APPENDIX C

Environmental

United States Department of the Interior

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

January 31, 2020

Colonel Stephen Murphy
District Commander
U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Colonel Murphy:

Please reference the St. Tammany Parish Flood Control Feasibility Study conducted by the U.S. Army Corps of Engineers, with the Coastal Protection and Restoration Authority Board acting as the non-federal sponsor. This study will evaluate the feasibility of providing flood damage reduction from coastal storms and heavy rainfall events in St. Tammany Parish.

The following comments are provided on a planning-aid basis to assist the Corps in developing environmentally acceptable project alternatives and features. These comments and recommendations do not constitute the final report of the Secretary of Interior as required by Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). The Service submits the following comments in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), the National Environmental Policy Act of 1969, as amended, the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 661 et seq.), the Migratory Bird Treaty Act (MBTA) (40 Stat. 755, as amended; 16 U.S.C. 703 et seq.), and the Bald and Golden Eagle Protection Act (BGEPA) (54 Stat. 250, as amended, 16 U.S.C. 668a-d).

General Comments

In St. Tammany Parish, pressure to natural vegetative habitats from development and other land use changes is high due to the abundance of well-drained soils. As part of a planning initiative, the Louisiana Department of Wildlife and Fisheries, Wildlife Diversity Program, analyzed the status of those habitats in St. Tammany Parish's natural vegetative types. Of the 22 vegetative habitat types identified, 15 are classified at wetlands, of which all are in a state of decline (Table 1).

Wetland Vegetative Type	Abundance/Status	Trend
Fresh Marsh	Rare	Stable/Very Slowly Declining
Intermediate Marsh	Common	Stable/Very Slowly Declining
Brackish Marsh	Uncommon	Stable/Very Slowly Declining
Hillside Seepage Bog	Exceedingly Rare	Declining
Bald Cypress/Bald Cypress-Tupelo Swamp	Common	Slowly Declining
Pond Cypress/Blackgum Swamp	Rare (old growth very rare)	Slowly Declining
Bottomland Hardwood Forest	Common (old growth very rare)	Slowly Declining
Small Stream Forest	Common (old growth very rare)	Declining
Bayhead Swamp	Common (poor quality)	Declining
Slash Pine-Pond Cypress/Hardwood Forest	Critically Imperiled	Declining
Slash Pine/Wiregrass	Rare	Probably Declining
Gum Pond	Uncommon (old growth very rare)	Slowly Declining
Shrub Swamp	Uncommon	Slowly Declining
Forested Seep	Rare	Declining
Longleaf Pine Flatwood Savannah	Rare	Declining

Table 1. Status and Trend of Vegetative Types in St. Tammany Parish.

In addition to those habitats St. Tammany Parish, has lotic habitat consisting of the Pearl River, Bayou Bonfuca, Bayou Lacombe, and the Tchefuncte River and their tributaries. Water quality varies but all are impacted by run-off from developed areas and dredging for navigation.

Should levee alignments be incorporated into the project design, the Service recommends avoiding and/or minimizing impacts to both herbaceous and forested wetlands. This would be achieved by locating levees and borrow canals in: 1) Non-forested (e.g., pastures, fallow fields, abandoned orchards, former urban areas) and non-wetlands; 2) wetland forests dominated by exotic tree species (e.g., Chinese tallow) or non-forested wetlands (e.g. wet pastures), excluding marshes; or disturbed wetlands (e.g., hydrologically altered, artificially impounded). In addition, levee protection and wave dampening might be achieved by establishing a forested buffer seaward of the levee. Levee alignments avoiding enclosures of tidal marshes should also be considered.

Borrow areas should be located within the protected side of the system. Levee alignments should avoid and/or minimize intercepting drainage and causing flooding of forested wetlands and nearby homes and businesses. To avoid such impacts, an interior borrow canal may be needed to maintain drainage to areas that would otherwise be impacted. Additionally, any planned floodgates should be designed to efficiently handle the drainage needs and avoid increased flooding duration and depths for the potentially large protected area north of any levee alignments.

Where construction of borrow pits or canals are needed, if possible, those features should be located in non-wetland areas providing the least fish and wildlife habitat value. To minimize fish and wildlife impacts, a hierarchical list of habitat types to avoid is provided (Appendix A).

Where borrow pits and/or canals must be constructed, those features may increase habitat value for fish and wildlife resources and provide additional fish and wildlife recreational opportunities. To achieve these habitat benefits, the Service offers recommendations on borrow pit construction (Appendix B).

To determine marsh target elevations for the fill sites, consolidation settlement calculations and self-weight consolidation tests should be conducted using borings taken from the fill sites and proposed borrow areas. The purpose of these analyses would be to determine a fill elevation that would be as close as possible to the existing marsh elevation at a certain target year; that target year is yet to be determined. The Service requests an opportunity to be involved in that decision making process and be given the opportunity to provide comments on target elevations.

The Service recommends using material from within each marsh creation area for construction of containment dikes. These dike borrow areas would, therefore, be filled with dredged material during marsh creation activities. To maintain slope stability, the Service recommends containment dike borrow areas be located a minimum of 25 feet from the toe of the dikes. The Service is anticipating the need to breach/degrade containment dikes within a certain target year; that year is yet to be determined. The Service requests an opportunity to be involved in that decision making process and be given the opportunity to provide comments on target year containment dike breaching/degrading.

Threatened and Endangered Species

Within the study area (St. Tammany Parish), seven threatened or endangered species are known to occur or believed to occur (Table 2). Information regarding those species and their preferred habitats are provided below.

Species	Species Group	Status
Manatee, West Indian	Mammal	Threatened
Mussel, Alabama Heelsplitter	Mollusk	Threatened
Quillwort, Louisiana	Plant	Endangered
Sturgeon, Gulf	Fish	Threatened, Critical Habitat
Tortoise, Gopher	Reptile	Threatened
Turtle, Ringed Map	Reptile	Threatened
Woodpecker, Red-cockaded	Bird	Endangered

Table 2. List of threatened and endangered species believed to occur within the project study area.

West Indian Manatee

The endangered West Indian manatee (*Trichechus manatus*) is known to regularly occur in Lakes Pontchartrain and Maurepas and their associated coastal waters and streams. It also can be found less regularly in other Louisiana coastal areas, most likely while the average water temperature is warm. Based on data maintained by the Louisiana Department of Wildlife and Fisheries, Wildlife Diversity Program, over 80 percent of reported manatee sightings (1999-2011) in Louisiana have occurred from the months of June through December. Manatee occurrences in Louisiana appear to be increasing and they have been regularly reported in the Amite, Blind, Tchefuncte, and Tickfaw Rivers, and in canals within the adjacent coastal marshes of southeastern Louisiana. Manatees may also infrequently be observed in the Mississippi River and coastal areas of southwestern Louisiana. Cold weather and outbreaks of red tide may adversely affect these animals. However, human activity is the primary cause for declines in species number due to collisions with boats and barges, entrapment in flood control structures, poaching, habitat loss, and pollution.

During in-water work in areas that potentially support manatees all personnel associated with the project should be instructed about the potential presence of manatees, manatee speed zones, and the need to avoid collisions with and injury to manatees. All personnel should be advised that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act of 1972 and the Endangered Species Act of 1973. Additionally, personnel should be instructed not to attempt to feed or otherwise interact with the animal, although passively taking pictures or video would be acceptable.

All on-site personnel are responsible for observing water-related activities for the presence of manatees. We recommend the following to minimize potential impacts to manatees in areas of their potential presence:

- All work, equipment, and vessel operation should cease if a manatee is spotted within a 50-foot radius (buffer zone) of the active work area. Once the manatee has left the buffer zone on its own accord (manatees must not be herded or harassed into leaving), or after 30 minutes have passed without additional sightings of manatee(s) in the buffer zone, in- water work can resume under careful observation for manatee(s).

- If a manatee(s) is sighted in or near the project area, all vessels associated with the project should operate at “no wake/idle” speeds within the construction area and at all times while in waters where the draft of the vessel provides less than a four-foot clearance from the bottom. Vessels should follow routes of deep water whenever possible.

- If used, siltation or turbidity barriers should be properly secured, made of material in which manatees cannot become entangled, and be monitored to avoid manatee entrapment or impeding their movement.

- Temporary signs concerning manatees should be posted prior to and during all in-water project activities and removed upon completion. Each vessel involved in construction activities should display at the vessel control station or in a prominent location, visible to all employees operating the vessel, a temporary sign at least 8½ " X 11" reading language similar to the following: “CAUTION BOATERS: MANATEE AREA/ IDLE SPEED IS REQUIRED IN CONSRUCTION AREA AND WHERE THERE IS LESS THAN FOUR FOOT BOTTOM CLEARANCE WHEN MANATEE IS PRESENT”. A second temporary sign measuring 8½ " x 11” should be posted at a location prominently visible to all personnel engaged in water-related activities and should read language similar to the following: “CAUTION: MANATEE AREA/ EQUIPMENT MUST BE SHUTDOWN IMMEDIATELY IF A MANATEE COMES WITHIN 50 FEET OF OPERATION”.

- Collisions with, injury to, or sightings of manatees should be immediately reported to the Service’s Louisiana Ecological Services Office (337/291-3100) and the Louisiana Department of Wildlife and Fisheries, Natural Heritage Program (225/765-2821). Please provide the nature of the call (i.e., report of an incident, manatee sighting, etc.); time of incident/sighting; and the approximate location, including the latitude and longitude coordinates, if possible.

Alabama Heelsplitter Mussel

Federally listed as a threatened species, the Alabama heelsplitter mussel (*Potamilus inflatus*) was historically found in Louisiana in the Amite, Tangipahoa, and Pearl Rivers. Many life history aspects of the species are poorly understood but are likely similar to that of other members of the Unionidae family. Although the primary host fish for the species is not certain, investigation by K. Roe et al. (1997) indicates that the freshwater drum (*Aplodinotus grunniens*) is a suitable glochidial host for the species.

Based on the most recent survey data, the currently known range for the Alabama heelsplitter in Louisiana occurs only in the lower third of the Amite River along the East Baton Rouge/Livingston Parish line from Spiller’s Creek, which is near Denham Springs downstream to the vicinity of Port Vincent. In addition, the species may be found in the Pearl River, as evidenced by two dead specimens reported from the West Pearl River drainage in 1996. Because it has not been used widely for past or present gravel mining operations, the lower third of the Amite River (between Louisiana Highway 37 and Louisiana Highway 42) is more typical of a coastal plain river; being characterized by a silt substratum, less channelization, and slower water flow, all of which are characteristic of heelsplitter habitat. This freshwater mussel is typically found in soft, stable substrates such as sand, mud, silt, and sandy gravel, in slow to moderate currents. Heelsplitter mussels are usually found in depositional pools below sand point bars and in shallow pools between sandbars and riverbanks.

Major threats to this species in Louisiana are the loss of habitat resulting from sand and gravel dredging and channel modifications for flood control, as shown by the apparent local extirpation of the species in the extensively modified upper portions of the Amite River.

Louisiana Quillwort

Federally listed as an endangered plant species, the Louisiana quillwort (*Isoetes louisianensis*) is a small, semi-aquatic, facultative evergreen plant with spirally arranged leaves (sporophylls) arising from a globose, two-lobed corm. The hollow leaves are transversely septate, and measure approximately 0.12 inches wide and up to 16 inches long. This species grows on sand

and gravel bars on the accreting sides of streams and moist overflow channels within riparian forest and bay head swamp communities in Washington and St. Tammany Parishes, Louisiana.

The Louisiana quillwort is believed to be dependent on a special hydrologic regime resulting from the presence of small springs scattered at the base of banks or bluffs. Major threats to this species are habitat loss through hydrologic modifications of stream habitat, and land use practices that significantly alter stream water quality and hydrology.

Gulf Sturgeon

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

On March 19, 2003, the Service and the National Marine Fisheries Service (NMFS) published a final rule in the Federal Register (Volume 68, No. 53) designating critical habitat for the Gulf sturgeon in Louisiana, Mississippi, Alabama, and Florida. In Louisiana, the designation includes portions of the Pearl and Bogue Chitto Rivers and Lake Pontchartrain east of the Lake Pontchartrain Causeway, as well as Little Lake, The Rigolets, Lake St. Catherine, and Lake Borgne in their entirety. The physical biological features (PBF) for the conservation of Gulf sturgeon, which should be considered when determining potential project impacts, are those habitat components that support feeding, resting, sheltering, reproduction, migration, and physical features necessary for maintaining the natural processes that support those habitat components. The PBF for Gulf sturgeon critical habitat include:

- abundant prey items within riverine habitats for larval and juvenile life stages, and within estuarine and marine habitats for juvenile, sub-adult, and adult life stages;

- riverine spawning sites with substrates suitable for egg deposition and development, such as limestone outcrops and cut limestone banks, bedrock, large gravel or cobble beds, marl, soapstone, or hard clay;

- riverine aggregation areas, also referred to as resting, holding and staging areas, used by adult, sub-adult, and/or juveniles, generally, but not always, located in holes below normal riverbed depths, believed necessary for minimizing energy expenditures during freshwater residency and possibly for osmoregulatory functions;

- a flow regime (i.e., the magnitude, frequency, duration, seasonality, and rate-of-change of freshwater discharge over time) necessary for normal behavior, growth, and survival of all life stages in the riverine environment, including migration, breeding site selection, courtship, egg fertilization, resting, and staging; and necessary for maintaining spawning sites in suitable condition for egg attachment, egg sheltering, resting, and larvae staging;

- water quality, including temperature, salinity, pH, hardness, turbidity, oxygen content, and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages;
- sediment quality, including texture and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages; and,
- safe and unobstructed migratory pathways necessary for passage within and between riverine, estuarine, and marine habitats (e.g., a river unobstructed by a permanent structure, or a dammed river that still allows for passage).

As part of the critical habitat designation, the Service and NMFS consultation responsibility was divided by project location and Federal action agency. In riverine waters, the Service is responsible for all consultations regarding Gulf sturgeon and critical habitat, while in marine waters the NMFS is responsible for consultation. For estuarine waters, the Service is responsible for consultations with the Department of Transportation (DOT), the Environmental Protection Agency (EPA), the U.S. Coast Guard (USCG), and the Federal Emergency Management Agency (FEMA). The Corps should consult with the NMFS office (Ms. Cathy Tortorici at 727.209.5953).

Gopher Tortoise

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

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

Ringed Map Turtle

The threatened ringed map (=sawback) turtle (*Graptemys oculifera*) is endemic to the Pearl River system. In Louisiana, it occurs in the Bogue Chitto River and in the Pearl River north of Louisiana Highway 190 in St. Tammany and Washington Parishes. This turtle prefers riverine habitats with moderate currents, channels wide enough to permit sunlight penetration for several hours each day, numerous logs for basking, and large, sandy banks that are used for nesting. The ringed map turtle is a small turtle (4 to 7 inches in plastron length) with a yellow ring bordered inside and outside with dark olive-brown on each shield of the carapace and a yellow plastron. The head has a large yellow spot behind the eye, two yellow stripes from the orbit backwards, and a characteristic yellow stripe covering the complete lower jaw.

The decline of the ringed map turtle has been attributed to habitat modification (i.e., loss of exposed sandbars, basking areas) and water quality deterioration, reservoir construction, channelization, desnagging for navigation, siltation, and the subsequent loss of invertebrate food sources.

Red-cockaded Woodpecker

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

At-Risk Species

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

The Service’s goal is to work with private and public entities on proactive conservation to conserve these species, thereby precluding the need to federally list as many at-risk species as possible. While not all species identified as at-risk will become ESA listed species, their potentially reduced populations warrant their identification and attention in mitigation planning.

Discussed below are species currently designated as “at-risk” that may occur within St. Tammany Parish. Within the study area, 12 threatened or endangered species are known to occur or believed to occur (Table 3).

Species	Species Group
Golden Winged Warbler	Bird
Frecklebelly Madtom	Fish
Saltmash Topminnow	Fish
Monarch Butterfly	Insect
Southern Snaketail Dragonfly	Insect
Eastern Beard Grass Skipper	Insect
Tri-colored Bat	Mammal
Alabama Hickory Nut	Mollusk
Correll's False Dragon-head	Plant
Alligator Snapping Turtle	Reptile
Eastern Diamondback Rattlesnake	Reptile
Pearl River Map Turtle	Reptile

Table 3. List of at-risk species believed to occur within the project study area.

Golden-Winged Warbler

The golden-winged warbler is a small bird, about 5 inches long, with a slim and pointed beak. The bird is silver, with bright yellow patches on the wings and head. They forage in shrubby areas, feeding on caterpillars and other insects as they hop along branches. These birds are very vocal during their breeding season.

