted by Entergy with the opportunity for comment (Attachment C).

In support of license renewal, Coastal Environments, Inc. (CEI) developed a report, which summarizes the results of a background literature search conducted of previous archaeological investigations made on the Entergy Louisiana, LLC property, a review of archival and secondary historical sources, and a property walkover. Previous cultural resources investigation reports, archaeological site forms, and historic structure records on file with the Louisiana Department of Culture, Recreation, and Tourism were examined for the report. In addition, a variety of internet archival depositories were consulted, as were resources housed at the Louisiana State Library. All of these data sets were used to develop an archaeological sensitivity analysis of the Entergy Louisiana, LLC property and to identify all known archaeological sites within a 6-mile radius of WF3, as well as properties listed on the NRHP within that same radius. (CEI 2014)

The approximately 3,560-acre Entergy Louisiana, LLC property consists primarily of wetlands, agriculture, and developed areas. The land within a 6-mile radius is primarily wetlands (Figure 3.1-2). For the purpose of license renewal, the aboveground area of potential effects (APE) is defined as the entire Entergy Louisiana, LLC property and everything within a 6-mile radius of WF3. The aboveground APE considers the visual integrity of historical properties in relation to WF3's continued operations. The archaeological APE is considered bounded by the approximately 3,560 acres, where ground disturbance, though unanticipated during WF3

operations throughout the license renewal period, might compromise the physical integrity of archaeological data.

The only transmission lines associated with WF3 that are considered within the scope of this 10 CFR Part 51 evaluation are located within the developed industrialized area of the Entergy Louisiana, LLC property and, as such, are already contained within both the aboveground and the archaeological APE. Portions of the Mississippi River and Lac des Allemands are also included within a 6-mile radius (Figure 3.0-3).

Although construction of the existing WF3 facility itself would have impacted any archaeological resources that may have been located within its footprint, much of the surrounding area remains largely undisturbed and is still used for agriculture. Two areas of archaeological deposits on the property, both associated with the former Waterford Plantation (16SC41), have already been identified as being partially eligible for inclusion on the NRHP. Two additional areas that likely contain *in situ* archaeological deposits have also been identified: the Waterford Plantation sugarhouse (16SC41) and the nearby Killona Plantation sugarhouse. Archival research has also identified the potential for early 18th century occupation of the property.

The CEI (2014) literature review for previously recorded archaeological sites included the APE and the area within a 6-mile radius of WF3. The purpose of the literature review was to inventory all previously and newly recorded archaeological sites on the approximately 3,560-acre Entergy Louisiana, LLC property and within a 6-mile radius of WF3, regardless of NRHP status, to help develop an understanding of the local context. Although portions of the Mississippi River and Lac des Allemands are contained within a 6-mile radius, no underwater cultural resources that reflect historical activities on the river or lake were found to have been recorded.

The results of the recent (2014) cultural resource assessment and previous assessments show that within the 3,560-acre APE and 6-mile radius, there are 10 resources that are either NRHP listed, determined eligible, or recommended eligible for the NRHP, or have the equivalent eligibility or potential eligibility under national heritage or legacy commission designations. These 10 resources include six aboveground properties and four archaeological sites (16SC41, 16SC50, 16SC51, and 16SC80) (Tables 3.7-1 and 3.7-2). One of these 10 resources, the former Waterford Plantation (16SC41) and associated areas occupy almost half of the approximately 3,560-acre Entergy Louisiana, LLC property (Figure 3.7-1). Only a portion of site 16SC41 is determined eligible for inclusion on the NRHP; the eligibility of the rest of the site is unknown. (CEI 2014)

Beyond the approximately 3,560-acre Entergy Louisiana, LLC property, but within a 6-mile radius, are eight NRHP-listed properties (Figure 3.7-2), including six aboveground properties and the Kenner and Kugler Cemeteries Archaeological District, which comprises two archaeological sites (16SC50 and 16SC51). One more unnamed archaeological site (16SC80) has an eligible status, but is yet unlisted. (CEI 2014)

Finally, 32 archaeological resources that are determined not eligible for the NRHP or remain unevaluated are also located within a 6-mile radius of WF3 (Table 3.7-1). None of these 32

archaeological resources are located on the approximately 3,560-acre Entergy Louisiana, LLC property. Of these 32 resources, seven have been determined ineligible by the SHPO, while two have been determined as partially ineligible/unknown. The remaining 23 resources have not been evaluated and are classified as unknown. (CEI 2014)

No traditional cultural properties have been suggested to date by research or by potentially interested parties for the Entergy Louisiana, LLC property or within a 6-mile radius of WF3, but one area on the Entergy Louisiana, LLC property has a high probability of having been the site of a 1718–1721 Ouacha Indian village (Figure 3.7-3). The location was later the site of two German settlements between 1721 and 1724. (CEI 2014)

3.7.1 Land Use History

The land use history for WF3 and the surrounding region was developed as part of a Phase 1A literature review and archaeological sensitivity assessment of the Entergy Louisiana, LLC property and is summarized here. Section 3.7.2 provides a more detailed discussion of historical land use as part of the cultural history.

The Entergy Louisiana, LLC property and the surrounding region hold evidence of both prehistoric and historic occupation by Native Americans and Euroamericans. Archaeological records suggest that the Entergy Louisiana, LLC property and the surrounding area were potentially occupied by Native American populations for the Paleo-Indian Period (prior to 6000 BC), the Archaic Period (ca. 6000 BC to 1500 BC), the Woodland Period (ca. 1500 BC to AD 1200), and the Mississippi Period (AD 1200 to 1450). The principal aboriginal groups encountered by European explorers in southeastern Louisiana were the Acolapissa, Quinipissa, Bayagoula/Mugulasha, Ouacha (Washa), Chaouacha, Tangipahoa, and Houma. (CEI 2014)

The National Park Service's (NPS's) Native American Consultation Database, developed as part of NPS's national program for compliance with the Native American Graves Protection and Repatriation Act of 1990, identified no federally recognized Indian tribes with judicially established land claims within St. Charles or St. John the Baptist parishes (NACD 2014).

The regional historic era cultural background begins with European exploration and settlement by the French in the early 17th century, followed by Spanish control west of the Mississippi and British control east of the Mississippi in the mid-18th century. In 1800, control reverted to France, which in turn sold the possession to the United States as the Louisiana Purchase in 1803. Louisiana became a state in 1812. Sugarcane production, rice cultivation, and logging were the primary economic activities in the area (Figure 3.7-4). (CEI 2014)

Between 1831 and 1844, area plantations began to be consolidated; the present study area was no different. Waterford Plantation, Killona Plantation, and Providence Plantation were all the result of consolidation. As these plantations expanded their cultivated fields and steam power usage became more widespread, it became both more efficient and economical to build new sugarhouses away from the river and closer to the center of the agricultural fields. Each plantation's big house, however, would have remained near the riverbank. (CEI 2014)

In January 1861, Louisiana seceded from the Union with the rest of the Confederacy, and the American Civil War began in April of the same year. After the war ended in 1865, sugarcane production dropped because planters had lost both financial resources and slaves; many turned to rice cultivation as it was less expensive and less labor intensive. (CEI 2014)

By the turn of the 20th century, timbering had largely overtaken sugarcane cultivation in marginal areas (Figure 3.7-5). Along the river, sugarcane cultivation was still widespread, but not to the extent at which it had once been grown. By the second quarter of the 20th century, however, most of the region had been timbered out and the industry was in decline. Plantations and truck farms began to give way to industrial complexes, particularly those related to petroleum, during the second decade of the century. (CEI 2014)

By 1921, a rail spur had been constructed to connect the Killona sugarhouse to the nearby Texas and Pacific Railroad (now Union Pacific Railroad). A remnant of that spur is still extant. By that same year, the Waterford sugarhouse had been abandoned, and likely demolished, and both Waterford and Killona plantations had become collectively known as Waterford. Although still growing sugarcane, an experiment was made in 1926 to grow sugar beets there. It is presumed that new facilities would have been required, or alterations made to existing ones, to process the beets rather than cane. Where those facilities were located is unknown. (CEI 2014)

What was to become the largest refinery in St. Charles Parish began with the construction of the Marine Terminal, a refinery of several 55,000-barrel storage tanks, near the town of Sellers in 1916. This facility, built by the Roxana Petroleum Company, began operations in 1918. Following World War I, an asphalt refinery was built by the New Orleans Refining Company near the Marine Terminal. This refinery became so important to the local economy that the town of Sellers was renamed Norco—the acronym of the New Orleans Refining Company (Figure 3.7-6). In the spring of 1929, Shell Petroleum Corporation (formerly Roxana Petroleum Company) took over the Norco plant and began modernizing the facility. The plant resumed operations in 1930 with 650 workers. (CEI 2014)

The petrochemical industry soon spread to the west bank of St. Charles Parish. To provide an adequate electrical supply to the area's growing industrial base and to burgeoning residential growth, LP&L (later Entergy Louisiana, LLC) established the Little Gypsy power plant at Montz, Louisiana, in 1960. Three years later, the same company acquired Killona and Waterford plantations in order to construct Waterford 1 and 2 (Figure 3.7-7). In September 1970, it was announced that those two units would be joined by a third unit, WF3. (CEI 2014)

Through the mid-20th century, vehicular access to the Killona area could be gained only via River Road (now LA-18). In May 1968, Governor John McKeithen announced that among the state's highway priorities for 1969 was the acquisition of ROW for a new four-lane highway to be built between Killona and U.S. Highway 90 (US-90). At the same time, it was announced that actual construction was to begin the following year for that segment of highway. An additional segment between Killona and the Sunshine Bridge (Louisiana Highway 70) was to be constructed between 1971 and 1973. Then known alternatively as the Donaldsonville-New Orleans Highway

or the West Bank Expressway, construction began on the 11.7-mile section of LA-3127 between US-90 and Killona in 1971 (Figure 3.7-8), and it was opened to traffic in July 1975. (CEI 2014)

While none of the structures associated with the Waterford Plantation were extant by the 1950s (Figure 3.7-9), many of those associated with neighboring Killona Plantation were still standing until the 1970s (Figure 3.7-8). Both properties were acquired by LP&L in 1963. In August 1970, LP&L announced plans to begin construction on the Waterford Generating Station. Now known as Waterford 1 and 2, construction of the first of two 430,000-kilowatt (kW) gas and oil-fired generating units was to be completed in January 1974. The second unit was to be completed in 1975. Before construction began on Waterford 1 and 2, LP&L announced plans to begin construction of WF3 immediately next to them in September 1970. The ground-breaking ceremony for Waterford 1 was held in May 1971. (CEI 2014)

When plans for WF3 were announced, it was anticipated that the facility would be completed by 1977. However, it was not until May 1974 that a limited work authorization was issued to LP&L to begin preliminary construction work for WF3 (Figures 3.7-10 and 3.7-11). Construction was further delayed by major design changes in 1979 and the facility was not brought online until 1985 (Figure 3.7-12). The most recent addition to Entergy Louisiana, LLC's property was the construction of Waterford 4 in 2008. (CEI 2014)

3.7.2 Cultural History

3.7.2.1 Paleo-Indian Period (Prior to 6000 BC)

Initial human occupation of this region occurred in the Paleo-Indian period. Archaeological evidence from other portions of North America suggests that the populations involved were probably small bands of hunter-gatherers adapted to terminal Pleistocene or very early Holocene environments. The early portion of the period is characterized by the widespread fluted-point tradition generally dated prior to 8500 BC. A few of these points resembling the Clovis type have been found in the parishes north of Lake Pontchartrain, generally made of exotic materials. (CEI 2014)

The later Paleo-Indian period is marked by the divergence of the fluted-point tradition into distinct sub-traditions. One of these includes Dalton and related projectile points found widely throughout the Southeast and Midwest. Some researchers have argued that the Dalton horizon dates from approximately 8500 to 7900 BC. Others suggest a slightly later ending date of 7500 BC, and that it represents an adaptation to the changing environments found at the end of the Pleistocene. One indication of this is the addition of a heavy woodworking tool, the Dalton adz, to an otherwise Paleo-Indian tool kit. Within southeast Louisiana, others have proposed the Jones Creek phase based on finds of Plainview, Dalton, and San Patrice points at the Jones Creek (16EBR13) and Blackwater Bayou (16EBR33) sites in East Baton Rouge Parish. (CEI 2014)

3.7.2.2 Archaic (6000 to 1500 BC)

3.7.2.2.1 Early Archaic Period, 6000–5000 BC

In much of eastern North America, the Early Archaic period represents a time of adaptation to the changing environments associated with early post-glacial climatic regimes. The available palynological evidence indicates that the present region lies beyond the southern boundary of boreal forest expansion, suggesting that the transition to Holocene climatic conditions may have been much less marked here than further north. While there is a distinct technological break with the earlier fluted-point tradition during this period, there are obvious continuities with transitional complexes such as San Patrice. The side-notched point style that appeared in the latter becomes one of the marker traits of the Early Archaic. Corner-notched types such as Palmer and Jude developed during this period, as did stemmed types such as Kirk and Hardin. In southeast Louisiana, archaeologists have proposed the St. Helena phase based on surface finds of Kirk and Palmer points in St. Helena Parish and adjacent parishes north of Lake Pontchartrain. (CEI 2014)

3.7.2.2.2 Middle Archaic Period, 5000–3000 BC

The Middle Archaic period is characterized by widespread regional differentiation of cultures, and a number of developments in ground stone technology. The latter includes grooved axes, atlatl weights, and pendants, as well as more extensive use of grinding stones which first appeared in the previous period. This period also roughly corresponds with the Hypsithermal Interval, which brought increased warmth and aridity to areas bordering the Great Plains. The impact of this climatic shift on other portions of the Southeast is not well known at present. It may be that the intensive shellfish collecting evidenced at some riverine sites of this period represents a response to this change. Others have also suggested that plant collecting increased in importance during this time. (CEI 2014)

There are also indications of increased sedentism and more complex social organization during this period in the form of increased site size, midden development, the use of storage pits, utilization of local raw materials, and an increase in the number of burials. Additionally, evidence of Middle Archaic mound building has been found at several sites in southeast Louisiana. The function of these mounds among what are thought to have been hunting and gathering societies is unclear, although one site, Monte Sano Bayou (16EBR17), contained what may be cremation burials. Other Early Archaic mound sites in the region include Hornsby (16SH21) and the LSU Campus mounds (16EBR6) in St. Helena and East Baton Rouge parishes, respectively. (CEI 2014)

3.7.2.2.3 Late Archaic Period, 3000–1500 BC

Research elsewhere in eastern North America suggests that the Late Archaic period was a time of marked population increases and the beginning of extensive trade networks. The evidence for the former is seen in the appearance of large habitation sites such as Indian Knoll, Kentucky, while the latter is reflected in the exotic raw materials that occur at some sites. Cultivation

involving several native seed plants, including sumpweed, chenopod, and sunflower, as well as squash, which is now thought to have been independently domesticated in eastern North America, also began during this period. The only Late Archaic phase identified in southeast Louisiana to date is the Pearl River phase, which is based on material from a series of oyster shell middens located near the mouth of the Pearl River. The diagnostic artifacts associated with this phase include Kent, Pontchartrain, Macon, Hale, and Palmillas projectile points and various types of atlatl weights. (CEI 2014)

3.7.2.3 Woodland (1500 BC to AD 1200)

3.7.2.3.1 Poverty Point Period, 1500–500 BC

In much of eastern North America this time interval witnessed a transition from Archaic hunting and gathering cultures to Woodland cultures characterized by food production, pottery manufacture, and mound building. Current interpretations suggest that these three features have different and possibly unrelated origins. Tropical domesticates had reached the East prior to 2000 BC, and there is good evidence of cultivation of native seed plants in the Kentucky and Ohio area by 1000 BC. Ceramics probably appeared somewhat earlier than this in the third millennium BC along the Atlantic Coast, and mound building may have developed independently in several areas by 1000 BC. (CEI 2014)

In the Lower Mississippi Valley, this transition is marked by the development of the distinctive Poverty Point culture. Among the material characteristics of this culture are baked clay balls or Poverty Point objects, microlith and lapidary industries, and earthworks. Pottery is not abundant, but fiber-tempered and sand-tempered wares have been found at several sites. Subsistence data from the J. W. Copes site (16MA47) suggest a continuation of an Archaic pattern of intensive collecting of wild plants and animals, supplemented by the cultivation of squash. (CEI 2014)

Two Poverty Point period phases have been identified in southeast Louisiana. The earlier Bayou Jasmine phase is based on data from the Bayou Jasmine site (16SJB2) in St. John the Baptist Parish and the Linsley site (16OR40) in Orleans Parish. Both of these sites are *Rangia* shell and earth middens located on abandoned distributary channels of the St. Bernard delta. Poverty Point objects have been recovered from both sites. The succeeding Garcia phase is based on data from the Garcia site (16OR34), a *Rangia* midden located near the eastern end of Lake Pontchartrain. One of the distinctive features of the material from this site is the extensive microlith industry. (CEI 2014)

3.7.2.3.2 Tchula Period, 500 BC–AD 1

This period in the Lower Mississippi Valley is characterized by the integration of pottery manufacture and mound building into a single cultural system. In the southern portion of the valley, these developments take place in an archaeological culture called Tchefuncte. Originally defined in southern Louisiana, Tchefuncte culture is now recognized to extend as far north as the vicinity of Clarksdale, Mississippi, and as far west as northeast Texas. The diagnostic artifacts of

this and most of the succeeding prehistoric cultures of the Lower Mississippi Valley are the distinctive ceramics. Tchefuncte pottery is characterized by a laminated paste that appears to lack tempering. Replication studies suggest that the laminated texture is simply the result of minimal preparation of the raw material, an expected feature of an incipient ceramic technology. Other diagnostic attributes of Tchefuncte ceramics include the use of podal supports and decorative techniques such as jab-and-drag incising. (CEI 2014)

Evidence for Tchefuncte subsistence comes largely from faunal assemblages recovered from the Bayou Jasmine (16SJB2) and Morton Shell Mound (16IB3) sites and floral remains from the latter site. The faunal assemblages vary somewhat between the two sites, probably due to habitat differences and perhaps to functional differences between the sites (a base camp in the case of Morton Shell Mound and a fishing camp in the case of Bayou Jasmine). The assemblage from Morton Shell Mound is dominated by white-tailed deer, followed by small mammals and fish, while that from Bayou Jasmine indicates an emphasis on fish and shellfish. (CEI 2014)

The floral remains from Morton Shell Mound document collecting of wild fruits and nuts, but also include the remains of two possible tropical cultigens, squash and bottle gourd, and one possible native cultigen, knotweed. Other archaeologists reviewed the evidence from the site and argued that there was not conclusive evidence of the presence of cultigens. (CEI 2014)

Mound construction, now well documented for the preceding Late Archaic and Poverty Point periods, is presently only known from one Tchefuncte site, the Lafayette Mounds (16SM17). Data from this site were recently analyzed and strongly suggests that the mound was built during the Tchefuncte occupation of the site. Evidence was also found for Tchefuncte mounds at three other sites: Coulee Crow (16SM17), located on the Vermilion River, and Lake Louis (16CT24) and Boothe Landing (16CT31), both located on the lower Ouachita River. (CEI 2014)

Two Tchula period phases have been identified in southeast Louisiana. One, the Pontchartrain phase, is based on early work at sites around Lake Pontchartrain, including the Tchefuncte (16ST1), Big Oak Island (16OR6), and Little Woods (16OR1-5) sites. It includes occupations that probably span the entire period and eventually should be subdivided. The other phase, Beau Mire, is based on research at the Beau Mire site (16AN17) in Ascension Parish. This phase is thought to date to the latter portion of the period. (CEI 2014)

3.7.2.3.3 Marksville Period, AD 1–400

In many parts of eastern North America this period is marked by evidence of extensive interregional contact through a phenomenon labeled the Hopewell Interaction Sphere. The focal points of this interaction sphere were societies in the Ohio and Illinois river valleys, which acquired large quantities of exotic raw materials, including obsidian, copper, mica, shark's teeth, and marine shells, in exchange for specialized finished goods such as copper panpipes and ear spools. Various theories have been offered to explain the nature of this interaction, some emphasizing socio-religious systems and others pointing to economic networks, but the problem remains unresolved. Within the Lower Mississippi Valley, the culture that participated in this interaction sphere is termed Marksville. (CEI 2014)

Some have argued that the Marksville culture developed out of Tchefuncte as a result of intermittent contacts with cultures in the Illinois River valley area, but they only speculate on the nature of these contacts. It was emphasized that the evidence for Hopewellian interaction is largely limited to the Marksville mortuary system and aspects of ceramic decoration. Other cultural subsystems, such as subsistence and settlement pattern, may have changed very little. Economic data from Marksville sites are extremely limited, but information from contemporary occupations in the Midwest suggests a pattern of intensive collecting of wild plant foods and high-density faunal resources, such as fish, supplemented by cultivation of native North American seed plants and a few tropical cultigens. Current evidence suggests that while maize may have been present at this time, it was of only minor importance to the economy. (CEI 2014)

Two Marksville period phases, Labranche and Gunboat Landing, have been defined in the vicinity of the present project. Labranche was set up on the basis of collections from sites around Lake Pontchartrain, including Big Oak Island (16OR6), Bayou Labranche Mouth (16SC11), and Bayou Trepagnier (16SC10). Based on the presence of an early variety of Marksville Stamped, the phase is thought to date to the early portion of the period. Gunboat Landing is a late Marksville phase proposed on the basis of excavations at several sites on the lower Amite River. (CEI 2014)

3.7.2.3.4 Baytown Period, AD 400–700

The Late Woodland era has been characterized as a time of cultural decline in much of the Eastern Woodlands. However, research in the last two decades has shown that, to the contrary, the late Woodland was a time of fundamental cultural changes that would transform many of the economies and societies of the native southeastern United States, setting the stage for the complex late historic cultures that were to follow. During the early part of the Late Woodland, maize agriculture began to dominate subsistence economies in the middle Mississippi, Ohio, and Illinois river valleys. Mound-building cultures with indications of incipient social ranking emerged in the Arkansas River lowlands and along the Florida Gulf Coast. (CEI 2014)

Troyville culture dominates the southern half of the Lower Mississippi Valley during this time period, from the northern Tensas and southern Yazoo basins down to the Gulf of Mexico. Troyville ceramics are characterized by the persistence of certain Marksville types such as Marksville Stamped, Marksville Incised, and Churupa Punctated, but in more "broken-down" varieties, such as *Bayou Rouge*, *Anglim*, and *Watson*. The appearance of Mulberry Creek Cord Marked, Larto Red Filmed, and early varieties of Coles Creek Incised and French Fork Incised is also seen during this period, the last two foreshadowing the arrival of Coles Creek culture. (CEI 2014)

Stone tool traditions were also undergoing important changes in this period. Small chipped stone points begin to supplant larger dart points, heralding the arrival of the bow and arrow. Subsistence data, although limited, suggest continuities with the preceding periods and their hunting and gathering economies. Evidence for maize cultivation is lacking in the Lower Mississippi Valley at this time, but it does appear that native seed crops were being cultivated in the northern reaches of the Lower Mississippi Valley. (CEI 2014)

Mound construction continued in the Baytown Period, and there are indications that the function of some of these mounds began to shift from cemeteries to building substructures. Burials appear to become more focused on the interment of individuals rather than large groups, and platform mounds begin to supplant accretional burial mounds, often covering them. These changes have been interpreted by some as important steps in the evolution of ranked societies in the Lower Mississippi Valley, possibly the first signs of important social change since mound construction began in the region. (CEI 2014)

The Troyville-like culture present on the Louisiana coast during Baytown times is poorly understood. To date, most sites yielding examples of painted pottery on a Baytown Plain paste have been assigned to this time frame. The Whitehall phase, named for the Whitehall site (16LV19) on the Amite River, is presently the only phase identified in the vicinity of the present project area. (CEI 2014)

Authorities have proposed dividing the Baytown Period in the Barataria Basin and adjacent areas into early (Grand Bayou) and late (Des Allemands) phases. Both of these phases are considered to be temporal subdivisions of the "coastal Troyville" culture, a somewhat poorly defined entity related to the Troyville culture of the Tensas and lower Red River basins. Grand Bayou phase sites are characterized by the presence of ceramics from the so-called terminal Marksville ceramic tradition. The Des Allemands phase is differentiated by the absence of Marksville/Troyville continuum ceramics (i.e., Marksville Incised, Marksville Stamped, Churupa Punctated), and the initial appearance of early Weeden Island-related ceramics, especially French Fork Incised, and early variants of Mazique Incised, such as *var. Bruly.* Isle Bonne is considered to be the type site for the Des Allemands phase. (CEI 2014)

3.7.2.3.5 Coles Creek Period, AD 700–1200

Elsewhere in eastern North America, this time interval corresponds to the latter portion of the Late Woodland period and the beginning of the Mississippi period. Within the Lower Mississippi Valley a cultural florescence that shows a marked resemblance to Weeden Island culture of northwest Florida occurs during this period. The precise nature of the relationship of Coles Creek culture to Weeden Island is uncertain, but the similarities in ceramic decoration and community pattern are unmistakable. Both were characterized by the use of incised, stamped, and punctuated pottery types in which the decorative zone is largely restricted to a band around the rim of the vessel, and by the construction of small platform mounds around plazas. The latter are generally interpreted as an indication of the development of stratified social systems during this period. These societies were apparently based on economies that included the cultivation of maize. While direct evidence for this is lacking from sites in the Lower Mississippi Valley, the remains of corn have been recovered from Weeden Island sites and from contemporary Late Woodland sites in the Midwest. (CEI 2014)

The development of substantial programs of mound construction, which tend to follow similar patterns from site to site, as well as the inferred presence of mound-top residence, have been interpreted as an indication of the development of ranked social systems during this period. Although mound centers tend to be relatively small, a few Coles Creek mound sites stand out in

both the number and size of mounds. Some mound sites, such as Osceola (16TE2), Mott (16FR11), Raffman (16MA20), and Insley (16FR3) had considerably more mounds than most other sites in the Lower Mississippi Valley. Mott supported as many as 13 mounds, and is seen by some authors as a paramount center. The recently rediscovered Bayou Grande Cheniere site (16PL159) is another large multimound (*n*=12) site. At a few sites, such as Mt. Nebo (16MA18) in north Louisiana and Lake George (22YZ557) in the Yazoo Basin, some individuals appear to have been treated differently in death than others, suggesting differential status. (CEI 2014)

Coles Creek societies were once thought to have been based on economies that included the cultivation of maize; however, ethnobotanical data suggest that neither maize nor the native North American seed crops were of importance at this time. Intensive fishing, hunting, and gathering supplemented by cultivation of a few plants, such as squash and gourds, are currently believed to have provided the subsistence base. (CEI 2014)

Three sequential Coles Creek phases (Bayou Cutler, Bayou Ramos, and St. Gabriel) are currently recognized for southeast Louisiana. The earliest of these, the Bayou Cutler phase (AD 700–850), is defined materially by many of the same artifact types noted for contemporary phases to the north, as well as several unique to the area. Present are many of the so-called "classic" Coles Creek markers: Coles Creek Incised, *vars. Coles Creek*, *Serentz*, *Dozier*, *Wade*, and *Athanasio*; Mazique Incised, *vars. Back Ridge* and *Sweet Bay*; Pontchartrain Check Stamped, *var. Pontchartrain*; and French Fork Incised, *vars. French Fork*, *Brashear*, *Wilzone*, and *Larkin*. The popularity of red-filmed pottery waned in this period, and plainwares became somewhat thinner and finer than in preceding periods. Decoration again was largely restricted to the upper third of the vessel, although *var. Pontchartrain* is an all-over decorated variety, perhaps accounting for its large numbers in many collections. (CEI 2014)

The succeeding Bayou Ramos phase was proposed using data from the Bayou Ramos I site (16SMY133). This is a late Coles Creek phase, defined by typical middle to late Coles Creek markers such as Coles Creek Incised, *var. Mott*; Mazique Incised, *var. King's Point*; Beldeau Incised, *var. Beldeau*; Avoyelles Punctated, *var. Avoyelles*; and Pontchartrain Check Stamped, *vars. Tiger Island* and *Crawford Point*. (CEI 2014)

The terminal Coles Creek St. Gabriel phase was set up on the basis of data uncovered from the type site (16IV128) in Iberville Parish. Markers for this phase include Coles Creek Incised, *vars. Hardy* and *Hilly Grove*; Mazique Incised, *var. Manchac*; Evansville Punctated, *var. Wilkinson*; Harrison Bayou Incised, *vars. Harrison Bayou* and *Bunkie*; and minor quantities of Plaquemine Brushed, *var. Plaquemine*. (CEI 2014)

3.7.2.4 Mississippi Period (AD 1200 to 1450)

The Mississippi period represents the apex of Native American social development in much of eastern North America, featuring highly ranked, chiefdom-level societies relying on the cultivation of Mesoamerican domesticates such as corn, beans, and squash. The most dynamic of these societies was probably centered on the massive Cahokia site in the Central Mississippi Valley around AD 1000. Mississippian culture, as this manifestation is called throughout the Southeast,

was characterized by the presence of shell-tempered ceramics and a settlement pattern featuring large, often fortified villages, and mound centers which were the focus of ceremonial and political life for a region. During the first half of the second millennium AD, Mississippian culture spread rapidly through the major river valleys of the Southeast, from the Carolina piedmont to northern Florida and west to the Caddo region of northeast Texas and Oklahoma. (CEI 2014)

In the Lower Mississippi Valley, Mississippian culture encountered an indigenous non-Mississippian culture, and a hybridization of the two occurred. The resident culture is considered to have been Plaquemine, an outgrowth of Coles Creek culture that began about AD 1000. The interaction between Mississippian and Plaquemine culture resulted in gradual changes in the Plaquemine ceramic tradition and settlement pattern. Later in the period, after AD 1400, an actual intrusion of Mississippian groups displaced the resident Plaquemine groups. A somewhat different interpretation of this sequence of events is that the Lower Mississippi Valley culture that experienced the initial Mississippian contact about AD 1100 was Coles Creek, and the resulting hybridization produced Plaquemine culture. The remainder of the period saw a gradual increase in Mississippian influence, at least in the Yazoo Basin, until about AD 1400 when a full Mississippian cultural pattern was achieved in the Lake George phase. (CEI 2014)

This reinterpretation of the cultural sequence resulted in a shift in the established chronologies. Phases such as Crippen Point, Preston, and St. Gabriel, which were formerly considered Plaquemine culture manifestations of the early Mississippi period, were placed late in the Coles Creek period and assigned to a late Coles Creek culture that persisted until AD 1200. Some have suggested moving the beginning of the Mississippi period back to AD 1000 in order to bring the Lower Mississippi Valley into agreement with the Central Mississippi Valley chronology. Under this scheme, Coles Creek culture would persist into the Mississippi period until about AD 1200, when Plaquemine culture appeared. (CEI 2014)

While disagreeing somewhat on the origin of Plaquemine culture, authorities concur that it exhibited numerous continuities with the preceding Coles Creek culture. Several of the Plaquemine ceramic types appear to be direct outgrowths of Coles Creek types. However, there are some changes, including the addition of small amounts of finely ground shell and other organic matter to the pottery and the extension of the decorative field to include the body of the vessel. Mound construction continued on an even greater scale than in the previous period. The mounds became larger, there were more at each site, and there were more sites. Intensive agriculture is presumed to be the economic base on which this florescence was built, but there is presently little direct evidence of it in the Lower Mississippi Valley. (CEI 2014)

Several regional phases of early Plaquemine culture have been identified in southern Louisiana. The closest of these to the present study area is the Barataria phase, based on data provided by excavations by the Delta Chapter of the Louisiana Archaeological Society at the Fleming site (16JE36). The principal ceramic markers of these phases include Anna Incised, *vars. Anna*, *Australia*, and *Evangeline*; L'Eau Noire Incised, *vars. L'Eau Noire* and *Bayou Bourbe*; Carter Engraved; Maddox Engraved; Baytown Plain, *var. Addis*; and mixed grog-and-shell varieties of Bell Plain. The Barataria phase can be distinguished from the contemporary Medora phase of

the Baton Rouge area by the absence of Plaquemines Brushed and a relative wealth of curvilinear incised types. (CEI 2014)

It is within this time frame that material of the so-called "Southern Cult" can be found. The strongest representation of cult designs in the southern Lower Mississippi Valley occurs on pottery of the Barataria phase. This is not surprising, given the existence of the Bayou Petre phase in the St. Bernard/Plaquemine area to the east, often associated with the Pensacola variant of Mississippian culture. Other Southern Cult items found in the region include fragments of carved stone discs from the Rosedale (16IV1) and Shellhill Plantation (16SJ2) sites. (CEI 2014)

By AD 1500, new influences began to be felt in the Louisiana coastal zone, as aboriginal groups began to take on the appearance, at least in material culture, of the peoples encountered by the early European explorers. This late Plaquemine culture is recognized by one overextended phase, called Delta Natchezan. This phase includes all southeast Louisiana sites with ceramics similar to those recorded for the protohistoric and historic Natchez. The type site for this phase is Bayou Goula (16IV11), the assumed location of the historic Bayagoula, excavated during the Works Progress Administration era. (CEI 2014)

Principal ceramic markers of the Delta Natchezan phase include Fatherland Incised, *vars. Fatherland* and *Bayou Goula*, and those versions of Addis Plain that contain small amounts of shell, *vars. Greenville* and/or *St. Catherine*. Mazique Incised, *var. Manchac* and Plaquemine Brushed may be considered minor elements in the assemblage, as well. A smattering of shell-tempered Mississippian sherds also was noted at Bayou Goula, principally the types Mississippi Plain and Pocahontas Punctated. The presence of minority amounts of shell-tempered pottery at other Delta Natchezan sites, such as Isle Bonne (16JE60) and Fleming (16JE36) in the Barataria region, argue for a great deal of interaction between the resident Plaquemine peoples and the advancing Mississippians to the north and east. (CEI 2014)

3.7.2.5 Protohistoric and European Contact (AD 1450 to 1700)

Rene Robert Cavelier, Sieur de la Salle, and a small group of French explorers were the first Europeans to lay claim to the area that would become southeast Louisiana, although survivors of Hernando De Soto's expedition had passed by on their journey down the Mississippi River in 1542. La Salle, intent on finding a trade route from Canada to China, traveled downriver to the mouth of the Mississippi, arriving there on April 7, 1682. His attempt to establish a colony in the region was unsuccessful, and it was not until 1699 that the French were able to occupy what would later become Louisiana. In that year, Pierre Le Moyne, Sieur d'Iberville, accompanied by his brother, Jean Baptiste Le Moyne, Sieur de Bienville, established a French settlement on Biloxi Bay (Mississippi) and began to explore the lower Mississippi River area. (CEI 2014)

The principal aboriginal groups encountered by European explorers in southeastern Louisiana were the Acolapissa, Quinipissa, Bayagoula/Mugulasha, Ouacha (Washa), Chaouacha, Tangipahoa, and Houma. The first of these groups, the Acolapissa, moved from present-day St. Tammany Parish to the Mississippi River bank in the early decades of the 1700s. There they

settled in several villages, including one in the area in the general vicinity of Gramercy and Laplace. The Acolapissa grew corn and beans, and exploited mast crops as well as the lakes and bayous of the area for fish and waterfowl. Like the Acolapissa, the Tangipahoa were originally from the north shore of Lake Pontchartrain, but had settled along the banks of the Mississippi River by the late 17th century. (CEI 2014)

The principal village of the Bayagoula/Mugulasha was located on the Mississippi River near the town that now bears their name (Bayou Goula). It is not known what the range of their territory would have been in prehistoric times. The Mugulasha were encountered first by La Salle in 1682 in their descent of the Mississippi. This group, then called the Quinipissa, became severely reduced in number by disease after this visit and subsequently joined the Bayagoula. The first recorded contact with the Bayagoula occurred in February of 1699 when a group of Bayagoula and Mugulasha discovered the French at Mobile and attempted to make an alliance. Shortly afterward, in March, Iberville ascended the Mississippi and visited their village on the west bank of the Mississippi, near the mouth of Bayou Lafourche. In 1700, the Bayagoula massacred the Mugulasha and 6 years later were themselves massacred by the Taënsa. The few Bayagoula that survived the 1706 massacre fled downriver to seek the protection of the French. The Bayagoula apparently remained there for only a short period of time before returning upriver to the present-day Donaldsonville area. (CEI 2014)

The first recorded encounter with the Ouacha occurred in 1699 when Iberville ascended the Mississippi River. Near the junction of the Mississippi and Bayou Lafourche, called the Ouacha River by his native guide, Iberville encountered two canoes, one filled with Bayagoulas and the other with Ouacha. It was argued that the Ouacha village was located down Bayou Lafourche, near present-day Labadieville. By 1718, the Ouacha had apparently moved their village, settling on the west bank of the Mississippi 11 leagues above New Orleans. (CEI 2014)

Little is known of the Chaouacha, who are generally believed to have been closely allied with the Ouacha. In 1699, the group was recorded as living on Bayou Lafourche near the Chaouacha, and they participated in the punitive expeditions against the Chitimacha after the death of the missionary St. Cosme in 1706. By 1712, Bienville had convinced them to move their village 25 leagues from the mouth to the Mississippi River near New Orleans. In the aftermath of the Natchez uprising of 1729, Étienne Périer de Salvert sent a party of slaves to attack the Chaouacha village, in an attempt to allay the fears of the citizens of the colony. The Ouacha and Chaouacha are recorded only sporadically after this point, and disappeared entirely by the end of the 18th century. (CEI 2014)

After meeting with the Bayagoula and Ouacha in March 1699, Iberville proceeded to the area of present-day Angola, in West Feliciana Parish, Louisiana. There, he found the Houma residing in dispersed villages. In 1706, the Houma moved south from Angola to the Bayou St. John area of present-day New Orleans. The Houma remained on Bayou St. John for only a short while before moving to present-day Ascension Parish. When this move occurred is unknown, but must have taken place by 1712–1713. The Houma eventually established several villages along the Mississippi River, but their village at the Grand Houmas remained at Burnside in Ascension Parish until 1785. (CEI 2014)

3.7.2.6 Historic Era

3.7.2.6.1 French Colonial Period, 1700–1763

Fort Maurepas, on Biloxi Bay, remained the capital of Louisiana until 1702, when the seat of government was moved to St. Louis de la Mobile, situated about 25 miles upriver from the mouth of the Mobile River in present-day Alabama. During the early years of the 18th century, the French colony of Louisiana stretched as far east as the Perdido River, where it was bound by Spanish Florida. In 1719, however, the French captured the community of Pensacola, pushing the boundary farther east. That same year, the capital of Louisiana was moved from Mobile to Ocean Springs, Mississippi, and in 1720 to Biloxi. Following a 1722 hurricane, the French abandoned both Biloxi and Pensacola and moved their capital to New Orleans, which had been established just 4 years earlier. (CEI 2014)

Much of the settlement of the colony during these early years was focused on large concessions granted along the Mississippi River above (i.e., upriver of) New Orleans. Biloxi remained largely abandoned until the late 18th century, and Mobile was supplanted by New Orleans in both size and commercial and political importance. While most settlers in Louisiana during this period were of French or French-Canadian descent, large numbers of Germans and Swiss were settled along the Mississippi River above New Orleans in 1721. That area soon became known as the Côte des Allemands, or the German Coast, and included much of present-day St. Charles and St. John the Baptist parishes. (CEI 2014)

The settlement of the German Coast is closely tied to the career of the Scottish financier, John Law. Law organized the General Bank of Finance in 1716 after convincing Philippe, duc d'Orleans that France would become a very wealthy country by printing paper money. In 1717, Law's paper money was accepted in France, and his bank was made the Royal Bank of France the following year. During this same period, Law organized the Company of the West in order to use some of the bank deposits to develop the French colony of Louisiana. In 1717, the Company of the West was given the proprietorship of Louisiana in return for settling the territory at the company's expense. (CEI 2014)

To attract settlers of good character, the Company of the West and its successor, the Company of the Indies, distributed pamphlets and handbills throughout Germany and the surrounding areas extolling the virtues of Louisiana. Germans responded positively to the advertisements, and in 1719 many made their way to the colony. Large numbers of these immigrants died en route to French ports, and many more died on the transatlantic voyage to the Louisiana colony. Once in Louisiana, many of the survivors died of disease and hunger after disembarking at the settlement of New Biloxi. Originally to settle three concessions, so many died that instead of settling three concessions, as originally planned, only Law's concession on the Arkansas River was settled. (CEI 2014)

When news reached Europe that Louisiana was not as idyllic as had been advertised, French businessmen began withdrawing their holdings from the Royal Bank of France. Gold and silver became scarce, paper money flooded the market, and the French government was forced to

devalue its paper money. The bank soon collapsed and Law was forced to flee France for his life in December 1720. When news of the collapse reached the colony, many of the German *engagés* from Law's Arkansas concession descended the Mississippi River to New Orleans and requested that Governor Bienville give them return passage to Europe. Instead, Bienville persuaded them to resettle a recently abandoned Native American village near the Étienne Demeuves Concession (see Figure 3.7-13) in present-day St. Charles Parish. Soon after, the *engagés* from Arkansas were joined by a large group of German *habitants* who arrived in Biloxi in June 1721. (CEI 2014)

Despite the rapidly growing population, it was not until after 1728 that the east bank of the German Coast began to be settled. Prior to this time, a number of large concessions had been made along the Mississippi River to individuals who were to improve and settle their property. However, the concessionaires in many places failed to do so. As a result, a royal edict was passed in 1728 that cancelled many of the large concessions along the river between Bayou Manchac and the Gulf of Mexico. This measure was undertaken as a means of forcing landholders to improve their holdings and of breaking up large, unimproved holdings. It was hoped this would increase the number of settlers in the colony, thereby dissuading the Spanish and English from encroaching on French lands. The 1728 edict effectively opened the east bank up for settlement, and by 1731 several German habitations had been established there. The growth of German settlements on the east bank of the river, however, was hampered by sporadic Indian attacks that continued until the mid-18th century. (CEI 2014)

While the German Coast residents were primarily truck farmers, plantations in surrounding areas cultivated cash crops such as indigo, tobacco, and, to a lesser degree, silk and the candleberry tree. However, both corn and rice were grown throughout the area. Rice agriculture was developed in Louisiana very early in the colony's history (shortly after 1712), because Europeans preferred it to corn, a native cultigen. Rice competed with corn as a staple crop in the young colony by 1720, and it became more important with the introduction of black slaves in 1723. (CEI 2014)

In 1732, Louisiana reverted to the French crown as the Company of the Indies found it could no longer support the colony. By the 1750s, France realized Louisiana was a financial burden and that there had been little return for the millions of *livres* spent on the development and supply of the colony. In 1762, France ceded Louisiana and the Isle of Orleans to Spain in the secret Treaty of Fontainebleau. While France saw Louisiana as a financial drain, Spain saw the colony as a defensive mechanism against British expansionism. Although the legal transfer of the colony took place in November 1762, it was not until October 1764 that the colonists actually found out that the transfer had taken place. (CEI 2014)

3.7.2.6.2 Spanish Colonial Period, 1763–1803

On November 13, 1762, France ceded the Isle of Orleans and Louisiana to Spain in the secret Treaty of Fontainebleau. The 1762 treaty remained a closely guarded secret even as France, Spain, and Great Britain negotiated the 1763 Treaty of Paris, which brought the Seven Years War to a close. As a result of that treaty, France ceded all of her holdings east of the Mississippi River

and north of the Isle of Orleans to Great Britain and the remainder of Louisiana to Spain. (CEI 2014)

Spain was slow to assert control over the colony of Louisiana. It was not until 1766 that the first Spanish governor, Don Antonio Ulloa, arrived in Louisiana, and it was not until January 1767 that Ulloa took formal possession of the colony. Unable to enforce Spanish rule on his French subjects, Ulloa had very little real control over Louisiana and, in October 1768, the Superior Council of Louisiana ordered Ulloa to leave the colony. That same month, approximately 500 Germans and Acadians arrived in New Orleans to express their dissatisfaction with Governor Ulloa. The Acadians had been falsely told that Ulloa was withholding specie that was to be used to redeem their worthless Acadian script, and the Germans had been informed that Ulloa had no intention of paying them for their goods that had already been shipped to New Orleans. In fact, Ulloa had no specie for exchange and had sent Gilbert de St. Maxent to the German Coast to pay off Spanish debts. St. Maxent, however, had been abducted by cohorts of Nicholas Chauvin de Lafreniere, and was unable to make the payments. (CEI 2014)

Once in New Orleans, the Acadians and Germans were convinced to support the Superior Council in an effort to rid the colony of Governor Ulloa. Realizing that he had little popular support, Ulloa was forced to evacuate Spanish civil authorities from New Orleans on November 1, 1768. Although this temporarily rid the colony of Spanish authority, a new Spanish Governor, General Alejandro O'Reilly, arrived in August 1769 to take formal possession of Louisiana for Spain. O'Reilly found Lafreniere and five of his cohorts guilty of conspiracy and had five of them executed by firing squad; a sixth had already died of natural causes. (CEI 2014)

By the 1770s, most of the land facing the Mississippi River along the German Coast had been claimed. While many grants along the river were large, most had a depth of only 40 arpents. Some of these smaller landholders had second depth grants of an additional 40 arpents made by the Spanish government; however, this was not a common practice until the American period. Some of the larger landholdings in the German Coast began to break up during the 1770s, as the original owners divided their holdings among their children. (CEI 2014)

German Coast planters continued to grow vegetables for sale in New Orleans as their primary crops until the end of the 18th century. Indigo, one of the more popular cash crops, became unprofitable to grow in Louisiana during the 1790s because of high production costs, soil exhaustion, pollution, and crop infestation. After a 1793 slave revolt in St. Dominique, many residents of the island moved to Louisiana bringing an interest in sugarcane agriculture with them. (CEI 2014)

Etienne de Bore's introduction of a profitable method of growing sugarcane, along with Antoine Morin's refinement of the granulation process, allowed large landholders to begin large-scale production of sugarcane, which soon became the dominant crop in St. Charles Parish. By 1802, indigo was only rarely grown, while sugar and cotton were the main cash crops. (CEI 2014)

3.7.2.6.3 Early American Period, 1803–1861

Louisiana remained under Spanish control until it was transferred back to France by the Treaty of San Ildefonso on October 1, 1800. As when the Spanish acquired the colony in 1763, the French did not take immediate possession of Louisiana. Rather, formal possession was delayed until November 30, 1803, seven months after the United States made the Louisiana Purchase. The American government, in turn, did not take possession of the territory until December 20, 1803. By the time of the Louisiana Purchase, land holdings and artificial levees lined the banks of the Mississippi River from south of New Orleans to as far upriver as White Castle in Iberville Parish. (CEI 2014)

Sugarcane had been grown in Louisiana for many years, but had been used for the production of syrup and tafia, a form of rum. It was not until a successful technique for granulation was introduced in about 1795 that it became truly economically viable to cultivate cane. By 1800, at least 75 planters in the New Orleans area were engaged in sugar planting and, over the next several years, the cultivation of sugar spread over much of the alluvial lands in the southern part of the state. Sugarcane production was given a considerable boost in 1803 when Louisiana was acquired by the United States. Unlike Spain and France, the United States had no other colonies or territories that produced sugar, and the expanding country provided an enormous market for Louisiana sugar. The high price of sugar, coupled with a high tariff, attracted many potential planters to the sugar industry and to Louisiana. Favorable soils and climate, combined with its close proximity to the market in New Orleans via the Mississippi River, offered an ideal environment for sugarcane production in the study region. (CEI 2014)

In October 1804, the United States government created the Territory of Orleans, which consisted of the Isle of Orleans and all of Louisiana below 33 degrees latitude west of the Mississippi River. The remainder of the Louisiana Purchase became the District of Louisiana. In April 1805, the Territory of Orleans was subdivided into 12 counties by the Territorial Legislature. Among the 12 counties were Orleans County and the German Coast. (CEI 2014)

The boundaries of both Orleans County and the German Coast were based on ecclesiastical divisions, which had never actually been precisely defined. Hence, their boundary lines were amorphous and cannot be accurately established. For instance, Orleans County consisted of "all that portion of the country lying on both sides of the river Mississippi from the Balize to the beginning of the parishes of Saint Bernard and Saint Louis." The ecclesiastical Parish of St. Louis refers to St. Louis Cathedral in New Orleans, while the ecclesiastical Parish of St. Bernard was more or less coterminous with present-day St. Bernard Parish. Both ecclesiastical parishes were included within the limits of Orleans County. Similarly, the County of the German Coast included the ecclesiastical parishes of Saint Charles and Saint John the Baptist. This arrangement lasted only until April 1807, when the County of the German Coast was split to form the civil parishes of St. Charles and Saint John the Baptist. Over the years, the boundaries dividing these entities have changed numerous times. (CEI 2014)

Though sugarcane dominated the agriculture of the area, rice was grown well into the early 19th century as well, particularly in St. Charles Parish. Rice fields were flooded during high river

stages by trenches cut through the river levee. These trenches, while providing necessary irrigation for the fields, represented weak spots in the river levee system and were the culprit of many crevasses during the 18th and early 19th centuries. Though rice could be grown near the apex of the natural levees of the river and its tributaries, it was generally planted in lower-lying areas nearer the toe of the levees. Farther away from the river and its adjacent levees were deep swamps. As during earlier periods, timbering of those swamps was economically important. Timber removed from the backswamps, particularly cypress, was not only used for building, but was also shipped overseas. Less desirable wood timbered from the swamps and cleared from the ever-expanding agricultural fields was often used as cord wood to fuel the growing need for steam power, whether it be in sugar mills or on steam packets. As the harvesting of timber grew, along with the need to drain the ever expanding number of agricultural fields, so too did the need for canals. (CEI 2014)

3.7.2.6.4 Civil War and Reconstruction, 1861–1900

On April 12, 1861, less than 3 months after Louisiana seceded from the Union, Confederate forces under the command of Louisiana native Brigadier General Pierre Gustave Toussaint Beauregard opened fire on Fort Sumter in South Carolina. The Union garrison surrendered two days later. Despite the importance of New Orleans to the Confederacy, it fell to Union naval forces on April 25, 1862. Several small skirmishes were subsequently fought on the west bank of St. Charles Parish, and numerous buildings were destroyed along both banks of the river by Union gunboats. Other buildings were confiscated for use by Union troops. One of the larger skirmishes to occur in the area transpired near modern-day Hahnville in August 1862 when Union troops learned of a Confederate attempt to gather cattle on the east bank of the river. In September 1862, Confederate forces occupied Boutte Station on the New Orleans, Opelousas & Great Western Railroad and attempted to ambush a Union train heading to Algiers. The ambush failed when a second Union train arrived from Algiers. The Confederates fell back to the St. Charles Parish courthouse at Hahnville where they were subsequently pinned down by additional Union forces. Ultimately, the Confederates were forced to escape through the swamps to evade capture, but had to leave their horses behind. (CEI 2014)

The New Orleans, Opelousas & Great Western Railroad connected New Orleans to Thibodaux and beyond, but it did not pass through the present study area. The Union Pacific Railroad line that passes through the study area was completed by the Western Division of the New Orleans, Mobile and Texas Railroad between New Orleans and Donaldsonville in May 1871. (CEI 2014)

Sugar production fell off dramatically throughout the region during the Civil War and Reconstruction as planters lost their financial resources and their labor supply. In response to these difficulties, some area sugar planters returned their attention to rice cultivation as it was less expensive and less labor intensive than sugar cultivation. (CEI 2014)

The rice industry expanded so rapidly during the early post-bellum years that it rapidly became the most important cash crop in the state. Indeed, in St. Charles Parish alone, rice production increased from 800,000 pounds in 1840 to 2,238,200 pounds in 1870. Still, St. Charles Parish

was not the largest producer of rice in the state. That distinction belonged to Plaquemines Parish. (CEI 2014)

With the abolition of slavery and an increasingly mechanized society, many small and large sugar planters in Southern Louisiana struggled to make a profit or even retain their land holdings following the war. However, many planters along the Mississippi River were quick to transform the economic makeup of their plantations. By the late 1870s, some sugar plantations started to resemble the dominant economic and social institutions of the antebellum period. For sugar and even rice growers in Louisiana, securing a reliable source of labor became one of the most difficult tasks. Although some African-Americans remained on the sugar plantations following the war, many migrated to cities, especially to the northeast and west in search of a better life. In response, area planters experimented with several options, including using Chinese labor in the sugar fields. Other groups, following a more racially motivated notion, opted for the use of Portuguese, Italians, and Germans on sugar estates. However, the importation of Chinese and other immigrant groups proved to be unsuccessful, and African-American labor remained the predominant labor source for the majority of sugar estates in south Louisiana. (CEI 2014)

3.7.2.6.5 Twentieth Century and Beyond, 1900–2014

By the turn of the 20th century, timbering had largely overtaken sugarcane cultivation in marginal areas. Along the river, sugarcane cultivation was still widespread, but not to the extent it had once been. By the second quarter of the 20th century, however, most of the region had been timbered out and the industry was in decline. Though timbering was no longer viable for large corporations, smaller companies employing portable sawmills continued to operate in the region into the middle of the 20th century. (CEI 2014)

Plantations and truck farms began to give way to industrial complexes, particularly those related to petroleum, during the second decade of the century (Figure 3.7-6). Destrehan Plantation became the home of the Mexican Petroleum Company in 1914, although production did not commence at the plant until 1916. The Mexican Petroleum Company was later taken over by the Pan American Petroleum Company and continued operations until 1958. In 1920, the Petroleum Import and Export Corporation began construction of a refinery in St. Rose. The St. Rose refinery was opened in 1921 and was later taken over by Cities Services Oil Company. (CEI 2014)

What was to become the largest refinery in St. Charles Parish began with the construction of the Marine Terminal, a refinery of several 55,000-barrel storage tanks, near the town of Sellers in 1916. This facility, built by the Roxana Petroleum Company, began operations in 1918. Following World War I, an asphalt refinery was built by the New Orleans Refining Company near the Marine Terminal. This refinery became so important to the local economy that the town of Sellers was renamed Norco—the acronym of the New Orleans Refining Company. In the spring of 1929, Shell Petroleum Corporation (formerly Roxana Petroleum Company) took over the Norco plant and began modernizing the facility. The plant resumed operations in 1930 with 650 workers. (CEI 2014)

The petrochemical industry soon spread to the west bank of St. Charles Parish. To provide an adequate electrical supply to the area's growing industrial base and to burgeoning residential growth, LP&L (later Entergy Louisiana, LLC) established the Little Gypsy power plant at Montz, Louisiana, in 1960. Three years later, the same company acquired Killona and Waterford plantations in order to construct Waterford 1 and 2 (Figure 3.7-7). In September 1970, it was announced that those two units would be joined by a third unit, WF3. The latter began commercial operation in 1985. (CEI 2014)

3.7.3 Onsite and Offsite Cultural Resources

Onsite cultural resources are those located within the 3,560-acre Entergy Louisiana, LLC property. That property includes the entirety of the archaeological APE, which is also the onsite portion of the aboveground APE (Figure 3.0-2). Although no license-renewal-related refurbishment activities have been identified, such that no adverse effects on cultural resources would occur, the 3,560-acre Entergy Louisiana, LLC property is still considered an APE for the continued operation of the WF3 facility for the purpose of Section 106 compliance for the LRA.

The single NRHP-eligible cultural resource recorded on site is the Waterford Plantation (16SC41), which has been determined partially eligible/unknown for NRHP listing. This site occupies roughly half of the Entergy Louisiana, LLC property, as shown in Figure 3.7-1. There are no additional NRHP-eligible cultural resources on the 3,560-acre Entergy Louisiana, LLC property. (CEI 2014)

A 1980 cultural resources evaluation of the WF3 property identified three areas (Figure 3.7-1) with *in situ* archaeological remains within the limits of the Waterford Plantation site (16SC41): the Waterford Plantation overseer's house (Area 3), the Waterford Plantation quarters area (Area 4), and the foundations of a drainage machine (Area 6). The first two areas (Areas 3 and 4) were subsequently determined eligible for inclusion on the NRHP. The third area (Area 6) is located south of LA-3127 and was not included in the 2014 walkover. In addition, the 1980 investigations identified an area of possible *in situ* deposits at the Waterford Plantation sugarhouse (Area 5). Two other areas (Areas 1 and 2) were found to have been destroyed or heavily disturbed. All of these areas are included within the site limits of Waterford Plantation (16SC41). Adjoining Killona Plantation has not been previously examined. (CEI 2014)

In its 2014 investigation, CEI completed an archaeological sensitivity analysis based on previous archaeological investigations, a review of archival and secondary historical sources, topography, and a walkover of the property. Five zones of sensitivity were identified on that portion of the Entergy Louisiana, LLC property located north of LA-3127 (Figure 3.7-14). These five zones are based upon the presence of known cultural remains and archivally documented settlement, and were developed as a guide for potential future construction activity at WF3 based upon the available data. (CEI 2014)

Offsite cultural resources are those outside the 3,560-acre Entergy Louisiana, LLC property boundary. As a comprehensive Phase 1 cultural resources survey was not conducted and is not considered necessary for renewal of the WF3 OL, a background literature search was conducted

to locate offsite cultural resources. Lists of known archaeological sites and historic properties within a 6-mile radius of WF3 are presented in Tables 3.7-1 and 3.7-2. (CEI 2014)

3.7.4 Cultural Resource Surveys

The first recorded cultural resources survey in the immediate area of WF3 was conducted in 1976 for the proposed route of LA-3127. That highway forms the southern limit of the 2014 CEI study area. The 1976 study did not locate any cultural resources in the immediate vicinity of the current WF3 project area. (CEI 2014)

In 1977, another study investigated a small portion of the Entergy Louisiana, LLC property while construction of the WF3 facility was ongoing. This study was limited to observing the ROW for the transmission lines connecting WF3 to a substation on the property and to the facility's intake and discharge structures. Access to the northern half of the transmission line ROW was closed due to construction activities, and the southern half had been already disturbed by the construction of the transmission lines. Excavations for the intake and discharge structures had already been largely completed as well, and the study was limited to observing their approximately 12-foot deep construction trenches. No cultural deposits were noted in either area. In addition, a pedestrian survey of several cultivated fields immediately upriver, downriver, and south of the railroad was conducted, although actual survey locations were unknown. No archaeological remains were located, and it should be noted that this 1977 investigation would not meet current Louisiana Division of Archaeology Phase 1 survey standards. (CEI 2014)

In July 1980, CEI conducted a cultural resources evaluation on the Entergy Louisiana, LLC property. As construction of the WF3 facility was by then well underway, the actual plant site was excluded from those investigations. Instead, the one-day field visit was limited to visiting areas possessing a high probability for containing archaeological remains to confirm the presence of potential sites identified through archival research. The 1980 field examination did not consider neighboring Killona Plantation, which forms part of the present study. Within the limits of Waterford Plantation, potential *in situ* archaeological remains were found at what was thought to be the plantation's overseer's house (Area 3), in the slave quarters area (Area 4), and at the former location of the Waterford sugar mill (Area 5) (Figure 3.7-1). In addition, the structural remains of a drainage machine (Area 6) were located southwest of LA-3127, outside of CEI's 2014 study area. On the basis of these findings, the entirety of Waterford Plantation was assigned site number 16SC41. Two years later, the overseer's house (Area 3) and the workers quarters (Area 4) were determined eligible for inclusion on the NRHP. Like the 1977 investigations, CEI's 1980 evaluation would not meet the current Louisiana Division of Archaeology Phase 1 survey standards. (CEI 2014)

In 1987, R. Christopher Goodwin & Associates, Inc., conducted a survey of six revetment areas along the Mississippi River for the USACE. One of the survey areas was in front of former Killona Plantation, immediately upriver of WF3. That particular survey area was composed of recent batture deposits, and no cultural resources were noted. (CEI 2014)

In early 2004, a helipad was constructed adjacent to the WF3 plant, at the location of the NRHP-eligible Waterford Plantation quarters. CEI subsequently conducted a damage assessment of that work and found that the recent construction work had indeed disturbed the archaeological deposits there (Area 4), but that the locality still contained extensive *in situ* deposits. It was also determined that the locality was much larger than originally designated. Based upon those findings, it was determined that the locality still possessed NRHP integrity. (CEI 2014)

Figure 3.7-15 shows the onsite locations of each of the five cultural resource studies described above.

3.7.4.1 2014 Phase 1A Sensitivity Assessment

Despite the completion of these five investigations, a comprehensive Phase 1 cultural resources survey has not been conducted of either the Waterford Plantation (16SC41) or the Killona Plantation, which together form the bulk of the 3,560-acre Entergy Louisiana, LLC property. Nor has a comprehensive Phase 1 cultural resources survey been conducted of adjoining Providence Plantation, a small part of which is included in the Entergy Louisiana, LLC property. The brief historical overview conducted for the Phase 1A sensitivity assessment has confirmed the identification of the high probability areas first noted at Waterford Plantation in 1980. Of the six high probability areas defined in 1980, two had already been destroyed by that date and two were subsequently determined eligible for inclusion on the NRHP. There are similar areas with a high potential for archaeological remains associated with Killona Plantation that have not been examined in detail. (CEI 2014)

Archival research conducted for the Phase 1A sensitivity assessment identified one area on the property that has a high probability of having served as the site of a 1718–1721 Ouacha Indian village (Figure 3.7-3). That location also served as the site of two German settlements between about 1721 and 1724 (Figure 3.7-14). There are archival accounts of a German cemetery located between the two settlements. Finally, there is also a high probability that both the Waterford and Killona plantations possessed cemeteries for their workers, both slave and freed. The locations of those cemeteries are unknown. (CEI 2014)

The one-day field visit and walkover of the Entergy Louisiana, LLC property north of LA-3127 was conducted on August 19, 2014, and limited to areas possessing high archaeological potential, exclusive of the actual WF3 plant site. The purpose of this walkover was to verify the potential for the presence of archaeological deposits on the property. (CEI 2014)

In addition to the field visit, background information was gathered specific to the Entergy Louisiana, LLC property, and databases at the Louisiana SHPO in Baton Rouge were consulted in an effort to identify previously recorded historic properties and archaeological sites within a 6-mile radius of WF3. Historic properties and archaeological sites within a 6-mile radius of WF3 are listed in Tables 3.7-1 and 3.7-2. Approximately half of the Entergy Louisiana, LLC property is composed of the former Waterford Plantation, which has been assigned archaeological site number 16SC41. Two localities (Areas 3 and 4) (Figure 3.7-1) within 16SC41 have been determined eligible for inclusion on the NRHP. (CEI 2014)

3.7.5 Procedures and Integrated Cultural Resources Management Plans

Entergy has administrative controls in place for management of cultural resources ahead of any future ground-disturbing activities at the plant, although no license-renewal-related ground-disturbing activities have been identified. These controls consist of the following:

- Fleet cultural resources protection plan that requires reviews, investigations, and consultations as needed, and provides instructions to workers when performing ground-disturbing activities in undisturbed or cultural resource sensitive areas (Entergy 2013c). Although there is no required training associated with this program, all employees are required to adhere to the instructions contained in the procedure.

- Site-specific cultural resource protection plan incorporated by reference in Section 4.2.1 of the WF3 Environmental Protection Plan to protect those areas on the property determined to be eligible for the NRHP, specifically the Waterford Plantation. This plan ensures that cultural resource remains are not damaged and are protected from unauthorized removal and that, in the event ground disturbance is required in these areas, remains will be appropriately protected for their cultural resource information value. (LP&L 1983) In addition, the area of the Waterford Plantation that has been determined to be partially eligible has signage warning of the presence of cultural resources and the necessity to contact Chemistry prior to any ground-disturbing activities in these areas.

These administrative controls ensure that existing, or potentially existing, cultural resources are adequately protected, and assists WF3 in meeting state and federal expectations.

For the approximately 660 acres of land leased to Raceland Raw Sugar LLC, as discussed in Section 3.1.1, the tenant is required to comply with all laws, acts, rules, and regulations in accordance with the lease agreement (Entergy 2014c). Therefore, consideration would be given to cultural resources in the event of an inadvertent discovery.

Table 3.7-1
Archaeological Sites, 6-Mile Radius of WF3

Site Number	Parish	Quadrangle	NRHP Status
16SC10	St. Charles	Laplace	Unknown
16SC19	St. Charles	Hahnville	Unknown
16SC21	St. Charles	Hahnville	Unknown
16SC22	St. Charles	Hahnville	Unknown
16SC24	St. Charles	Hahnville	Unknown
16SC31	St. Charles	Laplace	Partially Ineligible/Unknown[a]
16SC39	St. Charles	Hahnville	Unknown
16SC41[b]	St. Charles	Hahnville	Partially Eligible/Unknown[c]
16SC47	St. Charles	Hahnville	Unknown
16SC50	St. Charles	Laplace	Listed
16SC51	St. Charles	Laplace	Listed
16SC52	St. Charles	Laplace	Ineligible
16SC53	St. Charles	Laplace	Ineligible
16SC54	St. Charles	Laplace	Ineligible
16SC55	St. Charles	Hahnville	Ineligible
16SC56	St. Charles	Hahnville	Unknown
16SC57	St. Charles	Hahnville	Unknown
16SC58	St. Charles	Hahnville	Unknown
16SC59	St. Charles	Hahnville	Unknown
16SC65	St. Charles	Hahnville	Ineligible
16SC71	St. Charles	Hahnville	Unknown
16SC72	St. Charles	Hahnville	Partially Ineligible/Unknown[a]
16SC79	St. Charles	Laplace	Ineligible
16SC80	St. Charles	Laplace	Eligible
16SC85	St. Charles	Laplace	Ineligible
16SC86	St. Charles	Hahnville	Unknown

Table 3.7-1 (Continued)
Archaeological Sites, 6-Mile Radius of WF3

Site Number	Parish	Quadrangle	NRHP Status
16SC88	St. Charles	Laplace	Unknown
16SJB6	St. John the Baptist	Reserve	Unknown
16SJB8	St. John the Baptist	Reserve	Unknown
16SJB10	St. John the Baptist	Reserve	Unknown
16SJB12	St. John the Baptist	Reserve	Unknown
16SJB22	St. John the Baptist	Reserve	Unknown
16SJB24	St. John the Baptist	Laplace	Unknown
16SJB25	St. John the Baptist	Laplace	Unknown
16SJB27	St. John the Baptist	Reserve	Unknown
16SJB67	St. John the Baptist	Laplace	Unknown

(CEI 2014)

a. Only a portion of the site is determined not eligible for inclusion on the NRHP; the eligibility of the rest of the site is unknown.

b. Located on Entergy Louisiana, LLC property.

c. Only a portion of the site is determined eligible for inclusion on the NRHP; the eligibility of the rest of the site is unknown.

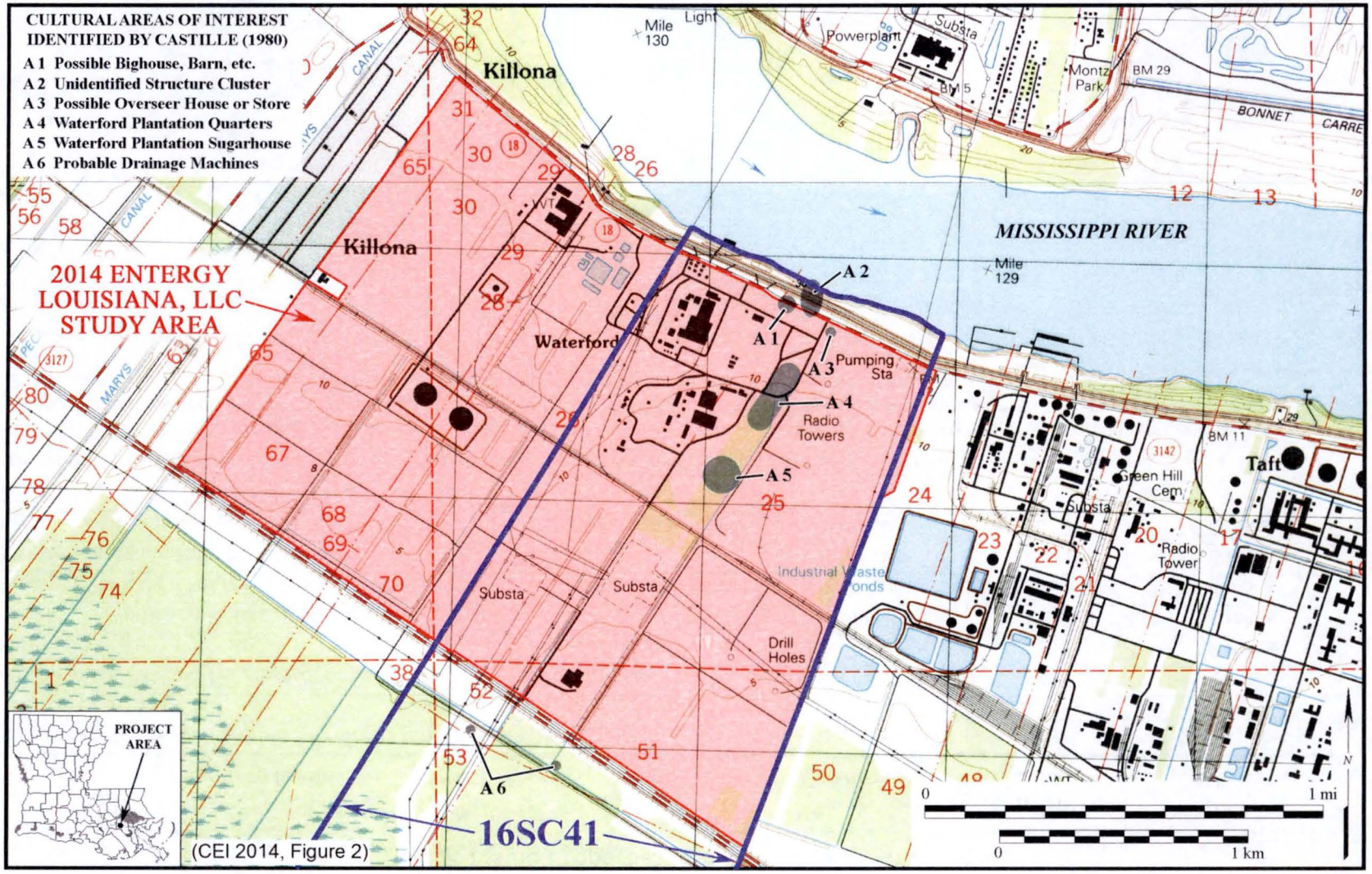
Table 3.7-2
NRHP-Listed Properties, 6-Mile Radius of WF3

Resource Name	Parish	Quadrangle	NRHP Listed	Distance from WF3[a]
Kenner and Kugler Cemeteries Archaeological District (16SC50 and 16SC51)	St. Charles	Laplace	1987	2.0 miles[b]
Dorvin House, Mollere House, Rosedon	St. Charles	Hahnville	1990	3.1 miles
Sorapuru House	St. John the Baptist	Reserve/Laplace	1999	3.9 miles
Homeplace Plantation House, Keller Homestead	St. Charles	Hahnville	1970	4.1 miles
Montegut Plantation House	St. John the Baptist	Laplace	1988	4.4 miles
Ormond Plantation House	St. Charles	Hahnville	1990	5.8 miles
Haydel-Jones House	St. John the Baptist	Reserve	2010	6.0 miles

(CEI 2014; NPS 2010; NPS 2014; USACE 2012a)

a. Distances are approximate and based on the WF3 reactor center point and NRHP location data.

b. The NRHP lists Kenner and Kugler Cemeteries as "address restricted." The distance provided was created using GIS to compare the two cemetery locations and background landmarks depicted in the February 8, 2012, USACE Bonnet Carre Public Meeting-Long Term Management Report (USACE 2012a, page 3) to a USGS topographic map. An approximate equidistant point was placed between the two locations to estimate distance.