The golden winged warbler relies on early successional forests with sparse trees and shrubs with an herbaceous understory of grasses and forbs in either wetland or upland settings. They use wetlands more than a closely related and competitive species, the blue-winged warbler. Golden-winged warblers occur in Louisiana during spring and fall migration in forested habitats. They depend on the forested habitats of the Gulf coast, including coastal Louisiana, to provide food and water resources before and after migration. Nesting habitat includes dense herbaceous cover and patches of shrubs, often adjacent to a forest edge. They winter in semi-open woodlands and coffee farms in Central America.

Population declines are associated with loss of habitat owing to succession and reforestation. Range expansion of the blue-winged warbler has increased competition and hybridization with the golden-winged warbler. Use of wetland habitat is important for the species, but their preferred habitat is reduced by invasion of the non-native *Phragmites* reed. The loss of wintering habitat in Central and South America, along with migratory habitat, also contributes to decline.

Frecklebelly Madtom

The frecklebelly madtom is a small freshwater catfish restricted to the Mobile and Pearl River basins of the southeastern United States. The fish is about 3-4 inches long, and is yellow to dark brown with dark mottling and speckling usually extending to the belly. Frecklebelly madtoms are nocturnal fish that primarily feed on aquatic insect larvae.

This species inhabits medium to large rivers with little sedimentation. They usually occur over firm gravel substrates in swiftly flowing waters. The primary habitat is rocky riffles, rapids, and runs, often near aquatic vegetation. In Louisiana, this species occurs in the Pearl River drainage, including the Bogue Chitto River and lower Pearl River tributaries. In addition to the Pearl River of Mississippi and Louisiana, this fish is also found in the Mobile Basin, which includes Alabama, eastern Mississppi, northern Georgia, and a small portion of southern Tennessee. The frecklebelly madtom occurs in the in the Tombigbee, Alabama, Cahaba, Etowah, and Conasauga Rivers of the Mobile Basin.

Threats to the success of the frecklebelly madtom include damming, impoundments, channelization, gravel removal operations, dredging, bridge construction and altered flow regimes. These practices restrict the movement of the fish and also increase siltation from habitat modifications, which is considered a significant threat to the species. Other threats include pollution from activities such as agriculture and construction.

Saltmarsh Topminnow

The saltmarsh topminnow is a small, approximately 2 inch coastal fish within the Funduludae family. It is considered a resident species of coastal marsh and closely related to other killifish species such as the Gulf killifish (*Fundulus grandis*).

Typically found in coastal salt marsh habitats characterized by saltmarsh cordgrass (*Spartina alterniflora*), with the greatest sampling success in areas comprised of saltmarsh cordgrass, big cordgrass (*Spartina cynosuroides*), and black rush (*Juncus roemerianus*). Most studies indicate the species is most abundant in low-salinity saltmarsh ecosystems, with the most abundance in salinities less than 12 ppt, although they have been found in salinities from 0 parts per thousand (ppt) to 31.4 ppt. Studies have found that the species primarily use the marsh interior, readily using intermediate to high marsh where channels and rivulets exist for access to marsh interior. This species is found in the northern Gulf of Mexico from Galveston Bay, Texas to Escambia Bay, Florida. Numerous studies have documented this species throughout its entire range and several studies suggest it may be more widespread and numerous than previously thought.

Monarch Butterfly

The monarch butterfly (*Danaus plexippus plexippus*) is reddish-orange with black vein-like markings. The wings have a black border with white spots. Monarchs go through a complete metamorphosis with four distinct life cycles: egg, caterpillar, chrysalis, and adult. It takes approximately one month for them to become adult butterflies. During the caterpillar stage, monarchs will only eat milkweed plants. Monarchs are known for their yearly migrations over great distances between their breeding grounds and overwintering locations.

Milkweed is the essential habitat component for monarch caterpillars, as it is their sole food source. There are about 100 species of milkweed native to North America. Milkweed grows in open fields, meadows, and other early successional habitat. Diverse native flowering plants that bloom during the growing season are essential habitat components during their migration.

Monarchs occur throughout North America, from southern Canada to Central America. There are two migratory populations: the eastern population that occurs east of the Rocky Mountains, and the western population that occurs west of those mountains. The eastern population migrates from their summer habitat, which extends from the Rocky Mountains to the Atlantic seaboard, to their wintering habitat in central Mexico. The Western population migrates from summer habitats across the western United States to the California coast in the winter.

Loss and degradation of both breeding and over-wintering habitat are large threats to the monarch. Both timing of migration and migration patterns are expected to be influenced by climate change. Anthropogenic practices such as mowing too frequently and the spread of invasive species threaten the monarch. Predation, the use of pesticides, and disease are also threats to the species.

On June 20, 2014, President Obama signed a Presidential Memorandum, “Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators,” outlining an expedited agenda to address the devastating declines in honey bees and native pollinators, including the monarch butterfly. Recent research has shown dramatic declines in monarchs and their habitats leading conservation groups to petition the Service to list the species under Endangered Species Act (ESA). Ensuring adequate and sustainable habitats, meeting all the life history needs of these species is of paramount importance. The Service and its partners are taking immediate actions to replace and restore monarch and pollinator habitat on both public and private lands across the U.S. landscape. Therefore we recommend revegetation of disturbed areas with native plant species, including species of nectar-producing plants and milkweed endemic to the area, we recommend consultation with state botanists to determine appropriate species where possible.

Southern Snaketail Dragonfly

The Southern snaketail is a dragonfly (order Odonata) with a green thorax which bears two lateral black stripes. Its head has segments of yellow, white, brown, and green. The abdomen is brown with yellow and white markings. Total length is 1.7 – 1.8 inches (43.5-46.0 millimters [mm]), depending on sex. The compound eyes in males are blue above and gray below. Adults are characterized by the most extensive dark markings of the subgenus *Ophionurus* and may be easily distinguished from most of its related species by the brown band along the interpleural interface on the thorax. It may be a subspecies of *O. incurvatus*. *O. australis* has been considered among the rarest of the *Odonata*. The extreme rarity of the Southern snaketail may be related to the substrate requirements of the larval stage, which is two years. Larvae were most often collected from pea-sized gravel in 10-20 cm of water, with areas at the tail of riffles being the most productive. The species is known to make significant seasonal migrations.

The Southern snaketail typically inhabits medium-sized freshwater streams with gravel substrate. For example, the type locality (Tangipahoa River) averaged less than 32 feet (10 meters [m]) wide with a few pools reaching a depth of 6.6 feet (2 m). The substrate was primarily a mixture of sand and pea-gravel eroded from local deposits. Good water quality and a stable stream flow is required.

This species was first described from just 50 miles of streams across three rivers and streams in eastern Louisiana and western Mississippi. It has also been collected in the western extent of the Florida panhandle (Escambia, Okaloosa, and Walton counties). Additional surveys in Mississippi, Alabama, and Georgia are needed.

Threats may include gravel mining, siltation, pesticides, flood scour, clear cutting/deforestation, perturbation of stream flow, and a naturally-occurring limited range of the species.

Eastern Beard Grass Skipper

The Eastern beard grass skipper (*Atrytone arogos arogos*), also called the Eastern arogos skipper, is a small yellow butterfly in the family of skippers, Hesperiidae. They have wings measuring 1.1 to 1.5 inches (29 to 37 mm)s, large eyes, short antennae, and three pairs of walking legs characteristic of skippers. The upper side of the wing is yellow-orange lined with a black border. They can be differentiated from closely related species by their deep orange coloration and white fringe on the underside of their wings. Flight usually takes place in the southern states from April to September, and in the northern states from June to July due to temperature constraints. They are a subspecies of the arogos skipper (*Atrytone arogos*), which extends into the western United States.

The historical range of this subspecies includes Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, Nebraska, New Jersey, New York, Pennsylvania, South Carolina, and Virginia. This subspecies is now so reduced that the few isolated remnant colonies, with some possibly no longer existing, occur in Louisiana, Mississippi, Florida, and New Jersey. It is believed to be extirpated from North Carolina since 2009. The distribution of *subspecies A. a. arogos* is much less than the entire species *A. arogos*.

They inhabit areas of grasslands and prairies, with specific habitat requirements varying regionally and among different subspecies. In eastern states habitats include serpentine barrens, savannas, and flatwoods, while arogos skippers in western states are typically found in dry grasslands. Arogos skippers rely on host plants including big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), reed grass (*Calamovilfa brevipilis*), and lopsided Indiangrass (*Sorghastrum secundum*) for reproduction and larval feeding. Some of these host plants rely on ephemeral conditions brought by fire or grazing regimes. Adult skippers feed on the nectar of knapweeds (*Centaurea*), milkweeds (*Asclepias*), thistles (*Cirsium*), and blazing-stars (*Liatris*). These sources of food vary regionally.

Habitat loss and fragmentation due to development, silviculture, agriculture, shrub and invasive species encroachment, and altered fire regimes have been the primary cause of the decline of this skipper in most of its range. While fire is necessary for host plants, fires do cause mortality in the species which is a threat to the sparse populations. Therefore conservative fire regimes, other methods for prairie maintenance such as grazing and mowing, and more research on management for *A. a. arogos* is needed. In the Southeast, predation by fire ants (*Solenopsis invicta*) might be a threat. Another cause of mortality is the bacteria septicemia, which is almost always fatal. Arogos skippers can also be hindered by parasites that negatively affect host plants. Fungus harms plants used as host plants during reproduction and as nectar sources for adults, directly affecting the skipper by decreasing sites for reproduction and sources of nutrients.

Tri-colored Bat

The tricolored bat (*Perimyotis subflavus*), also known as the eastern pipistrelle, is a small bat weighing 0.14-2.8 ounces (4-8 grams) with a head to tail length ranging from 3-3.5 inches (77-89 mm) and wingspan of 8.7-8.9 inches (220-225 mm). The bat gets its name from their individual hairs being 'tri-colored': brown at tip, yellow in the middle, and dark at the base. Overall the fur appears yellow-brown, with reddish forearm skin. This small bat flies slowly with an erratic pattern while foraging, causing it to sometimes be mistaken for a moth.

The tricolored bat is distributed from southern Canada through most of the eastern United States (38 states total), and along eastern Mexico to Honduras. This species is thought to be expanding its distribution westward based on a number of documented westerly range expansions. In Louisiana, this species is distributed statewide except for the extreme southern portions of the state and is encountered more frequently in northern portion of Louisiana than the southern.

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

The main threat to this species is White Nose Syndrome (*Pseudogymnoascus destructans*), with affected hibernation sites resulting in more than a 75% decline of bats, with some sites declining by 90%. Other threats include habitat modification and destruction including forest and grassland conversion to urban/suburban land use, and mortality during migration from winter hibernaculum to summer roosting habitat due to wind energy development. The tricolored bat is listed as a species of least concern by the IUCN and as S4 (apparently secure) in Louisiana with many occurrences. Stevens et al. (2017) suggests this species is common throughout the state and heightened conservation consideration is not warranted at this time. However, range wide declines in this species have occurred in response to threats, and create a need for continued population monitoring.

Alabama Hickorynut

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

(*Etheostoma nigrum*), Gulf darter (*Etheostoma swaini*), blackbanded darter (*Percina nigrofasciata*), dusky darter (*Percina sciera*), and redspot darter (*Etheostoma artesiae*).

The range of this species is unclear, as it is endemic to the Mobile River basin. It is believed to be distributed across eastern Gulf drainages in Alabama, Louisiana, Mississippi, and Oklahoma. It occurs in the Pearl and Amite River Systems of Louisiana. This species has been extirpated from much of its range by impoundment of large stream habitat and water quality degradation.

The Alabama hickorynut inhabits sand and gravel substrates in moderate currents in large streams. However, the presence of moderate gradient pool and riffle habitats in a variety of stream and river sizes may contain this species.

Habitat modification and destruction due to siltation and impoundment threaten this species. It is also negatively affected by the pollution of streams and rivers.

Correll's False Dragon-head

Correll's false dragon-head (*Physostegia correllii*) is a robust, somewhat succulent plant that grows up to 3.3feet (1 meter) tall. Its stems are often unbranched, with mid-stem leaves opposite and usually widest in the middle with large sharp teeth. The leaves decrease in size from mid to upper-stem. This plant is a hardy perennial with elongate rhizomes. The plant flowers from May to September with pink and tubular flowers with two lips. This plant requires full sun.

The wetland indicator status of this species is obligate, meaning it occurs almost always in wetlands. Occurrences in Louisiana are all in roadside ditches. Elsewhere it occurs along river banks, often growing in flowing water. Vigorous growth of rhizomes allows Correll's false dragon-head to be competitive in disturbed areas. Potential habitat includes non-natural habitats such as drainage and irrigation ditches and wet utility rights-of-way. This species is known from Texas, southern Louisiana, and northern Mexico (Nuevo Leon, Sonora, and Coahuila).

This species is threatened by ditch dredging and scraping for maintenance and installation of water lines and other utilities. Use of herbicides along roadsides is also an issue. Exotic invasive species may be a threat, though Correll's false dragon-head does appear to be competitive against many plants, with one Louisiana population competing with the exotic torpedo grass (*Panicum repens*) and being monitored closely. Correll's flase dragon-head is possibly naturally rare, and there is a need to increase survey efforts to detect previously unknown populations.

Alligator Snapping Turtle

The alligator snapping turtle *Macrochelys temminckii*) is the largest species of freshwater turtle in North America and is highly aquatic and somewhat secretive. They are primitive in appearance and are characterized by a large head, long tail, and an upper jaw with a strongly hooked beak. They have muscular legs and webbed toes with long, pointed claws. They have three keels with posterior elevations on the scutes of the carapace, which is dark brown and often has algal growth that adds to the alligator snapping turtle's camouflage. Their hinge-less plastron is significantly smaller than their carapace and is narrow and cross-shaped with a long, narrow bridge. The plastron is greyish-brown in color in adults; in juveniles it may be somewhat mottled with small whitish blotches. Their eyes are positioned on the side of the head and are surrounded by small, fleshy, pointed projections. Numerous epidermal projections are also present on the side of the head, chin and neck. Hatchlings look very similar to adults. Sexual maturity is achieved in 11-21 years for males and 13-21 years for females. No more than one clutch per year per female has been observed in the wild.

Alligator snapping turtles are opportunistic scavengers and consume a variety of foods. Fish comprise a significant portions of their diet; however, crayfish, mollusks, smaller turtles, insects, nutria, snakes, birds and vegetation (including acorns). The alligator snapping turtle is the only turtle species that has a predatory lure (a small, worm-like appendage on the tongue). Both adults and juveniles use this lure to attract fish into striking range. The lure is white or pale pink in juveniles and mottled or gray in adults.

The alligator snapping turtle is confined to river systems that flow into the Gulf of Mexico, extending from the Suwannee River in Florida to the San Antonio River in Texas. They are found in large rivers, major tributaries, bayous, canals, swamps, lakes, ponds and oxbows. It is most common in freshwater lakes and bayous, but also found in coastal marshes and sometimes in brackish waters near river mouths. The alligator snapping turtle is highly associated with in-stream structure (e.g., tree root masses, stumps, submerged trees, etc.).

Extensive commercial and recreational harvesting in the last century resulted in significant declines to many alligator snapping turtle populations. Commercial harvesting is now prohibited in all states within its range and recreational harvest is prohibited in every state except for Mississippi and Louisiana. Currently, the primary threats to the species are legal and illegal intentional harvest, bycatch associated with commercial fishing of catfish and buffalo, nest predation and habitat alteration.

Eastern Diamondback Rattlesnake

The eastern diamondback rattlesnake (*Crotalus adamanteus*) is recognized by it large size, dorsal pattern of diamonds, yellowish unpatterned belly, black tail, and rattle at the tip of the tail. The dorsal pattern has 18-20 diamonds aligned apex to apex down the midline of the back. They reach sexual maturity at 2-6 years and have a gestation period of approximately one year. Females reproduce at 2 to 4 year intervals and may live for 10 years, with a few snakes living 15-20 years.

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

The historic range consists of the coastal plain of the southeastern U.S. including North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, and Louisiana. It is currently believed to be extirpated in Louisiana.

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

Pearl River Map Turtle

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

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

The range of this species is confined to the Pearl River system in Mississippi and eastern Louisiana. Pearl River drainage populations occur in the Ross Barnett Reservoir, the main stem Pearl River, Bogue Chitto River, Yockanookany River, and Strong River.

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

Migratory Birds and Other Trust Resources

Bald Eagle

The proposed project area may provide nesting habitat for the bald eagle (*Haliaeetus leucocephalus*), which was officially removed from the List of Endangered and Threatened Species as of August 8, 2007. However, the bald eagle remains protected under the MBTA and BGEPA. Comprehensive bald eagle survey data have not been collected by the Louisiana Department of Wildlife and Fisheries (LDWF) since 2008, and new active, inactive, or alternate nests may have been constructed within the proposed project area since that time.