(CEI 2014, Figure 2)

Figure 3.7-1
Cultural Areas of Interest, Entergy Louisiana, LLC Property Northeast of LA-3127

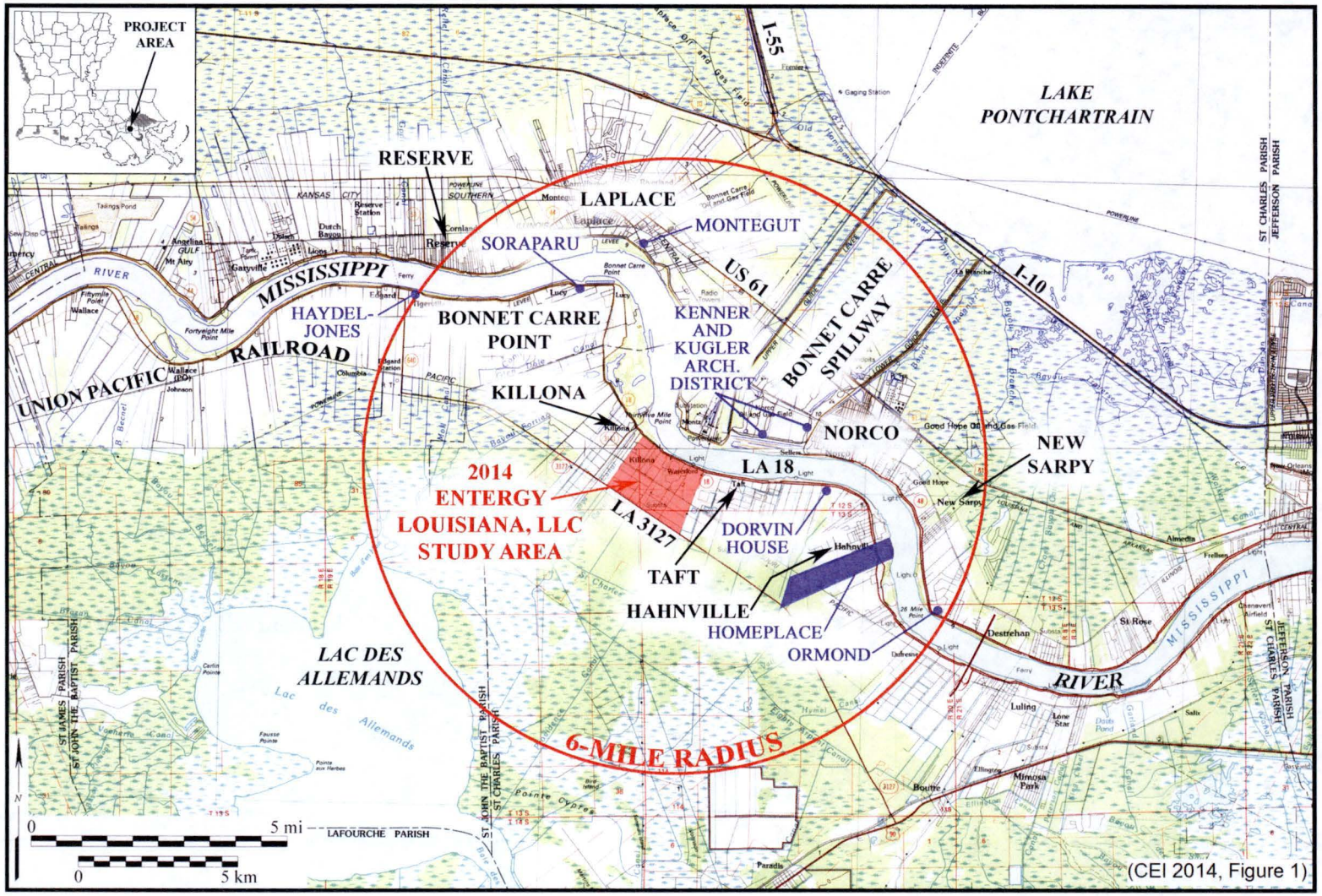


Figure 3.7-2
NRHP-Listed Sites, 6-Mile Radius of WF3

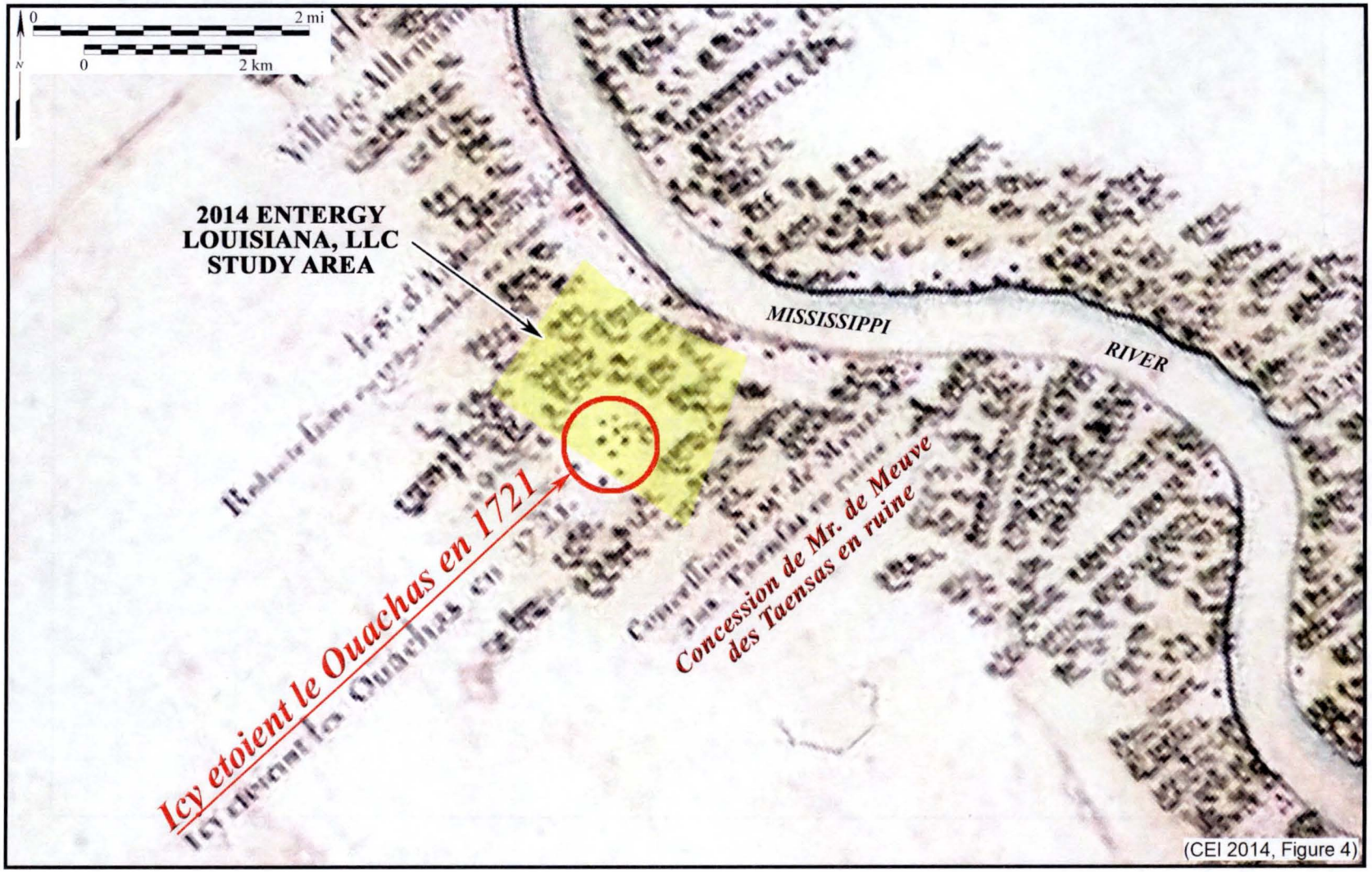
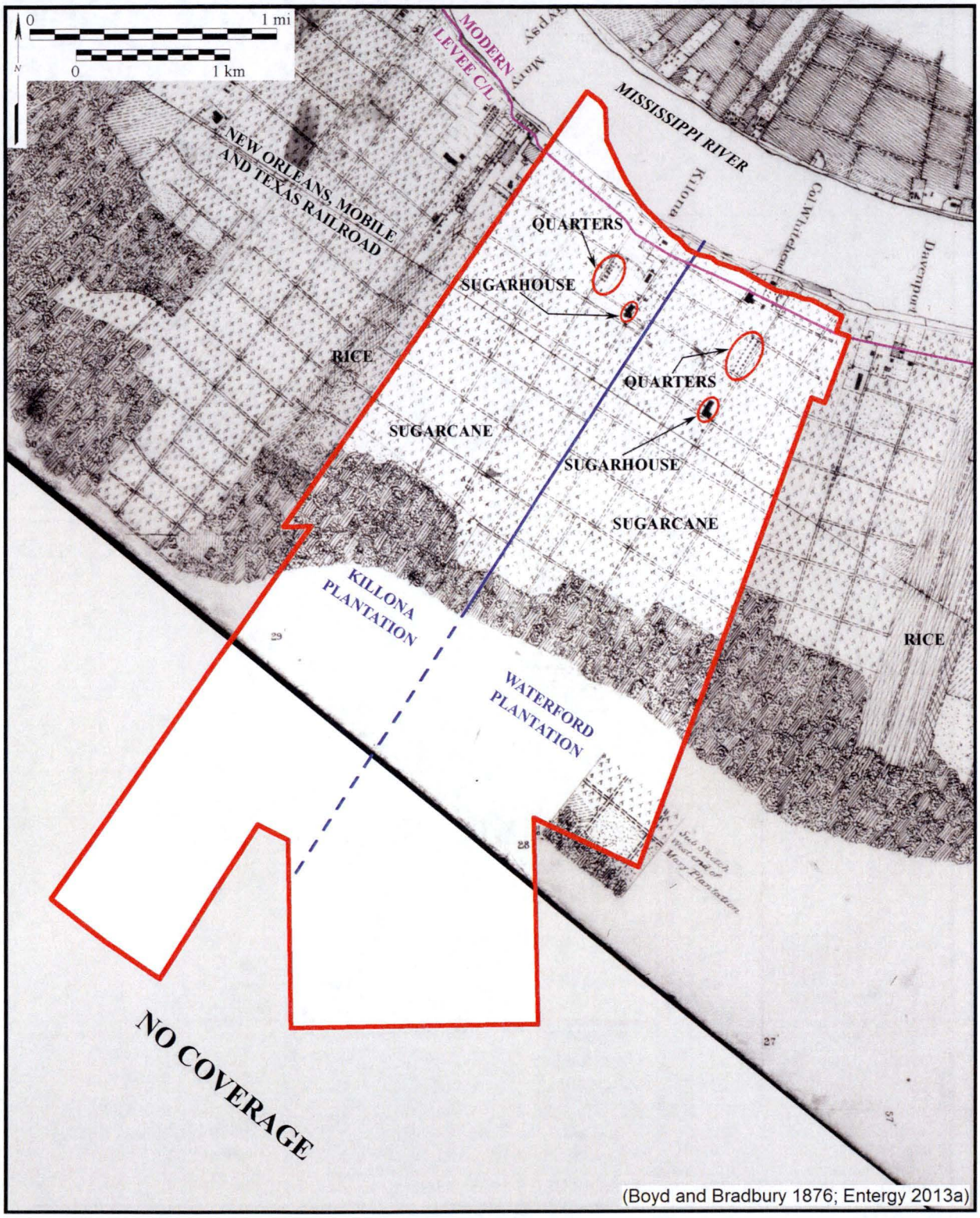
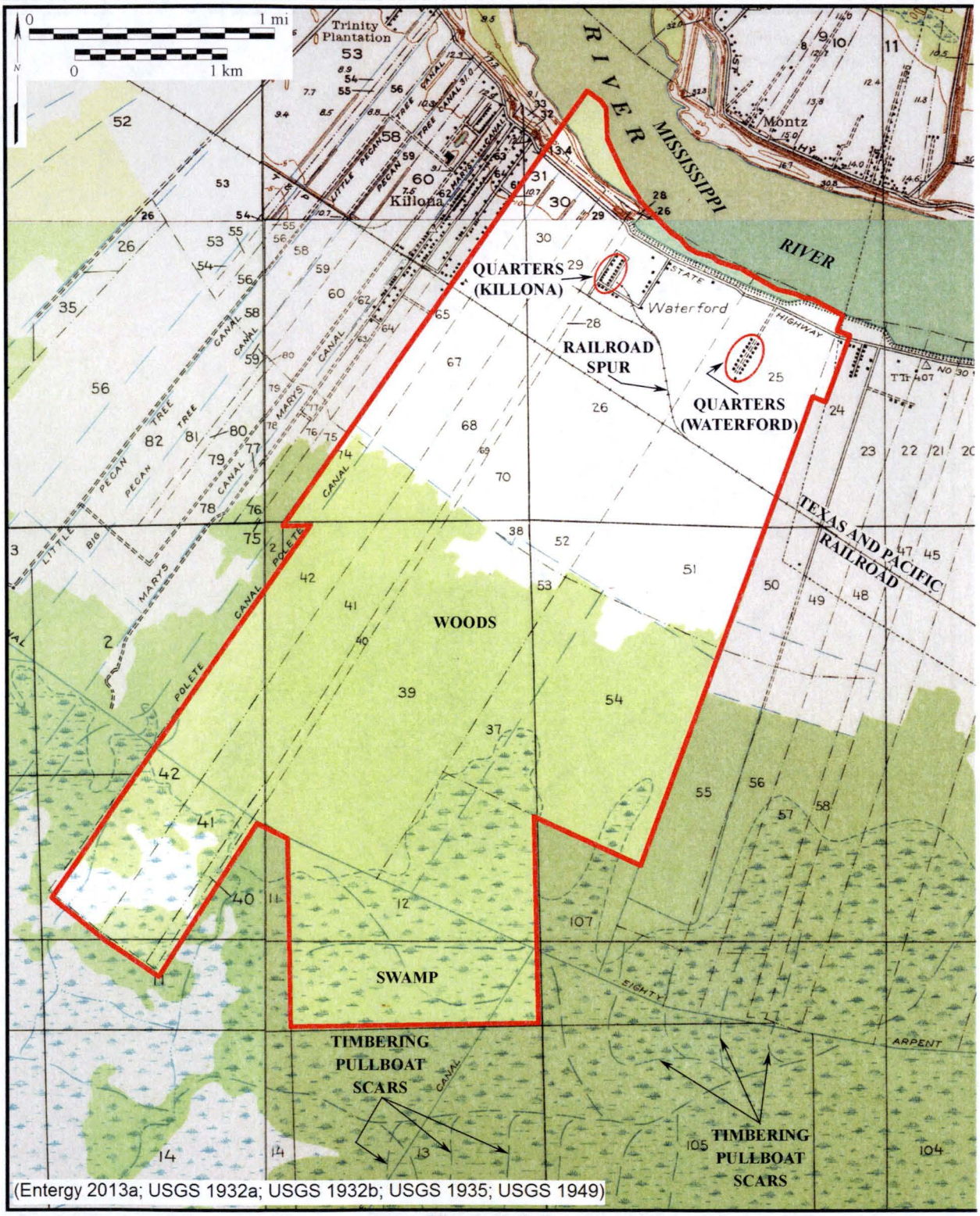


Figure 3.7-3
Ouacha Village Site, 1718–1721



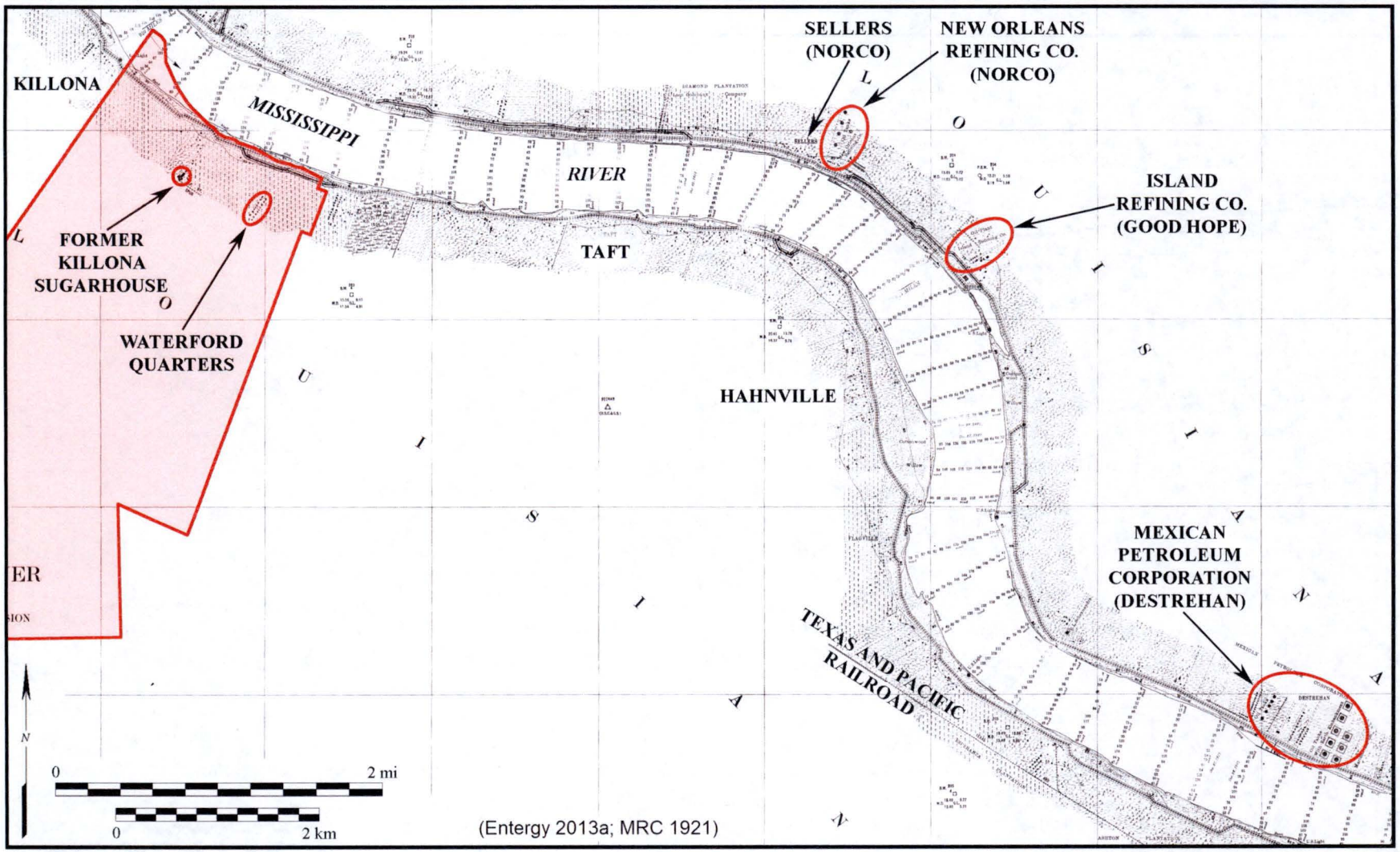
(Boyd and Bradbury 1876; Entergy 2013a)

Figure 3.7-4
Entergy Louisiana, LLC Property circa 1876



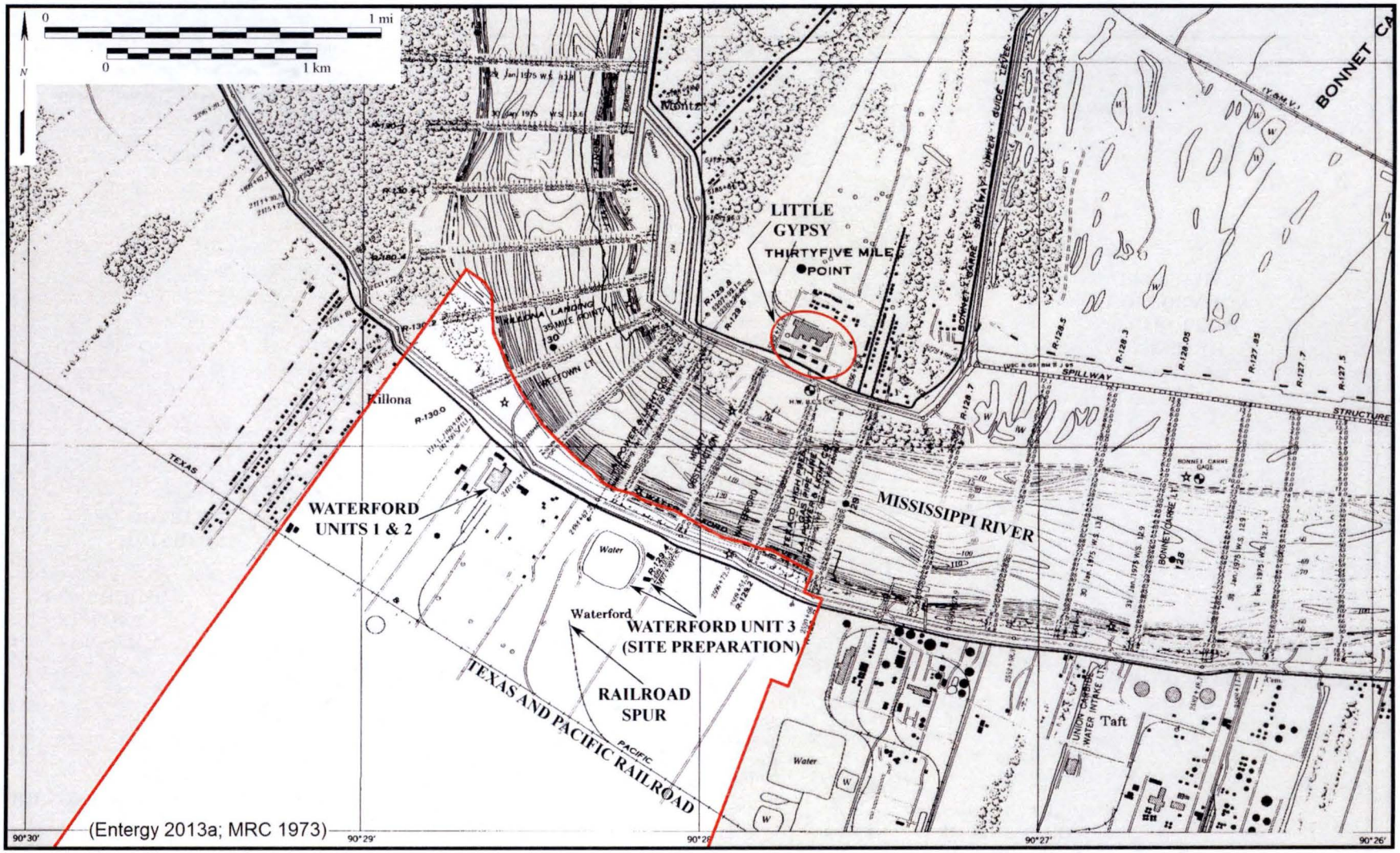
(Entergy 2013a; USGS 1932a; USGS 1932b; USGS 1935; USGS 1949)

Figure 3.7-5
Entergy Louisiana, LLC Property circa Early 1930s with Evidence of Timbering and Rail Spur



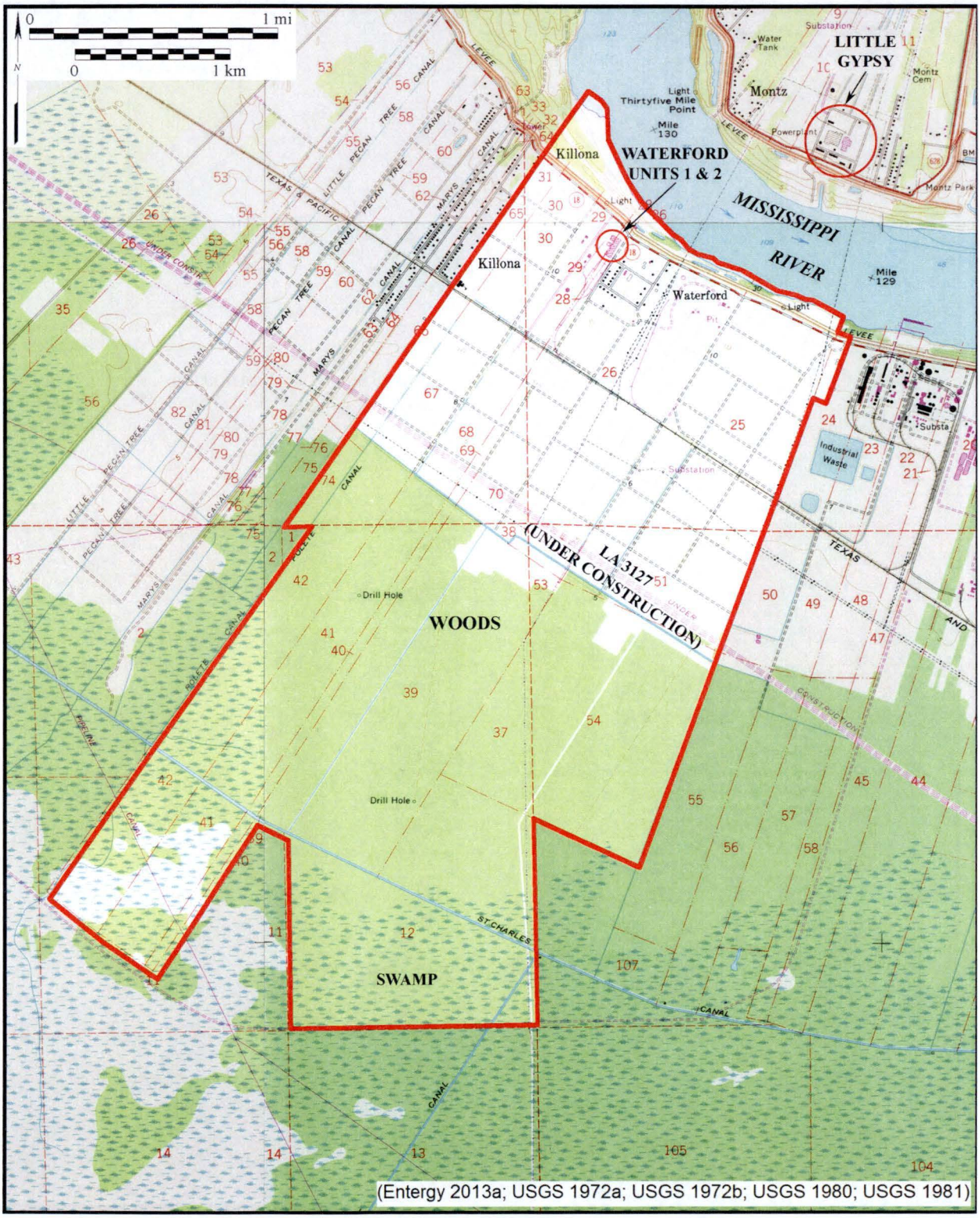
(Entergy 2013a; MRC 1921)

Figure 3.7-6
Growth of Petroleum Industry near the Entergy Louisiana, LLC Property circa 1921



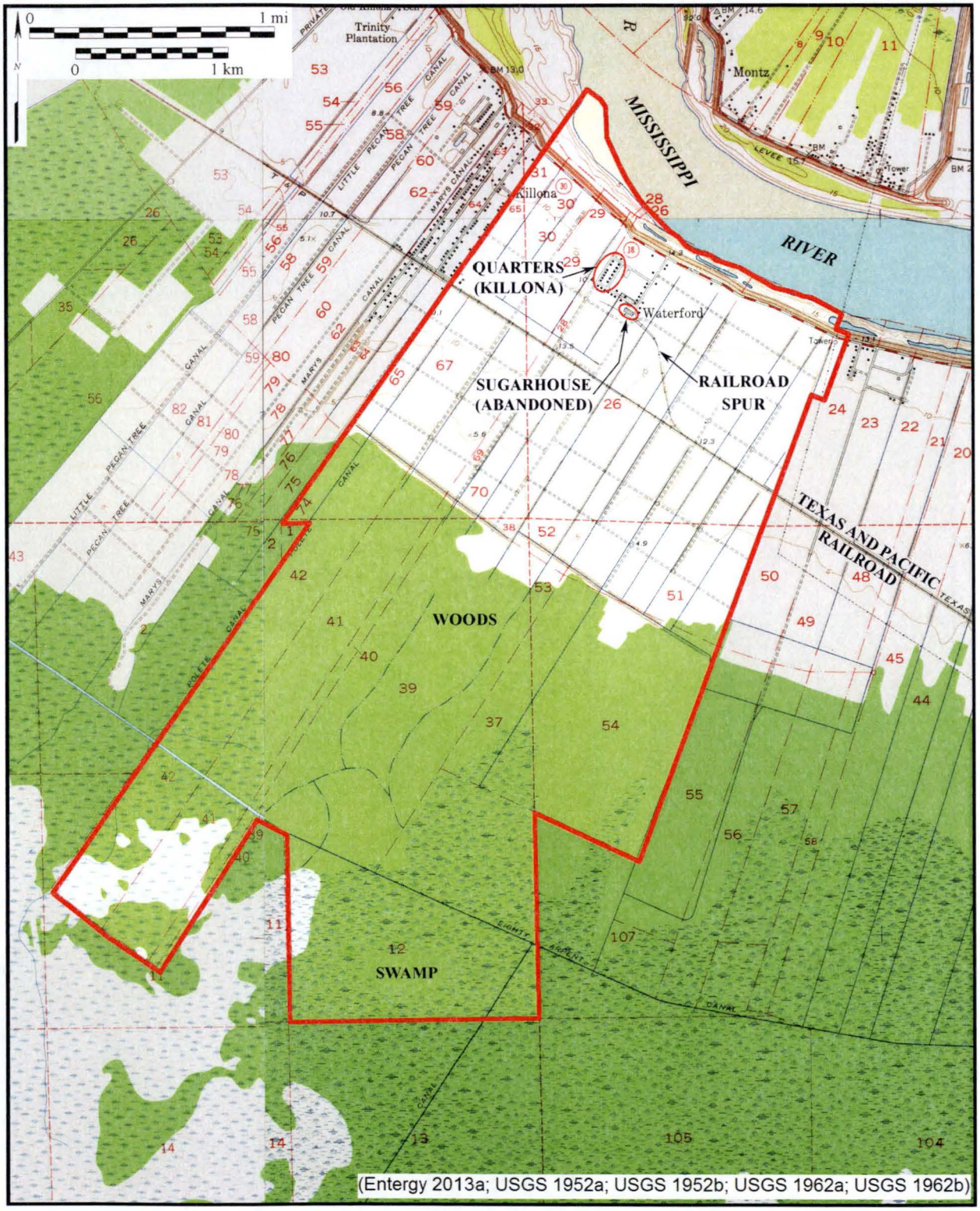
(Entergy 2013a; MRC 1973)

Figure 3.7-7
Utility Ownership and Development circa 1973



(Entergy 2013a; USGS 1972a; USGS 1972b; USGS 1980; USGS 1981)

Figure 3.7-8
Transportation Improvements circa early 1970s



(Entergy 2013a; USGS 1952a; USGS 1952b; USGS 1962a; USGS 1962b)