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

The Service developed the National Bald Eagle Management (NBEM) Guidelines to provide landowners, land managers, and others with information and recommendations to minimize potential project impacts to bald eagles, particularly where such impacts may constitute "disturbance," which is prohibited by the BGEPA. A copy of the NBEM Guidelines is available at:
http://www.fws.gov/southeast/es/baldeagle/NationalBaldEagleManagementGuidelines.pdf. Those Guidelines recommend: (1) maintaining a specified distance between the activity and the nest (buffer area); (2) maintaining natural areas (preferably forested) between the activity and nest trees (landscape buffers); and (3) avoiding certain activities during the breeding season. During any project construction, on-site personnel should be informed of the possible presence of nesting bald eagles in the vicinity of the project boundary, and should identify, avoid, and immediately report any such nests to this office. If a bald eagle nest occurs or is discovered within 660 feet of the proposed project area, then an evaluation must be performed to determine whether the project is likely to disturb nesting bald eagles. That evaluation may be conducted on-line at: http://www.fws.gov/southeast/es/baldeagle. Following completion of the evaluation, that website will provide a determination of whether additional consultation is necessary.

On September 11, 2009, the Service published two federal regulations establishing the authority to issue permits for non-purposeful bald eagle take (typically disturbance) and eagle nest take when recommendations of the NBEM Guidelines cannot be achieved. Permits may be issued for nest take only under the following circumstances where: 1) necessary to alleviate a safety emergency to people or eagles, 2) necessary to ensure public health and safety, 3) the nest prevents the use of a human-engineered structure, or 4) the activity or mitigation for the activity will provide a net benefit to eagles. Except in emergencies, only inactive nests may be permitted to be taken. The Division of Migratory Birds for the Southeast Region of the Service (phone: 404/679-7051, e-mail: SEmigratorybirds@fws.gov) has the lead role in conducting consultations and issuance of permits. Should you need further assistance interpreting the guidelines, avoidance measures, or performing an on-line project evaluation, please contact Ulgonda Kirkpatrick (phone: 321/972-9089, e-mail: ulgonda_kirkpatrick@fws.gov.

Coastal Forest and Neotropical Migrating Songbirds

The construction of levees and borrow canals can result in temporary and/or permanent impacts to migratory birds and the habitats upon which they depend for various life requisites. The Service has concerns regarding the direct and cumulative impacts resulting from the loss and fragmentation of forest and grassland habitats, and the direct and indirect impacts that these losses will have upon breeding migratory birds of conservation concern within the West Gulf Coast Plain Bird Conservation Region (http://www.fws.gov/migratorybirds/pdf/grants/ BirdsofConservationConcern2008.pdf). Many migratory birds of conservation concern require large blocks of contiguous habitat to successfully reproduce and survive.

In Louisiana, the primary nesting period for forest-breeding migratory birds occurs between April 15 and August 1. Some species or individuals may begin nesting prior to April 15 or complete their nesting cycle after August 1, but the vast majority nest during this period. The proposed project may directly impact migratory birds of conservation concern because habitat clearing that occurs during the aforementioned primary nesting period may result in unintentional take of active nests (i.e., eggs and young) in spite of all reasonable efforts to avoid such take. The MBTA prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Department of the Interior. While the MBTA has no provision for allowing incidental take, the Service recognizes that some birds may be taken during project construction/operation even if all reasonable measures to avoid take are implemented.

In addition to the direct loss of grassland and forested habitat, the proposed project may indirectly impact migratory birds of conservation concern because construction of large-scale projects within forested habitats typically results in habitat fragmentation. Forest fragmentation may contribute to population declines in some avian species because fragmentation reduces avian reproductive success (Robinson et al. 1995). Fragmentation can alter the species composition in a given community because biophysical conditions near the forest edge can significantly differ from those found in the center or core of the forest. As a result, edge species could recruit to the fragmented area and species that occupy interior habitats could be displaced. The fragmentation of intact forests could have long-term adverse impacts on some forest interior bird species.

The primary impact to forest habitat conditions from the proposed project would result from the conversion of forest habitat to levees and open water borrow sites. We recommend that the project sponsors refuge avoid impacts to forested areas (particularly those containing a hardwood species component) to the maximum extent practicable.

Wading Bird Colonies

In accordance with the Migratory Bird Treaty Act of 1918 (as amended) and Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), please be advised that the project area includes habitats which are commonly inhabited by colonial nesting waterbirds and/or seabirds.

Colonies may be present that are not currently listed in the database maintained by the Louisiana Department of Wildlife and Fisheries. That database is updated primarily by: (1) monitoring previously known colony sites and (2) augmenting point-to-point surveys with flyovers of adjacent suitable habitat. Although several comprehensive coast-wide surveys have been recently conducted to determine the location of newly-established nesting colonies, we recommend that a qualified biologist inspect the proposed work site for the presence of undocumented nesting colonies during the nesting season because some waterbird colonies may change locations year-to-year.

For colonies containing nesting wading birds (i.e., herons, egrets, night-herons, ibis, and roseate spoonbills), anhingas, and/or cormorants, all activity occurring within 1,000 feet of a rookery should be restricted to the non-nesting period, depending on the species present. Below is the list of colonial nesting birds that may be found and the corresponding activity window during which the project may occur without affecting nesting wading bird colonies. Please note that no part of the project should occur outside those windows.

Species	Project Activity Window/Non-nesting Period
Anhinga	July1-March 1
Cormorant	July 1-March 1
Great Blue Heron	August 1-February 15
Great Egret	August 1-February 15
Little Blue Heron	August 1-March 1
Tricolored Heron	August 1-March 1
Reddish Egret	August 1-March 1
Cattle Egret	September 1-April 1
Green Heron	September 1-March 15
Black-crowned Night-heron	September 1-March 1
Yellow-crowned Night-heron	September 1-March 15
Ibis	September 1-April 1
Roseate Spoonbill	August 1-April 1

Table 4. Colonial nesting birds and their corresponding non-nesting period.

In addition, we recommend that on-site contract personnel including project-designated inspectors be trained to identify colonial nesting birds and their nests, and avoid affecting them during the breeding season (i.e., the time period outside the activity window). Should on-site contractors and inspectors observe potential nesting activity, coordination with the LDWF and the Service should occur.

Big Branch and Bogue Chitto National Wildlife Refuges

The Big Branch National Wildlife Refuge and the Bogue Chitto National Wildlife Refuge are located within St. Tammany Parish. All project related activities on those refuges must be coordinated with Refuge Manager Danny Breaux (985-882-2000). Work will require either a Right-of-Way or Special Use Permit in advance. Issuance of a right-of-way or Special Use Permit will be contingent on a determination that the proposed work will be compatible with the purposes for which the Refuge was established. Close coordination by both the Corps and its contractors must be maintained with the Refuge Manager to ensure that construction and maintenance activities are carried out in accordance with provisions of any Special Use Permit issued by the refuge. Any impacts to the refuge will need to be mitigated on refuge lands.

St. Tammany Wildlife Refuge

The St. Tammany Wildlife Refuge, operated by the Louisiana Department of Wildlife and Fisheries, is located within St. Tammany Parish. Any work conducted on this area should be cleared well in advance with Vaughan McDonald (225-765-2708). Any impacts to the refuge should be mitigated on refuge lands.

Fontainebleau State Park

Fontainebleau State Park, operated by the Office of State Parks, is located within St. Tammany Parish. Any work conducted on this area should be cleared in advanced with that agency (225-342-8111) and any impacts to the park should be mitigated on park lands.

Fish and Wildlife Conservation Measures

The President's Council on Environmental Quality regulations for implementing the National Environmental Policy Act define mitigation to include: (1) avoiding the impact; (2) minimizing the impact; (3) rectifying the impact; (4) reducing or eliminating the impact over time; and (5) compensating for impacts. The Service supports and adopts this definition and considers the specific elements to represent the desirable sequence of steps in the mitigation planning process. Through this process, the Service strives to make the project's hurricane protection goals co- equal to fish and wildlife resource conservation.

The Service's Mitigation Policy (Federal Register, Vol. 46, pp. 7644-7663, January 23, 1981) has designated four resource categories which are used to ensure that the level of mitigation recommended will be consistent with the fish and wildlife resources involved. The mitigation planning goals and associated Service recommendations should be based on those four categories, as follows:

> Resource Category 1 - Habitat to be impacted is of high value for evaluation species and is unique and irreplaceable on a national basis or in the ecoregion section. The mitigation goal for this Resource Category is that there should be no loss of existing habitat value.
>
> Resource Category 2 - Habitat to be impacted is of high value for evaluation species and is relatively scarce or becoming scarce on a national basis or in the ecoregion section. The mitigation goal for habitat placed in this category is that there should be no net loss of in-kind habitat value.
>
> Resource Category 3 - Habitat to be impacted is of high to medium value for evaluation species and is relatively abundant on a national basis. FWS's mitigation goal here is that there be no net loss of habitat value while minimizing loss of in-kind habitat value.
>
> Resource Category 4 - Habitat to be impacted is of medium to low value for evaluation species. The mitigation goal is to minimize loss of habitat value.

Considering the high value of forested wetlands and marsh for fish and wildlife and the relative scarcity of that habitat type, those habitat types are designated as Resource Category 2, the mitigation goal for which is no net loss of in-kind habitat value. Non-wetland forests would also be considered Resource Category 2. Scrub-shrub habitat that may be impacted, however, is a Resource Category 3 due to their reduced value to wildlife, fisheries and degraded wetland functions. The mitigation goal for Resource Category 3 habitats is no net loss of habitat value. Depending on the habitat quality of St. Tammany's major waterbodies and their tributaries those waterbodies could be either a Resource Category 2 or 3.

To achieve fish and wildlife resource conservation, the Service recommends that the following planning objectives be adopted to guide future project planning efforts:

1. Conserve important fish and wildlife habitat (marshes, forested wetlands, and non-wetland forest) by avoiding and minimizing the acreage of those habitats directly impacted by flood control features. Forest clearing associated with project features should be conducted during the fall and winter to minimize impacts to nesting migratory birds, when practicable.
2. Minimize enclosure of wetlands within new levee alignments. When enclosing wetlands is unavoidable, acquire non-development easements on those wetlands, or maintain hydrologic connections with adjacent, un-enclosed wetlands to minimize secondary impacts from development and hydrologic alteration.
3. Where levees would be constructed, avoid intercepted drainage and water logging impacts to protected-side forest habitats through construction of levee borrow canals or other means.
4. Avoid impacts to threatened and endangered species, at risk species, and species of concern such as the bald eagle and wading bird nesting colonies.
5. Fully compensate for any unavoidable losses of wetland habitat or non-wetland forest caused by project features.

Mitigation Planning for Unavoidable Habitat Impacts

Project features should be located and designed to avoid impacts to wetlands and non-wetland forested habitat. Should unavoidable impacts occur, those impacts should be minimized to the greatest extent possible. Any remaining unavoidable impacts must then be mitigated. Mitigation planning, including site selection and design, should be closely coordinated with the Service and other interested natural resource agencies. Full, in-kind compensation, quantified as Average Annual Habitat Units, should be provided for unavoidable net adverse impacts on forested areas, wetlands, marsh, and associated submerged aquatic vegetation. Mitigation measures that would provide habitat for at-risk species in the project area should be included in any mitigation plan and project features; the Service can assist in development of such measures.

Mitigation measures should be constructed concurrently with the features that they are mitigating (i.e., mitigation should be completed no later than 18 months after levee construction has begun). If mitigation is provided via an in-lieu fee program or mitigation bank, completed mitigation would be achieved when credits were purchased from either source. If mitigation is not implemented concurrent with levee construction, the amount of mitigation needed should be reassessed and adjusted to offset temporal habitat losses, including Essential Fisheries Habitat functions.

For marsh mitigation, the acreage of marsh created to mitigate project impacts should meet or exceed the marsh acreage projected by the Habitat Evaluation Team for target year 5. If deficiencies occur in year 5 acres, additional mitigation shall be provided.

In coordination with the Service and other fish and wildlife conservation agencies, the Corps should address the Environmental Protection Agency's and the Corps of Engineers' 12 requirements for each mitigation measure (Appendix C). The Corps should remain responsible for marsh mitigation until the mitigation is demonstrated to be fully compliant with success and performance criteria. At a minimum, this should include compliance with the requisite vegetation, elevation, acreage, and dike gapping criteria.

We look forward to assisting the Corps in the documentation of existing conditions, development of alternatives, and assessment of project alternatives on Federal trust resources during the subsequent feasibility study. Should you have any questions regarding our comments, please contact Karen Soileau (337/291-3132) of this office.

Sincerely,

Joseph A. Ranson
Field Supervisor
Louisiana Ecological Services Office

Cc: Southeast Louisiana Refuge Complex, Lacombe, LA
National Marine Fisheries Service, Baton Rouge, LA
Louisiana Department of Wildlife and Fisheries, Baton Rouge, LA

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Louisiana Ecological Services Field Office
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Lafayette, LA 70506
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In Reply Refer To:
Consultation Code: 04EL1000-2021-SLI-0601
Event Code: 04EL1000-2021-E-01713
Project Name: St Tammany Feasibility Study

January 08, 2021

Subject: Updated list of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

***Due to the Louisiana Governor's mandatory quarantine order for the coronavirus (COVID-19), and in order to keep our staff and the public safe, we are unable to accept or respond in a timely manner to consultation request or project review/concurrence that we receive through the U.S. Mail. Please submit your request electronically to lafayette@fws.gov or call 337-291-3100.**

The enclosed species list identifies threatened, endangered and candidate species, as well as designated and proposed critical habitat that may occur within the boundary of your proposed project and may be affected by your proposed project. The Fish and Wildlife Service (Service) is providing this list under section 7 (c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Changes in this species list may occur due to new information from updated surveys, changes in species habitat, new listed species and other factors. Because of these possible changes, feel free to contact our office (337/291-3126) for more information or assistance regarding impacts to federally listed species. The Service recommends visiting the ECOS-IPaC site or the Louisiana Ecological Services website (www.fws.gov/lafayette) at regular intervals during project planning and implementation for updated species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the habitats upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of Federal trust resources and to determine whether projects may affect Federally listed species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected (e.g. adverse, beneficial, insignificant or discountable) by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF or by contacting our office at the number above.

Bald eagles have recovered and were removed from the List of Endangered and Threatened Species as of August 8, 2007. Although no longer listed, please be aware that bald eagles are protected under the Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668 *et seq.*). The Service developed the National Bald Eagle Management (NBEM) Guidelines to provide landowners, land managers, and others with information and recommendations to minimize potential project impacts to bald eagles, particularly where such impacts may constitute "disturbance," which is prohibited by the BGEPA. A copy of the NBEM Guidelines is available at: http://www.fws.gov/southeast/es/baldeagle/NationalBaldEagleManagementGuidelines.pdf. Those guidelines recommend: (1) maintaining a specified distance between the activity and the nest (buffer area); (2) maintaining natural areas (preferably forested) between the activity and nest trees (landscape buffers); and (3) avoiding certain activities during the breeding season. On-site personnel should be informed of the possible presence of nesting bald eagles within the project boundary, and should identify, avoid, and immediately report any such nests to this office. If a bald eagle nest occurs or is discovered within or adjacent to the proposed project area, then an evaluation must be performed to determine whether the project is likely to disturb nesting bald eagles. That evaluation may be conducted on-line at: http://www.fws.gov/southeast/es/baldeagle. Following completion of the evaluation, that website will provide a determination of whether additional consultation is necessary. The Division of Migratory Birds for the Southeast Region of the Service (phone: 404/679-7051, e-mail: SEmigratorybirds@fws.gov) has the lead role in conducting any necessary consultation. Should you need further assistance interpreting the guidelines or performing an on-line project evaluation, please contact this office.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g. cellular, digital television, radio and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm ; http://www.towerkill.com; and http://fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

Activities that involve State-designated scenic streams and/or wetlands are regulated by the Louisiana Department of Wildlife and Fisheries and the U.S. Army Corps of Engineers, respectively. We, therefore, recommend that you contact those agencies to determine their interest in proposed projects in these areas.

Activities that would be located within a National Wildlife Refuge are regulated by the refuge staff. We, therefore, recommend that you contact them to determine their interest in proposed projects in these areas.