Figure 3.7-9
Entergy Louisiana, LLC Property circa 1950s

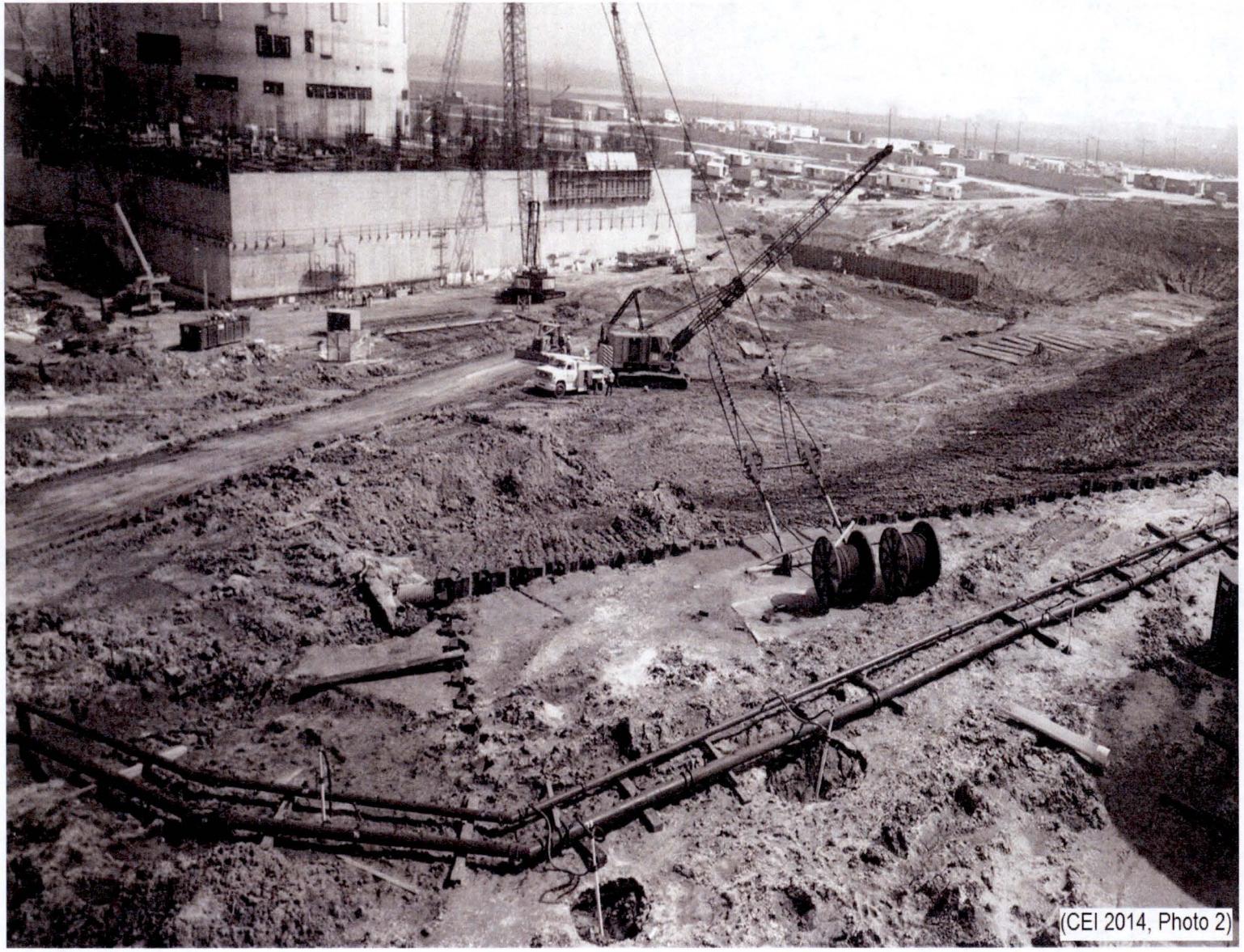


Figure 3.7-10
WF3 Plant Construction, 1978

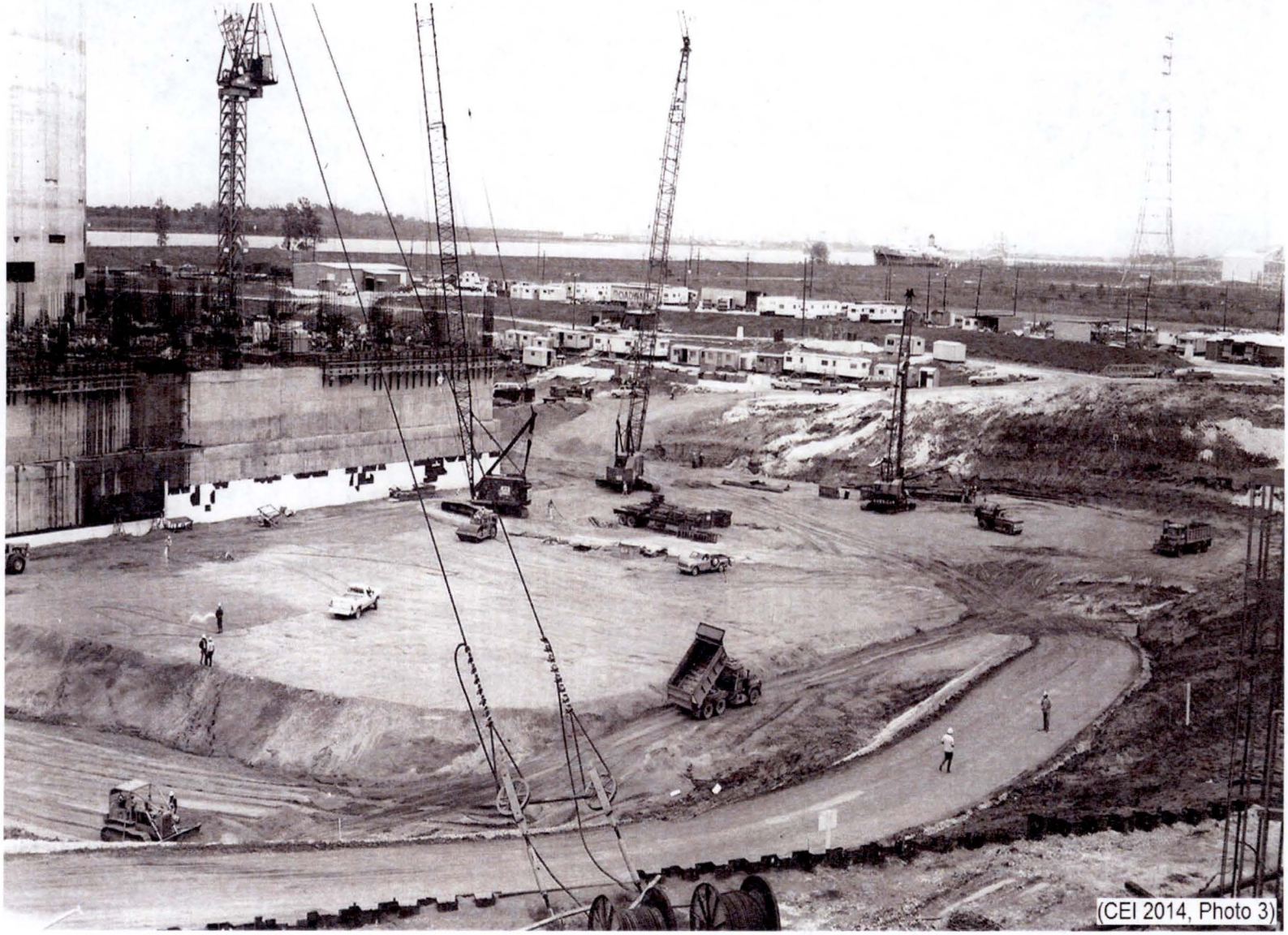


Figure 3.7-11
WF3 Plant Construction, 1978

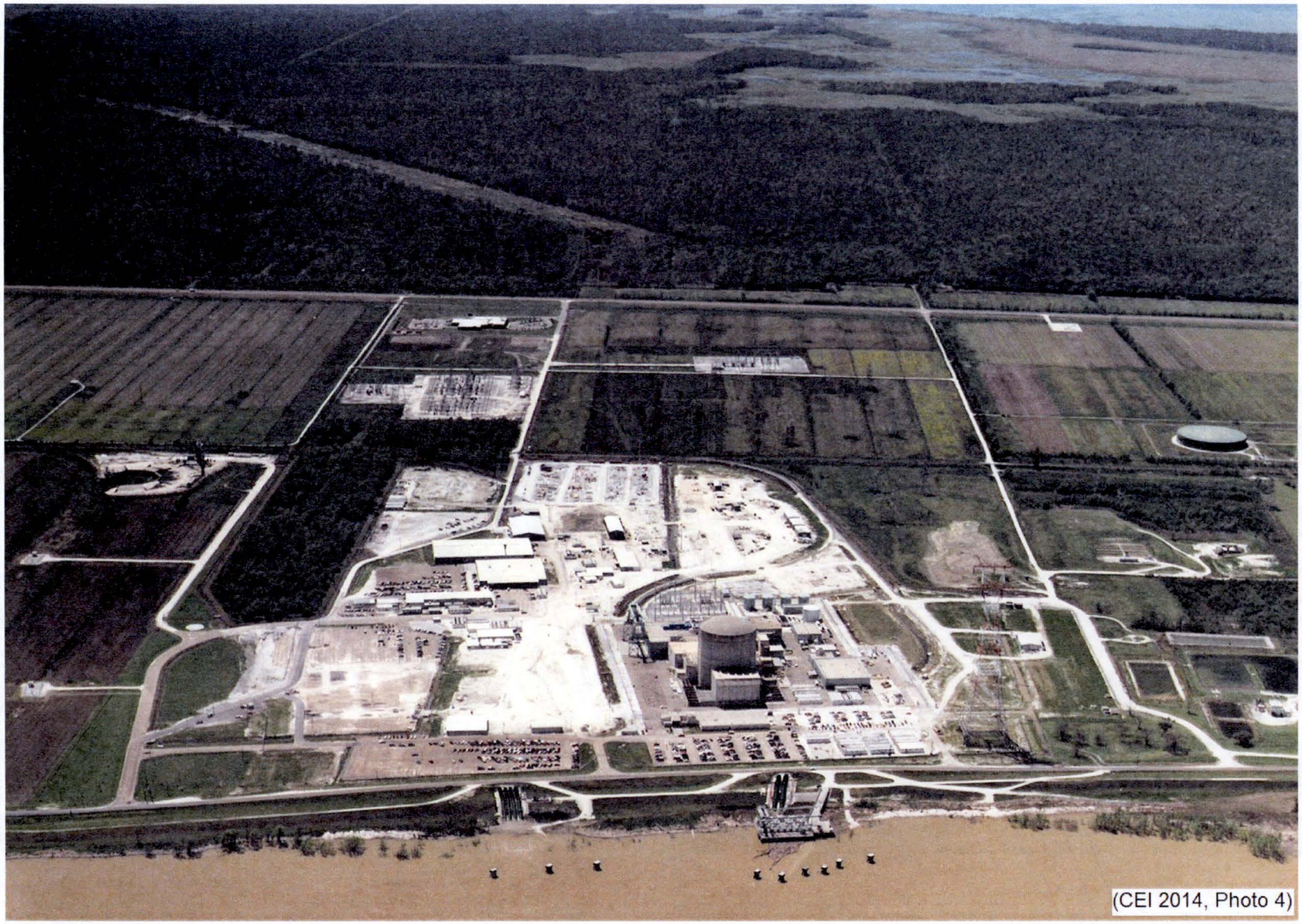
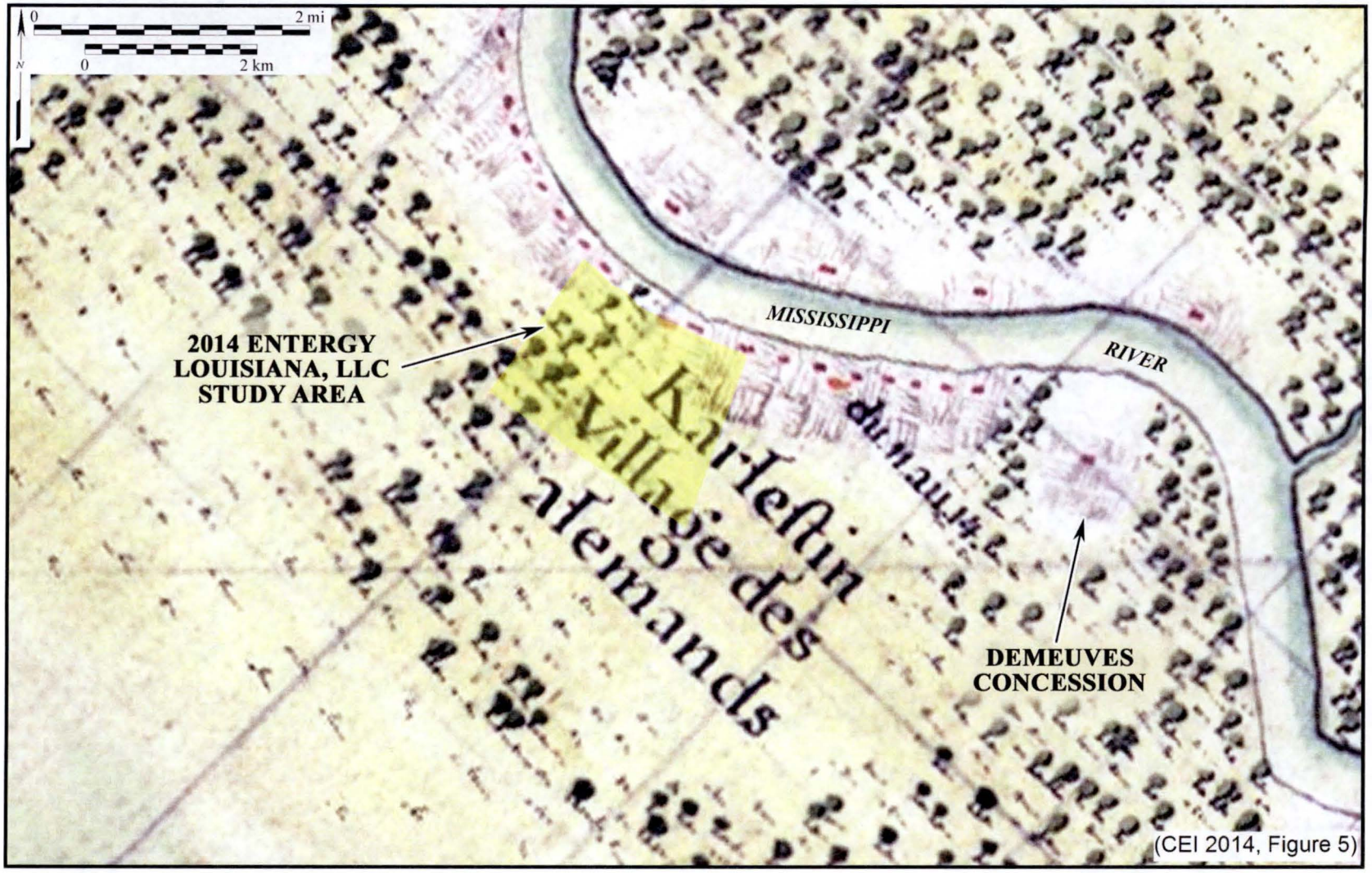
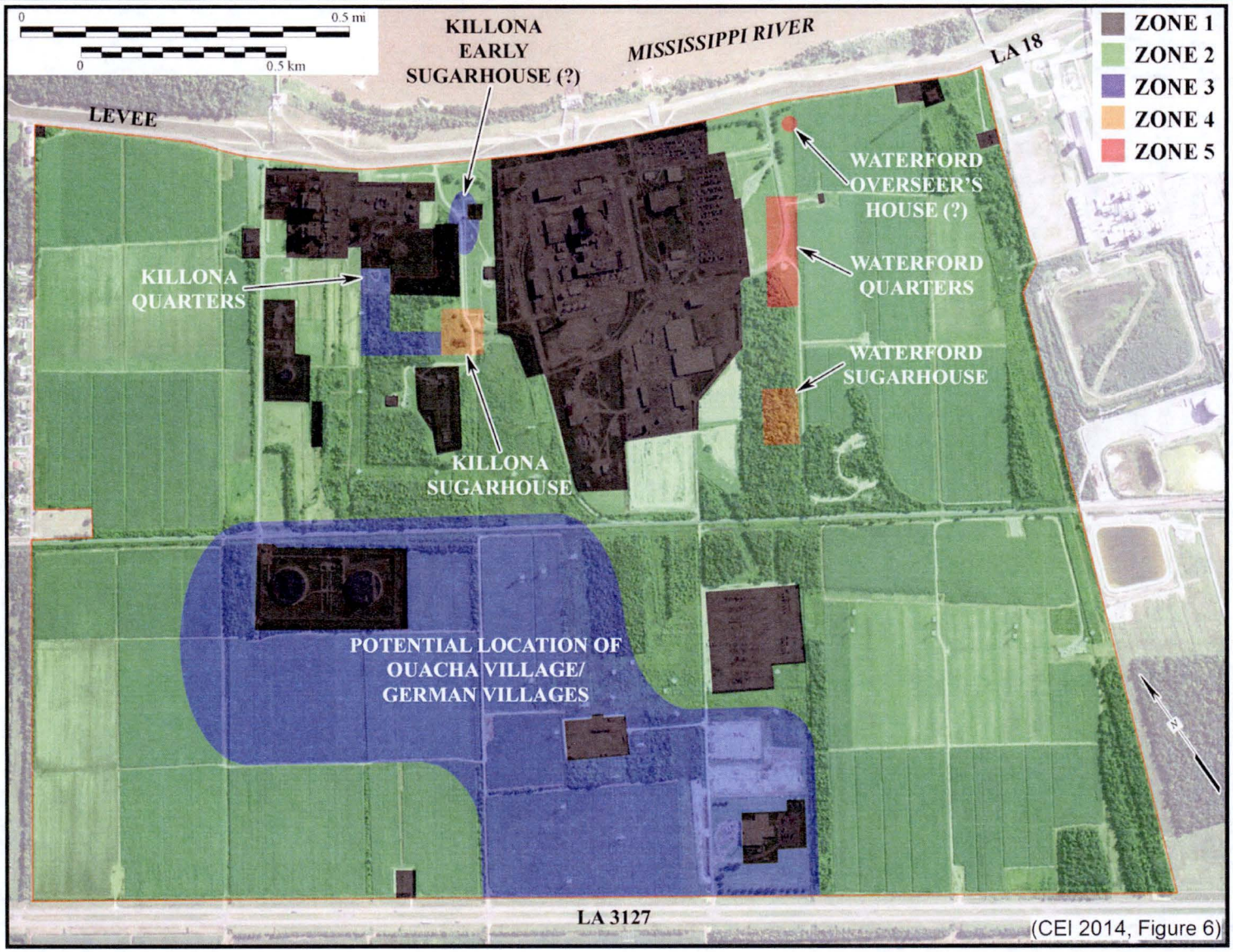


Figure 3.7-12
Aerial View of WF3 Plant circa 1996



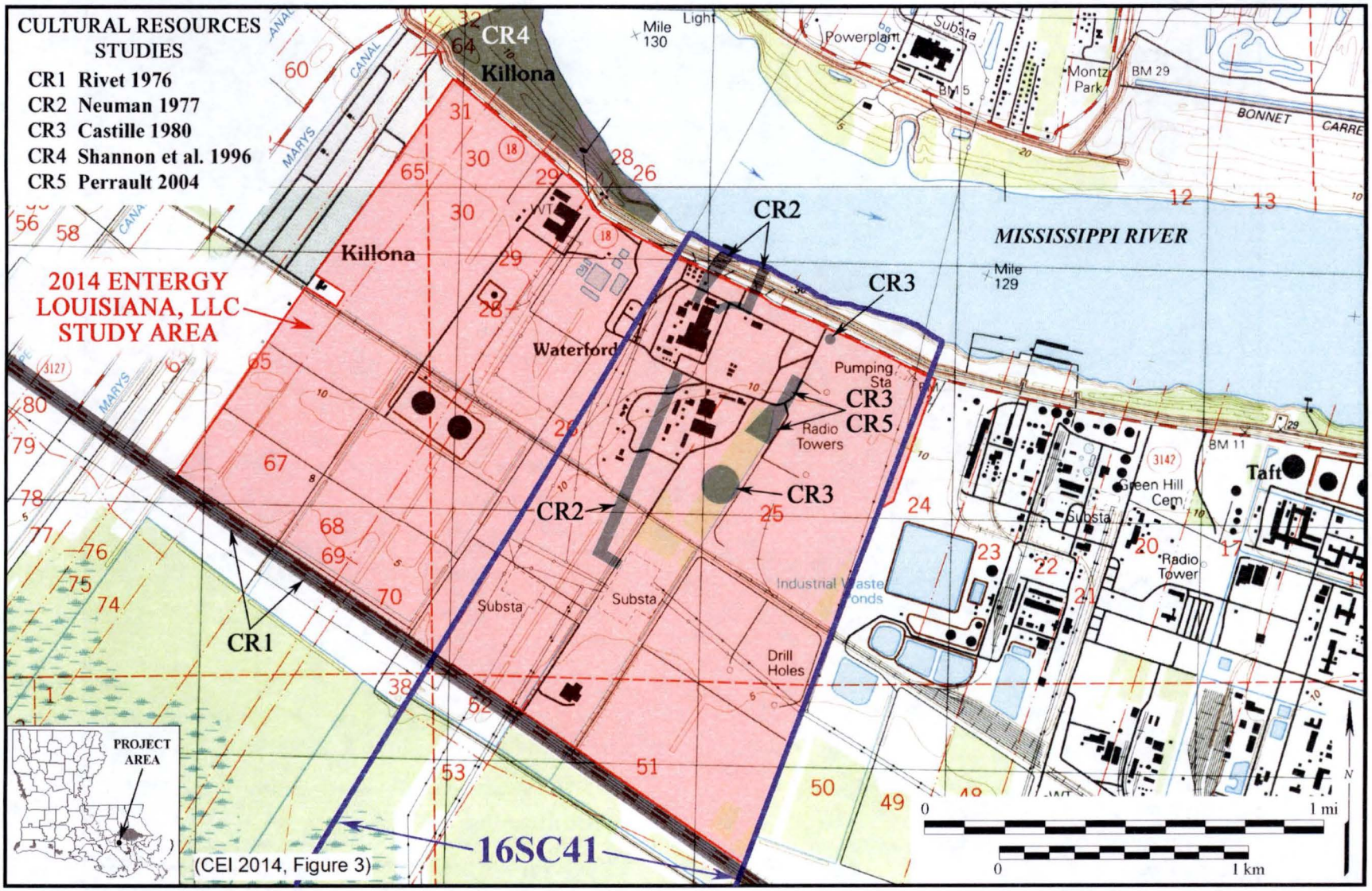
(CEI 2014, Figure 5)

Figure 3.7-13
Vicinity of Entergy Louisiana, LLC Property circa 1720s



(CEI 2014, Figure 6)

Figure 3.7-14
Zones of Archaeological Sensitivity, Entergy Louisiana, LLC Property Northeast of LA-3127



(CEI 2014, Figure 3)

Figure 3.7-15
Location of Cultural Resource Studies, Entergy Louisiana, LLC Property

3.8 Socioeconomics

Socioeconomic descriptions are focused on St. Charles and Jefferson parishes in Louisiana because approximately 44 percent of WF3 employees are located in these two parishes, while the remaining workforce is dispersed throughout 19 surrounding Louisiana parishes and in four other states, as presented in Table 2.5-1. In addition, WF3 is one of Entergy Louisiana, LLC's assets on which property taxes are paid to St Charles Parish.

Refueling outages occur at the plant on an 18-month cycle and historically have lasted approximately 25–30 days. As discussed in Section 2.5, there are approximately 700–900 contractor workers at the plant during outages. The Baton Rouge and New Orleans metropolitan areas are both located within a 50-mile radius of the plant and offer numerous motel, campground, and food service conveniences along the I-10 transportation corridor. Nearby Louisiana communities, Kenner, Luling, and Hahnville, also provide accommodations to workers and are accessible to the plant via LA-18.

3.8.1 Employment and Income

The two parishes most influenced by WF3 operations are St. Charles and Jefferson parishes, because the highest percentage of WF3 employees reside in these two parishes, and WF3 is one of Entergy Louisiana, LLC's assets on which property taxes are paid to St Charles Parish. As discussed in Section 3.10, the populations of both St. Charles Parish and Jefferson Parish are expected to increase during the license renewal period. Low-income populations and poverty thresholds for these two counties are described in Section 3.10.2.

The estimated employed population in St. Charles Parish in 2012 was 31,214 persons, with no particular occupational sector showing employment dominance. The top three occupations each employed approximately 14 percent of parish workers, or 42 percent of the total workforce. Leading in employment was the manufacturing sector with 4,492 persons employed, followed by the construction sector with 4,455 persons employed, and the government and government enterprises sector with 4,012 persons employed. (BEA 2014) The largest employer in St. Charles Parish in 2014 was St. Charles Parish School Board, followed by Motiva/Shell Chemical, Dow St. Charles Operations, and Entergy (SCP 2015b, page 154). The annual payroll in St. Charles Parish was reported to be approximately $2 billion in 2012, and the average wage per job was $62,454 (BEA 2014). In 2012, per capita personal income was $38,332 (BEA 2014), and the annual unemployment rate decreased from 6 percent in 2012 to 5.8 percent in 2013 (BLS 2014).

The estimated employed population in Jefferson Parish in 2012 was 265,747 persons. The leading occupation was the retail trade sector with approximately 12 percent, or 32,300 persons employed. This was followed by the healthcare and social assistance sector with approximately 11 percent, or 29,569 persons employed; and the government and government enterprises sector with approximately 9 percent, or 23,585 persons employed. (BEA 2014) The largest employer in Jefferson Parish in 2013 was Ochsner Health System, followed by Jefferson Parish School Board, Stewart Enterprises, Inc., and Acme Truck Line (JEDCO 2014, page 33). The

annual payroll in Jefferson Parish was approximately $19.5 billion in 2012, and the average wage per job was $45,930 (BEA 2014). In 2012, per capita personal income was $45,049 (BEA 2014), and the annual unemployment rate decreased from 6.2 percent in 2012 to 5.8 percent in 2013 (BLS 2014).

Both St. Charles Parish and Jefferson Parish fall within the seven-parish New Orleans-Metairie-Kenner Metropolitan MSA. Periodically, reports tracking post Hurricane Katrina recovery within the seven-parish MSA are released, and include indicators measuring population, economy, housing, and infrastructure. The latest 2013 report, *The New Orleans Index at Eight*, focuses on 8 years after the storm and recovery from the recent multi-year national economic recession. (TDC 2014, page 4)

The recession took hold locally in 2008, and the MSA lost only 1 percent of its jobs before the economy rebounded. By 2012, the MSA had recouped all its recession-era losses and reached 1 percent above its 2008 job level. Job losses due to Hurricane Katrina and the levee failures accelerated the shifting of jobs to suburban parishes. The geographic distribution of jobs in the MSA shows that after Hurricane Katrina, Jefferson Parish surpassed Orleans Parish to become the largest job center in the MSA. Jefferson accounted for 38 percent of MSA jobs compared to 34 percent for Orleans Parish. St. Charles Parish had the third largest share of jobs in the MSA at 5 percent. (TDC 2014, page 22)

Greater New Orleans was recovering from Hurricane Katrina when the region was hit by the Great Recession in 2008 and the Gulf of Mexico Deepwater Horizon oil spill in 2010. While most sectors have gained jobs since 2012, four industries (manufacturing, oil and gas, government, and administrative and waste services) have shed jobs. Nonetheless, government still represents the largest share of employment in the region at 17 percent, followed by wholesale and retail trade at 15 percent, leisure and hospitality at 13 percent, and professional services at 13 percent. (TDC 2014, page 14)

After Katrina, in 2006, average wages in the MSA were 4 percent lower than the U.S. average. The MSA average wage declined from 2006 to 2012, and the MSA average wage of $47,790 in 2012 was approximately 7 percent lower than the U.S. average. In comparison, MSA average wages were approximately 8 percent higher than the average for the state of Louisiana. (TDC 2014; BEA 2014)

3.8.2 Housing

Between 2000 and 2010, the total population for St. Charles Parish grew by approximately 9.8 percent (Table 3.10-2). As seen in Table 3.8-1, total available housing within St. Charles Parish followed the population growth trend, with a 14.1 percent growth in total housing units and a vacancy rate that increased by less than 1 percent. This would indicate enough housing was available to keep up with the increase in parish population. (USCB 2014d)

Jefferson Parish experienced a significant decline in population in the aftermath of Hurricane Katrina in 2005. As seen in Table 3.10-2, between 2000 and 2010, the total population in the

parish decreased by approximately 5 percent. With the outmigration of population during this time period, the number of vacant housing units grew by 66.9 percent, even though there was less than a 1 percent gain in the total number of housing units as shown in Table 3.10-2. As indicated by the vacancy rate increase of 4.1 percent, enough housing units were available for the existing population in the parish. (USCB 2014d)

Between 2000 and 2010, median home values in St. Charles Parish grew by 78.5 percent, and home values grew by 63.9 percent in Jefferson Parish (Table 3.8-1). In the same time period, monthly rental rates grew by 71.6 percent in St. Charles Parish and by 60.5 percent in Jefferson Parish. (USCB 2014d)

3.8.3 Water Supply and Wastewater

3.8.3.1 Water Supply

The St. Charles Parish Waterworks Department is the service provider for Parish residents and relies on the Mississippi River as its water source. It is also the potable water service provider for WF3. The St. Charles East Bank Water District serves almost half the Parish population (26,113) and is supported by five facilities. As shown in Table 3.8-2, demand on the East Bank services is currently at approximately 30.7 percent of capacity. The West Bank Water District consists of four facilities and serves a Parish population of 26,584; demand is currently at 41.1 percent of capacity. The East Bank system was recently upgraded and there are no plans to add to the West Bank system. Because the water department is currently meeting population needs in the Parish, there are no plans to expand these systems in the foreseeable future. (ENERCON 2014a)

As discussed in Section 2.2.2.6, the St. Charles Parish water system furnishes a metered supply of potable water to WF3 through municipal water mains. A valve connection supplies the majority of the water via a backflow prevention and metering station located at the southeast corner of the plant site. The potable water distribution system then supplies water to various buildings throughout the site. In 2013 and 2014, the St. Charles Parish water system provided approximately 1,166,090 and 1,346,630 gallons, respectively to WF3 (Entergy 2015k).

The Jefferson Parish Water Department is also organized into East Bank and West Bank districts, and the Mississippi River is the water source. The East Bank water district has four facilities and serves a population of 243,782. Reported demand is currently at approximately 40.6 percent of capacity. The West Bank district consists of two plants, has a population of 188,770, and demand is at 35.7 percent of capacity. Population in the parish has declined since 2000 (Table 3.10-2), and it is expected that consumption will remain relatively steady in the near future. (ENERCON 2014b)

Two municipalities in Jefferson Parish act as the water service providers for their populations: the City of Gretna and the City of Westwego. The Gretna Water Department has its own waterworks system that serves a population of 17,736 and utilizes the Mississippi River as its water source. Gretna has one plant facility with demand currently at 33.3 percent of capacity.

A water system upgrade was completed in 2013. (ENERCON 2014c) The City of Westwego water treatment facility relies on the Mississippi River as the water source and serves a population of 8,354. The demand on the plant is currently at 73.3 percent of capacity, and additional upgrades have been undertaken, with more planned. (ENERCON 2014d)

As discussed in Section 3.5.3.2, groundwater usage in St. Charles Parish and Jefferson Parish is substantially less than surface water use, but some private supply wells are utilized for residents not on public utilities (Table 3.5-4).

3.8.3.2 Wastewater

The St. Charles Parish Wastewater Department is organized similar to the Water Department, providing services through an East Bank complex and a West Bank complex. As shown in Table 3.8-3, the East Bank plant in Destrehan is at 54 percent of capacity. The West Bank has two facilities, with the demand at the Hahnville plant at 92 percent of capacity and demand at the Luling Oxidation Pond at 50 percent of capacity, for a combined average of 71 percent. During wet weather events, all plants in the Parish operate above their design capacity with the Hahnville Plant having to go into bypass mode. The Parish would like to construct an additional treatment facility on the West Bank to support future growth, but there are currently no plans or timeline for when this may take place. (ENERCON 2014e) Currently, adequate capacity is available in the Parish for current population needs.

As discussed in Section 3.5.1.1.3, with the exception of the EEC, sanitary wastewater from all plant locations at WF3 is collected and discharged to the St. Charles Parish POTW where it is managed appropriately. Sanitary wastewater from the EEC, which is regulated by WF3's LPDES Permit No. LA0007374 (Attachment A), flows to an onsite sewage treatment unit prior to discharging to 40 Arpent Canal via LPDES Outfall 005.

As shown in Table 3.8-3, the Jefferson Parish Wastewater Department has one East Bank wastewater plant with demand at approximately 60.6 percent of capacity. The Jefferson Parish West Bank has five plants (three major treatment plants and two minor plants) with a combined average demand on capacity at 56.5 percent. (ENERCON 2014f) The City of Gretna Wastewater Department has one plant providing services for its population and is at 38.5 percent capacity (ENERCON 2014c). The City of Westwego also has one plant in its wastewater system and demand is currently at 66.3 percent of capacity. Some recent upgrades of the system have been undertaken, with more planned. (ENERCON 2014d) Adequate capacity is available in the Parish for current population needs.

3.8.4 Community Services and Education

St. Charles Parish has one public school district. Based on the 2011–2012 school year, there were 17 public schools (pre-kindergarten through 12th grade) in the parish with 9,743 students. The student/teacher ratio was 11.87. (NCES 2014) In addition, the parish operates a facility for high school juniors and seniors to pursue a career-oriented curriculum using state-of-the-art equipment and technologies, and three adult learning centers in Norco, Killona, and Boutte (SCP

2011, page 119). St. Charles Parish also has three private schools, with an additional 717 students during the 2011–2012 school year (NCES 2014). In 2010, the State of Louisiana ranked the St. Charles public school district 10th among 69 school districts, based on performance scores (SCP 2011, page 119). During that same school year, the Louisiana Department of Education began to assign letter grades to schools based on school performance scores, where A is the highest and F is the lowest score. In St. Charles Parish, 98 percent of students attended schools that met state standards in 2012, and this percentage is nearly the same as pre-Katrina. Furthermore, 74 percent of students were in schools that earned an "A" or "B" score. (TDC 2014, page 42) School district projections for the next 5 years indicate a stable level of enrollment, consistent with overall population projections for the parish, which indicates a slow rate of growth (SCP 2011, page 119).

The Jefferson Parish Public School System is one of the state's largest school districts and the only public school district in the Parish. Based on the 2012–2013 school year, there were 80 public schools in the parish totaling 46,389 students. Additionally, during the same time period there were approximately 80 private and parochial schools in Jefferson Parish that served approximately 34,949 students. (JEDCO 2014, page 10) The student/teacher ratio for the 2011–2012 school year was 15.03 (NCES 2014). During the 2012–2013 school year, 90 percent of Jefferson Parish public school students were enrolled in an "academically satisfactory" school that met state standards of quality, an increase from about 80 percent pre-Katrina. Based on Louisiana public school scoring, 36 percent of Jefferson Parish students attended schools that earned a "D" average, indicating the school barely met state standards; another 33 percent attended a "C" school; and 21 percent attended schools that earned an "A" or "B". (TDC 2014, page 42)

No higher education institutions are located within St. Charles Parish. However, 18 colleges and universities are all located within a few hours of St. Charles Parish; 10 are in the New Orleans metro area and can be reached within half an hour or less (SCP 2011, page 119). Two regional technical institutes (JEDCO 2014, page 11) are located in close proximity to St. Charles Parish. Along with access to metro area higher education, the population has access to Herzing University, branches of Louisiana Technical College, and a University of New Orleans Maritime Technical Center, all of which are located in Jefferson Parish (JEDCO 2014, page 11).

In St. Charles Parish, there are no municipalities and the primary law enforcement agency is the St. Charles Parish Sheriff's Office. St. Charles Parish has more than 375 full-time law enforcement personnel. (SCPSO 2014) Serving a 2013-estimated population of 52,617 (USCB 2014a), the ratio of law enforcement personnel per 1,000 residents was approximately 7.1.

In neighboring Jefferson Parish, in addition to the Jefferson Parish Sheriff's Office, six municipalities have a police force. The Jefferson Parish Sheriff's Office has more than 1,500 law enforcement personnel. (JEDCO 2014, page 33) Serving a 2013-estimated population of 434,767 (USCB 2014a), the ratio of sheriff's department law enforcement personnel per 1,000 residents was 3.5 in 2013. The six municipalities with their own police forces in Jefferson Parish are Grand Isle, Gretna, Harahan, Kenner, Lafitte, and Westwego (USACOPS 2014).

The City of New Orleans has the largest fire department in the region, with 32 stations and a staff of 712 full-time paid fire fighters (USFA 2014). St. Charles Parish is divided into 10 fire districts, all of which rely on volunteers (SCP 2011, page 121). In 2014, St. Charles Parish had approximately 229 volunteer fire protection service personnel (USFA 2014) serving a 2013-estimated population of 52,617 (USCB 2014a); the ratio of firefighters per 1,000 residents was 4.4 in 2013. In 2014, Jefferson Parish had approximately 529 paid career fire protection service personnel and another 529 volunteer firefighters for a total of 1,058 (USFA 2014) serving a 2013-estimated population of 434,767 (USCB 2014a); the ratio of firefighters per 1,000 residents in Jefferson Parish was 2.4 in 2013.

The two primary healthcare facilities in St. Charles Parish are the St. Charles Parish Hospital and the Luling Rehabilitation Hospital, both of which are located in Luling. The St. Charles Parish Hospital also operates a medical clinic on the parish's east bank in Destrehan. (SCP 2011, page 121)

St. Charles Parish Hospital has 59 licensed beds and a staff of approximately 478 (SCP 2011, page 119; SCHG 2014); 57 physicians are affiliated with the facility (Healthgrades 2014). As of 2014, the hospital merged with Ochsner Health System, a regional healthcare company which employs 900 full-time physicians and 14,000 other employees throughout southeastern Louisiana (OHS 2014).

Some of the larger medical facilities located in Jefferson Parish include East Jefferson General Hospital; Ochsner Medical Center—Kenner; Ochsner Medical Center—West Bank; Tulane Medical Center—Lakeside Hospital; and West Jefferson Medical Center. In 2012, the American Hospital Directory reported 1,151 beds for Jefferson Parish. (AHD 2014) As discussed in Section 3.8.1, the second largest employment sector in Jefferson Parish was healthcare and social assistance.

3.8.5 Local Government Revenues

For property tax purposes, Louisiana calculates a total entity or unit value for regulated utilities in the state, including Entergy Louisiana, LLC, and does not value WF3 on a standalone basis. All Entergy Louisiana, LLC owned property in Louisiana was assessed at approximately $519 million in 2014 (LTC 2014, page 9). The 2013 taxable assessed value of Entergy Louisiana, LLC property allocated to St. Charles Parish was approximately $179.9 million dollars (SCP 2015b, page 142). Entergy Louisiana, LLC does not receive separate tax invoices from St. Charles Parish for power plants. In 2014, Entergy Louisiana, LLC paid approximately $20.8 million in property taxes to St. Charles Parish (Table 3.8-4).

Total property tax revenues for St. Charles Parish, including parish and local taxes, were approximately $142.9 million in 2014. The two largest programs receiving parish funds were school maintenance at approximately $52.0 million, with total school taxes equaling approximately $70.5 million, and law enforcement at approximately $22.1 million, with total law enforcement equaling approximately $26.8 million. (LTC 2014, page 90) In 2014, Entergy Louisiana, LLC payments to St. Charles Parish in property taxes represented roughly 15 percent

of the total parish property tax revenues. Entergy Louisiana, LLC anticipates that continued fluctuations in the company's assessed value and tax rates will impact the tax payments to St. Charles Parish; however, Entergy Louisiana, LLC does not expect these changes to be notable or significant changes to future property tax payments.

WF3 currently employs 641 full-time employees (Table 2.5-1). Additionally, 700–900 contractor workers participate in regularly scheduled 18-month refueling outages. Therefore, employment of current employees and contractor workers at WF3 benefits local and regional economies as employee salaries flow through the communities by purchasing goods and services, and contributing income, sales, and personal property taxes.

State general sales and use tax is levied on the sale of tangible personal property at retail; the use, consumption, distribution or storage of any tangible personal property; the lease or rental within Louisiana of any item or article of tangible personal property; and the sale of services as defined in the statutes under R.S. 47:301(14) (LDR 2014). The state has a sales tax rate of 4 percent, with a combined local rate of 5 percent (LATA 2014). St. Charles Parish collected approximately $27 million in sales taxes in 2014, down from the $35 million in 2013 (SCP 2015c).

Other than taxes, no other significant payments are made by Entergy Louisiana, LLC to St. Charles Parish as it relates to WF3.

3.8.6 Transportation

St. Charles Parish's intermodal location along the Mississippi River provides direct access to major markets throughout the state and the world. Along with the interstate road system, St. Charles Parish is served by freight rail, deepwater, air transportation, and truck/freight carriers (SCP 2014b).

The region within a 50-mile radius of WF3 has a highly developed roadway network (Figures 3.0-3 and 3.0-4). I-10, which extends between the cities of Baton Rouge and New Orleans, is located outside a 6-mile radius of WF3 and traverses St. John the Baptist, St. Charles, and Jefferson parishes, north of the Mississippi River and south of Lake Pontchartrain. US-90, also located outside a 6-mile radius of WF3, supports east-west traffic in the region on the south side of the Mississippi River between New Orleans, Houma, and Morgan City. Along with US-90 providing vehicular access to the state arterial and collector network of roads within a 6-mile radius of WF3, I-10 vehicular traffic has access to areas south of the Mississippi River in St. Charles Parish, and specifically WF3, via Interstate Highway 310 (I-310). (SCP 2011, page 88)

Traffic counts have increased approximately 5 percent per year along the major arterial network (in St. Charles Parish). In contrast, traffic volumes along minor arterials and local roads have grown very little and, in some cases, they have decreased, indicating a relatively slow pace of development in St. Charles Parish in the 7 years prior to 2011. Local traffic analysis notes that the most significant issue related to the functionality of the roadway network is that it is hampered by travel barriers: wetlands, vast expanses of privately owned and restricted industrial property,

privately owned railroad lines, and the Mississippi River. The network is alternative-poor and results in circuitous trip patterns that cause increased travel time and distance to travelers. Proactive action on the part of parish and state leadership would be necessary to alter this pattern. (SCP 2011, page 89)

The main vehicular entrance to WF3 is from LA-18 on the north side of the plant. Louisiana Department of Transportation & Development (LaDOTD) average annual daily traffic volumes for the state roads within a 6-mile radius that link to the WF3 plant are listed in Table 3.8-5. LA-3127 has the heaviest east-west traffic within a 6-mile radius of WF3. Counts taken at locations in St. John the Baptist Parish (since 2002) and St. Charles Parish (since 2004) illustrate slow growth in traffic. The LA-18 traffic counts taken at locations east and southeast of WF3 in St. Charles Parish have slowly risen since 2004, whereas the count taken northwest of the plant in St. John the Baptist Parish has decreased since 2002. LA-3142, located east of the plant, is a predominantly north-south collector road and carries the greatest amount of traffic, linking LA-3127 to LA-18. (LaDOTD 2014a)

The U.S. Transportation Research Board has developed a commonly used indicator, called level of service (LOS), to measure how well a highway accommodates traffic flow. LOS is a qualitative assessment of traffic flow and how much delay the average vehicle might encounter during peak hours. LOS categories as defined in the *Highway Capacity Manual*, are listed in Table 3.8-6. (TRB 2010)

No LOS assignments were available for local road sets. However, transportation studies comparing daily traffic volume data to daily capacity for St. Charles Parish roadways suggest that travel flow is generally good and there is very little traffic congestion currently within the parish. Where congestion occurs, it is primarily near major industries at morning and evening workday peak-hours. (SCP 2011, page 89) Based on LOS traffic conditions defined in Table 3.8-6, St. Charles Parish roads near the plant would fall within an LOS "A" to LOS "C" range of conditions. Local studies give no indication that the capacities of roads providing access to WF3 are exceeded by current needs. For years 2015 to 2018, the LaDOTD has no significant road expansion or improvements currently scheduled for St. John the Baptist Parish or St. Charles Parish. (LaDOTD 2014b)

The only transit service in St. Charles Parish is provided by the River Parishes Transit Authority, an on-demand system using a fleet of three 12-passenger buses, which is funded through a cooperative venture between St. Charles and St. John the Baptist parishes. Currently, critical population mass does not exist for other types of mass transit. (SCP 2011, page 91)

Freight rail in St. Charles Parish is served by the Canadian National Illinois Central, Union Pacific, Burlington Northern Santa Fe, and Kansas City Southern railroads, which connect to the six-carrier network of the New Orleans area, the largest in the southern United States (SCP 2014b).

Water transportation is a major means for accessing St. Charles Parish. Cargo can be delivered from St. Charles Parish to all of mid-America via the 19,000-mile Mississippi River system. For

international access, the nearby deepwater Port of South Louisiana and Port of New Orleans operate foreign trade zones. (SCP 2014b)

Air transportation is available from the Louis Armstrong New Orleans International Airport, which is located less than 5 miles from St. Charles Parish, providing one- and two-stop service to nearly all major domestic and international destinations (SCP 2014b).

Truck/freight carriers service the St. Charles Parish area with easily accessible interstate highway connectivity via I-310 and I-10 (SCP 2014b).

3.8.7 Recreational Facilities

As shown in Figure 3.0-5, one of the nearest and largest designated recreational areas within a 6-mile radius of WF3 is the Bonnet Carre Spillway. Just west of the spillway is the Maurepas Swamp WMA, a portion of which is located within a 6-mile radius of WF3. As described in Section 3.0.4, several local parks including Killona Park, Montz Park, Bethune Park, Cambridge Park, Greenwood Park, Highway 51 Park, Larayo Park, and Emily C. Watkins Park also fall within a 6-mile radius of WF3.

The Bonnet Carre Spillway was constructed by the USACE in 1931 for flood control. Since then, this 7,623-acre tract of federal land has evolved into an extensively used outdoor recreation area. The USACE estimates that the spillway attracts approximately 400,000 visitors each year. Recreational uses include fishing, crawfishing, hunting, dog training, camping, wildlife observation, boating, and picnicking. Five boat launching sites provide access to the spillway's waterways and western Lake Pontchartrain. A primitive campground is provided by St. Charles Parish. The public is allowed access provided activities do not interfere with the operation of the spillway. (USACE 2012b; USACE 2014c)

Maurepas Swamp WMA totals 122,098 acres of mostly flooded cypress tupelo swamp (ENERCON 2014g). Access into the area is primarily by boat, but several portions can be accessed on foot. Users must obtain self-clearing permits for all activities within the WMA. Recreational activities within the WMA include fishing, hunting, trapping, boating, and bird watching. Two tent-only camping areas were established in 2012. (LDWF 2014a) Visitation numbers for the WMA are based on the number of user activities recorded on the self-clearing permits filed. For the 2013 calendar year, 9,864 activities were recorded. This number is anticipated to be low because boaters and anglers who enter the WMA from outside its boundaries are not required to file self-clearing permits, and some users do not file permits. The LDWF estimates that including those visitors, user activities in 2013 would have been approximately 19,692. (ENERCON 2014h)

In 2013, St. Charles Parish Economic Development and Tourism Department reported that Destrehan Plantation (the Parish's most popular tourist attraction) visitation rose about 10 percent since 2012, to 35,248 visitors. The Parish German Coast Farmers' Market had nearly 27,000 patrons in attendance in 2013. (SCP 2013)

Various local parks are located within a 6-mile radius of WF3 (Table 3.0-1) in both St. Charles and St. John the Baptist parishes.

The existing inventory of St. Charles Parish parks and facilities encompasses 317 acres of land. Currently, the parish parks system includes 50 sites. Of these, 28 sites are owned by St. Charles Parish, and 22 sites are leased from the St. Charles Parish School District, local civic organizations, the Catholic Archdiocese of New Orleans, and private companies. Many of these parks are found within neighborhoods and feature community recreational activities and programs, including youth and adult sports, senior citizen activities, summer camps, and special events. St. Charles Parish has no system that tracks visitor use by park facility. (SCP 2012, pages 5 and 13–21)

Along with local parks listed in Table 3.0-1, St. John the Baptist Parish has a number of major neighborhood parks, smaller parks, and public boat launches. Parish park facilities support organized sports activities, neighborhood playgrounds, and picnic amenities. The master plan recommends a number of future capital improvements for parks located in St. John the Baptist Parish, but currently there are no plans for adding new parks to the parish system. No visitation information specific to St. John the Baptist Parish parks was available. Highway 51 Park is one of St. John the Baptist Parish's premiere parks and is located within a 6-mile radius of WF3. (SJBP 2013) The parish's annual Andouille Festival is a 3-day special event held at the Highway 51 Park and attracts almost 18,000 people each October (SJBP 2014b).

There are also popular multi-use paths atop the Mississippi River levees, on both the east and the west banks of the river. The pathways accommodate walkers, in-line skaters, joggers, and bicyclists. The path on the east bank runs from Jefferson Parish to St. John the Baptist Parish, with construction funded by the LaDOTD. On the west bank, St. Charles Parish and the LaDOTD have completed a 10.7-mile path. The parish continues to seek grant funding to complete the path across the entire parish. Ultimately, the path will span from East Baton Rouge to Audubon Park in New Orleans. (SCP 2012, pages 13–19)

Table 3.8-1
Jefferson and St. Charles Parishes Housing Statistics, 2000–2010

Parish	2000	2010	2000 to 2010 Change
Jefferson			
Total housing units	187,907	189,135	0.7% increase
Occupied units	176,234	169,647	-3.7% decrease
Vacant units	11,673	19,488	66.9% increase
Vacancy rate (percent)	6.2	10.3	4.1% increase
Median house value ($)	105,300	172,600[a]	63.9% increase
Median rent ($/month)	544	873[a]	60.5% increase
St. Charles			
Total housing units	17,430	19,896	14.1% increase
Occupied units	16,422	18,557	13.0% increase
Vacant units	1,008	1,339	32.8% increase
Vacancy rate (percent)	5.8	6.7	0.9% increase
Median house value ($)	104,200	186,000[b]	78.5% increase
Median rent ($/month)	507	870[b]	71.6% increase

(USCB 2014d)

a. 2010 American Community Survey 1-Year Estimates
b. 2008–2010 American Community Survey 3-Year Estimates

Table 3.8-2
Public Water Systems, St. Charles and Jefferson Parishes

Water System	Parish	Source	Number of Plants/Facilities	2010 Population Served	Design Capacity (MGD)	Average Production (MGD)	Demand (Percent Design Capacity)
St. Charles Water District East Bank (New Sarpy)	St. Charles	Surface water	5	26,113	13.0	4.0	30.7
St. Charles Water District West Bank (Luling)	St. Charles	Surface water	4	26,584	9.0	3.7	41.1
Jefferson Water Department East Bank Complex	Jefferson	Surface water	4	243,782	87.0	35.3	40.6
Jefferson Water Department West Bank Complex	Jefferson	Surface water	2	188,770[a]	61.0	21.8	35.7
Gretna Water	Jefferson	Surface water	1	17,736	7.5	2.5	33.3
Westwego Water	Jefferson	Surface water	1	8,354	3.0	2.2	73.3

(ENERCON 2014a; ENERCON 2014b; ENERCON 2014c; ENERCON 2014d)

a. Reported Jefferson Parish west bank population includes City of Gretna and City of Westwego.

Table 3.8-3
Public Wastewater Systems, St. Charles and Jefferson Parishes

Wastewater System	Parish	Number of Plants/Facilities	Design Capacity (MGD)	Average Production (MGD)	Demand (Percent Design Capacity)
St. Charles Wastewater East Bank Complex—Destrehan	St. Charles	1	6.0	3.2	54.0
St. Charles Wastewater West Bank Complex—Hahnville and Luling	St. Charles	2	5.5	3.7	71.0[(a)]
Jefferson Wastewater Department East Bank—Jefferson	Jefferson	1	33.0	20.0	60.6
Jefferson Wastewater Department West Bank Complex—Bridge City, Marrero, Harvey and Lafitte (Jonathan Davis and Rosethorne)	Jefferson	5	33.2	17.4	56.5[(b)]
Gretna Wastewater	Jefferson	1	6.5	2.5	38.5
Westwego Wastewater	Jefferson	1	3.0	1.9	66.3

(ENERCON 2014c; ENERCON 2014d; ENERCON 2014e; ENERCON 2014f)

a. Average of Hahnville (92.0 percent) and Luling (50.0 percent) reported demand on capacity.

b. Average of Bridge City (57.1 percent), Marrero (63.5 percent), Harvey (42.4 percent), Jonathan Davis (48.0 percent), Rosethorne (71.4 percent) demand on capacity.

Table 3.8-4
Entergy Louisiana, LLC Property Tax Payments, 2010–2014

Year	Entergy Louisiana, LLC Property Taxes	St. Charles Parish Revenues	Percent of Parish Revenue
2010	$21,366,443	$116,481,724	18
2011	$21,398,845	$125,882,648	17
2012	$20,703,039	$131,423,253	16
2013	$20,458,149	$136,517,151	15
2014	$20,812,041	$142,863,672	15

(Entergy 2015l; LTC 2010; LTC 2011; LTC 2012; LTC 2013; LTC 2014)

Table 3.8-5
Total Average Annual Daily Traffic Counts on State Routes near WF3

State Route	Location (Parish)	Mile Marker	2002	2004	2005	2007	2008	2010	2011	2013
LA-18	Northwest of LA-3141 (St. John the Baptist)	43.14	2,132	NC	2,534	NC	1,617	NC	1,441	NC
LA-3127	Northwest of LA-3141 (St. John the Baptist)	29.18	4,892	NC	5,080	NC	6,359	NC	6,704	NC
LA-3127	West of LA-3141 (St. Charles)	32.16	NC	1,927	NC	6,730	NC	7,586	NC	7,174
LA-3141	West of WF3 (St. Charles)	0.56	NC	1,037	NC	1,830	NC	1,864	NC	1,570
LA-3142	Southeast of WF3 (St. Charles)	0.80	NC	3,404	NC	5,741	NC	5,441	NC	6,240
LA-18	East of LA-3142 (St. Charles)	51.12	NC	4,930	NC	5,698	NC	5,118	NC	5,911
LA-3160	Southeast of WF3 (St. Charles)	0.31	NC	2,255	NC	2,148	NC	1,851	NC	2,862
LA-18	Southeast of LA-3160 (St. Charles)	52.57	NC	8,199	NC	8,707	NC	6,505	NC	9,343
LA-3127	Southeast of LA-3160 (St. Charles)	39.15	NC	11,726	NC	13,098	NC	13,743	NC	13,996

(LaDOTD 2014a)
NC: No Count

Table 3.8-6
Level of Service Definitions

Level of Service	Conditions
A	Free flow of the traffic stream. Vehicles are almost completely unimpeded in their ability to maneuver within the traffic stream. The effects of incidents or point breakdowns are easily absorbed.
B	Reasonably free flow of the traffic stream. The ability to maneuver within the traffic stream is only slightly restricted. The effects of minor incidents and point breakdowns are still easily absorbed.
C	Influence of the traffic density on operations becomes marked. Freedom to maneuver within the traffic stream is noticeably restricted, and lane changes require more care and vigilance on the part of the driver. Minor incidents may still be absorbed, but the local deterioration in service quality will be significant. Queues may be expected to form behind any significant blockages.
D	Ability to maneuver is severely restricted due to traffic congestion. Speeds begin to decline with increasing flows, with density increasing more quickly. Freedom to maneuver within the traffic stream is seriously limited. Even minor incidents can be expected to create queuing, because the traffic stream has little space to absorb disruptions.
E	Operations at or near capacity, highly volatile level. There are virtually no usable gaps within the traffic stream, leaving little room to maneuver within the traffic stream. 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 and substantial queuing.
F	Breakdown or unstable flow. Such conditions exist within queues forming behind bottlenecks, which occur when the number of vehicles arriving is greater than the number of vehicles that can be discharged, or when the forecast demand exceeds the computed capacity. Operations within queues are highly unstable, with vehicles experiencing brief periods of movement followed by stoppages. Whenever queues due to a breakdown exist, they have the potential to extend upstream for considerable distances. Downstream operations improve (assuming that there are no additional downstream bottlenecks) as discharging vehicles move away from the bottleneck.

(TRB 2010)

3.9 Human Health

3.9.1 Radiological Hazards

As discussed in Section 2.3, no license-renewal-related refurbishment activities have been identified.

3.9.1.1 Liquid and Gaseous Effluent Releases

A description of the WF3 liquid and gaseous radwaste system is presented in Section 2.2.3 of this ER. All normal liquid and gaseous release pathways to the environment are continuously monitored to ensure that potential doses to the general public would be well within the allowable limits of 10 CFR Part 20 and 10 CFR Part 50, Appendix I (WF3 2014a, Sections 11.2.1 and 11.3.1). The controls for limiting the release of radiological liquid and gaseous effluents are described in the WF3 *Offsite Dose Calculation Manual*. Controls are based on (1) concentrations of radioactive materials in liquid and gaseous effluents and projected dose or (2) dose commitment to a hypothetical member of the public. (WF3 2014g)

Regulation 10 CFR 50.36(a) requires nuclear power plants to submit an annual report to the NRC that lists the types and quantities of radioactive effluents released into the environment. Based on review of the WF3 annual radioactive effluent release reports for 2010 through 2014 (Entergy 2011c; Entergy 2012b; Entergy 2013d; Entergy 2014f; Entergy 2015m), doses to members of the public complied with the radiation protection standards contained in Appendix I to 10 CFR Part 50, 10 CFR Part 20, and 40 CFR Part 190.

Dose estimates for members of the public are calculated based on radioactive gaseous and liquid effluent release data, and atmospheric and aquatic transport models. The 2014 annual radioactive effluent release report (Entergy 2015m) contains a detailed presentation of the radioactive discharges and the resultant calculated doses. The following summarizes the calculated dose to a member of the public from radioactive gaseous and liquid effluents released during 2014 (Entergy 2015m):

- The maximum whole body dose to an offsite member of the public from radioactive liquid effluents is 8.12E-04 millirem (mrem), which is below the 3-mrem dose criterion in Appendix I to 10 CFR Part 50.

- The maximum organ dose to an offsite member of the public from radioactive liquid effluents is 1.07E-03 mrem, which is below the 10-mrem dose criterion in Appendix I to 10 CFR Part 50.

- The maximum air dose at the site boundary from gamma radiation in gaseous effluents is 3.21E-02 milliradiation absorbed dose (mrad), which is below the 10-mrad dose criterion in Appendix I to 10 CFR Part 50.

- The maximum air dose at the site boundary from beta radiation in gaseous effluents is 7.80E-02 mrad, which is below the 20-mrad dose criterion in Appendix I to 10 CFR Part 50.

- The maximum organ (child bone) dose to an offsite member of the public from carbon-14, radioactive iodine, tritium, and radioactive material in particulate form with half-lives greater than 8-days was 4.57 mrem, which is well below the 15 mrem dose criterion in Appendix I to 10 CFR Part 50.

- The maximum organ (child thyroid) dose to an offsite member of the public from radioactive iodine and radioactive material in particulate form with half-lives greater than 8-days was 0.119 mrem, which is well below the 15 mrem dose criterion in Appendix I to 10 CFR Part 50.

- Maximum total body dose to an offsite member of the public from the combined radioactive releases (i.e., gaseous, liquid, and direct radiation) are only required to be evaluated if quarterly doses exceed 3 mrem to the total body (liquid releases); 10 mrem to any organ (liquid releases); 10 mrad gamma air dose; 20 mrad beta air dose; or 15 mrem to any organ from radioiodines and particulates. At no time during 2014 were any of these limits exceeded; therefore, the evaluation was not required.

3.9.1.2 Radiological Environmental Monitoring Program

The REMP is conducted to assess the radiological impact, if any, to its employees, the public, and the environment from operations. The REMP measures aquatic, terrestrial, and atmospheric radioactivity, as well as ambient radiation. The REMP also measures background radiation (i.e., cosmic sources, global fallout, and naturally occurring radioactive material, including radon). The REMP supplements the radioactive effluent monitoring program by verifying that any measurable concentrations of radioactive materials and levels of radiation in the environment are not higher than those calculated using the radioactive effluent release measurements and transport models. (NRC 2014b, Section 4.9.2.1)

WF3 established its REMP prior to the station becoming operational (1985) to provide data on background radiation and radioactivity normally present in the area, and to ensure that plant operating controls properly function to minimize any associated radiation endangerment to human health or the environment. The REMP is designed for the following (Entergy 2015h):

- Analyzing important pathways for anticipated types and quantities of radionuclides released into the environment.

- Considering the possibility of a buildup of long-lived radionuclides in the environment and identifying physical and biological accumulations that may contribute to human exposures.

- Considering the potential radiation exposure to plant and animal life in the environment surrounding WF3.
- Correlating levels of radiation and radioactivity in the environment with radioactive releases from station operation.

WF3 has continued to monitor the environment; its REMP includes sampling indicator and control locations. The REMP utilizes indicator locations near the site to show any increases or buildup of radioactivity that might occur due to station operation, and control locations farther away from the site to indicate the presence of only naturally occurring radioactivity. WF3 compares indicator results with control, preoperational, and previous years of operational results to assess any impact WF3 might have on the surrounding environment. (Entergy 2015h)

The WF3 REMP is based on four exposure pathways to the public: airborne, direct radiation, waterborne, and ingestion. The airborne samples taken around WF3 are airborne radioiodine and particulates. Direct radiation is measured at locations around the plant site, one in each meteorological sector, using thermoluminescent dosimeters. The waterborne pathway samples are taken from surface water and drinking water, and shoreline sediment samples also are taken for this pathway. The ingestion pathway samples include milk, fish and invertebrates, and broadleaf vegetation. (Entergy 2015h)

WF3 prepares an annual radiological environmental operating report, which contains a discussion of the results of the monitoring program performed for the previous year, and submits it to the NRC. These annual reports provide a data set that covers a broad range of activities that would occur at a nuclear power plant, including refueling outages, non-refueling outage years, routine operation, and years where there may be significant maintenance activities (NRC 2014b, Section 4.9.2.1). Based on submitted annual radiological environmental operating reports for 2010 through 2014 (Entergy 2011d; Entergy 2012c; Entergy 2013e; Entergy 2014g; Entergy 2015h), WF3 observed no adverse trends (i.e., steadily increasing build-up of radioactivity levels), and the 5 years of data show no measurable impact to the environment from WF3 operations.

3.9.1.3 Groundwater Protection Monitoring Program

In 2007, the NEI established a standard for monitoring and reporting radioactive isotopes in groundwater in NEI 07-07, *Industry Ground Water Protection Initiative Final Guidance Document* (NEI 2007). WF3 implemented the recommendations of this industry standard after initial sampling efforts in 2007. Information on the WF3 groundwater protection program is presented in Sections 3.5.2.4 and 4.5.2.4 of this ER. Results of WF3's groundwater protection program are contained in the annual radioactive effluent release report submitted annually to the NRC. Based on results since the groundwater monitoring program was initiated in 2007, no tritium or plant-related gamma isotopes or hard-to-detect radionuclides have been detected (Entergy 2008; Entergy 2009b; Entergy 2010; Entergy 2011c; Entergy 2012b; Entergy 2013d; Entergy 2014f; Entergy 2015m).

3.9.1.4 Occupational Exposure

Some workers at WF3 are classified as radiological workers and, depending on their work assignments, receive occupational radiation exposure. The NRC regulations at 10 CFR Part 20 limit the annual total effective dose equivalent (TEDE) for individual radiation workers to 0.05 sieverts (5 roentgen equivalent man [rem]) per year; however, WF3 procedures administratively limit the exposure below the NRC's regulatory limit.

Based on NUREG-0713, the 3-year average (2010–2012) collective TEDE (sum of dose for all exposed workers) for WF3 was approximately 122 person-rem per reactor as compared to the national average collective dose for all PWRs of approximately 55 person-rem for the same 3-year period. (NRC 2014c, Table 4.7) In 2013, the collective TEDE for WF3 was approximately 3.1 person-rem and in 2014, which was an outage year, the collective TEDE was 69.5 person-rem (Entergy 2015n).

The average TEDE per WF3 worker over this period (2010–2012) was 0.111 rem as compared to the national average of 0.093 rem for all PWRs. The average TEDE per megawatt generated per year was 0.12 rem for WF3 as compared to the national average of 0.06 rem for PWRs. (NRC 2014c, Table 4.7)

Contributing cause to the elevated occupational doses at WF3 during this 3-year period was due to a reactor coolant pump replacement in the 2011 refueling outage. Although the NRC requires nuclear plants to keep collective doses as low as reasonably achievable (ALARA), there is no regulatory limit on collective dose.

WF3 is not planning to undergo refurbishment for the license renewal term, and there are no expected increases in occupational exposure because of license renewal. In addition, based on data (1993–2005) in the GEIS, WF3 occupation radiation exposures fall within the range of those for other operating PWRs (NRC 2013b, Table 3.9-8).

3.9.2 Microbiological Hazards

The GEIS discusses microbiological hazards around nuclear power plants, including background information, results of studies of microbiological hazards in cooling towers, hazards to plant workers, and hazards to members of the public. The discussion of specific hazards focuses on the thermophilic microorganisms *Legionella* spp., which can be a hazard in cooling towers, and *Naegleria fowleri*, which can be a hazard in cooling water discharge. (NRC 2013b, Section 3.9.3) There have been no Entergy or state studies conducted to determine the presence of these microorganisms in waters influenced by WF3.

Exposure to *Legionella* spp. from power plant operations is a potential problem for a subset of the workforce. Plant personnel most likely to come in contact with *Legionella* aerosols would be workers who dislodge biofilms, where *Legionella* are often concentrated, such as during the cleaning of condenser tubes and cooling towers. (NRC 2013b, Section 3.9.3.3) Although WF3 does not use cooling towers for condenser cooling, condenser tube maintenance may occur.

Plant workers cleaning condenser tubes are protected by a fleet procedure that provides a standard methodology for identifying industrial hazards prior to performance of jobs. Under this procedure, possible factors that may influence safe execution of the job, including chemical and biological hazards, would be considered and appropriate worker protection measures would be designated for use during performance of the work. (Entergy 2013f) Exposure of members of the public to *Legionella* from WF3 operations would not be expected, because there is no opportunity for these pathogens to be sufficiently concentrated at expected exposure points.

Naegleria fowleri in heated plant effluent can be a hazard to recreational water users. *Naegleria* infection is the cause of primary amebic meningoencephalitis, an extremely rare disease that is usually fatal. *Naegleria* spp. is ubiquitous in nature and can be enhanced in heated water bodies at temperatures ranging from 95°F to 106°F or higher. *Naegleria* is rarely found in water cooler than 95°F, and infection rarely occurs in water temperatures of 95°F or less. (NRC 2013b, Section 3.9.3.1)

As discussed in Section 2.2.2.1, warm water exiting the WF3 condenser is transferred to the discharge structure. The discharge structure (Figure 2.2-6) consists of a concrete seal well where the warm water enters and then exits by overflowing about 95 feet of weirs which run around three of the four sides of the discharge structure. The discharge canal then carries the water from the discharge structure to the river at an approximate discharge velocity of 7 fps to promote rapid mixing with the ambient water, which results in a smaller thermal plume size, thereby limiting the area of conditions necessary for optimal growth of these thermophilic microorganisms.

As discussed in Section 2.2.2.1, the average flow in the Mississippi River in the vicinity of the WF3 plant is estimated to be approximately 500,000 cfs. Therefore, the average heated discharge flow is very small compared to the volume of river water flowing by the plant, thereby creating limited opportunity for rapid growth and population increases of thermophilic microorganisms.

In addition, because the discharge structure area is within WF3's EAB, recreational activities, such as boating, swimming, or fishing by the public are not allowed. Diseases caused by thermophilic microorganisms associated with warm waters are typically contracted via nasal passageway contact with contaminated water (NRC 2013b, Section 3.9.3.3). Therefore due to restricted access at the WF3 discharge structure area there is a very low probability that the public would contact the warm water that could support thermophilic microorganisms.

Based on conversation with the Louisiana State Epidemiologist (Louisiana Department of Health and Hospitals), there have been only three cases of primary amebic meningoencephalitis reported during the period 2004–2013: two cases in 2011 and one case in 2013, none of which was related to recreational surface water use. Instead, the contributing cause in all three cases was insufficient chlorination in public water supplies typically occurring at the end of the distribution system. In addition, the Louisiana State Epidemiologist also stated that no studies have been conducted in the Mississippi River for the *Naegleria* ameba. Studies are only carried out for reported cases of primary amebic meningoencephalitis. (ENERCON 2014i)

3.9.3 Electric Shock Hazards

As discussed in Section 2.2.5.4 of this ER, it was determined that the in-scope transmission lines meet the applicable shock prevention provisions of the NESC. Entergy's analysis determined that the calculated induced short-circuit current was approximately 3.9 mA, which is within the NESC 5-mA standard. In addition, operational requirements associated with OSHA are incorporated into WF3's occupational health and safety program. Specifically, as it relates to transmission lines and acute shock hazards, WF3 has processes in place which limit the potential for plant workers to receive an "induced" current from an object becoming capacitively charged. Also as discussed in Section 2.2.5.4, because all in-scope transmission lines are located completely within Entergy Louisiana, LLC owned property, the public does not have access to this area and, as a result, no induced shock hazards would exist for the public.

3.10 Environmental Justice

3.10.1 Regional Population

The GEIS presents a population characterization method based on two factors: "sparseness" and "proximity" (NRC 1996, Section C.1.4). Sparseness measures population density and city size within 20 miles of a site and categorizes the demographic information as follows.

Demographic Categories Based on Sparseness

		Category
Most sparse	1.	Less than 40 persons per square mile and no community with 25,000 or more persons within 20 miles.
	2.	40 to 60 persons per square mile and no community with 25,000 or more persons within 20 miles.
	3.	60 to 120 persons per square mile or less than 60 persons per square mile with at least one community with 25,000 or more persons within 20 miles.
Least sparse	4.	Greater than or equal to 120 persons per square mile within 20 miles.

(NRC 1996, Section C.1.4)

"Proximity" measures population density and city size within 50 miles and categorizes the demographic information as follows.

Demographic Categories Based on Proximity

		Category
Not close proximity	1.	No city with 100,000 or more persons and less than 50 persons per square mile within 50 miles.
	2.	No city with 100,000 or more persons and between 50 and 190 persons per square mile within 50 miles.
	3.	One or more cities with 100,000 or more persons and less than 190 persons per square mile within 50 miles.
Close proximity	4.	Greater than or equal to 190 persons per square mile within 50 miles.

(NRC 1996, Section C.1.4)

The GEIS then uses the following matrix to rank the population in the vicinity of the plant as low, medium, or high.

GEIS Sparseness and Proximity Matrix

		Proximity			
		1	**2**	**3**	**4**
Sparseness	**1**	1.1	1.2	1.3	1.4
	2	2.1	2.2	2.3	2.4
	3	3.1	3.2	3.3	3.4
	4	4.1	4.2	4.3	4.4

Low Population Area | Medium Population Area | High Population Area

(NRC 1996, Figure C.1)

The 2010 census population and TIGER/Line data from the U.S. Census Bureau (USCB) were used to determine demographic characteristics in the vicinity of the site. The data were processed at the state, county, and census block levels using ArcGIS (USCB 2014c; USCB 2014e). Census data include people living in group quarters such as institutionalized and non-institutionalized populations. Examples of institutional populations living in group quarters are correctional institutions (i.e., prisons, jails, and detention centers); nursing homes; mental (psychiatric) hospitals; hospitals or wards for the chronically ill; and juvenile institutions. Examples of non-institutional populations living in group quarters are group homes; college dormitories; military quarters; soup kitchens; shelters for abused women (shelters against domestic violence or family crisis centers); and shelters for children who are runaways, neglected, or without conventional housing.

The 2010 census data indicate that approximately 371,976 people live within a 20-mile radius of WF3, which equates to a population density of 296 persons per square mile (USCB 2014c; USCB 2014e). Based on the GEIS sparseness index, the site is classified as Category 4, least sparse, with greater than or equal to 120 persons per square mile within 20 miles.

The 2010 census data indicate that approximately 2,006,583 people live within a 50-mile radius of WF3, which equates to a population density of 255 persons per square mile (USCB 2014c; USCB 2014e). Three communities within a 50-mile radius have a population greater than

100,000 residents (Table 3.10-1). Based on the GEIS proximity index, the site is classified as Category 4, greater than or equal to 190 persons per square mile within 50 miles.

As illustrated in the GEIS sparseness and proximity matrix, the combination of "sparseness" Category 4 and "proximity" Category 4 results in the conclusion that WF3 is located in a "high" population area.

The area within a 50-mile radius of WF3 totally or partially includes 21 parishes—all within the state of Louisiana (Table 3.10-2). According to the 2010 census, the permanent population (not including transient populations) of the entire 21 parishes was approximately 2,466,402 (Table 3.10-2). By 2045, the end of the proposed license renewal period, the permanent population (not including transient populations) of the entire 21 parishes is projected to be approximately 3,398,807. Based on 2010–2045 population projections, an annual growth rate of approximately 0.92 percent is anticipated for the permanent population in the 21 parishes wholly or partially within a 50-mile radius (WPEI 2014).

As shown in Table 3.10-2, the total population (including transient populations) of the entire 21 parishes, which are totally or partially included within a 50-mile radius, is projected to be approximately 3,453,766 in 2045. The total population (including transient populations) within a 50-mile radius is projected to be 2,882,454 in 2045. (UNO 2014; USCB 2014a; WPEI 2014)

The latest permanent population projections were obtained from Woods & Poole Economics, Inc. (WPEI 2014). Parish-level permanent population values for the parishes within a 50-mile radius are shown in Table 3.10-2. Transient data for the state were obtained from the Louisiana Tourism Forecast 2014–2017 (UNO 2014).

WF3 is located in St. Charles Parish. As shown in Table 3.10-2, the population of St. Charles Parish, Louisiana, as reported in the 2010 census was 52,780. Based on Louisiana's projected data set (Table 3.10-3), St. Charles Parish projected population for 2045 is expected to be 78,562. The average projected annual growth rate for this period is 1.04 percent (WPEI 2014). Estimated projected populations and average annual growth rates for St. Charles and Jefferson parishes are shown in Table 3.10-3.

Cities and towns with centers falling within a 50-mile radius are listed in Table 3.10-1. The towns nearest to WF3 with a census-reported population are Killona and Taft. As shown in Table 3.10-1, their 2010 populations were reported at 793 and 63 residents, respectively. Luling, Louisiana, the largest city in St. Charles Parish, had a 2010 population of 12,119 residents. Three communities within a 50-mile radius have a population greater than 100,000: Baton Rouge, Louisiana (approximately 50 miles); Metairie, Louisiana (approximately 19 miles); and New Orleans, Louisiana (approximately 25 miles). These communities have a 2010 population of 229,493; 138,481; and 343,829 residents, respectively. A total of seven additional communities within a 50-mile radius have a population greater than 25,000.

3.10.1.1 Migrant Labor

Migrant labor, or migrant worker, is defined by the USDA as "a farm worker whose employment required travel that prevented the migrant worker from returning to his/her permanent place of residence the same day." In 2012, St. Charles Parish reported that 10 out of 70 total farms employed farm labor. Jefferson Parish reported that 16 out of 57 total farms employed farm labor. The 2012 Census of Agriculture reported that neither St. Charles Parish nor Jefferson Parish employed migrant farm workers. For these two parishes, an estimated total of 88 farm laborers were hired, of which 45 were estimated to work fewer than 150 days per year. (USDA 2012)

3.10.1.2 Subsistence Consumption

Subsistence refers to the use of natural resources as food for consumption and for ceremonial and traditional cultural purposes, usually by low-income or minority populations. Specific examples of subsistence uses include gathering plants for direct consumption (rather than produced for sale from farming operations), for use as medicine, or in ritual practices. Fishing or hunting activities associated with direct consumption or use in ceremonies, rather than for sport, are other examples.