Additional information on Federal trust species in Louisiana can be obtained from the Louisiana Ecological Services website at: www.fws.gov/lafayette or by calling 337/291-3100.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Louisiana Ecological Services Field Office
200 Dulles Drive
Lafayette, LA 70506
(337) 291-3100

Project Summary

Consultation Code: 04EL1000-2021-SLI-0601
Event Code: 04EL1000-2021-E-01713
Project Name: St Tammany Feasibility Study
Project Type: DREDGE / EXCAVATION
Project Description: The TSP is a combined alternative that includes an alignment that consists of levee and floodwall sections in west and south Slidell, clearing and snagging in Bayou Patassat in Slidell, channel improvements in Mile Branch in Covington, and Nonstructural home elevations and floodproofing for the rest of the Parish at the 50 year floodplain. The combined structural and nonstructural TSP will reduce risk to approximately 15,568 structures in the study area.

The levee and floodwall alignment, located in the City of Slidell, Louisiana, is a combination of portions of the levee from alternative 5 and alternative 6a (except for northwest portion of the alignment) of the final array, and is tied together with a railroad gate across the railroad tracks. The alignment will comprise of approximately 14 miles of levee and 2.3 miles of floodwall for a total length of 16.3 miles. There are a series of pump stations and control structures that are part of this alternative, including 5 pump stations, 4 gate complexes, and 1 channel floodgate. There is a total of 3 sluicegates, 7 vehicular gates, one railroad gate, and 7 ramps. Interstate 10 will also be elevated to the preliminary design elevation of 15ft.

Bayou Patassat is a small tributary of Bayou Bonfouca also located in Slidell, Louisiana. The preliminary design of the channel improvements assumes an existing bank elevation of 1 ft, a 10 ft bottom width at elevation (-) 5 ft. The bank is at 1V:3H slope. The work is located between Bayou Vincent pump station and Highway 11. Approximately 0.17 miles (900 ft) of clearing and snagging will occur in the channel.

The Mile Branch channel improvements start at the intersection of Mile Branch and Highway 190, crossing Highway 190 Business, and end at the intersection of Mile Branch and the Tchefuncte River. This alternative consists of channel improvements on the lower 2.15 miles (11,341 ft channel) of Mile Branch in Covington. The preliminary design assumes an existing bank elevation of 1 ft, a 10-ft bottom width at elevation (-) 5ft. The bank is at 1V:3H slope. The improvements include clearing and grubbing and mechanical dredging of the channel. The channel bottom will be lowered by 5 ft. Approximately 20 acres of channel will be cleared and grubbed prior to mechanical dredging.

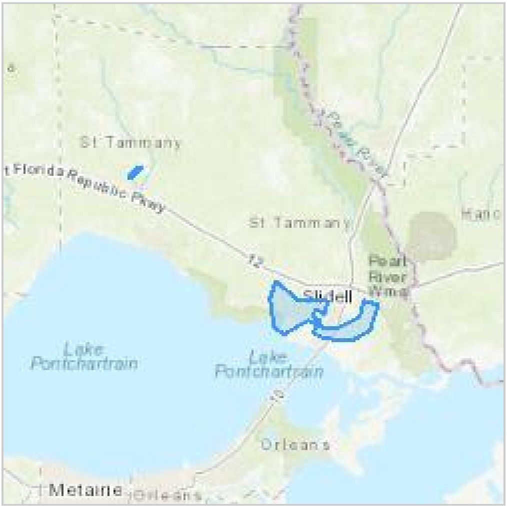
A total of 8,498 homes will be elevated to the future 100-year stage up to 13’; and nonresidential structures floodproofed up to 3 feet. The floodproofing of these structures address the structures in the 50 year floodplain that are not included in the areas benefitted from the structural features of the TSP. It is estimated that 6,664 homes will be raised and

1,854 structures floodproofed.

The TSP is also the National Economic Development (NED) Plan. As shown below in Table 21.2.1, the combined net benefits are $123,588,663 and the BCR is 1.8. This combined plan has the greatest economic net benefit and is consistent with protecting the environment.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@30.27076965,-89.84049423247268,14z



Counties: St. Tammany County, Louisiana

Endangered Species Act Species

There is a total of 5 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
West Indian Manatee *Trichechus manatus* There is **final** critical habitat for this species. The location of the critical habitat is not available. ***This species is also protected by the Marine Mammal Protection Act, and may have additional consultation requirements.*** Species profile: https://ecos.fws.gov/ecp/species/4469	Threatened

Birds

NAME	STATUS
Red-cockaded Woodpecker *Picoides borealis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/7614	Endangered

Reptiles

NAME	STATUS
Gopher Tortoise *Gopherus polyphemus* Population: West of Mobile and Tombigbee Rivers No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6994	Threatened
Ringed Map Turtle *Graptemys oculifera* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2664	Threatened

Fishes

NAME	STATUS
Atlantic Sturgeon (gulf Subspecies) *Acipenser oxyrinchus (=oxyrhynchus) desotoi* There is **final** critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/651	Threatened

Critical habitats

There is 1 critical habitat wholly or partially within your project area under this office's jurisdiction.

NAME	STATUS
Atlantic Sturgeon (gulf Subspecies) *Acipenser oxyrinchus (=oxyrhynchus) desotoi* https://ecos.fws.gov/ecp/species/651#crithab	Final

Appendix A
Borrow Site Prioritization Criteria

Where multiple alternative borrow areas exists, use of those alternative sites should be prioritized in the following order: existing commercial pits, upland sources, previously disturbed/manipulated wetlands within a levee system, and low-quality wetlands outside a levee system. The Service supports the use of such protocols to avoid and minimize impacts to wetlands and bottomland hardwoods within project areas. Avoidance and minimization of those impacts helps to provide consistency with restoration strategies and compliments the authorized hurricane protection efforts. Such consistency is also required by Section 303(d)(1) of the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA).

Accordingly, the Service recommends that prior to utilizing borrow sites every effort should be made to reduce impacts by using sheetpile and/or floodwalls to increase levee heights wherever feasible. In addition, the Service recommends that the following protocol be adopted and utilized to identify borrow sources in descending order of priority:

1. Permitted commercial sources, authorized borrow sources for which environmental clearance and mitigation have been completed, or non-functional levees after newly constructed adjacent levees are providing equal protection.
2. Areas under forced drainage that are protected from flooding by levees, and that are:
    a) non-forested (e.g., pastures, fallow fields, abandoned orchards, former urban areas) and non-wetlands;
    b) wetland forests dominated by exotic tree species (i.e., Chinese tallow-trees) or non-forested wetlands(e.g., wet pastures), excluding marshes;
    c) disturbed wetlands (e.g., hydrologically altered, artificially impounded).
3. Sites that are outside a forced drainage system and levees, and that are:
    a) non-forested (e.g., pastures fallow fields, abandoned orchards, former urban areas) and non-wetlands;
    b) wetland forests dominated by exotic tree species (i.e., Chinese tallow-trees) or non-forested wetlands (e.g., wet pastures), excluding marshes;
    c) disturbed wetlands (e.g., hydrologically altered, artificially impounded).

Notwithstanding this protocol, the location, size and configuration of borrow sites within the landscape is also critically important. Coastal ridges, natural levee flanks and other geographic features that provide forested/wetland habitats and/or potential barriers to hurricane surges should not be utilized as borrow sources, especially where such uses would diminish the natural functions and values of those landscape features.

To assist in expediting the identification of borrow sites, the Service recommends that immediately after the initial identification of a new borrow site the Corps should initiate informal consultation with the Service regarding potential impacts to federally listed threatened or endangered species. In addition, to the maximum extent practicable, the Service recommends avoiding and/or minimizing impacts to at-risk species. To aid you in complying with those proactive consultation responsibilities, the Service has provided (in the above letter) a list of threatened and endangered species and their respective critical habitats if designated, and a list of at-risk species.

Appendix B

Borrow Pit/Canal Construction Recommendations for Improved Fish and Wildlife Habitat Quality

The Service offers the following additional recommendations for reducing borrow site impacts on fish and wildlife resources and, where feasible, enhancing those resources. However, these additional recommendations should not be implemented if they would result in the expansion of existing borrow pits or construction of new borrow pits in wetlands or bottomland hardwoods.

1. A minimum of 30 percent of the borrow pits' edge should slope no greater than 5 horizontal (H):1 vertical (V), starting from the water line down to a depth of approximately 5 feet.
2. Most of the woody vegetation removed during clearing and grubbing should be placed into the deepest parts of the borrow pits and the remaining debris should be placed in the water along the borrow pit shorelines, excluding those areas where the 5H:1V slope, per recommendation 1, have been constructed.
3. Following construction, perimeter levees (if constructed) around each borrow pit should be gapped at 25-foot intervals with an 8-foot-wide breach, the bottom elevation of which should be level with the adjacent natural ground elevation.

When avoidance and minimization of bottomland hardwood and wetland impacts is not practicable, all unavoidable net losses of those habitats should be fully offset via compensatory mitigation. Such compensatory mitigation should sited within the watershed and/or hydrologic unit where the impact occurred, and should be completed concurrently with borrow operations, or as soon thereafter as possible.

Should the need for borrow material exceed that of locally available non-wetland sites, the search for levee-building material is often conducted primarily on project-by-project basis. In the context of such project-by-project searches for borrow material, the least-expensive and easiest sources of borrow material are usually located within wetlands and/or bottomland hardwoods, adjacent to the proposed levee. Such on-site sources, however, often involve adverse impacts to wetlands, thus exacerbating the overall wetland loss problem in all coastal basins, especially those in the deltaic plain of southeast Louisiana. In short, while such on-site sources are relatively inexpensive, they will frequently be inconsistent with coastal restoration efforts and, to the extent that wetlands will be adversely impacted, use of those sites will be counterproductive with respect to minimizing wetland impacts and attaining the goal of increasing non-structural hurricane protection within a sustainable ecosystem.

If large amounts of borrow material will be needed, the Corps should begin working to identify borrow sites of acceptable quantity and quality, while avoiding and/or minimizing adverse environmental impacts. We therefore recommend that a plan be developed that integrates borrow resources, uses, and needs for various programs and activities. Guiding principles should be developed to identify borrow resources, borrow-site designs, and prioritize uses to avoid competing for resources, maximize benefits with those resources, and avoid adverse environmental impacts.

APPENDIX C

TWELVE REQUIRMENTS FOR MITIGATION PLANNING (from the U.S. Army Corps of Engineers & EPA 2008 Final Mitigation Rule in the FEDERAL REGISTER Vol. 73, No. 70, April 10, 2008)

Twelve Requirements for a Compensatory Mitigation Plan

1. Objectives. A description of the resource type(s) and amount(s) that will be provided, the method of compensation (restoration, establishment, preservation etc.), and how the anticipated functions of the mitigation project will address watershed needs.

2. Site selection. A description of the factors considered during the site selection process. This should include consideration of watershed needs, onsite alternatives where applicable, and practicability of accomplishing ecologically self-sustaining aquatic resource restoration, establishment, enhancement, and/or preservation at the mitigation project site.

3. Site protection instrument. A description of the legal arrangements and instrument including site ownership that will be used to ensure the long-term protection of the mitigation project site.

4. Baseline information. A description of the ecological characteristics of the proposed mitigation project site, in the case of an application for a DA permit, the impact site. This may include descriptions of historic and existing plant communities, historic and existing hydrology, soil conditions, a map showing the locations of the impact and mitigation site(s) or the geographic coordinates for those site(s), and other characteristics appropriate to the type of resource proposed as compensation. The baseline information should include a delineation of waters of the United States on the proposed mitigation project site. A prospective permittee planning to secure credits from an approved mitigation bank or in-lieu fee program only needs to provide baseline information about the impact site.

5. Determination of credits. A description of the number of credits to be provided including a brief explanation of the rationale for this determination.
   - For permittee-responsible mitigation, this should include an explanation of how the mitigation project will provide the required compensation for unavoidable impacts to aquatic resources resulting from the permitted activity.
   - For permittees intending to secure credits from an approved mitigation bank or in-lieu fee program, it should include the number and resource type of credits to be secured and how these were determined.

6. Mitigation work plan. Detailed written specifications and work descriptions for

the mitigation project, including: the geographic boundaries of the project; construction methods, timing, and sequence; source(s) of water; methods for establishing the desired plant community; plans to control invasive plant species; proposed grading plan; soil management; and erosion control measures. For stream mitigation projects, the mitigation work plan may also include other relevant information, such as planform geometry, channel form (e.g., typical channel cross- sections), watershed size, design discharge, and riparian area plantings.

7. Maintenance plan. A description and schedule of maintenance requirements to ensure the continued viability of the resource once initial construction is completed.

8. Performance standards. Ecologically-based standards that will be used to determine whether the mitigation project is achieving its objectives.

9. Monitoring requirements. A description of parameters monitored to determine whether the mitigation project is on track to meet performance standards and if adaptive management is needed. A schedule for monitoring and reporting monitoring results to the DE must beincluded.

10. Long-term management plan. A description of how the mitigation project will be managed after performance standards have been achieved to ensure the long-term sustainability of the resource, including long-term financing mechanisms and the party responsible for long-term management.

11. Adaptive management plan. A management strategy to address unforeseen changes in site conditions or other components of the mitigation project, including the party or parties responsible for implementing adaptive management measures.

12. Financial assurances. The DE may require additional information as necessary to determine the appropriateness, feasibility, and practicability of the mitigation project.

13. Other information. The DE may require additional information as necessary to determine the appropriateness, feasibility, and practicability of the mitigation project.

Draft Coordination Act Report Recommendations from USFWS and USACE Responses

With regard to indirect project effects, the Service offers the following recommendations:

1. Estimates of project-related indirect impacts associated with the proposed levee should be defined/mapped and a detailed description of those impacts (i.e., impoundment and interrupted hydrology, etc.) should be included in the Draft EIS.

USACE Response*: Estimates of anticipated indirect impacts associated with project features are analyzed by alternative and measure in the draft report. Maps indicating initial placement for levee and all related features are included in the draft report in Section 10, Tentatively Selected Plan.*

2. The operation plan of the water control structures, under both the coastal storm and heavy rainfall event scenarios, associated with this project should be provided to the Service as soon as possible.

USACE Response: *Gates and pump stations would only be operated during tropical storms, high water, and maintenance events. Estimates for this currently are approximately 10 days per year. Details regarding these will be found in Engineering Appendix D. The draft operations plan would be completed during PED and shared with USFWS.*

Direct wetland losses will result from construction of the proposed project features. Avoidance and minimization of direct wetland impacts should be pursued to the greatest extent practicable. The Service provides the following recommendations to avoid and/or minimize project impacts on fish and wildlife resources, and for mitigating unavoidable impacts to those resources.

3. Construction features of the proposed project should not be located within Big Branch Marsh NWR. If the Corps determines that this option is not feasible, close coordination with the Service will be necessary to minimize impacts to that refuge to the maximum extent practicable. In addition, all necessary refuge permits should be obtained before any surveys or construction begins on the refuge.

USACE Response: *Current designs indicate portions of the proposed action will be located on Big Branch Marsh NWR however efforts to minimize impacts to habitat will continue beginning with optimization. Coordination with USFWS is ongoing, and will continue through all study phases. Necessary permits will be acquired for surveys and construction prior to the start of those activities.*

4. If any construction features are located within Big Branch Marsh NWR, mitigation for those direct and indirect impacts should occur on that refuge. In addition, after closely coordinating with the Service, adverse impacts to the refuge may be mitigated via a land swap for lands within Big Branch Marsh's acquisition boundary, should the Service deem those areas contain quality fish and wildlife habitat.

USACE Response: *Acknowledged; close coordination with the Refuge will continue through all study phases to ensure adequate mitigation for Refuge impacts and habitat impacts are identified.*

5. The Corps should be responsible for the maintenance and monitoring of all construction features that occur on Big Branch NWR.

USACE Response: *The NFS would be responsible for operation and maintenance of the constructed project.*

6. Species of vegetation, planted and maintained on levees or levee slopes on Big Branch Marsh NWR, should be closely coordinated with the Service.

USACE Response: *Acknowledged.*

7. Public access (on top of and over) that portion of the levee occurring on Big Branch Marsh NWR should be addressed in the Draft EIS.

USACE Response: *Following completion of construction, public access across the levee into Big Branch NWR will be restored.*

To the maximum extent practicable, the proposed levee should be located to avoid and minimize direct and indirect impacts to wetlands.

USACE Response: *Concur.*

8. Borrow locations for levee construction should be identified and provided to the Service. Borrow areas should be located within the protected side of the system and should avoid and/or minimize impacts to both herbaceous and forested wetlands.

USACE Response: *Information regarding borrow sources including maps and preliminary impacts are included in the draft report in Appendix B.*

9. Borrow pit features may increase habitat value for fish and wildlife resources and provide additional fish and wildlife recreational opportunities. To achieve these habitat benefits, the Service offers recommendations on borrow pit construction (Appendix A and B).

USACE Response: *Recommendations noted.*

10. The Corps should coordinate closely with the Service and other fish and wildlife conservation agencies throughout the engineering and design of project features including levees, floodgates, and water control structures to ensure that those features are designed, constructed and operated consistent with wetland restoration and associated fish and wildlife resource needs.

USACE Response: *Coordination is ongoing with the natural resource agencies, and would continue, throughout the engineering and design phases of the St. Tammany Parish, Louisiana Feasibility Study. Close coordination with the Refuge will continue through all study phases to ensure adequate mitigation for Refuge impacts and habitat impacts are identified.*

11. Floodgates should be designed to efficiently handle the drainage needs and avoid increased flooding duration and depths for the potentially large protected area north of the levee alignment.

USACE Response: *Concur.*

12. Estimates of direct wetland impacts should be included in the Draft EIS.

USACE Response: *Estimates of anticipated direct impacts associated with project features are analyzed and included in the draft report in Environmental Appendix C. I*

13. If organic soils must be removed from the construction site, that material should be used to create or restore emergent wetlands to the greatest extent practicable. If that is not practicable, then use of that material to improve borrow pit habitat quality (e.g., construct bank slopes, reduce depths, etc.) should be examined.

USACE Response: *Comment noted. Land acquired for construction activities would be in the name of the local sponsor. Best management practices will be followed for disposal of any material.*

14. Should snagging and clearing be included as a feature of the project, those activities should follow the techniques described within the Stream Obstruction Removal Guidelines (Appendix C).

USACE Response: *Comment noted.*

15. Forest clearing associated with project features should be conducted during the fall or winter to minimize impacts to nesting migratory birds, when practicable.

USACE Response: *If the project is authorized by Congress and funded for construction, coordination on the construction schedule would continue with USFWS and best management practices would be followed to minimize impacts to nesting migratory birds.*

16. Avoid adverse impacts to bald eagle nesting locations and wading bird colonies through careful design of project features and timing of construction. Surveys prior to construction such be undertaken to ensure no nesting birds are within 1,000 feet of any proposed work. If nesting birds are found within 1,000 feet of any proposed work sites, the Service and the Louisiana Department of Wildlife and Fisheries should be contacted for procedures to avoid impacts.

USACE Response: *Concur.*

17. A Biological Assessment should be prepared to identify potential direct and indirect impacts to federally listed threatened and endangered species that occur within the project impact area. Those species include the: West Indian manatee, inflated heelsplitter, Louisiana quillwort, Gulf sturgeon, gopher tortoise, ringed

map turtle and red-cockaded woodpecker. The Corps should determine if the potential impacts identified would "likely (or not likely) adversely affect" those species.

USACE Response: *Concur. CEMVN has determined that the proposed project "may affect, but is not likely to adversely affect" (NLAA) the federally listed species of Gulf sturgeon, West Indian manatee, inflated heelsplitter, Louisiana quillwort, gopher tortoise, ringed map turtle and red-cockaded woodpecker; and a "may affect, but not likely to adversely affect" for Gulf sturgeon critical habitat. These species could potentially be found in the project area, which also contains Gulf sturgeon critical habitat. The Biological Assessment (BA) as required by the ESA is still in development with USFWS, and a separate BA is being developed for consultation with NMFS, and both will be available in the Final Environmental Impact Statement (FEIS).*

18. The Service recommends that you contact the Service's Louisiana Ecological Services Office for additional consultation if: 1) the scope or location of the proposed project is changed significantly, 2) new information reveals that the action may affect listed species or designated critical habitat; 3) the action is modified in a manner that causes effects to listed species or designated critical habitat that were not previously considered; or 4) a new species is listed or critical habitat designated. Additional consultation as a result of any of the above conditions or for changes not covered in this consultation should occur before changes are made and/or finalized.

USACE Response: *Concur.*

19. Consideration should be given to minimize adverse impacts to species currently designated as "at-risk" that may occur within St. Tammany Parish. Those species include the: golden winged warbler, frecklebelly madtom, saltmarsh topminnow, monarch butterfly, Southern snaketail butterfly, Eastern beard grass skipper, tri-colored bat, Alabama hickory nut, Correll's false dragon-head, alligator snapping turtle, Eastern diamondback rattlesnake and Pearl River map turtle.

USACE Response: *The proposed alignments for St. Tammany avoid impacts to wetlands, non-wet bottomland hardwoods and "at-risk" species to the greatest extent possible. However, the proposed levee heights and subsequent levee slopes and floodwalls to meet design criteria require a construction footprint, which permanently impact approximately 350 acres of marsh and forested wetlands which are habitat where "at-risk" species may reside as described in the Environmental Appendix C.*

20. Full, in-kind compensation (quantified as AAHUs) should be provided for unavoidable net adverse impacts on forested wetlands, marsh, and associated submerged aquatic vegetation, including any additional losses identified during post-authorization engineering and design studies. To help ensure that the proposed mitigation features meet their goals, the Service provides the following recommendations.

    a. The Corps should fully compensate for any unavoidable losses of wetland habitat or non-wet bottomland hardwoods caused by project features.
    b. Mitigation measures should be constructed concurrently with the features that they are mitigating. If construction is not concurrent with mitigation implementation then revising the impact and mitigation period-of-analysis to reflect additional temporal losses will be required.
    c. The Service and other fish and wildlife conservation agencies should be consulted in the development of plans and specifications for all mitigation features and any monitoring and/or adaptive management plans.

d. To avoid shortfalls in marsh creation acreage, the contractor should be required to guarantee the creation of at least the target acreage of marsh platform, or excess acres should be created.
e. The acreage of marsh created to mitigate project impacts should meet or exceed the marsh acreage projected by the Habitat Evaluation Team for target year 5.
f. The acreage of marsh, bottomland hardwoods, pine savannah and swamp created for mitigation purposes, and adjacent affected wetlands, should be monitored over the project life to evaluate project impacts, effectiveness of compensatory mitigation measures, and the need for additional mitigation should those measures prove insufficient.
g. The Corps should maintain full responsibility for all mitigation projects until the projects are found to be fully compliant with success and performance requirements. Success requirements are provided (Appendix D).
h. If applicable, a General Plan for mitigation should be developed by the Corps, the Service, and the managing natural resource agency in accordance with Section 3(b) of the FWCA for mitigation lands (Appendix E).

USACE Response: *USACE will fully compensate for all unavoidable impacts to habitat incurred by the proposed action. Every effort will be made to mitigate concurrent with construction. USACE will provide all resource agencies with a copy of the draft plans and specifications, monitoring and adaptive management for review and comment. Mitigation features would be monitored over the 50 year period of analysis to ensure the mitigation requirement is fully satisfied. Any mitigation components are considered a feature of the entire project. The non-Federal sponsor is responsible for all Operational, Maintenance, Repair, Replacement and Rehabilitation (OMRR&R) of all project features, as required by the USACE OMRR&R manual provided to the non-Federal sponsor upon completion of a project. A General Plan would be developed if necessary for the project.*

Appendix A

Borrow Site Prioritization Criteria

Where multiple alternative borrow areas exists, use of those alternative sites should be prioritized in the following order: existing commercial pits, upland sources, previously disturbed/manipulated wetlands within a levee system, and low-quality wetlands outside a levee system. The Service supports the use of such protocols to avoid and minimize impacts to wetlands and bottomland hardwoods within project areas. Avoidance and minimization of those impacts helps to provide consistency with restoration strategies and compliments the authorized hurricane protection efforts. Such consistency is also required by Section 303(d)(1) of the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA).

Accordingly, the Service recommends that prior to utilizing borrow sites every effort should be made to reduce impacts by using sheetpile and/or floodwalls to increase levee heights wherever feasible. In addition, the Service recommends that the following protocol be adopted and utilized to identify borrow sources in descending order of priority:

1. Permitted commercial sources, authorized borrow sources for which environmental clearance and mitigation have been completed, or non-functional levees after newly constructed adjacent levees are providing equal protection.
2. Areas under forced drainage that are protected from flooding by levees, and that are:
   a) non-forested (e.g., pastures, fallow fields, abandoned orchards, former urban areas) and non-wetlands;
   b) wetland forests dominated by exotic tree species (i.e., Chinese tallow-trees) or non-forested wetlands(e.g., wet pastures), excluding marshes;
   c) disturbed wetlands (e.g., hydrologically altered, artificially impounded).
3. Sites that are outside a forced drainage system and levees, and that are:
   a) non-forested (e.g., pastures fallow fields, abandoned orchards, former urban areas) and non-wetlands;
   b) wetland forests dominated by exotic tree species (i.e., Chinese tallow-trees) or non-forested wetlands (e.g., wet pastures), excluding marshes;
   c) disturbed wetlands (e.g., hydrologically altered, artificially impounded).

Notwithstanding this protocol, the location, size and configuration of borrow sites within the landscape is also critically important. Coastal ridges, natural levee flanks and other geographic features that provide forested/wetland habitats and/or potential barriers to hurricane surges should not be utilized as borrow sources, especially where such uses would diminish the natural functions and values of those landscape features.

To assist in expediting the identification of borrow sites, the Service recommends that immediately after the initial identification of a new borrow site the Corps should initiate informal consultation with the Service regarding potential impacts to federally listed threatened or endangered species. In addition, to the maximum extent practicable, the Service recommends avoiding and/or minimizing impacts to at-risk species. To aid you in complying with those proactive consultation responsibilities, the Service has provided (in the above letter) a list of threatened and endangered species and their respective critical habitats if designated, and a list of at-risk species.

Appendix B

Borrow Pit/Canal Construction Recommendations for Improved Fish and Wildlife Habitat Quality

The Service offers the following additional recommendations for reducing borrow site impacts on fish and wildlife resources and, where feasible, enhancing those resources. However, these additional recommendations should not be implemented if they would result in the expansion of existing borrow pits or construction of new borrow pits in wetlands or bottomland hardwoods.

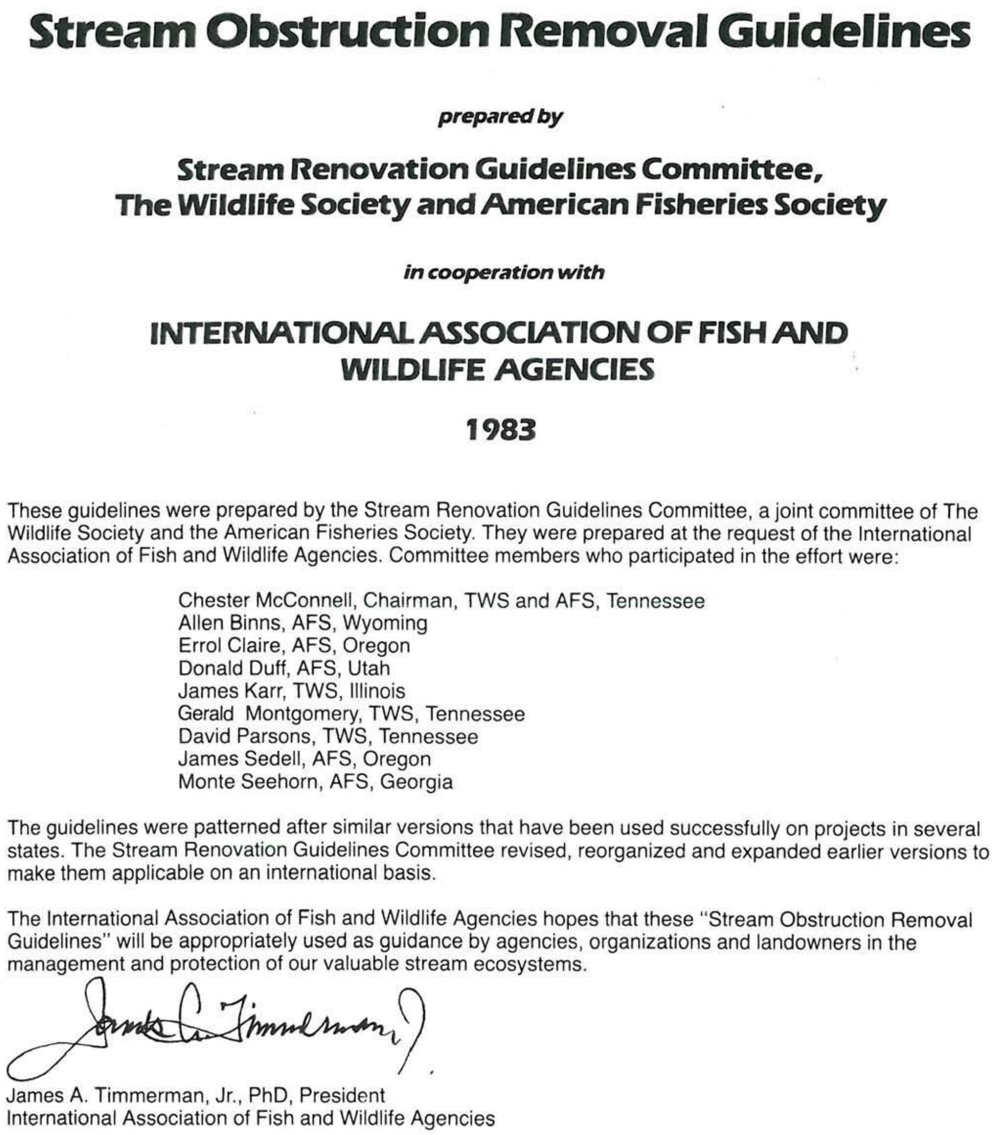
1. A minimum of 30 percent of the borrow pits' edge should slope no greater than 5 horizontal (H):1 vertical (V), starting from the water line down to a depth of approximately 5 feet.
2. Most of the woody vegetation removed during clearing and grubbing should be placed into the deepest parts of the borrow pits and the remaining debris should be placed in the water along the borrow pit shorelines, excluding those areas where the 5H:1V slope, per recommendation 1, have been constructed.
3. Following construction, perimeter levees (if constructed) around each borrow pit should be gapped at 25-foot intervals with an 8-foot-wide breach, the bottom elevation of which should be level with the adjacent natural ground elevation.

When avoidance and minimization of bottomland hardwood and wetland impacts is not practicable, all unavoidable net losses of those habitats should be fully offset via compensatory mitigation. Such compensatory mitigation should sited within the watershed and/or hydrologic unit where the impact occurred, and should be completed concurrently with borrow operations, or as soon thereafter as possible.

Should the need for borrow material exceed that of locally available non-wetland sites, the search for levee-building material is often conducted primarily on project-by-project basis. In the context of such project-by-project searches for borrow material, the least-expensive and easiest sources of borrow material are usually located within wetlands and/or bottomland hardwoods, adjacent to the proposed levee. Such on-site sources, however, often involve adverse impacts to wetlands, thus exacerbating the overall wetland loss problem in all coastal basins, especially those in the deltaic plain of southeast Louisiana. In short, while such on-site sources are relatively inexpensive, they will frequently be inconsistent with coastal restoration efforts and, to the extent that wetlands will be adversely impacted, use of those sites will be counterproductive with respect to minimizing wetland impacts and attaining the goal of increasing non-structural hurricane protection within a sustainable ecosystem.

If large amounts of borrow material will be needed, the Corps should begin working to identify borrow sites of acceptable quantity and quality, while avoiding and/or minimizing adverse environmental impacts. We therefore recommend that a plan be developed that integrates borrow resources, uses, and needs for various programs and activities. Guiding principles should be developed to identify borrow resources, borrow-site designs, and prioritize uses to avoid competing for resources, maximize benefits with those resources, and avoid adverse environmental impacts.

Appendix C



Stream Obstruction Removal Guidelines

prepared by

Stream Renovation Guidelines Committee,
The Wildlife Society and American Fisheries Society

in cooperation with

INTERNATIONAL ASSOCIATION OF FISH AND WILDLIFE AGENCIES

1983

These guidelines were prepared by the Stream Renovation Guidelines Committee, a joint committee of The Wildlife Society and the American Fisheries Society. They were prepared at the request of the International Association of Fish and Wildlife Agencies. Committee members who participated in the effort were:

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The guidelines were patterned after similar versions that have been used successfully on projects in several states. The Stream Renovation Guidelines Committee revised, reorganized and expanded earlier versions to make them applicable on an international basis.

The International Association of Fish and Wildlife Agencies hopes that these "Stream Obstruction Removal Guidelines" will be appropriately used as guidance by agencies, organizations and landowners in the management and protection of our valuable stream ecosystems.