Determining the presence of subsistence use can be difficult, as data at the county or block group level are aggregated and not usually structured to identify such uses on or near the site, where any potential impacts arising from the continued operation of WF3 would arise. Frequently, the best means of investigating the presence of subsistence use is through dialogue with the local population who are most likely to know of such activity. This may include county officials as well as land owners in the immediate vicinity who would have knowledge of subsistence activity.

Through a series of phone calls and emails, contact was made with a number of individuals associated with local churches, social services and economic development organizations, area commercial fishing businesses, and the LDEQ. No populations involved in subsistence use activities (as described above) were identified on or near the site. This is consistent with the controlled access to WF3, and the use of the adjacent land either for residential or industrial use. (ENERCON 2015a)

3.10.2 Minority and Low-Income Populations

3.10.2.1 Background

The NRC performs environmental justice analyses utilizing a 50-mile radius around the plant as the environmental "impact area." LIC-203 Revision 3 (NRC 2013d) defines a geographic area for comparison as a 50-mile radius (also referred to as "the region" in this discussion) centered on the nuclear plant. An alternative approach is also addressed that uses an individual state that encompasses the 50-mile radius individually for comparative analysis as the "geographic area." Both approaches were used to assess the minority and low-income population criteria for WF3.

LIC-203 guidance suggests using the most recent USCB decennial census data. However, low-income data are collected separately from the decennial census and are available in 5-year averages. The 2010 low-income and minority census population data and TIGER/Line data for Louisiana were obtained from the USCB website and processed using ArcGIS software. Census population data were used to identify the minority and low-income populations within a 50-mile radius of WF3. Environmental justice evaluations for minority and low-income populations are based on the use of USCB block groups for minority and low-income populations.

3.10.2.2 Minority Populations

The NRC procedural guidance defines a "minority" population as Black or African American, American Indian or Alaska Native, Asian, Native Hawaiian/Other Pacific Islander, some other race, two or more races, the aggregate of all minority races, Hispanic or Latino ethnicity, and the aggregate of all minority races and Hispanic ethnicity (NRC 2013d, pages D-4 and D-5). The guidance indicates that a minority population is considered present if either of the following conditions exists:

1. The minority population in the census block group exceeds 50 percent; or
2. The minority population percentage is more than 20 percentage points greater in the census block group than the minority percentage of the geographic area chosen for the comparative analysis.

To establish minimum thresholds for each minority category, the non-white minority population total for each state was divided by the total population in the state. This process was repeated with a 50-mile radius total minority population and 50-mile radius total population. As described in the second criterion, 20 percent was added to the minority percentage values for each geographic area. The lower of the two NRC conditions for a minority population was selected as defining a minority area (i.e., census block group minority population exceeds 50 percent, or minority population is more than 20 percent greater than the minority population of the geographic area). Any census block group with a percentage exceeding this value was considered a minority population. Minority percentages for Louisiana and a 50-mile radius, along with corresponding thresholds, are shown in Table 3.10-4.

A minority category of "Aggregate of All Races" is created when the populations of all the 2010 U.S. Census minority categories are summed. The 2010 "Aggregate of All Races" category, when compared to the total population, indicates 36.4 percent of the population in a 50-mile radius are minorities. The minority population percentage for Louisiana is 37.4 percent (Table 3.10-4). Using the second criterion listed above for identification of a minority population, when a 50-mile radius is used as the geographic area, any census block group with a combined minority population equal to or greater than 56.4 percent would be considered a minority population. Because 56.4 percent exceeds the criterion of 50 percent, the first criterion (50 percent) would be used. The states are evaluated in a similar manner. When the two states are used as the geographic area, any census block group with an "Aggregate of All Races" population exceeding 50 percent in Louisiana would be considered a minority population.

Because Hispanic is not considered a race by the USCB, Hispanics are already represented in the census-defined race categories. However, because Hispanics can be represented in any race category, some white Hispanics not otherwise considered minorities become classified as a minority when categorized in the "Aggregate and Hispanic" category. Also, Hispanics of non-white racial background are included in both the racial group and the Hispanic group, and thereby counted twice. The "Aggregate and Hispanic" category, however, results in the greatest chance of consideration of populations within a block group to be classified as minority.

The number of census block groups contributing to the minority population count was evaluated using the criteria shown in Table 3.10-4 and summarized in Table 3.10-5. The results of the evaluation are census block groups flagged as having a minority population(s). The resulting maps (Figures 3.10-1, 3.10-2, 3.10-3, 3.10-4, 3.10-5, 3.10-6, 3.10-7, 3.10-8, 3.10-9, 3.10-10, 3.10-11, 3.10-12, 3.10-13, 3.10-14, 3.10-15, and 3.10-16) depict the location of minority population census block groups flagged accordingly for each race or aggregate category. Because no block group met the criteria for the Native Hawaiian/Other Pacific Islander race category, no figures illustrating that race category were produced.

The percentage of census block groups exceeding the "Aggregate of All Races" minority population criterion was 37.5 percent when a 50-mile radius was used and 37.5 percent when the individual state was used as the geographic area (Table 3.10-5). For the "Aggregate and Hispanic" category, 42.8 percent of the census block groups contained a minority population when the region was used, and 42.8 percent of the block groups contained minority populations when the individual state was used (Table 3.10-5). The minority population values of the block groups were significantly reduced when races were analyzed individually.

The identified minority population closest to WF3 is the block group the site falls in: census block group 220890627002. The census block group contained a total of 1,302 people, with 1,142 "Black or African American," 1 "American Indian," 1 "Asian," 6 "Two or More Races," and 5 "Hispanic or Latino" individuals. Using either the individual state criteria or the regional criteria, the block group contains a "Black or African American" population, an "Aggregate of All Races" population, and an "Aggregate and Hispanic" population. (USCB 2014e)

There are 16 block groups within a 6-mile radius that meet the criteria for a minority population. There are 645 identified minority population block groups located in, partially within, or adjacent to cities, municipalities, or USCB-defined urban areas (USCB 2014c; USCB 2014e). This leaves several block groups that do not fall within or are not immediately adjacent to cities, municipalities, or USCB-defined urban areas (USCB 2014c; USCB 2014e).

As discussed in Section 3.0.4, there are no Native American Indian lands within a 50-mile radius of WF3.

3.10.2.3 Low-Income Populations

The NRC guidance defines "low-income" using USCB statistical poverty thresholds for individuals or families (NRC 2013d, pages D-5 and D-6). As addressed above with minority

populations, two alternative geographic areas (Louisiana individually and the region) were used as the geographic areas for comparison in this analysis. The guidance indicates that a low-income population is considered present if either of the two following conditions exists:

1. The low-income population in the census block group exceeds 50 percent; or
2. The percentage of households below the poverty level in a block group is significantly greater (typically at least 20 percentage points) than the low-income population percentage of the geographic area chosen for the comparative analysis (i.e., individual state and region's combined average).

To establish minimum thresholds for the individual low-income category, the population with an income below the poverty level for the state was divided by the total population for whom poverty status is determined in the state. To establish minimum thresholds for the family low-income category, the family population count with an income below the poverty level for the state was divided by the total family population count in the state. This process was repeated for the regional population with an income below the poverty level and regional total population for whom poverty status is determined. As described in the second criterion, 20 percent was added to the low-income values for individuals and families and each geographic area. None of the geographic areas described in the first criterion exceeded 50 percent.

When the 2006–2010 census data category "income in the past 12 months below poverty level" (individual) is compared to "total population for whom poverty status is determined," 15.5 percent of the population in the region has an individual income below poverty level, as shown in Table 3.10-6. In the state of Louisiana, the percentage of individuals with an income below poverty level is 18.1 percent (Table 3.10-6).

According to the USCB, Louisiana has an estimated 285,360 families, as shown in Table 3.10-6. When the 2006–2010 census data family category "income in the past 12 months below poverty level" is compared to "total family count", 14.7 percent of the families within the region have an income below poverty level (Table 3.10-6). In the state of Louisiana, the percentage of the family population with an income below poverty level is 17.4 percent (Table 3.10-6).

For example, when Louisiana is used as the geographic area, any census block group within the region with a low-income population equal to or greater than 38.1 percent of the total block group population would be considered a "low-income population" (individual) (Table 3.10-6). Using the appropriate criteria for the individual state, 191 of the total 1,602 census block groups (12.0 percent) have low-income individual population percentages which meet or exceed the percentages in Table 3.10-6. These census block groups are illustrated in Figure 3.10-17.

When the region is used as the geographic area, any census block group within a 50-mile radius with populations of low-income individuals equal to or greater than 35.5 percent of the total block group population would be considered a "low-income population." Using these criteria, 208 of the 1,602 census block groups (13.0 percent) were identified within a 50-mile radius of WF3, as shown in Figure 3.10-18. (USCB 2014c; USCB 2014f)

Similarly, these criteria are found using both geographies and family census counts (Table 3.10-6). Using the family individual state and regional criteria, 191 and 208 census block groups, respectively, were identified as having low-income families (Table 3.10-5). These census block groups are illustrated in Figure 3.10-19 and Figure 3.10-20. (USCB 2014c; USCB 2014f)

The closest low-income block group that meets the guidance criteria for individuals or families is located approximately 3.7 miles east-northeast of WF3, inside and adjacent to the New Orleans Urban Area. It is Block Group 220890624001. (USCB 2014f)

As an indicator of community unaffordable housing, post-Katrina analysis in the MSA identified households where housing costs were more than 35 percent of pre-tax income. Since 2004, the share of renters in Orleans Parish paying unaffordable housing costs rose from 43 percent to 54 percent, while the rest of the MSA rose from 36 percent to 49 percent. For homeowners, the share of homeowners paying unaffordable housing in Orleans Parish maintained at 27 percent, while the rest of the MSA rose from 16 percent to 20 percent. For renters, the analysis did not consider the change in values for the "rest of the MSA" category as statistically significant, nor did it consider the change in values for homeowners in Orleans Parish or the "rest of the MSA" category as statistically significant. (TDC 2014, page 38)

Table 3.10-1
Cities or Towns Located Totally or Partially within a 50-Mile Radius of WF3

City/Town/Village/CDP	Parish	2000 Census Population[(a)]	2010 Census Population[(a)]	Distance to WF3 (miles)[(b)(c)]	Direction
Abita Springs	St. Tammany	1,957	2,365	42	NE
Albany	Livingston	865	1,088	36	NNW
Ama	St. Charles	1,285	1,316	11	ESE
Amelia	St. Mary	2,423	2,459	44	WSW
Amite City	Tangipahoa	4,110	4,141	50	N
Arabi	St. Bernard	8,093	3,635	28	E
Avondale	Jefferson	5,441	4,954	17	ESE
Barataria	Jefferson	1,333	1,109	28	SE
Baton Rouge	East Baton Rouge	227,818	229,493	52	NW
Bayou Blue	Terrebonne	Null	12,352	27	SSW
Bayou Cane	Terrebonne	17,046	19,355	31	SSW
Bayou Country Club	Lafourche	Null	1,396	24	SW
Bayou Gauche	St. Charles	1,770	2,071	13	SSE
Bayou Goula	Iberville	Null	612	44	WNW
Bayou L'Ourse	Assumption	Null	1,978	40	WSW
Belle Chasse	Plaquemines	9,848	12,679	30	ESE
Belle Rose	Assumption	1,944	1,902	35	W
Berwick	St. Mary	4,418	4,946	49	WSW
Bourg	Terrebonne	Null	2,579	31	SSW
Boutte	St. Charles	2,181	3,075	8	SE
Bridge City	Jefferson	8,323	7,706	19	ESE

Table 3.10-1 (Continued)
Cities or Towns Located Totally or Partially within a 50-Mile Radius of WF3

City/Town/Village/CDP	Parish	2000 Census Population[(a)]	2010 Census Population[(a)]	Distance to WF3 (miles)[(b)(c)]	Direction
Central	East Baton Rouge	Null	26,864	52	NW
Chackbay	Lafourche	4,018	5,177	20	WSW
Chalmette	St. Bernard	32,069	16,751	31	E
Chauvin	Terrebonne	3,229	2,912	39	S
Choctaw	Lafourche	Null	879	18	SW
Convent	St. James	Null	711	22	W
Covington	St. Tammany	8,483	8,765	40	NNE
Cut Off	Lafourche	5,635	5,976	32	SSE
Denham Springs	Livingston	8,757	10,215	45	NW
Des Allemands	St. Charles	2,500	2,505	12	S
Destrehan	St. Charles	11,260	11,535	7	ESE
Donaldsonville	Ascension	7,605	7,436	32	WNW
Dulac	Terrebonne	2,458	1,463	44	SSW
Eden Isle	St. Tammany	6,261	7,041	43	ENE
Edgard	St. John the Baptist	2,637	2,441	6	WNW
Elmwood	Jefferson	4,270	4,635	17	E
Estelle	Jefferson	15,880	16,377	24	ESE
Folsom	St. Tammany	525	716	47	NNE
French Settlement	Livingston	945	1,116	28	NW
Galliano	Lafourche	7,356	7,676	39	SSE
Gardere	East Baton Rouge	8,992	10,580	47	WNW

Table 3.10-1 (Continued)
Cities or Towns Located Totally or Partially within a 50-Mile Radius of WF3

City/Town/Village/CDP	Parish	2000 Census Population[(a)]	2010 Census Population[(a)]	Distance to WF3 (miles)[(b)(c)]	Direction
Garyville	St. John the Baptist	2,775	2,811	11	WNW
Golden Meadow	Lafourche	2,193	2,101	44	SSE
Gonzales	Ascension	8,156	9,781	32	WNW
Gramercy	St. James	3,066	3,613	14	WNW
Grand Point	St. James	Null	2,473	17	W
Gray	Terrebonne	4,958	5,584	29	SW
Gretna	Jefferson	17,423	17,736	26	E
Hahnville	St. Charles	2,792	3,344	4	ESE
Hammond	Tangipahoa	17,639	20,019	35	N
Harahan	Jefferson	9,885	9,277	17	ESE
Harvey	Jefferson	22,226	20,348	24	ESE
Hester	St. James	Null	498	18	W
Houma	Terrebonne	32,393	33,727	31	SSW
Independence	Tangipahoa	1,724	1,665	44	N
Inniswold	East Baton Rouge	4,944	6,180	45	NW
Jean Lafitte	Jefferson	2,137	1,903	27	SE
Jefferson	Jefferson	11,843	11,193	18	E
Kenner	Jefferson	70,517	66,702	14	E
Killian	Livingston	1,053	1,206	26	NNW
Killona	St. Charles	797	793	1	WNW
Kraemer	Lafourche	Null	934	16	SW

Table 3.10-1 (Continued)
Cities or Towns Located Totally or Partially within a 50-Mile Radius of WF3

City/Town/Village/CDP	Parish	2000 Census Population[(a)]	2010 Census Population[(a)]	Distance to WF3 (miles)[(b)(c)]	Direction
Labadieville	Assumption	1,811	1,854	31	WSW
Lacombe	St. Tammany	7,518	8,679	38	NE
Lafitte	Jefferson	1,576	972	31	SE
Lafourche Crossing	Lafourche	Null	2,002	24	SW
Laplace	St. John the Baptist	27,684	29,872	5	N
Larose	Lafourche	7,306	7,400	30	SSE
Lemannville	Ascension	Null	860	28	WNW
Livingston	Livingston	1,342	1,769	39	NNW
Lockport	Lafourche	2,624	2,578	24	S
Lockport Heights	Lafourche	Null	1,286	24	S
Luling	St. Charles	11,512	12,119	8	ESE
Lutcher	St. James	3,735	3,559	14	WNW
Madisonville	St. Tammany	677	748	34	NNE
Mandeville	St. Tammany	10,489	11,560	35	NE
Marrero	Jefferson	36,165	33,141	23	ESE
Mathews	Lafourche	2,003	2,209	22	S
Meraux	St. Bernard	10,192	5,816	32	E
Metairie	Jefferson	146,136	138,481	19	E
Montegut	Terrebonne	1,803	1,540	36	S
Monticello	East Baton Rouge	4,763	5,172	48	NW
Montpelier	St. Helena	214	266	48	NNW

Table 3.10-1 (Continued)
Cities or Towns Located Totally or Partially within a 50-Mile Radius of WF3

City/Town/Village/CDP	Parish	2000 Census Population[(a)]	2010 Census Population[(a)]	Distance to WF3 (miles)[(b)(c)]	Direction
Montz	St. Charles	1,120	1,918	2	NNE
Moonshine	St. James	Null	194	21	W
Morgan City	St. Mary	12,703	12,404	49	WSW
Napoleonville	Assumption	686	660	33	W
Natalbany	Tangipahoa	1,739	2,984	38	N
New Orleans	Orleans	484,674	343,829	25	E
New Sarpy	St. Charles	1,568	1,464	5	ESE
Norco	St. Charles	3,579	3,074	4	E
North Vacherie	St. James	2,411	2,346	15	W
Oak Hills Place	East Baton Rouge	7,996	8,195	45	WNW
Old Jefferson	East Baton Rouge	5,631	6,980	41	NW
Paincourtville	Assumption	884	911	35	W
Paradis	St. Charles	1,252	1,298	8	SSE
Paulina	St. James	Null	1,178	15	W
Pearl River	St. Tammany	1,839	2,506	51	ENE
Pierre Part	Assumption	3,239	3,169	44	W
Plaquemine	Iberville	7,064	7,119	50	WNW
Pleasure Bend	St. John the Baptist	Null	250	11	WSW
Pointe a la Hache	Plaquemines	Null	187	50	SE
Ponchatoula	Tangipahoa	5,180	6,559	31	N
Port Sulphur	Plaquemines	3,115	1,760	57	SE

Table 3.10-1 (Continued)
Cities or Towns Located Totally or Partially within a 50-Mile Radius of WF3

City/Town/Village/CDP	Parish	2000 Census Population[(a)]	2010 Census Population[(a)]	Distance to WF3 (miles)[(b)(c)]	Direction
Port Vincent	Livingston	463	741	33	NW
Poydras	St. Bernard	3,886	2,351	36	ESE
Prairieville	Ascension	Null	26,895	37	NW
Presquille	Terrebonne	Null	1,807	32	SSW
Raceland	Lafourche	10,224	10,193	20	SSW
Reserve	St. John the Baptist	9,111	9,766	6	NW
River Ridge	Jefferson	14,588	13,494	15	E
Romeville	St. James	Null	130	23	W
Schriever	Terrebonne	5,880	6,853	27	SW
Shenandoah	East Baton Rouge	17,070	18,399	42	NW
Siracusaville	St. Mary	Null	422	46	WSW
Slidell	St. Tammany	25,695	27,068	46	ENE
Sorrento	Ascension	1,227	1,401	27	WNW
South Vacherie	St. James	3,543	3,642	14	WSW
Springfield	Livingston	395	487	30	N
St. Gabriel	Iberville	5,514	6,677	42	WNW
St. James	St. James	Null	828	22	W
St. Rose	St. Charles	6,540	8,122	10	E
Supreme	Assumption	1,119	1,052	33	WSW
Taft	St. Charles	Null	63	1	ESE
Terrytown	Jefferson	25,430	23,319	27	E

Table 3.10-1 (Continued)
Cities or Towns Located Totally or Partially within a 50-Mile Radius of WF3

City/Town/Village/CDP	Parish	2000 Census Population[a]	2010 Census Population[a]	Distance to WF3 (miles)[b][c]	Direction
Thibodaux	Lafourche	14,431	14,566	25	SW
Tickfaw	Tangipahoa	617	694	40	N
Timberlane	Jefferson	11,405	10,243	28	ESE
Union	St. James	Null	892	27	WNW
Village St. George	East Baton Rouge	6,993	7,104	44	NW
Violet	St. Bernard	8,555	4,973	35	E
Waggaman	Jefferson	9,435	10,015	16	ESE
Walker	Livingston	4,801	6,138	41	NW
Wallace	St. John the Baptist	570	671	11	W
Watson	Livingston	Null	1,047	49	NW
Welcome	St. James	Null	800	24	W
Westminster	East Baton Rouge	2,515	3,008	47	NW
Westwego	Jefferson	10,763	8,534	21	ESE
White Castle	Iberville	1,946	1,883	42	WNW
Woodmere	Jefferson	13,058	12,080	25	ESE

Null: No available data.

a. (USCB 2014b)
b. (USDOT 2014)
c. Distances reported were measured from the WF3 center point to the city center.

Table 3.10-2
Parish Populations Totally or Partially Included within a 50-Mile Radius of WF3

State and Parish	2000 Population[(a)]	2010 Population[(a)]	2045 Projected Permanent Population[(b)]	2045 Projected Total Population[(b)(c)]
Louisiana	2,478,267	2,466,402	3,398,807	3,453,766
Ascension	76,627	107,215	201,994	205,260
Assumption	23,388	23,421	25,649	26,064
East Baton Rouge	412,852	440,171	570,315	579,537
Iberia	73,266	73,240	96,776	98,340
Iberville	33,320	33,387	34,810	35,373
Jefferson	455,466	432,552	478,624	486,363
Lafourche	89,974	96,318	123,153	125,145
Livingston	91,814	128,026	338,058	343,525
Orleans	484,674	343,829	360,740	366,573
Plaquemines	26,757	23,042	24,781	25,182
St. Bernard	67,229	35,897	48,424	49,207
St. Charles	48,072	52,780	78,562	79,832
St. Helena	10,525	11,203	11,631	11,819
St. James	21,216	22,102	23,198	23,573
St. John the Baptist	43,044	45,924	64,750	65,797
St. Martin	48,583	52,160	83,126	84,471
St. Mary	53,500	54,650	57,132	58,056
St. Tammany	191,268	233,740	422,402	429,232
Tangipahoa	100,588	121,097	186,893	189,915
Terrebonne	104,503	111,860	136,973	139,187

Table 3.10-2 (Continued)
Parish Populations Totally or Partially Included within a 50-Mile Radius of WF3

State and Parish	2000 Population[(a)]	2010 Population[(a)]	2045 Projected Permanent Population[(b)]	2045 Projected Total Population[(b)(c)]
West Baton Rouge	21,601	23,788	30,816	31,314
Regional Parishes Total	**2,478,267**	**2,466,402**	**3,398,807**	**3,453,766**

CDP: Census designated place.

Note: For parishes with projected negative population growth, the maximum population values for that parish were held constant.

a. (USCB 2014a)
b. (WPEI 2014; USCB 2014e)
c. (UNO 2014)

Table 3.10-3
Parish Population Growth, 2010–2045

			2015	2020	2025	2030	2035	2040	2045
Louisiana	Jefferson Parish	Population	441,552	451,982	460,987	468,082	473,204	476,646	478,624
		Average Annual Growth %	0.41	0.47	0.40	0.31	0.22	0.15	0.08
	St. Charles Parish	Population	55,512	59,371	63,268	67,121	70,898	74,614	78,562
		Average Annual Growth %	1.01	1.35	1.28	1.19	1.10	1.03	1.04

(WPEI 2014)

Table 3.10-4
Minority Populations Evaluated Against Criterion

	Louisiana			50-Mile Radius (Region)[a]		
Total Population[b]	4,533,372			2,066,246		
Census Categories	**State Population by Census Category[b]**	**Percent[c]**	**Criteria**	**State Population by Census Category[d]**	**Percent[c]**	**Criteria**
Black or African American	1,452,396	32.0	50.0	606,224	29.3	49.3
American Indian or Alaska Native	30,579	0.7	20.7	16,492	0.8	20.8
Asian	70,132	1.5	21.5	46,178	2.2	22.2
Native Hawaiian/Other Pacific Islander	1,963	0.04	20.04	887	0.04	20.04
Some Other Race	69,227	1.5	21.5	46,619	2.3	22.3
Two or More Races	72,883	1.6	21.6	35,705	1.7	21.7
Aggregate of All Races	1,697,180	37.4	50.0	752,105	36.4	50.0
Hispanic or Latino	192,560	4.2	24.2	129,196	6.3	26.3
Aggregate and Hispanic	1,889,740	41.7	50.0	881,301	42.7	50.0

a. (USCB 2014e) Population values reported in this column are from block groups. Block groups located on the 50-mile radius boundary were not area weighted for these calculations.

b. (USCB 2014g; USCB 2014h)

c. Percent values were calculated by dividing each census categories' population by Louisiana, and 50-mile radius total population values.

d. (USCB 2014e)

Table 3.10-5
Minority Census Block Group Counts, 50-Mile Radius of WF3

Individual State Method			50-Mile Radius	
	Census Block Groups[a]		Census Block Groups[a]	
Total block groups with population within 50-mile radius	1,602		1,602	
Census Categories	**Minority and Low-Income Category Block Groups**	**Percent Block Groups within 50-Mile Radius**	**Minority and Low-Income Category Block Groups**	**Percent Block Groups within 50-Mile Radius**
Black or African American	509	31.8	517	32.3
American Indian or Alaska Native	6	0.4	6	0.4
Asian	9	0.6	9	0.6
Native Hawaiian/Other Pacific Islander	0	0	0	0
Some Other Race	5	0.3	5	0.3
Two or More Races	2	0.1	2	0.1
Aggregate of All Races	600	37.5	600	37.5
Hispanic or Latino	41	2.6	33	2.1
Aggregate and Hispanic	685	42.8	685	42.8
Low Income[b] (Individuals)	191	11.9	208	13
Low Income[b] (Families)	165	10.3	191	11.9

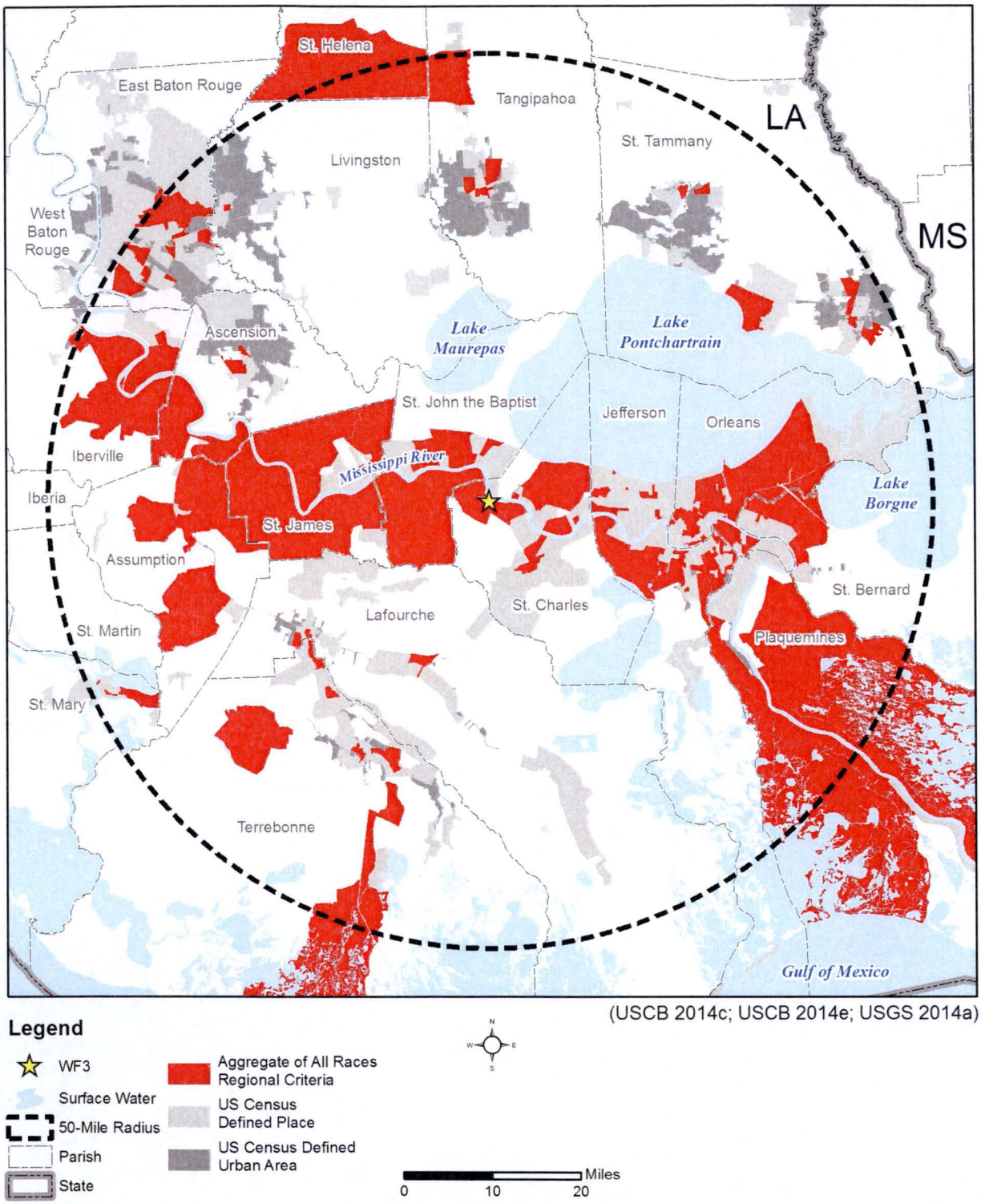
a. (USCB 2014e)
b. (USCB 2014f)

Table 3.10-6
Low-Income Population Criteria Using Two Geographic Areas

	Louisiana			50-Mile Radius (Region)		
(Income) Total Population[a]	4,302,475			1,952,021		
(Income) Total Families[a]	1,641,165			738,660		
Census Category	**State Population by Census Category**	**Percent[b]**	**Criteria**	**State Population by Census Category**	**Percent[b]**	**Criteria**
Low Income—Number of Persons Below Poverty Level	780,359	18.1	38.1	303,226	15.5	35.5
Low Income—Number of Families Below Poverty Level	285,360	17.4	37.4	108,311	14.7	34.7

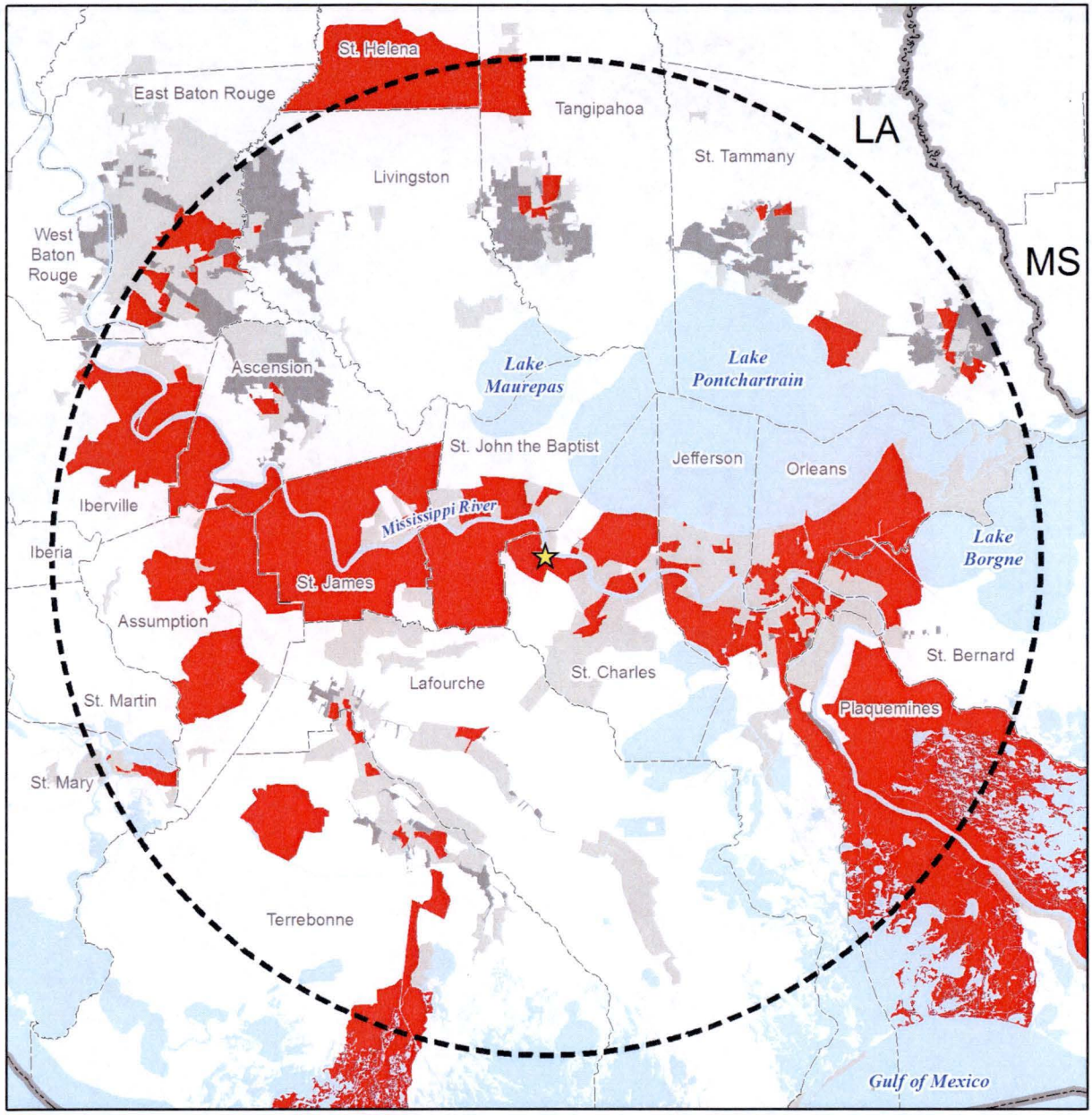
a. (USCB 2014f)

b. (USCB 2014e) Percent values were calculated by dividing each census categories' population by Louisiana and 50-mile radius total population values.