James A. Timmerman, Jr., PhD, President
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Table of Contents

Introduction

The intent of these guidelines is to aid in correcting stream flow problems, caused by obstructions, in an environmentally sound manner and to maintain natural stream characteristics. They are a positive alternative, designed to protect natural resources, to be used when a government agency or other interests are considering channelization, clearing and snagging, or other severe stream modifications. The purpose is not to generate projects but to provide a sound alternative that will lessen adverse impacts when a decision has been made to correct stream flow problems.

Many important, interrelated factors that influence streams are not addressed in these guidelines. For example, they do not provide management suggestions for watershed, floodplain or riparian areas, nor do they provide instructions for development of specific instream fish habitat features. Information concerning these aspects is readily available in various publications.

Debris, sediment and channel structure play an important role in maintaining the integrity of aquatic ecosystems but sometimes excessive amounts cause problems that man seeks to correct. In cases where excessive debris and/or fine sediment have no significant impact on societal values, no work need be done. Persons interested in wild natural resources oppose destructive, structural stream modification practices and favor nonstructural measures in most instances. It is recognized, however, that unwise land use and abusive stream use practices often diminish the flow capacities of streams to the extent that corrective action is demanded. Development interests and flood-damaged communities often successfully promote drastic stream modifications to achieve some desired level of water conveyance or flood relief. When planners seek solutions to stream flow problems, nonstructural measures should always be used to correct the problems when practical. In cases where it is inappropriate or infeasible to address flow problems with no action or nonstructural alternatives, the obstruction removal alternative in accordance with these guidelines is recommended as the preferred alternative.

The guidelines shall be applied and monitored by an interdisciplinary team of experts knowledgeable about local conditions. This is essential to successful implementation. The team shall be responsible for classifying the various stream reaches and monitoring ongoing and completed work for compliance.

These guidelines are only applicable to situations where channel blockages result in unacceptable flow problems and where restoration of the natural or former flow capacity of the channel is desired. The combination of obstruction removal and various nonstructural alternatives should be thoroughly examined before it is determined that more drastic channel modification is the only feasible solution. In either case, natural resource agencies may seek mitigation of unavoidable ecological damages.

These guidelines have been designed for broad application and, by necessity, are quite general. Users are encouraged to adapt these concepts to specific local situations.

Application of these guidelines requires the following sequential actions:

1. establish interdisciplinary team of experts,
2. classify stream reaches according to degree of flow problems and biological sensitivity,
3. specify extent and methods of removal for each flow condition,
4. monitor ongoing work to insure compliance, and
5. establish maintenance provisions.

Anyone considering work in streams should be aware that federal and/or state legal requirements may be applicable. In addition, use of guidelines, such as the Channel Modification Guidelines developed jointly by the U.S. Soil Conservation Service and the U.S. Fish and Wildlife Service and some state agency guidelines, may be required.

Definition of Stream Obstruction Conditions

Condition One

These stream segments have acceptable flow and no work would be required. They may contain various amounts of instream debris and fine sediment, such as silt, sand, gravel, rubble, boulders, logs and brush. In certain situations flow may be impeded, but due to stream and land classification or adjacent land-use, this is not a problem.

Condition Two

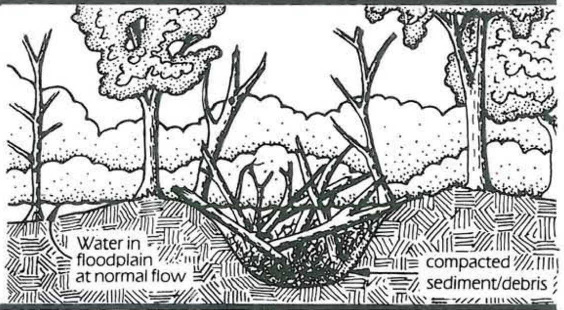
These stream segments currently have no major flow impediments, but existing conditions are such that obstructions are likely to form in the near future, causing unacceptable problems. This condition is generally characterized by small accumulations of logs and/or other debris which occasionally span the entire stream width. Accumulations are isolated, not massive and do not presently cause upstream ponding damages.

Condition Three

These stream segments have unacceptable flow problems. Obstructions are generally characterized by large accumulations of lodged trees, root wads, and/or other debris that frequently span the entire stream width. Although impeded, some flow moves through the obstruction. Large amounts of fine sediment have not covered or lodged in the obstruction.

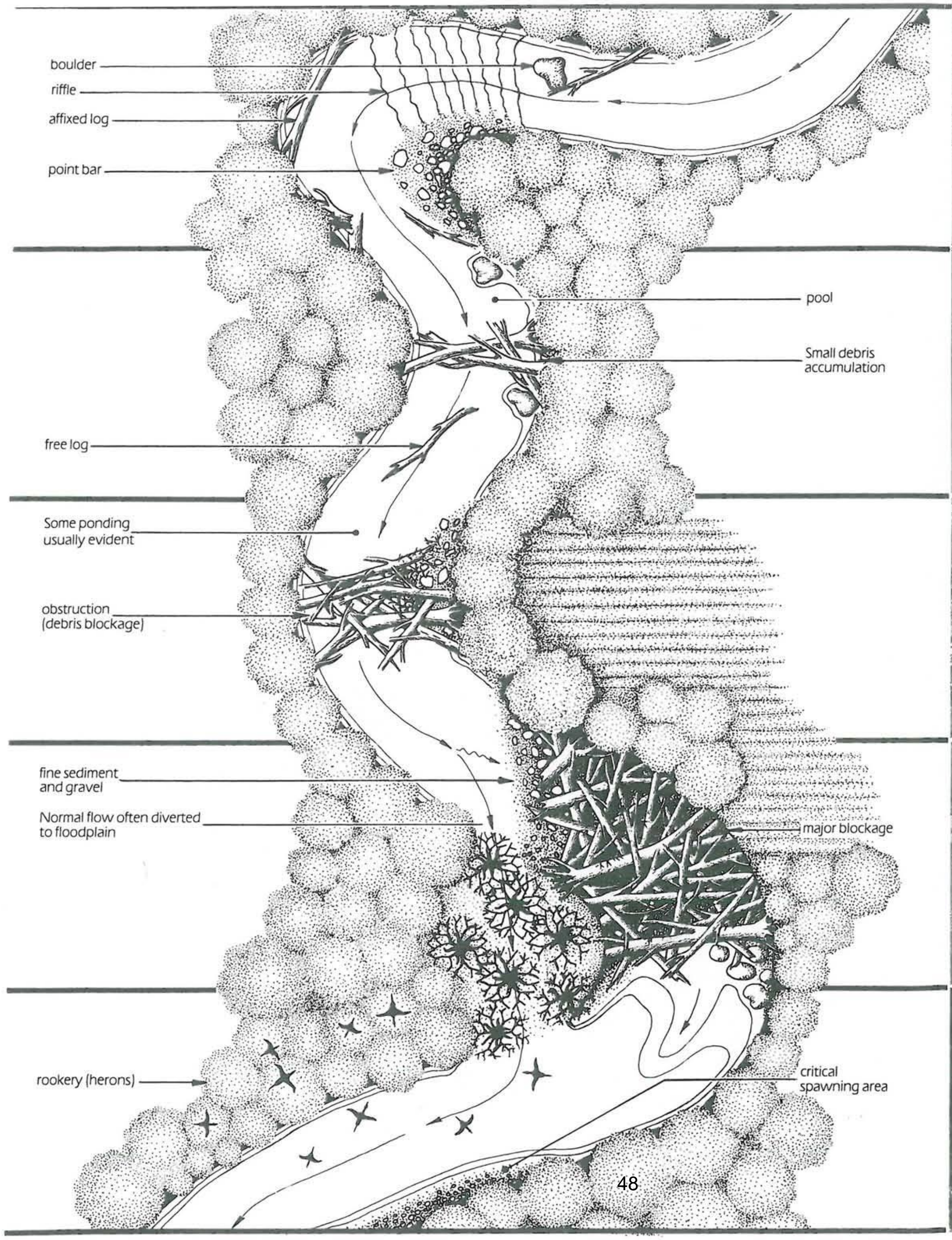
Condition Four

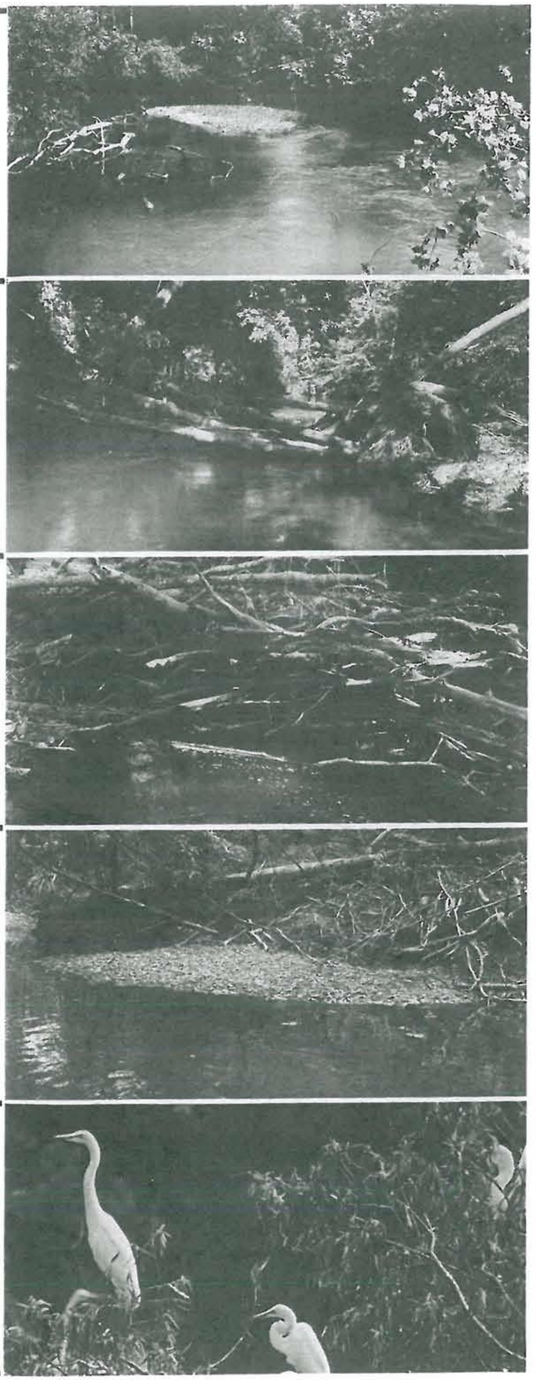
These stream segments are characterized by major blockages causing unacceptable flow problems. Obstructions consist of compacted debris and/or sediment that severely restricts flow.



Condition Five

These stream segments possess unique, sensitive, or especially valuable biotic resources and should be dealt with on a case-by-case basis. Examples include, but are not limited to: Areas harboring rare or endangered species, shellfish beds, fish spawning and rearing areas, and rookeries.


boulder
riffle
affixed log
point bar
pool
Small debris accumulation
free log
Some ponding usually evident
obstruction (debris blockage)
fine sediment and gravel
Normal flow often diverted to floodplain
major blockage
rookery (herons)
critical spawning area



Materials That May Be Removed

Fine Sediment

Only those fine sediment accumulations that are obstructing flows to a degree that results in unacceptable flow problems may be removed (Figure 1). Small accumulations of fine sediment generally do not cause problems and should be left undisturbed (Figure 2).

Debris Blockages

Only those debris accumulations that are obstructing flows to a degree that results in unacceptable flow problems, or are likely to cause problems in the near future, may be removed (Figure 3). Small accumulations of debris generally do not cause problems and should be left undisturbed (Figure 4).

Affixed logs that are crossways in the channel that are causing problems or are likely to cause problems in the near future should be moved to a more parallel orientation or may be removed (Figure 5). Isolated or single logs shall not be disturbed if they are embedded, lodged, or rooted in the channel and are not causing flow problems (Figure 6). Generally, embedded logs that do not span the channel are not considered to cause problems and should not be removed.

Free logs that are not rooted, embedded, or lodged should be left, repositioned, affixed, or may be removed (Figure 7).

Gravel, rubble, and boulders in isolated accumulations normally do not cause flow problems and should not be removed (Figure 8). Accumulations that are causing flow problems should be repositioned or may be removed.

Rooted Trees

Rooted trees (alive or dead) may be cut and repositioned or removed if they are likely to cause problems in the near future or if their removal is required to secure access and provide for practical operation of equipment (Figures 9, 10). Tree stumps with roots should be left in place to prevent bank erosion (Figure 11).

Figure 1. **Fine sediments (silt and sand) have completely filled this stream segment. About 98 percent of the stream water now flows across the floodplain on both sides of the stream and cannot be seen in this photograph. Such accumulations may be removed.**

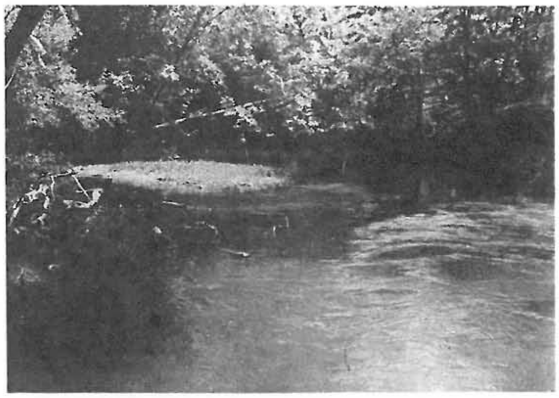


Figure 2. **Small accumulation of silt, sand and gravel should be left undisturbed. It is not obstructing flow and it provides beneficial habitat for fish and other aquatic life.**

Figure 3. **Debris accumulation obstructing flow and is likely to cause additional problems. Such accumulations may be removed.**

Figure 4. **Small accumulation of debris on the inside of the stream channel bend is causing no flow problems. Such material is beneficial to fish and other aquatic life and should be left undisturbed. As a preventative measure, some of the debris could be cut above the water to keep other debris from becoming lodged.**

Figure 5. Log crossways of stream channel, trapping additional debris and restricting flow. Flow problems are likely to increase in the near future. Such accumulations may be removed.

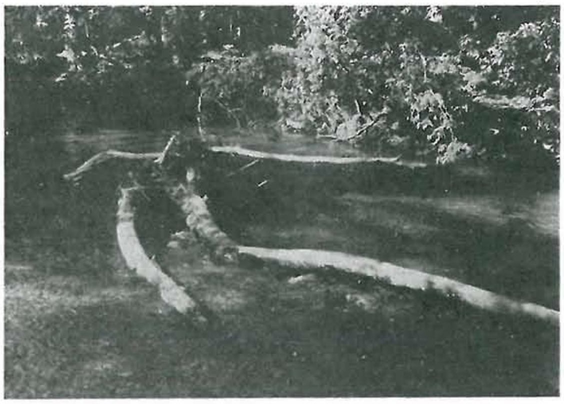


Figure 7. Free log in stream channel currently causing no flow problems. Such logs should be left, repositioned, affixed, or may be removed.

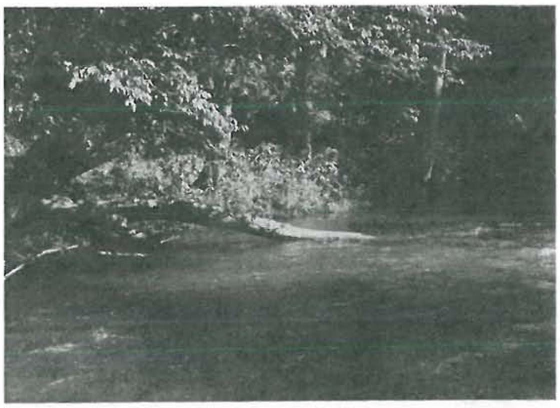


Figure 6. Single log with one end lodged on stream bank and the other embedded in the stream bottom. If no flow problems are associated with such logs they should be left in place.

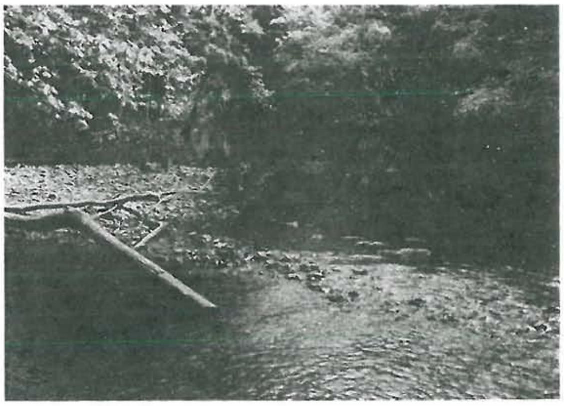


Figure 8. Isolated accumulation of gravel and rubble causing no flow problems. Such accumulations should be left in place. These areas are essential for some forms of aquatic life.

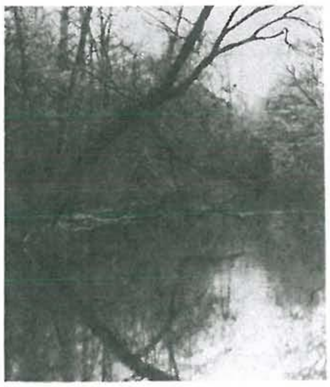


Figure 9. Dead tree leaning across stream is likely to fall in the near future and may be cut.

Figure 10. Cut tree repositioned along stream bank to aid in preventing bank erosion and to provide fish habitat.

Figure 11. Tree stump with roots left in place to prevent bank erosion. Valuable fish habitat was also salvaged.

Material Removal

General Criteria

No stream work, including bank clearing, repositioning, or removal of material, should be allowed except at specific locations where unacceptable flow problems occur or may occur in the near future. Where stream work is needed, access routes for equipment should be selected to minimize disturbance to the floodplain and riparian areas (Figure 12). Channel excavation and debris removal also should be accomplished in a manner that minimizes clearing of vegetation. The smallest equipment feasible should be used. If tributaries or distributaries must be disturbed by the project, they shall be restored when the work is completed. All disturbed areas shall be reseeded or replanted with plant species which will stabilize soils and benefit fish and wildlife.

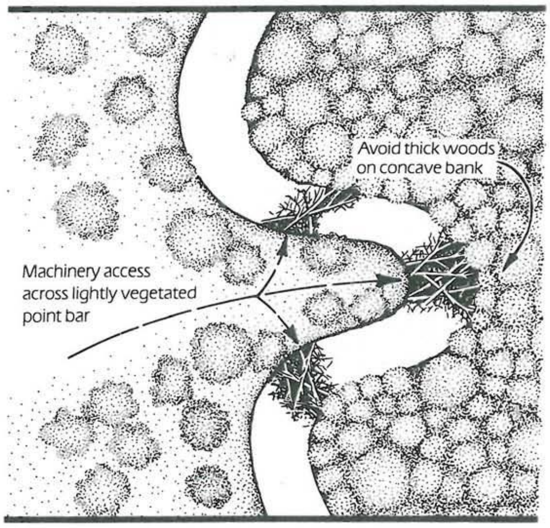


Figure 12. **Schematic plan for machinery access to selected debris blockages designed to protect stream bank vegetation.**

Specific Criteria

Condition One Segments. No work shall be conducted in Condition One Segments.

Condition Two Segments. Equipment that will cause the least damage to the environment shall be selected for performing the work. First consideration will be given to the use of hand operated equipment such as axes, chain saws, and winches to remove accumulations (Figure 13). Boats with motors may be used where needed (Figure 14). When the use of hand operated equipment is not feasible, heavier equipment may be used. Examples include: small tractors, backhoes, bulldozers, log skidders, and low PSI equipment (Figure 15). Equipment shall be operated in a manner that results in the least damage to vegetation and soils of the project area. In some cases explosives may be used resulting in less damage. Debris designated for removal from the stream or floodway should be removed or secured in such a manner as to restrict its re-entry into the channel. Generally, it should be positioned so as to reduce flood flow impediment.

Condition Three Segments. Equipment limitations will be the same as for condition two segments. Work shall be accomplished within the channel or from one side of the channel where possible (Figure 16). Selective tree clearing shall be limited to the minimum clearing necessary for equipment access and efficient operation of equipment on the worked side of the channel. Disposal of material may be accomplished by removing it from the floodplain or by burning, burying, or piling, as appropriate, with the minimum amount of disturbance to vegetation. Piled debris shall be gapped at frequent intervals and at all tributaries and distributaries.

Condition Four Segments. Blockage removal may employ any equipment necessary to accomplish the work in the least damaging manner (Figure 17). Work should be accomplished from one side of the channel, where practical. Material shall be disposed in accordance with guidelines presented above for condition three segments (Figure 18). Spoil piles should be constructed as high as sediment properties allow. The placement of spoil around the bases of mature trees should be avoided.

Condition Five Segments. Special provisions for protecting unique, sensitive, or productive biotic resources shall be developed by appropriate professionals on a case by case basis.

Subsequent Maintenance

Stream conditions shall be monitored on a regular basis and maintenance work shall be conducted in accordance with the guidance contained herein.

Figure 13. **Chainsaw being used to cut log so that it can be pulled with small hand winch and repositioned along stream bank.**

Figure 14. Hand labor crew in boat hooking cable to log. The small crawler tractor with winch will pull the log from the stream. Small equipment can be carefully maneuvered through the floodplain forest causing little damage.

Figure 17. Dragline being used to remove compacted debris and sediment at major blockage (Condition Four).

Figure 15. Hand labor crew hooking cable to log to be pulled from stream by small crawler tractor with winch. Only a narrow work zone along the stream was disturbed because of the small equipment. Note stump left in place to stabilize bank.

Figure 18. Large dead tree removed from stream, pulled onto the floodplain and positioned to prevent its re-entry into the channel.

Figure 16. Debris and sediment removal was accomplished by working from one side of the stream. Selected trees were cleared to allow equipment access and operation. Trees have now grown back on the cleared side.

Glossary

blockage Organic and inorganic materials which completely span or fill the channel causing water to pond or to be diverted onto the floodplain.

debris Includes gravel, cobble, rubble, and boulder-sized sediments as well as trees and other organic material.

distributary Any channel or outlet that conveys water away from a stream.

fine sediment Silt and sand-sized materials.

floodplain A plain along a stream that is covered by water when the stream overflows its bank.

flow impediment Any material in a channel which reduces the velocity of and retards flow, i.e. an obstruction.

interdisciplinary team A group of persons having expert knowledge in various disciplines including fish, wildlife, engineering, hydrology, and geomorphology.

low PSI equipment Equipment with wide tracks or large inflatable tires that lower the ratio of equipment weight to track surface. (PSI = pounds per square inch)

nonstructural measures Measures that reduce flood damages without altering the stream or its overflow characteristics. Nonstructural measures may include, but are not limited to: Land-use regulation, land. acquisition, providing for the maintenance of aquatic areas, floodplain zoning, flood-proofing existing buildings, flood forecasting, flood warning, providing flood hazard information, flood insurance, tax adjustments, emergency assistance, and relocation of properties and people.

obstruction Any material which hinders the progress of stream flow, i.e. a flow impediment.

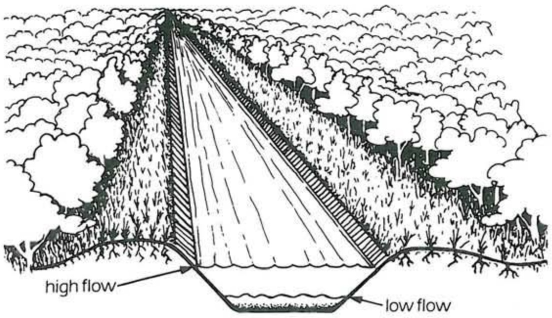
ponding An increase in water surface elevation upstream of a blockage or an obstruction.

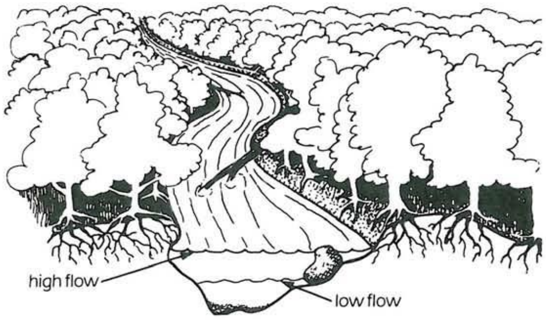
riparian Relating to or living on or near the bank of a watercourse. These zones range in width from narrow bands in desert or mountainous areas to wide bands which occur in the piedmont and gulf states.

structural measures Artificial measures designed to reduce flood damages by altering the stream and/or its overflow characteristics. Examples include: channelization, reservoirs, floodways, dikes, levees, floodwalls, pumping plants, and diversions.

tributary Any channel or inlet that conveys water into a stream.

Some Effects of Stream Modification





Channelized stream -

Water velocity and substrate uniform in channel and unsuitable for many forms of aquatic life.

No shrubs or trees near channel to provide shade, nutrient input or deep growing root structures to control bank erosion.

Little habitat diversity and thus fewer kinds and amounts of fish and other aquatic life.

During dry seasons and low flows, insufficient water depths support fewer aquatic life forms.

Aid in drainage of wetlands and lowering of water tables.

Encourages unwise development in frequently flooded areas of the floodplain.

May provide higher degree of flood relief in immediate area but peak flows surge downstream increasing flooding.

Tends to degrade water quality.

Obstruction removal from stream -

Water velocity and substrate diversified due to varied channel depths, meanders and instream features.

Trees and shrubs near channel provide shade which maintains suitable water temperature and provides wildlife habitat.

Leaves, wood and insects drop into stream providing nutrients for aquatic life.

Instream rocks and logs and bank undercuts provide cover.

Trees and shrubs have deep roots that curtail stream bank erosion.

Habitat diversity formed by pools, riffles and debris provides for numerous kinds and amounts of fish and other aquatic life.

During dry periods and low flows, sufficient water depth is maintained to support stream life.

Natural streams replenish water tables and aid in maintaining wetlands and bottomland forests.

May provide less flood relief in immediate area but retards increased flooding downstream due to slower water flow and temporary water storage in the floodplain.

Tends to preserve water quality.

APPENDIX D

MITIGATION SUCCESS CRITERIA AND MITIGATION MONITORING: MARSH MITIGATION FEATURES (Fresh, Intermediate, and Brackish Marsh Habitats)

MITIGATION SUCCESS CRITERIA

The success (performance) criteria described herein are applicable to all proposed marsh habitats (fresh marsh, intermediate marsh, and brackish marsh restoration features), unless otherwise indicated.

1. General Construction

A. Complete all initial mitigation construction activities (e.g. construction of temporary retention/perimeter dikes, placement of fill (borrow material/dredged material), construction of permanent dikes if applicable, etc.) in accordance with the mitigation work plan and final project plans and specifications. Upon completion of construction, USACE or its contractor shall provide construction surveys to include all project features. These activities are classified as "initial construction requirements."

B. Approximately 1 year following completion of all initial mitigation construction activities (when the restored marsh feature has stabilized to the point that the containment berms are no longer required to prevent the loss of fill material from the project site), USACE or its contractor shall complete all final mitigation construction activities, in accordance with the mitigation work plan and final project plans and specifications. Such activities may include, but are not limited to: degrading temporary retention/perimeter dikes; completion of armoring of permanent dikes; "gapping" or installation of "fish dips"; soil testing; completion of plantings; and construction of trenasses or similar features within marsh features as a means of establishing shallow water interspersion areas within the marsh. Finishing the aforementioned construction activities will be considered as the "completion of final construction requirements".

2. Topography[1]

A. Initial Success Criteria:
  1. One year after completion of fill placement:
    - Demonstrate that at least 80% of each mitigation feature has a surface elevation that is within +0.5 to – 0.5 feet of the desired target surface elevation as determined by the settlement curve for that year.
  2. Two years after completion of fill placement:
    - Demonstrate that at least 80% of the mitigation site has a surface elevation that is within +0.5 feet to – 0.25 of the desired target surface elevation as determined by the settlement curve for that year.

B. Intermediate Success Criteria:
  1. Two years following achievement of Topography Criteria 2.A.2. —

- Demonstrate that at least 80% of the mitigation site has a surface elevation that is within the functional marsh elevation range[2].
- There are no additional monitoring or attainment requirements for topography beyond meeting the Intermediate Success Criteria for topography.

Notes:
[1] Elevation survey data and report will be provided to the IET for review in order to determine concurrence. The surveys must include water levels inside and outside the marsh creation site at locations representative of site conditions.
[2] The "functional marsh elevation range", i.e. the range of the marsh surface elevation that is considered adequate to achieve proper marsh functions and values, is determined during the final design phase.

3. Native Vegetation

A. Fresh marsh:

1. Initial Success Criteria (2 growing seasons following completion of initial construction activities in General Construction 1.A.):
    - Achieve a minimum average cover of 50% comprised of native herbaceous species.
    - Demonstrate that vegetation satisfies USACE hydrophytic vegetation criteria.
2. Intermediate Criteria (2 years following attainment of Native Vegetation Criteria 3.A.1.):
    - Achieve a minimum average cover of 60% comprised of native herbaceous species.
    - Demonstrate that vegetation satisfies USACE hydrophytic vegetation criteria.
3. Long-Term Success Criteria[3] (Every monitoring event after attainment of Native Vegetation Criteria 3.A.2.):
    - Achieve a minimum average cover of 60% comprised of native herbaceous species.
    - Demonstrate that vegetation satisfies USACE hydrophytic vegetation criteria.

Notes:
[1] Fresh marsh is typically not planted due to the expectation that it will naturally vegetate more quickly than intermediate or brackish marsh. However, if percent cover success criteria are not met, plantings may become necessary in the absence of other recommended actions

B. Intermediate marsh and brackish marsh:

1. Initial Success Criteria (2 growing seasons following completion of initial construction activities in General Construction 1.A.):
    - Initial plantings must attain at least 80% survival of planted species, or achieve a minimum average cover of 25% native herbaceous species (includes planted species and volunteer species). If site self-vegetates, the site must achieve a minimum average cover of at least 50% native herbaceous species.
    - Demonstrate that vegetation satisfies USACE hydrophytic vegetation criteria.
2. Intermediate Criteria (2 years following attainment of Native Vegetation Criteria 3.B.1):
    - Achieve a minimum average cover of 60%, comprised of native herbaceous species (includes planted species and volunteer species).

- Demonstrate that native vegetation satisfies USACE hydrophytic vegetation criteria.

3. Long-Term Success Criteria[3] (Every monitoring event after attainment of Native Vegetation Criteria 3.B.2.):
   - Achieve a minimum average cover of 60%, comprised of native herbaceous species (includes planted species and volunteer species).
   - Demonstrate that native vegetation satisfies USACE hydrophytic vegetation criteria.

Note:
[1] There is not a minimum average cover requirement for years 21 – 50. However, vegetation data will be collected throughout the 50-year project life.

4. Invasive and Nuisance Vegetation (for all marsh types)

A. Initial, Intermediate, and Long-term[1] Success Criteria
   - Maintain the project area such that the total average vegetative cover accounted for by invasive and nuisance species constitute less than 5% of the total average plant cover throughout the 50-year project life. The list of invasive and nuisance species is found in Appendix A and will be tailored to reflect specific site needs.

Note:
[1] Yearly inspections to determine the need for invasive/nuisance control would be conducted until the long term success criteria for vegetation is achieved. After it is achieved, the frequency of inspections to determine the need for invasive/nuisance control would be adjusted based on site conditions.

MITIGATION MONITORING GUIDELINES

The guidelines for mitigation monitoring provided herein are applicable to all types of marshes being restored unless otherwise indicated.

Baseline Monitoring Report (First Monitoring Report)

A "baseline" monitoring report will be prepared upon completion of Final Construction Requirements 1.B. and upon any re-plantings associated with construction. Information provided will typically include the following:

- A detailed discussion of all mitigation activities completed.

- A plan view drawing of the mitigation site showing the approximate boundaries of the restored marsh, significant interspersion features established within the marsh features (as applicable), proposed monitoring transect locations, proposed sampling plot locations, photo station locations and water level survey locations.

- Initial and final construction surveys of all project features (including but not limited to the fill area, fish dips, weirs, culverts, etc.) and an analysis of the survey data will be provided addressing attainment of topographic success criteria. If a project is immediately adjacent to existing marsh habitat, the topographic survey will include spot elevations collected within the existing marsh habitat near the restored marsh.

- Photographs documenting conditions in the project area will be taken at the time of monitoring. Photos will be taken at permanent photo stations within the restored marsh. At least two photos will be taken at each station with the view of each photo always oriented in the same general direction from one monitoring event to the next. The number of photo stations required and the locations of these stations will vary depending on the mitigation site. The USACE will make this determination in coordination with the Interagency Team and will specify the requirements in the Mitigation Monitoring Plan. At a minimum, 4 photo stations will be established within each marsh cell.

- For planted marsh only -- A detailed inventory of all species planted, including the number of each species planted, the stock size planted, and where the species were planted will be documented. For mitigation sites that include more than one planted marsh cell/feature, provide a breakdown itemization indicating the number of each species planted in each feature and correlate this itemization to the marsh features depicted on the plan view drawing of the mitigation site.