(USCB 2014c; USCB 2014e; USGS 2014a)

Figure 3.10-1
Census—Aggregate of All Races Populations (Regional)



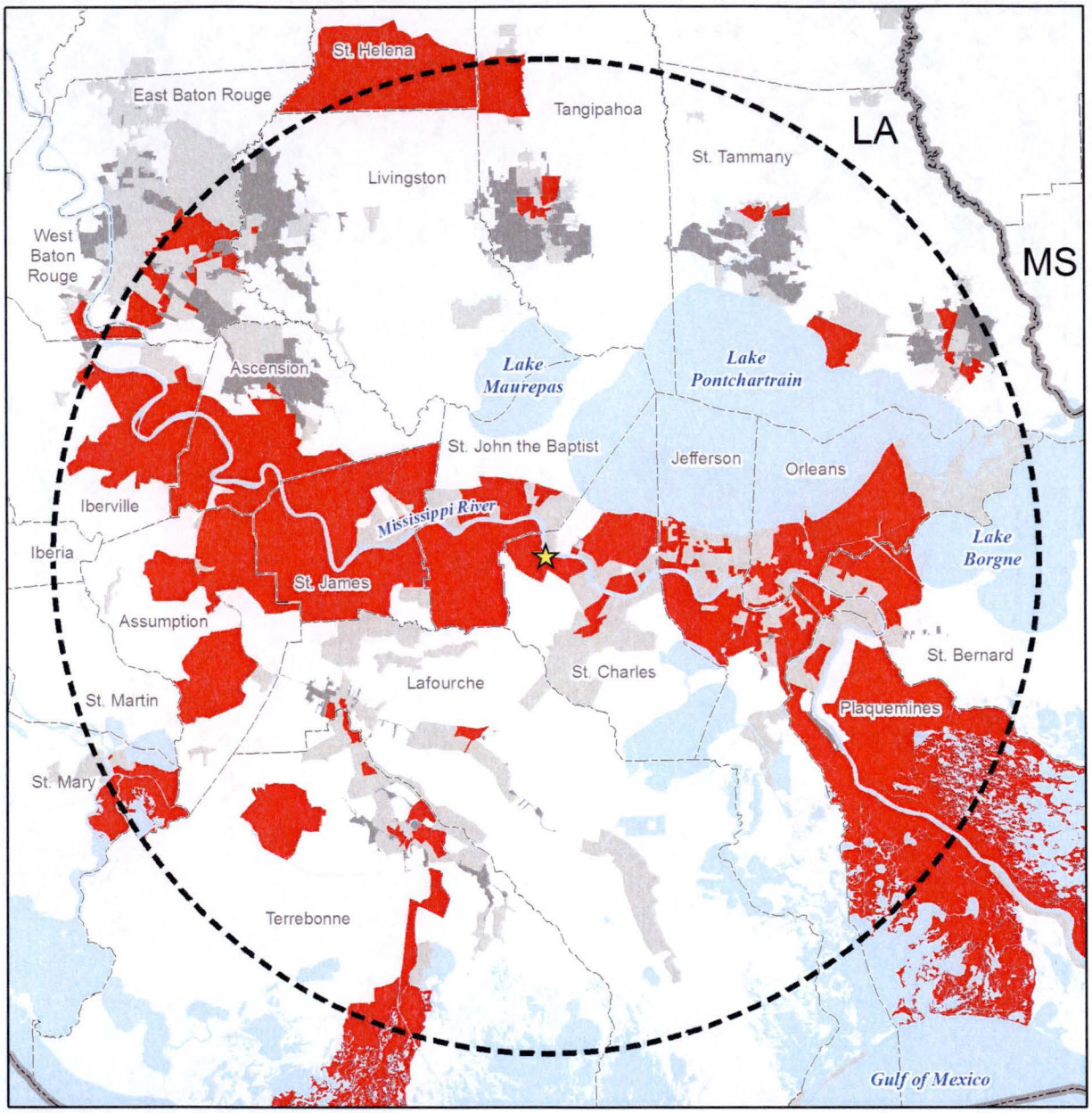
(USCB 2014c; USCB 2014e; USGS 2014a)

Legend

- WF3
- Surface Water
- 50-Mile Radius
- Parish
- State
- Aggregate of All Races State Criteria
- US Census Defined Place
- Census Defined Urban Area

Miles
0 10 20

Figure 3.10-2
Census—Aggregate of All Races Populations (Individual State)



(USCB 2014c; USCB 2014e; USGS 2014a)

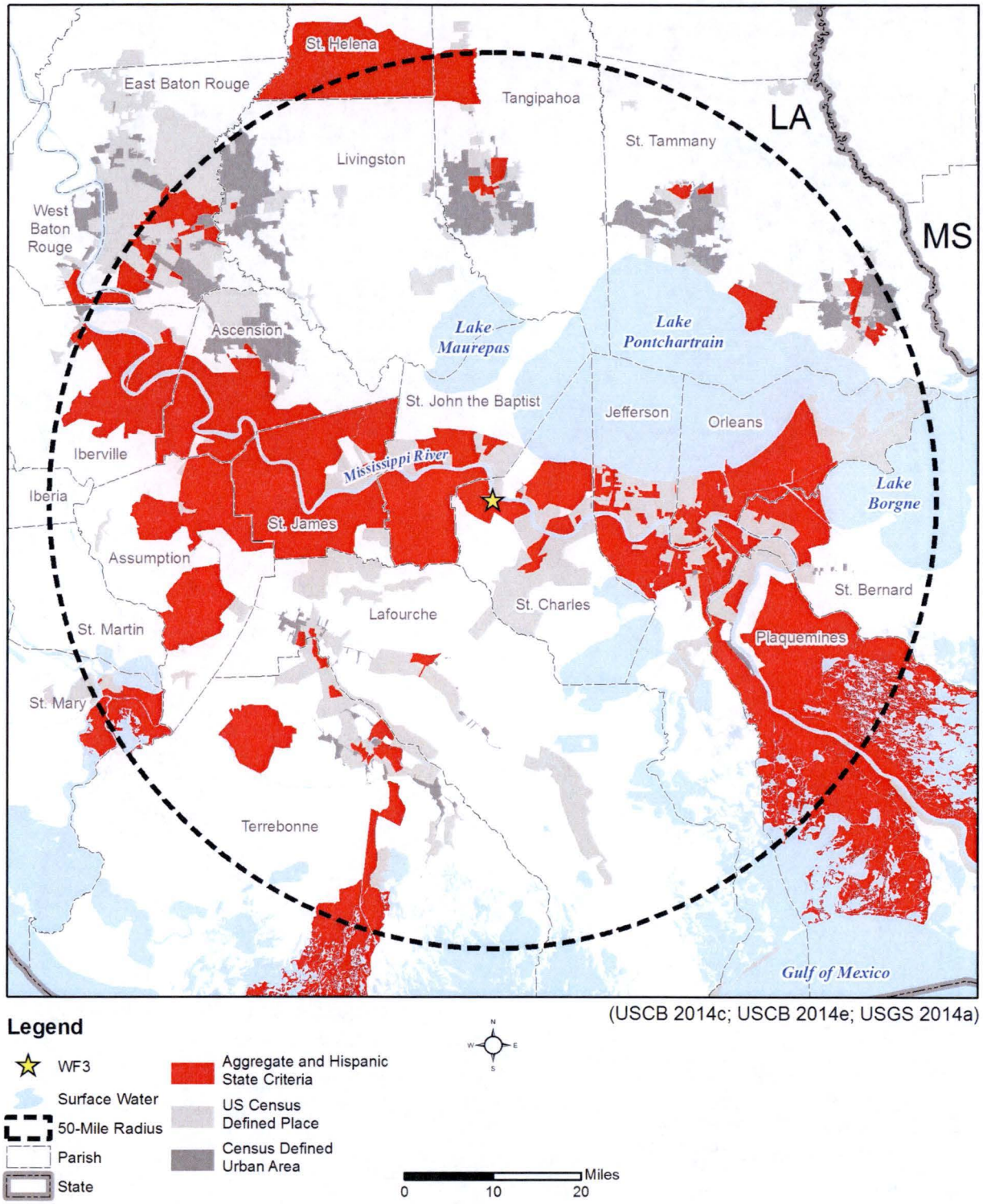
Legend

- WF3
- Surface Water
- 50-Mile Radius
- Parish
- State
- Aggregate and Hispanic Regional Criteria
- US Census Defined Place
- US Census Defined Urban Area

N W E S

0 10 20 Miles

Figure 3.10-3
Census—Aggregate and Hispanic Populations (Regional)



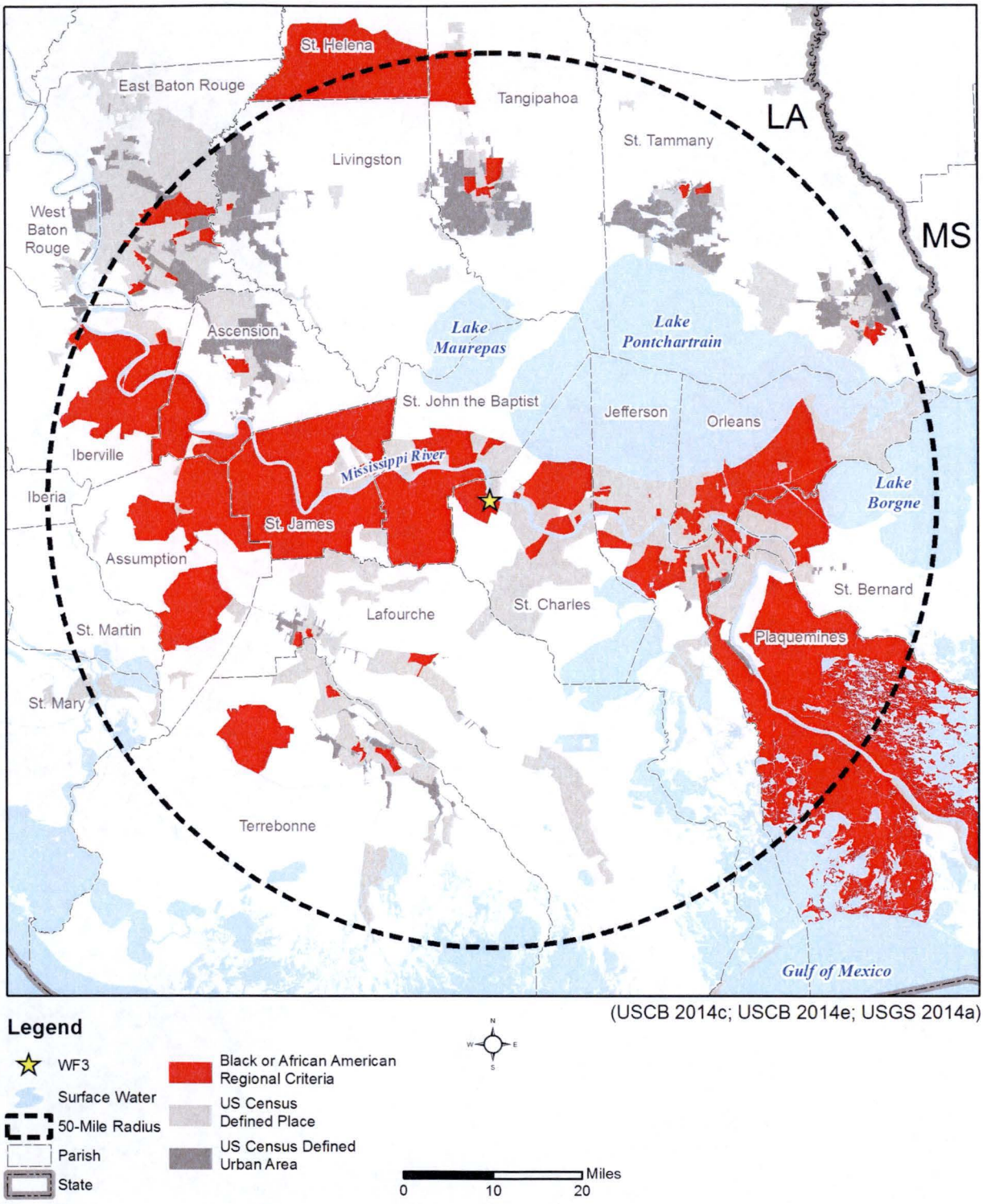
(USCB 2014c; USCB 2014e; USGS 2014a)

Legend

- WF3
- Surface Water
- 50-Mile Radius
- Parish
- State
- Aggregate and Hispanic State Criteria
- US Census Defined Place
- Census Defined Urban Area

Miles
0 10 20

Figure 3.10-4
Census—Aggregate and Hispanic Populations (Individual State)



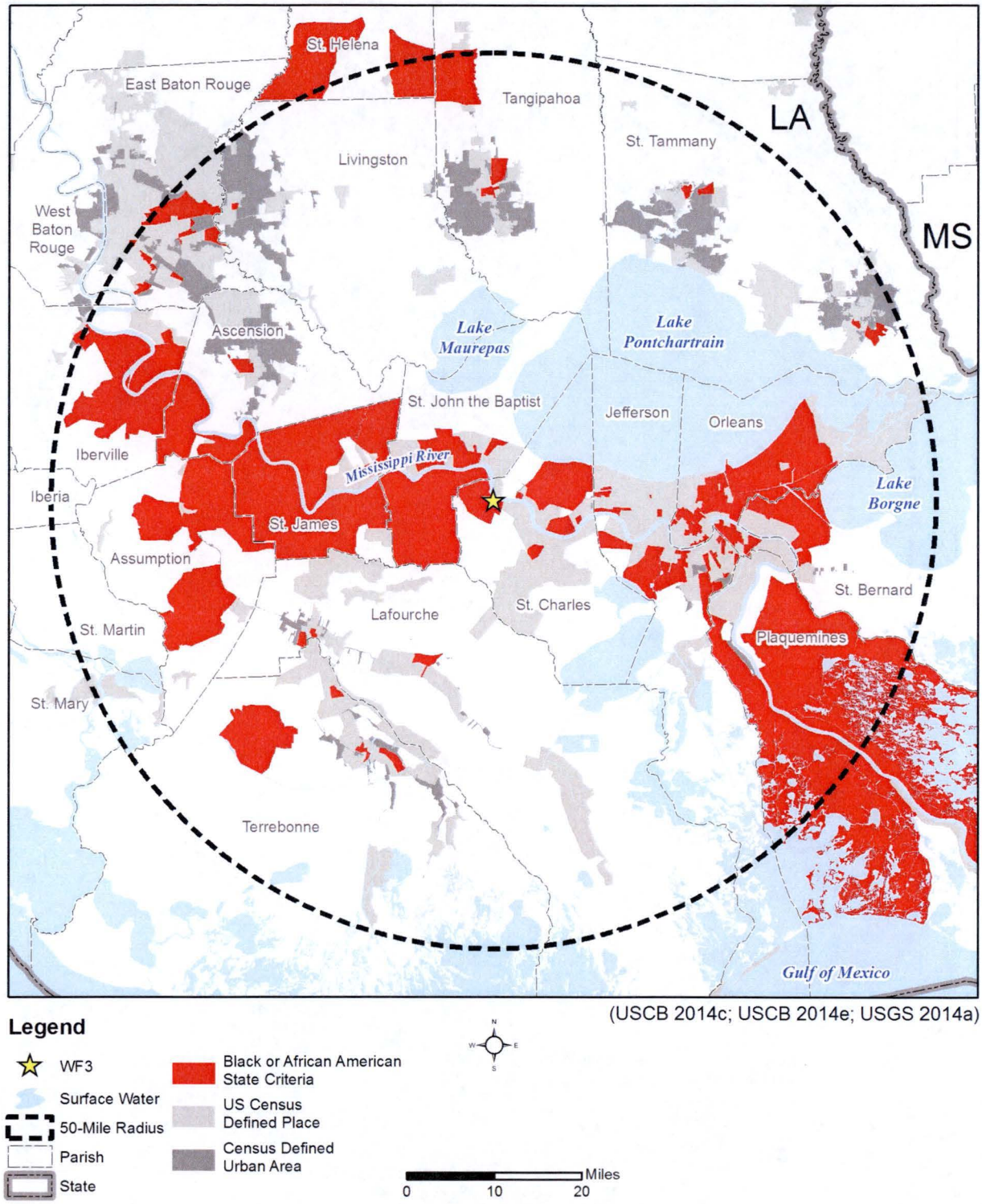
(USCB 2014c; USCB 2014e; USGS 2014a)

Legend

- WF3
- Surface Water
- 50-Mile Radius
- Parish
- State
- Black or African American Regional Criteria
- US Census Defined Place
- US Census Defined Urban Area

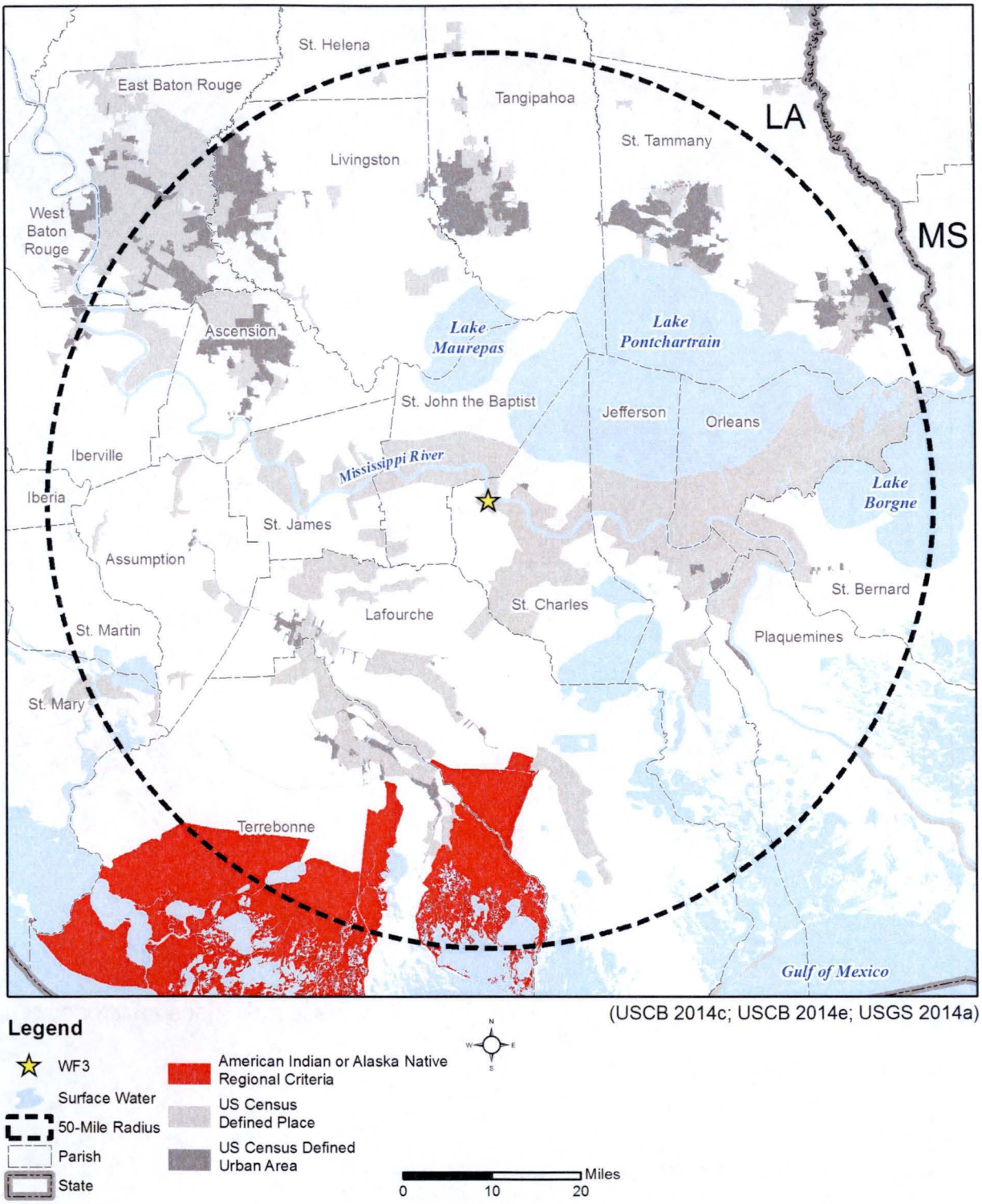
Miles: 0 10 20

Figure 3.10-5
Census—Black or African American Populations (Regional)



(USCB 2014c; USCB 2014e; USGS 2014a)

Figure 3.10-6
Census—Black or African American Populations (Individual State)



(USCB 2014c; USCB 2014e; USGS 2014a)

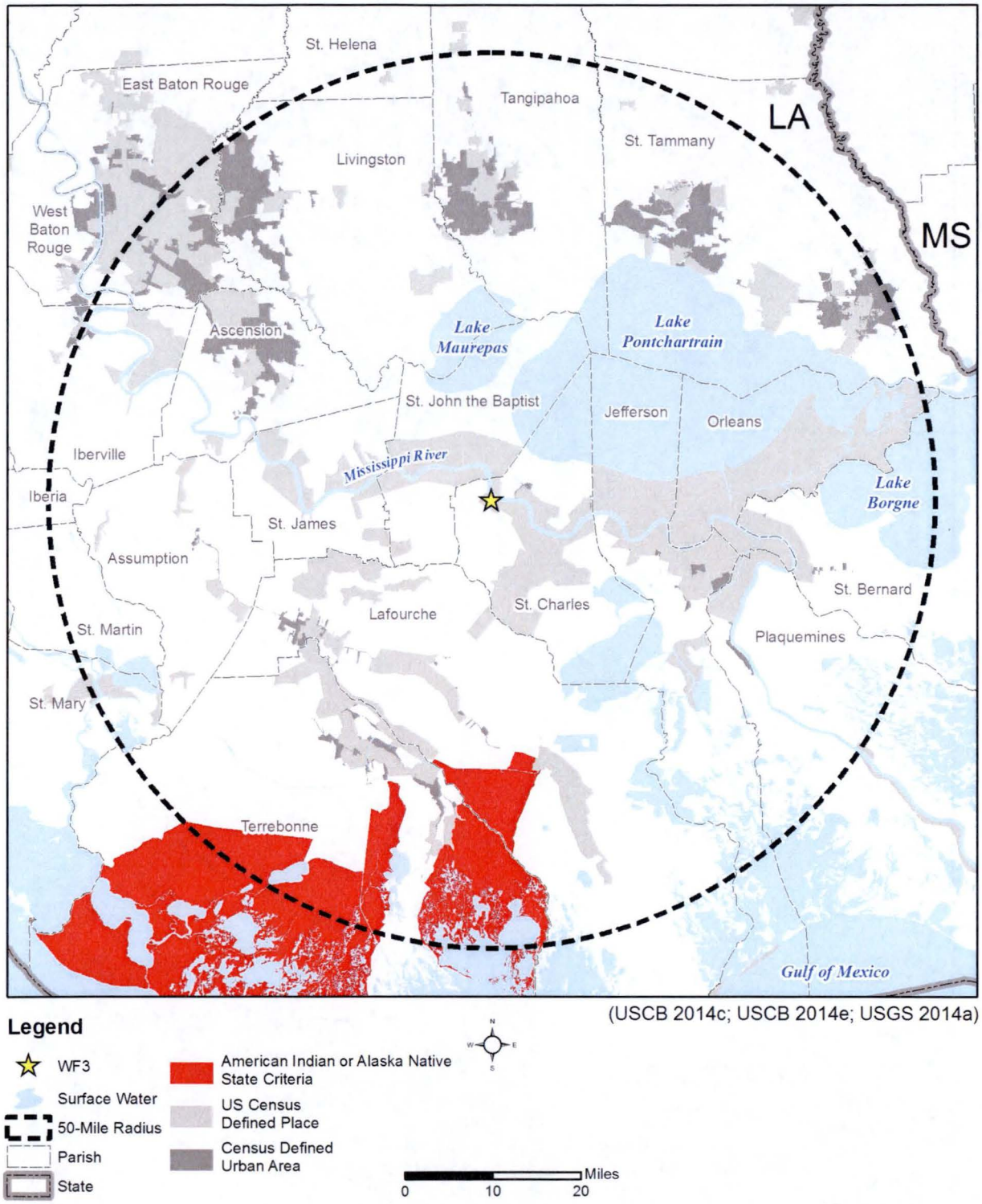
Legend

- WF3
- Surface Water
- 50-Mile Radius
- Parish
- State
- American Indian or Alaska Native Regional Criteria
- US Census Defined Place
- US Census Defined Urban Area

N W E S

0 10 20 Miles

Figure 3.10-7
Census—American Indian or Alaska Native Populations (Regional)



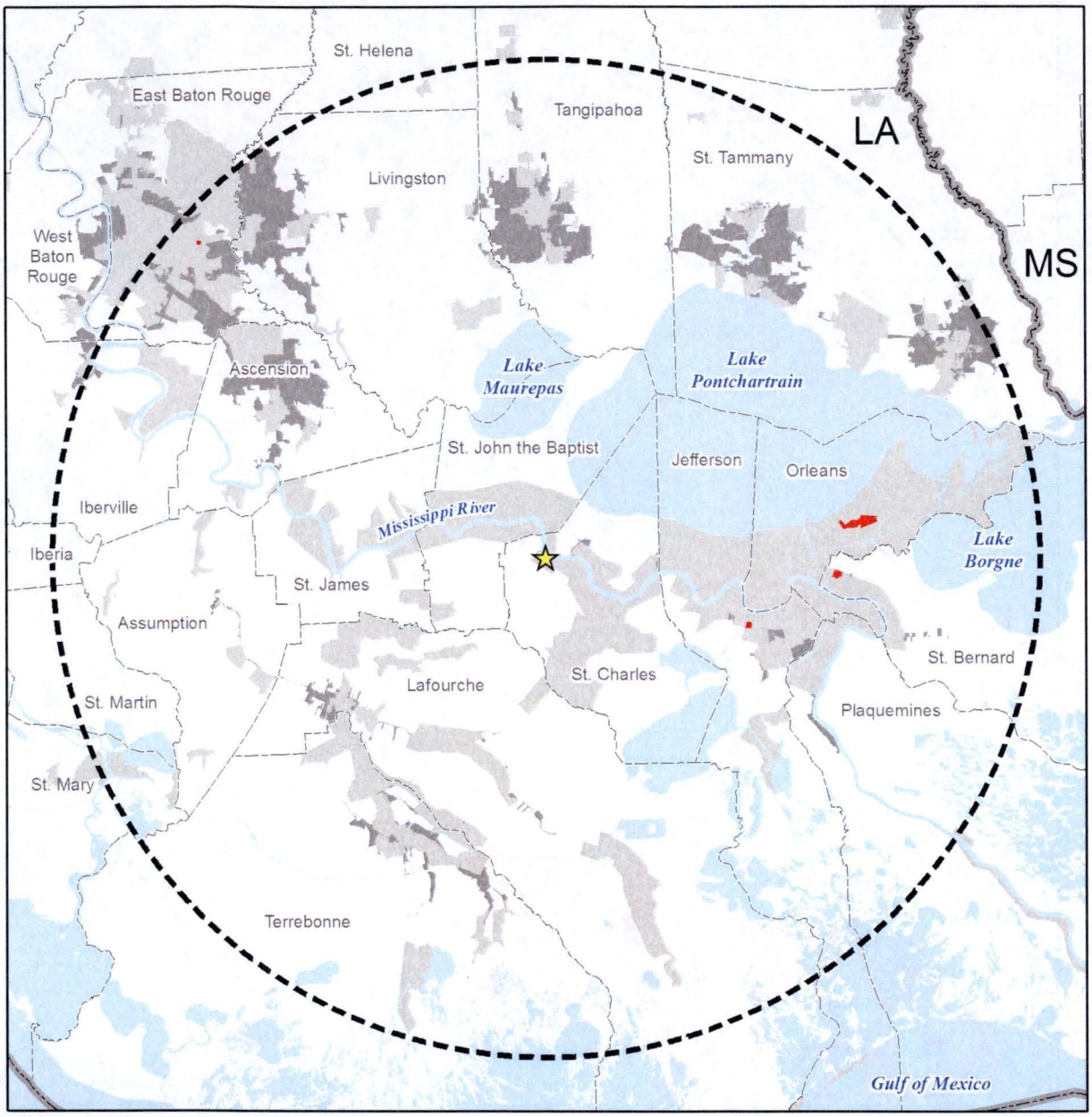
(USCB 2014c; USCB 2014e; USGS 2014a)

Legend

- WF3
- Surface Water
- 50-Mile Radius
- Parish
- State
- American Indian or Alaska Native State Criteria
- US Census Defined Place
- Census Defined Urban Area

Miles: 0, 10, 20

Figure 3.10-8
Census—American Indian or Alaska Native Populations (Individual State)



(USCB 2014c; USCB 2014e; USGS 2014a)

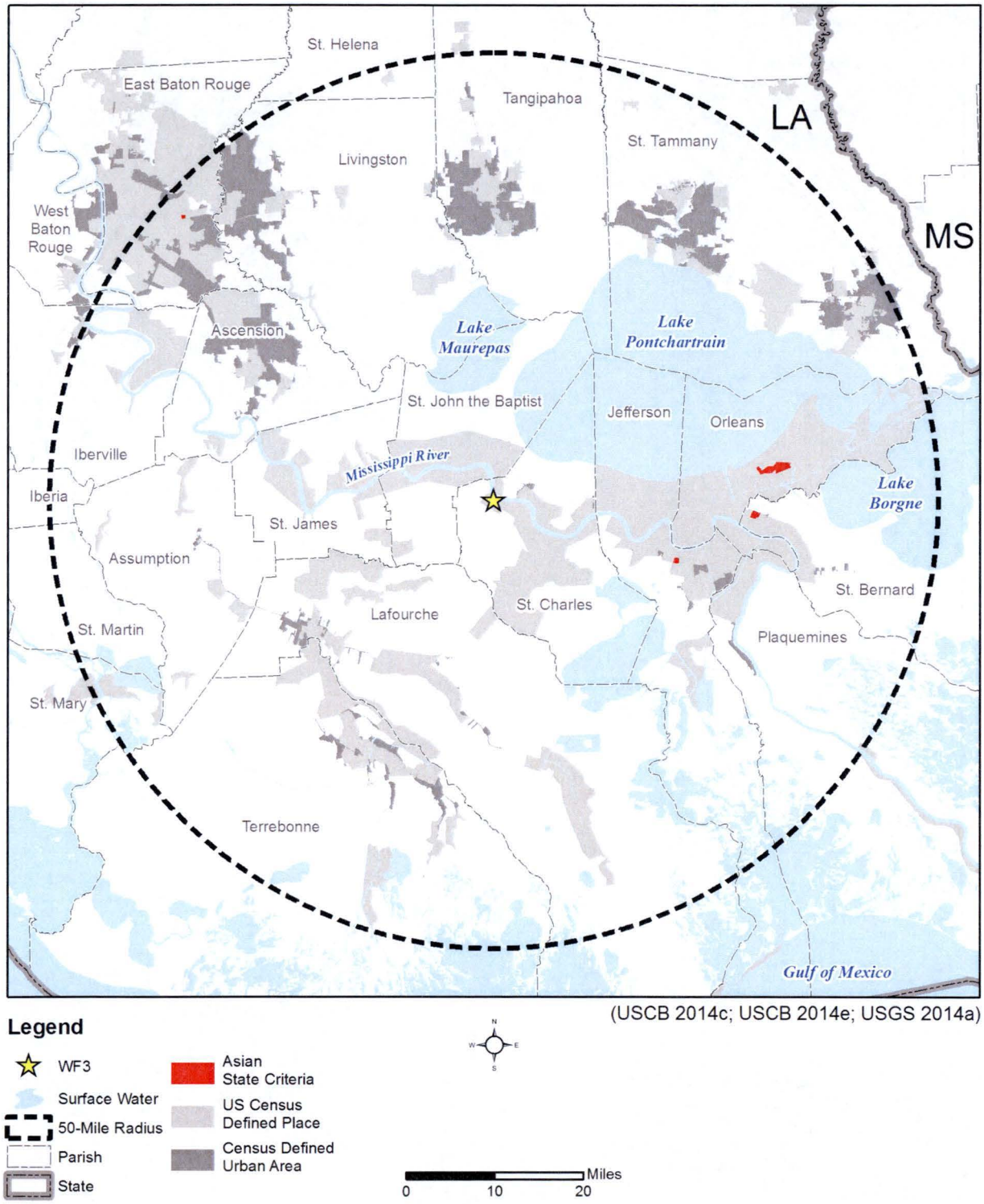
Legend

- WF3
- Surface Water
- 50-Mile Radius
- Parish
- State
- Asian Regional Criteria
- US Census Defined Place
- US Census Defined Urban Area

N W E S

0 10 20 Miles

Figure 3.10-9
Census—Asian Populations (Regional)



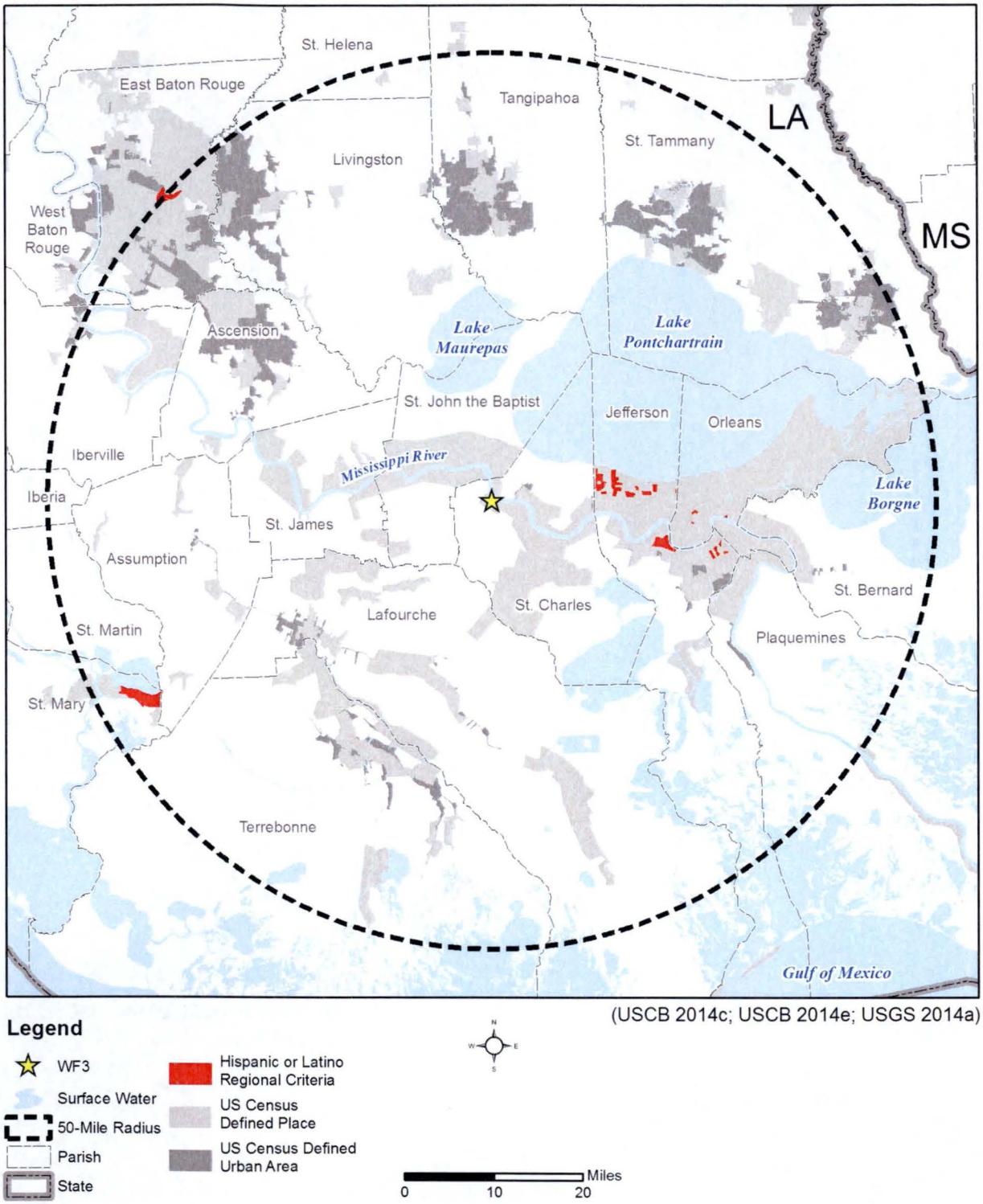
(USCB 2014c; USCB 2014e; USGS 2014a)

Legend

- WF3
- Surface Water
- 50-Mile Radius
- Parish
- State
- Asian State Criteria
- US Census Defined Place
- Census Defined Urban Area

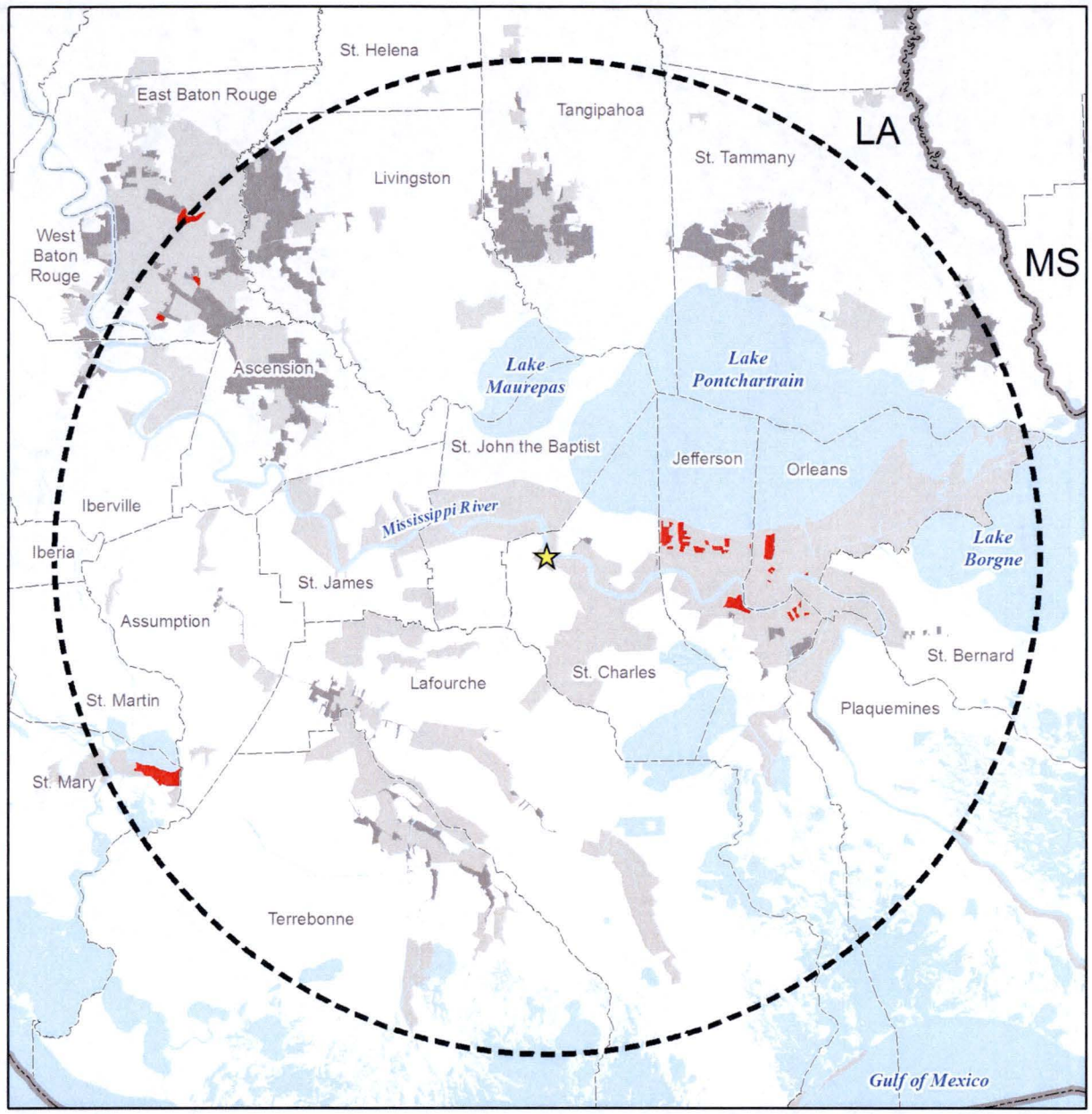
Miles
0 10 20

Figure 3.10-10
Census—Asian Populations (Individual State)



(USCB 2014c; USCB 2014e; USGS 2014a)

Figure 3.10-11
Census—Hispanic or Latino Populations (Regional)



(USCB 2014c; USCB 2014e; USGS 2014a)

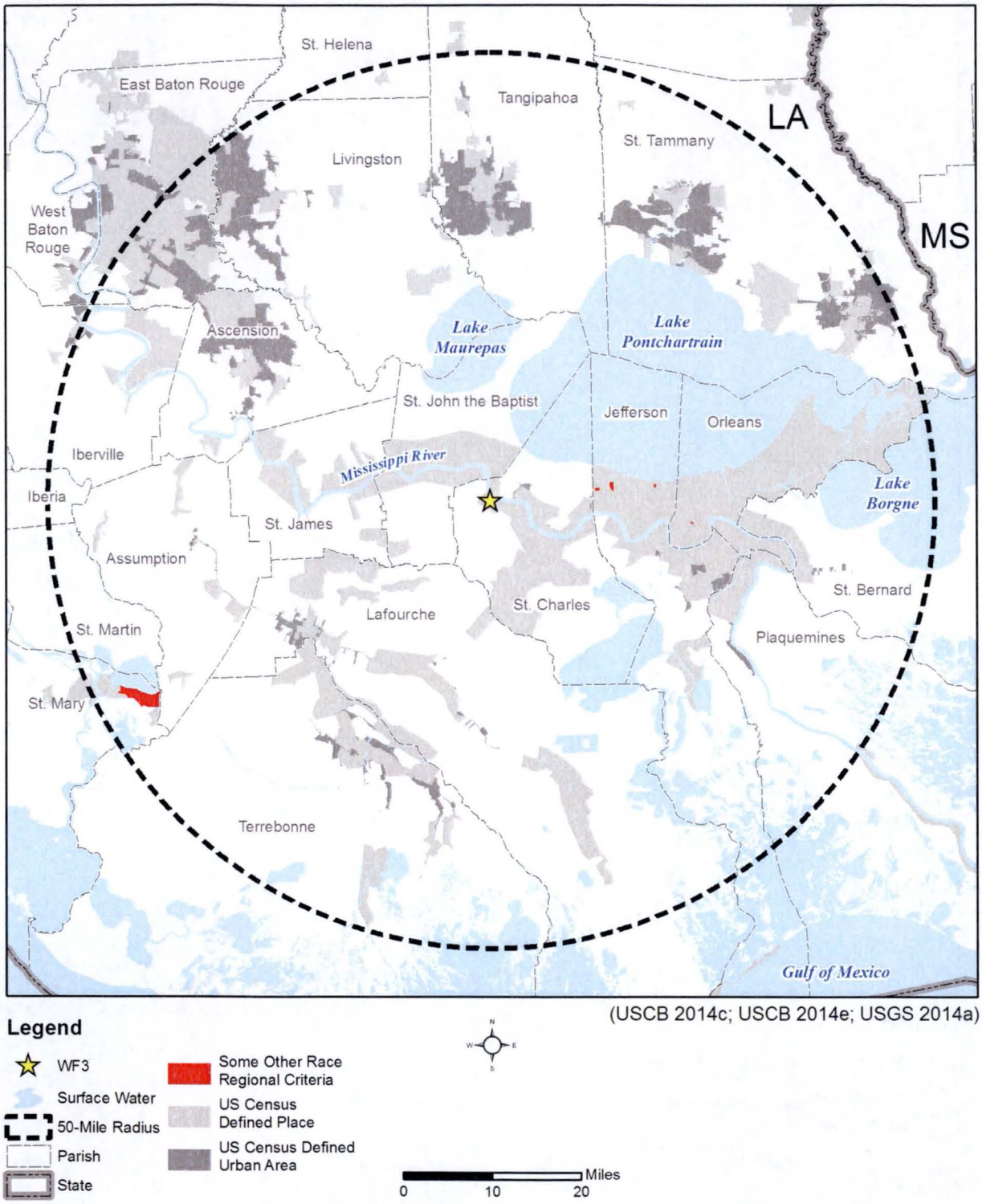
Legend

- WF3
- Surface Water
- 50-Mile Radius
- Parish
- State
- Hispanic or Latino State Criteria
- US Census Defined Place
- Census Defined Urban Area

N W E S

0 10 20 Miles

Figure 3.10-12
Census—Hispanic or Latino Populations (Individual State)



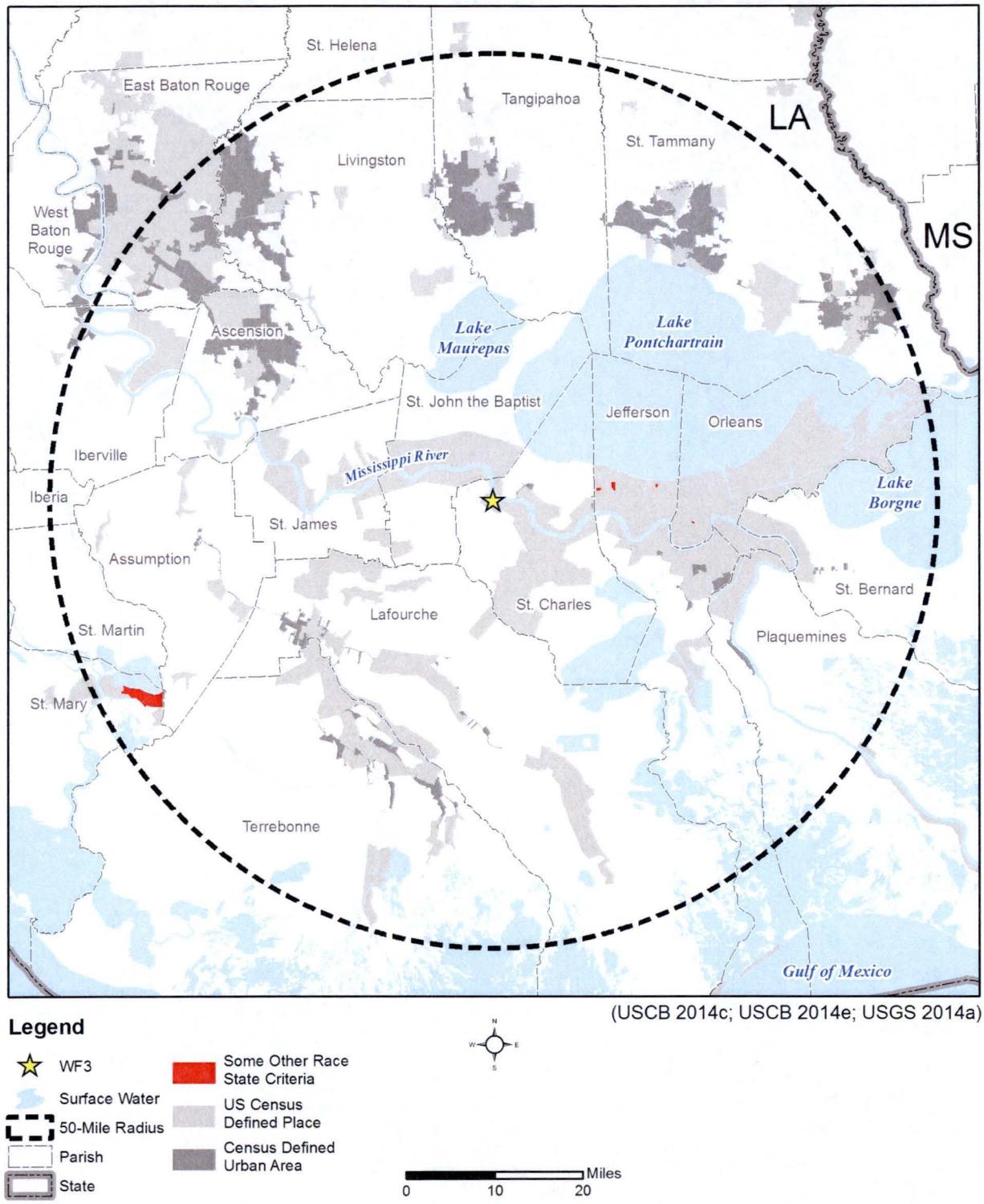
(USCB 2014c; USCB 2014e; USGS 2014a)

Legend

- WF3
- Surface Water
- 50-Mile Radius
- Parish
- State
- Some Other Race Regional Criteria
- US Census Defined Place
- US Census Defined Urban Area

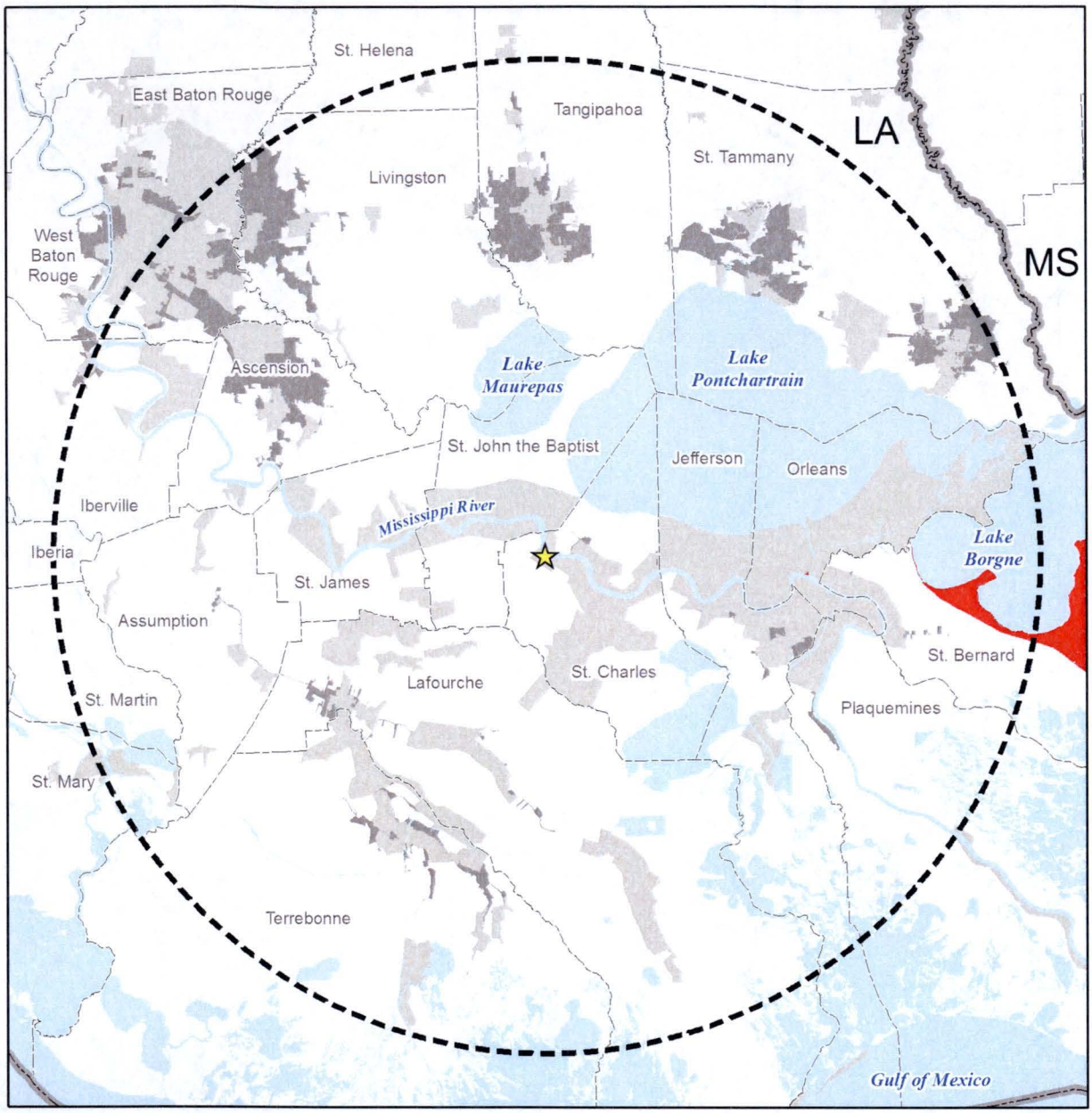
Miles
0 10 20

Figure 3.10-13
Census—Some Other Race Populations (Regional)



(USCB 2014c; USCB 2014e; USGS 2014a)

Figure 3.10-14
Census—Some Other Race Populations (Individual State)



(USCB 2014c; USCB 2014e; USGS 2014a)

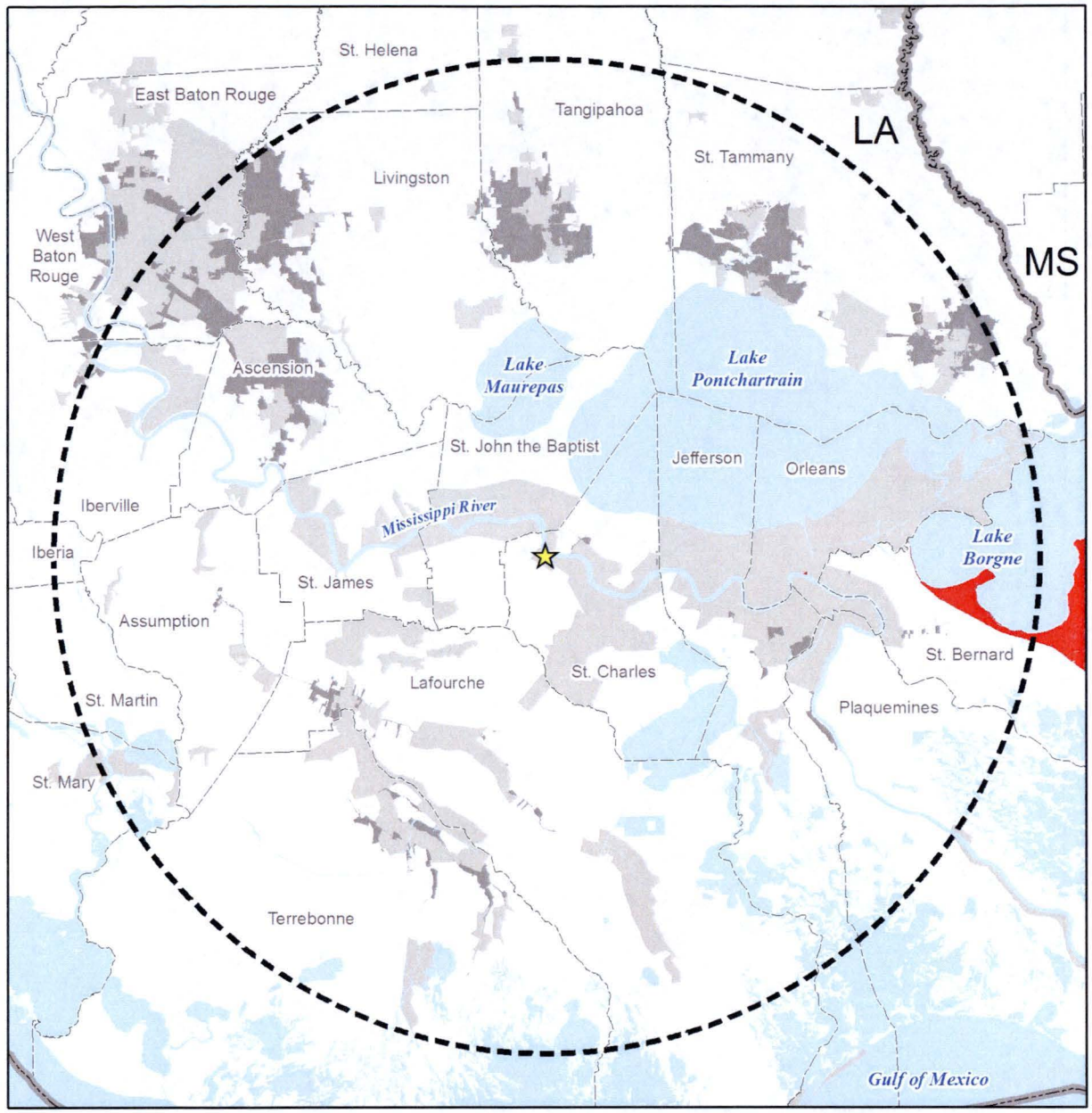
Legend

- WF3
- Surface Water
- 50-Mile Radius
- Parish
- State
- Two or More Races Regional Criteria
- US Census Defined Place
- US Census Defined Urban Area

N W E S

0 10 20 Miles

Figure 3.10-15
Census—Two or More Races Populations (Regional)



(USCB 2014c; USCB 2014e; USGS 2014a)

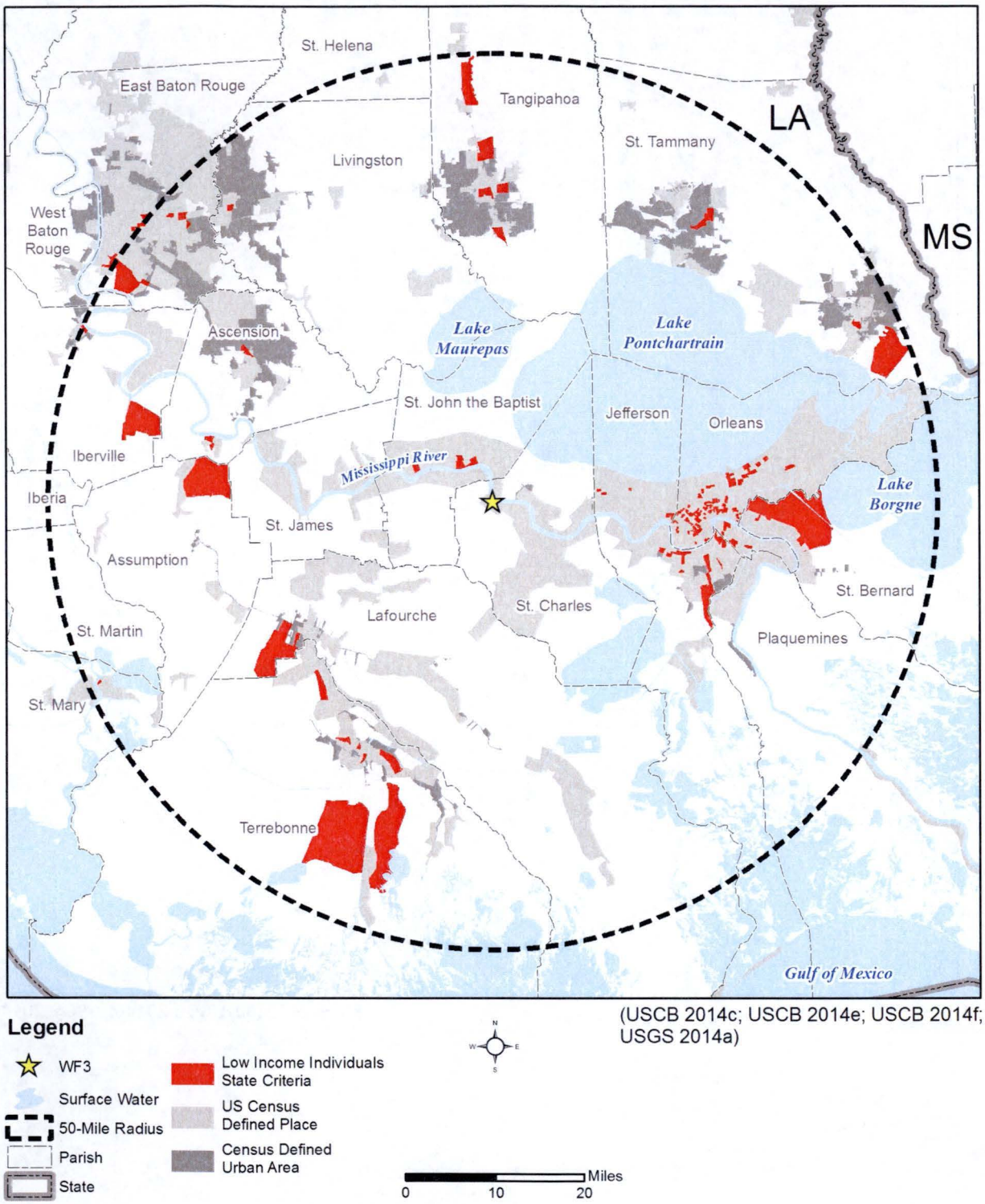
Legend

- WF3
- Surface Water
- 50-Mile Radius
- Parish
- State
- Two or More Races State Criteria
- US Census Defined Place
- Census Defined Urban Area

N W E S

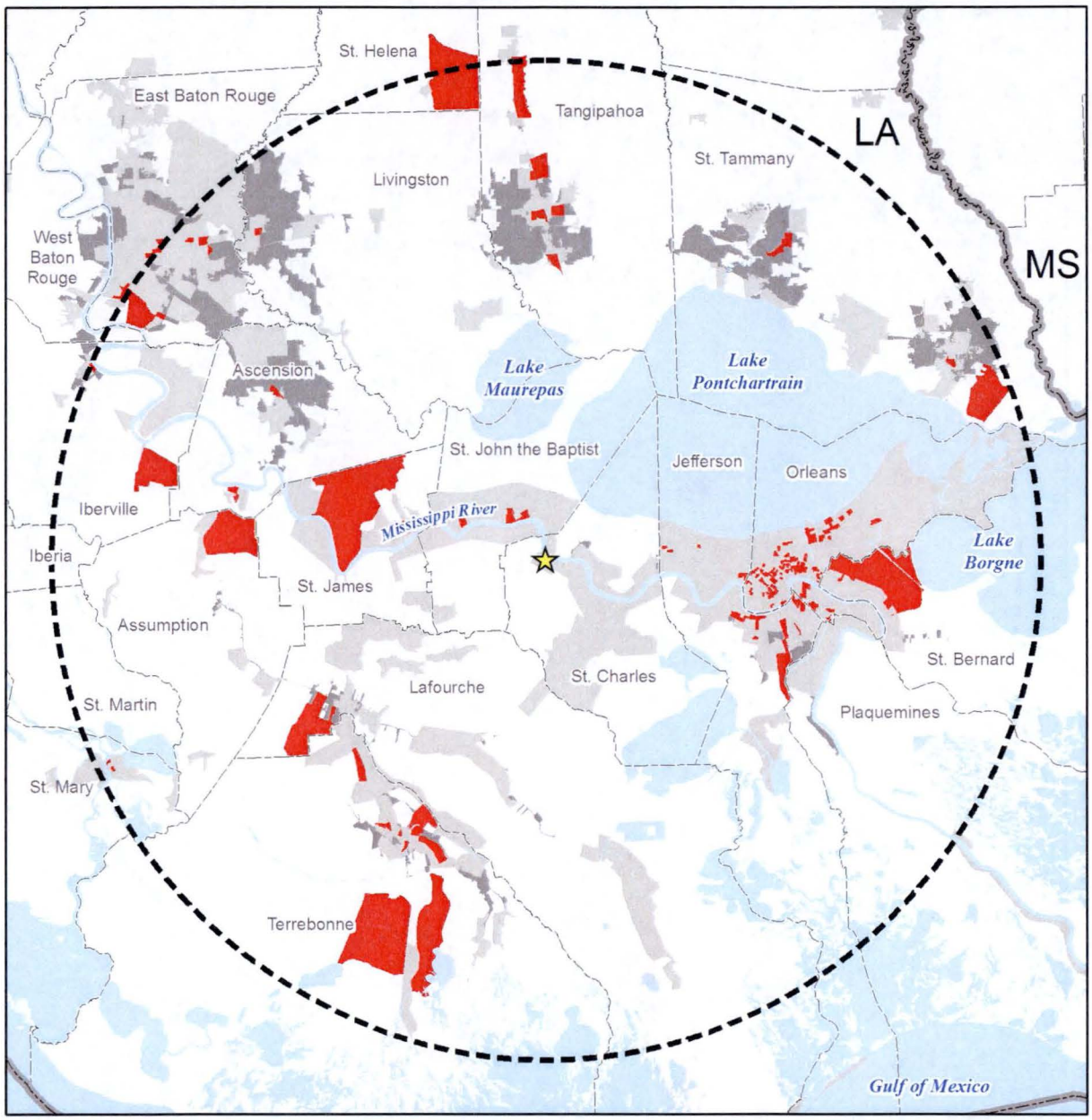
0 10 20 Miles

Figure 3.10-16
Census—Two or More Races Populations (Individual State)



(USCB 2014c; USCB 2014e; USCB 2014f; USGS 2014a)

Figure 3.10-17
Census—Low Income Individuals (Individual State)



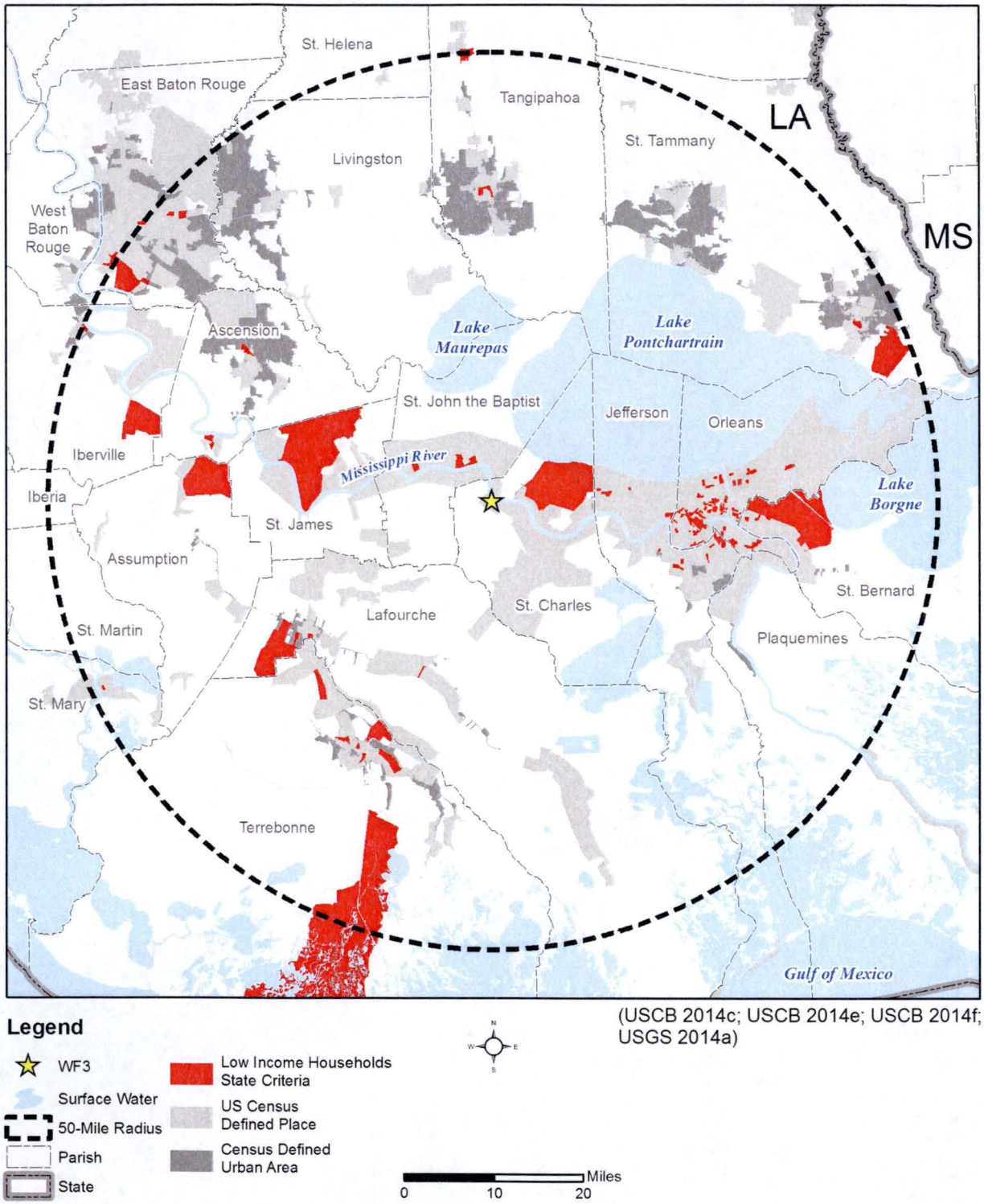
(USCB 2014c; USCB 2014e; USCB 2014f; USGS 2014a)

Legend

- WF3
- Surface Water
- 50-Mile Radius
- Parish
- State
- Low Income Individuals Regional Criteria
- US Census Defined Place
- US Census Defined Urban Area

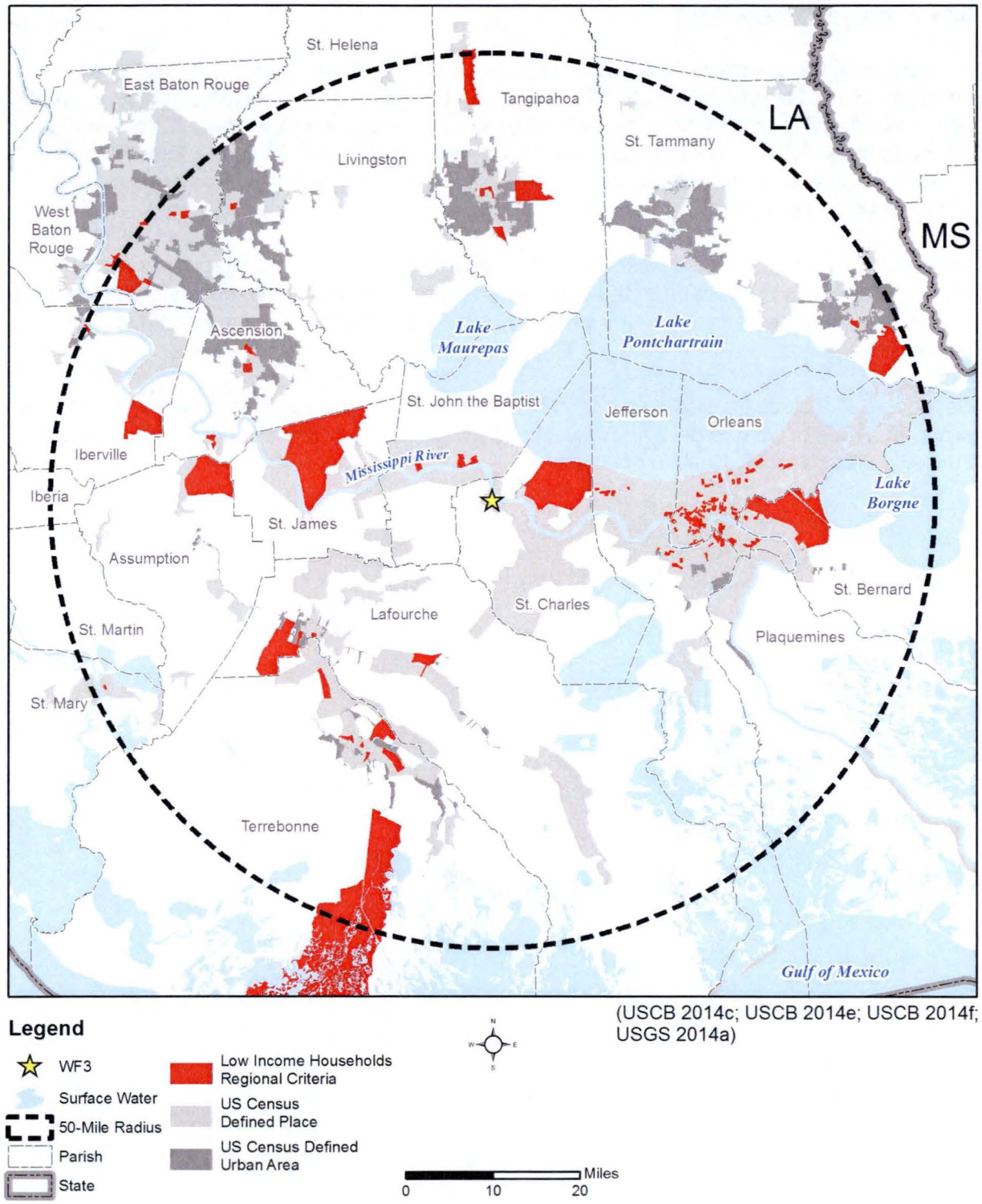
Miles
0 10 20

Figure 3.10-18
Census—Low Income Individuals (Regional)



(USCB 2014c; USCB 2014e; USCB 2014f; USGS 2014a)

Figure 3.10-19
Census—Low Income Households (Individual State)



(USCB 2014c; USCB 2014e; USCB 2014f; USGS 2014a)

Legend

- WF3
- Surface Water
- 50-Mile Radius
- Parish
- State
- Low Income Households Regional Criteria
- US Census Defined Place
- US Census Defined Urban Area

Miles
0 10 20

Figure 3.10-20
Census—Low Income Households (Regional)

3.11 Waste Management

In addressing the plant's radioactive and nonradioactive waste management systems and programs, NRC Regulatory Guide 4.2, Supplement 1, Revision 1, specifies that the information being requested in this section can be incorporated by reference to Section 2.2 of the ER (NRC 2013a, Section 3.11). Therefore, consistent with NRC Regulatory Guide 4.2, Entergy is providing the information below to address WF3's radioactive and nonradioactive waste management systems and programs.

Section 2.2.3 includes a discussion of WF3's liquid, gaseous, and solid radwaste systems. The section provides a description of the systems, management of LLMW, radwaste storage, spent fuel storage, and permitted facilities currently utilized for offsite processing and disposal of radioactive wastes.

Section 2.2.4 includes a discussion of WF3's RCRA nonradioactive waste management program, types of wastes generated, waste minimization program, and permitted facilities currently utilized for disposition of wastes.