- As part of the as-built/final construction survey, water level surveys will be taken inside and outside the marsh creation site at predetermined locations identified in coordination with the IET and NFS. Each interior water level elevation should have a corresponding exterior water level elevation taken consecutively and within close proximity. If there appears to be disparity in water levels within the marsh creation site, additional shots may be required. The baseline monitoring report will provide the surveyed water level data and will compare it to mean high and mean low water elevation data collected from a tidal elevation recording station in the general vicinity of the mitigation site. The report will further address estimated mean high and mean low water elevations at the mitigation site based on field indicators.

- Various qualitative observations will be made in the mitigation site to help assess the status and success of mitigation and maintenance activities. These observations will include: general estimate of the average percent cover by native plant species; general estimates of the average percent cover by invasive and nuisance plant species; general observations concerning colonization of the mitigation site by volunteer native plant species; general condition of native vegetation; trends in the composition of the plant community; wildlife utilization as observed during monitoring (including fish species and other aquatic organisms); the condition of interspersion features (tidal channels, trenasses, depressions, etc.) constructed within the marsh features, noting any excessive scouring and/or siltation occurring within such features; the natural formation of interspersion features within restored marshes; observations regarding general surface water flow characteristics within marsh interspersion features; the general condition of "gaps", "fish dips", or similar features constructed in permanent dikes; if present, the general condition of any armoring installed on permanent dikes. General observations made during the course of monitoring will also address potential problem zones and other factors deemed pertinent to the success of the mitigation project.

- A summary assessment of all data and observations along with recommendations as to actions necessary to help meet mitigation and management/maintenance goals and mitigation success criteria.

- A brief description of anticipated maintenance/management work to be conducted during the period from the current monitoring report to the next monitoring report.

Additional Monitoring Reports

All monitoring reports generated after the Baseline Monitoring Report will be called either Initial, Intermediate or Long-Term Monitoring Reports and shall include the year in which the monitoring occurred (i.e. Monitoring Report 2019). All Monitoring Reports shall provide the following information unless otherwise noted:

- All items listed for the Baseline Monitoring Report with the exception of: (a) the topographic surveys, although additional topographic surveys are required for specific monitoring reports (see below); and (b) the inventory of species and location map for all planted species.

- Quantitative data for all plants in each stratum. Data will be collected from permanent sampling quadrats established at approximately equal intervals along permanent monitoring transects established within each marsh feature. Each sampling quadrat will be approximately 2 meters X 2 meters in size (although the dimensions of each quadrat may be increased, if necessary, to provide better data in planted marsh features). The number of monitoring transects and number of sampling quadrats per transect will vary depending on size of the mitigation site and will be determined by the IET during the final design phase of the project. The resulting requirements, including quadrat dimensions, will be specified in the Final Mitigation Monitoring Plan for the project. Data recorded from the sampling quadrats will include but not be limited to: average total percent cover by native plant species; average total percent cover by invasive plant species; average total percent cover by nuisance plant species; percent cover of each plant species; the wetland indicator status of each species; and the average percent survival of each planted species (i.e. number of living planted species as a percentage of total number of plants installed), if discernable at the time of monitoring.

- One photograph shall be taken from the SE corner of each sampling plot to clearly capture the vegetation plot and must include a sign that indicates the plot number and sampling date.

- A brief description of maintenance and/or management work performed since the previous monitoring report along with a discussion of any other significant occurrences.

- Topographic surveys of each marsh restoration feature for initial and intermediate monitoring events (at approximately 2 years and 4 years following completion of final construction activities (General Construction 1.B.)). These surveys will cover the same components as described for the topographic survey conducted for the Baseline Monitoring Report. In addition to the surveys themselves, each of the two monitoring reports will include an analysis of the topographic data in regards to the attainment of applicable topographic success criteria. If the surveys indicate topographic success criteria have not been achieved and supplemental topographic alterations are necessary, then another topographic survey will be required following completion of the supplemental alterations. This determination will be made by USACE and the IET.

Monitoring Reports Following Planting or Re-planting Activities

Planting or re-planting of certain areas within restored marsh habitats may be necessary to ensure attainment of applicable native vegetation success criteria. Any monitoring report submitted following completion of a planting event must include an inventory of the number of each species planted, the stock size used, and the locations for each species planted. It must also include a depiction of the areas re-planted or those planted, as applicable, cross-referenced to a listing of the species and number of each species planted in each area. The perimeter of re-planted area should be documented with GPS coordinates. If single rows are replanted, then GPS coordinates should be taken at the end of the transect.

MITIGATION MONITORING SCHEDULE AND RESPONSIBILITIES

Monitoring will typically take place in mid to late summer during the required years for monitoring, but may be delayed until later in the growing season due to site conditions or other unforeseen circumstances. Monitoring Reports will be submitted by December 31 of each year of monitoring to the USACE, NFS, and the IET. The various monitoring and reporting responsibilities addressed in this section are all subject to the provisions set forth in the Introduction section.

The USACE will be responsible for conducting the monitoring events and preparing the associated monitoring reports until such time that the following mitigation success criteria are achieved (criteria follow numbering system used in success criteria section):

1. General Construction – 1.A. and 1.B.
2. Topography – 2.A.1 and 2.A.2.
3. Native Vegetation – For fresh marsh features, criteria 3.A.1; for intermediate marsh and brackish marsh features, criteria 3.B.1.
4. Invasive & Nuisance Vegetation – 4.A. until such time as monitoring responsibilities are transferred to the NFS.

The USACE will be responsible for conducting Baseline and Initial Success Monitoring events and preparing the associated monitoring reports.

The NFS will be responsible for conducting the required monitoring events and preparing the associated monitoring reports for all other required years after the USACE has achieved the initial success criteria listed above. The responsibility for management, maintenance, and monitoring of the non-structural components of the mitigation project (i.e. vegetation) will typically be transferred to the NFS during the first quarter of the year immediately following submittal of the monitoring report that demonstrates attainment of the initial success criteria. Once monitoring responsibilities have been transferred to the NFS, the next monitoring event

(Intermediate) should take place 2 growing seasons after Initial Success (Topography 2.A.2 and Native Vegetation 3.A.1 or 3.B.1) has been met. After Intermediate Success Criteria (Topography 2B and Native Vegetation 3.A.2 or 3.B.2) has been met, Long-Term Success Criteria monitoring will be conducted every 5 years throughout the remaining 50-year period of analysis (which begins once initial success criteria have been met).

In certain cases, it is possible that the marsh mitigation features may be established along with other mitigation features, like swamp or bottomland hardwood habitats, at the same mitigation site. This scenario could require some adjustments to the typical monitoring schedule described above in order to develop a reasonable and efficient monitoring schedule that covers all the mitigation features. Such adjustments, if necessary, would be made at the time final mitigation plans are generated. This schedule must be in general accordance with the guidance provided above and will be prepared by the USACE and the IET.

If certain success criteria are not achieved, failure to attain these criteria would trigger the need for additional monitoring events not addressed in the preceding paragraphs. The USACE would be responsible for conducting such additional monitoring and preparing the associated monitoring reports in the following instances:

(A) For fresh marsh features –

- If the initial vegetative cover success criteria (3.A.1) are not achieved, a monitoring report will be required for each consecutive year until two sequential annual reports indicate that the applicable vegetative cover criteria have been satisfied. This requirement only exists if planting the marsh mitigation feature is required to meet the success criteria, the USACE would be responsible for the purchase and installation of the required plants.

(B) For intermediate and brackish marsh features –

- If the initial survival criteria for planted species or the initial vegetative cover criterion (3.B.1) are not achieved a monitoring report will be required for each consecutive year until two sequential annual reports indicate that the applicable survival criteria or vegetative cover criteria have been satisfied. The USACE would be responsible for the purchase and installation of supplemental plants needed to attain the success criteria.

(C) For all types of marsh features–

- If initial topographic success criteria (2.A.1 and 2.A.2) are not achieved, the IET would convene to determine whether corrective actions are necessary. If corrective actions are necessary additional surveys and a monitoring report will be required to indicate whether applicable criteria have been satisfied. The USACE would also be responsible for performing the necessary corrective actions.

- If initial invasive and nuisance species criteria (4.A) are not achieved a monitoring report will be required for each consecutive year until two sequential annual reports indicate that the applicable criteria have been satisfied. The USACE would be responsible for the irradiation activities needed to attain the success criteria.

There could also be cases where failure to attain certain success criteria would trigger the need for additional monitoring events for which the NFS would be responsible:

(A) For fresh marsh features –

- If the native vegetation intermediate success criteria (3.A.2) are not achieved, a monitoring report will be required for each consecutive year until two sequential annual reports indicate that the success criteria have been satisfied. The Sponsor would also be responsible for the purchase and installation of supplemental plants needed to attain the success criteria.

(B) For intermediate and brackish marsh features –

- If the native vegetation intermediate success criteria (3.B.2) are not achieved, a monitoring report will be required for each consecutive year until two sequential annual reports indicate that the native vegetation intermediate success criteria has been satisfied. The Sponsor would also be responsible for the purchase and installation of supplemental plants needed to attain the success criteria.

(C) For all types of marsh features –

- If the topographic intermediate success criteria (2.B.) are not achieved, the IET would convene to determine whether corrective actions are necessary. If corrective actions are necessary, additional surveys and a monitoring report will be required to indicate whether applicable criteria have been satisfied. The NFS would also be responsible for performing the necessary corrective actions if the IET determines such corrective actions are necessary.

- If the native vegetation long term success criteria (3.A.3 and 3.B.3) are not achieved, the IET would convene to discuss whether corrective actions would be necessary. If corrective actions are necessary, a monitoring report will be required for each consecutive year following completion of the corrective actions until two sequential annual reports indicate that the native vegetative cover criteria have been attained. The NFS would be responsible for performing the corrective actions, conducting the additional monitoring events, and preparing the associated monitoring reports.

- If the intermediate and long term invasive and nuisance species criteria (4.A) are not achieved a monitoring report will be required for each consecutive year until two sequential annual reports indicate that the applicable criteria have been satisfied. The NFS would be responsible for the irradiation activities needed to attain the success criteria.

Once monitoring responsibilities have been transferred to the NFS, the NFS will retain the ability to modify the monitoring plan and the monitoring schedule should this become necessary due to unforeseen events or to improve the information provided through monitoring. Fifteen years following achievement of Long Term Success Criteria, the number of monitoring transects and/or quadrats that must be sampled during monitoring events may be reduced substantially if it is clear that mitigation success is proceeding as anticipated. Any significant modifications to the monitoring plan or the monitoring schedule must first be approved by the USACE and the IET.

APPENDIX E

TWELVE REQUIRMENTS FOR MITIGATION PLANNING
(from the U.S. Army Corps of Engineers & EPA 2008 Final Mitigation Rule in the
FEDERAL REGISTER Vol. 73, No. 70, April 10, 2008)

Twelve Requirements for a Compensatory Mitigation Plan

1. Objectives. A description of the resource type(s) and amount(s) that will be provided, the method of compensation (restoration, establishment, preservation etc.), and how the anticipated functions of the mitigation project will address watershed needs.

2. Site selection. A description of the factors considered during the site selection process. This should include consideration of watershed needs, onsite alternatives where applicable, and practicability of accomplishing ecologically self-sustaining aquatic resource restoration, establishment, enhancement, and/or preservation at the mitigation project site.

3. Site protection instrument. A description of the legal arrangements and instrument including site ownership, that will be used to ensure the long-term protection of the mitigation project site.

4. Baseline information. A description of the ecological characteristics of the proposed mitigation project site, in the case of an application for a DA permit, the impact site. This may include descriptions of historic and existing plant communities, historic and existing hydrology, soil conditions, a map showing the locations of the impact and mitigation site(s) or the geographic coordinates for those site(s), and other characteristics appropriate to the type of resource proposed as compensation. The baseline information should include a delineation of waters of the United States on the proposed mitigation project site. A prospective permittee planning to secure credits from an approved mitigation bank or in-lieu fee program only needs to provide baseline information about the impact site.

5. Determination of credits. A description of the number of credits to be provided including a brief explanation of the rationale for this determination.
    - For permittee-responsible mitigation, this should include an explanation of how the mitigation project will provide the required compensation for unavoidable impacts to aquatic resources resulting from the permitted activity.
    - For permittees intending to secure credits from an approved mitigation bank or in-lieu fee program, it should include the number and resource type of credits to be secured and how these

were determined.

6. Mitigation work plan. Detailed written specifications and work descriptions for the mitigation project, including: the geographic boundaries of the project; construction methods, timing, and sequence; source(s) of water; methods for establishing the desired plant community; plans to control invasive plant species; proposed grading plan; soil management; and erosion control measures. For stream mitigation projects, the mitigation work plan may also include other relevant information, such as planform geometry, channel form (e.g., typical channel cross-sections), watershed size, design discharge, and riparian area plantings.

7. Maintenance plan. A description and schedule of maintenance requirements to ensure the continued viability of the resource once initial construction is completed.

8. Performance standards. Ecologically-based standards that will be used to determine whether the mitigation project is achieving its objectives.

9. Monitoring requirements. A description of parameters monitored to determine whether the mitigation project is on track to meet performance standards and if adaptive management is needed. A schedule for monitoring and reporting monitoring results to the DE must be included.

10. Long-term management plan. A description of how the mitigation project will be managed after performance standards have been achieved to ensure the long-term sustainability of the resource, including long-term financing mechanisms and the party responsible for long-term management.

11. Adaptive management plan. A management strategy to address unforeseen changes in site conditions or other components of the mitigation project, including the party or parties responsible for implementing adaptive management measures.

12. Financial assurances. The DE may require additional information as necessary to determine the appropriateness, feasibility, and practicability of the mitigation project.

Other information. The DE may require additional information as necessary to determine the appropriateness, feasibility, and practicability of the mitigation project.

JOHN BEL EDWARDS
GOVERNOR

JACK MONTOUCET
SECRETARY

PO BOX 98000 | BATON ROUGE LA | 70898

August 3, 2020

Ms. Amy Dixon, Project Manager
United States Army Corps of Engineers
CEMVN-PMR-C
7400 Leake Avenue
New Orleans, LA 70118

RE: St. Tammany Feasibility Study – public meeting information

Dear Ms. Dixon:

The Louisiana Department of Wildlife and Fisheries (LDWF) has only very recently become involved in the St. Tammany Feasibility Study, and staff were so far, unable to participate fully in the gathering of information and selection of alternatives and ideas. Nonetheless, we offer the following information and comments in response to the ongoing public comment period associated with the St. Tammany Feasibility Study Public Meetings and information presented. Staff look forward to participating in future Project Development Team (PDT) meetings and other project related discussions.

Scenic Rivers

From what staff can determine, many of the alternatives within the current array impact the Louisiana Scenic Rivers System. A number of the remaining, proposed measures may be detrimental to system streams. Other measures may conflict with related policy constraints. Based on our review of the current array of proposed alternatives, Alternative 4 may impact Cane Bayou, Bayou LaCombe, and Bayou Liberty; Alternative 5 may impact Bayou Liberty and Bayou LaCombe; Alternative 7 may impact the West Pearl River and Morgan River; and Alternative 8 may impact Simpson Creek and Mile Branch. All aforementioned waterways are Louisiana designated Natural and Scenic Rivers (LASR). Several of the proposed measures impacting these waterways are prohibited by the Scenic Rivers Act (LA R.S. 56:1840-1856), while others may require LDWF authorization. For information on prohibitions and permitting requirements, Scenic Rivers Coordinator, Chris Davis can be contacted at (225)765-2642. The Scenic Rivers Act, Scenic Rivers Rules and Regulations (Title 76, Part IX) and other related information can be found at https://www.wlf.louisiana.gov/page/scenic-rivers.

Staff have noted that Environmental Planning has thus far considered the effect alternatives may have on recreation and views from the Lakefront and the St. Tammany Trace. LDWF recommends that these considerations (and others) be extended to LASRs as well.

Additional Alternatives

LDWF has noted that modeling of similar river systems (e.g., Amite River and Vermillion River) have shown that channel improvements and other strategies intended to increase drainage efficiency are often ineffective, counterproductive, or otherwise unviable options for addressing riverine flooding associated with lower gradient reaches, especially those subject to unfavorable tailwater conditions (e.g., high tides and wind driven water). Due to these findings in similar systems, staff believe USACE should instead consider riverine flood risk reduction strategies that restore natural functions and allow for stormwater and/or floodwater to be retained or detained in the upper watershed, thereby reducing flood peaks and overall flood risk within downstream problem areas. LDWF has noted that many small headwater streams and other smaller tributaries have been and/or are being dredged or otherwise disconnected from their floodplains. Additionally, large scale landscape changes that promote rapid drainage of forested wetlands and other natural storage areas have occurred. We believe that these types of landscape impacts and other features may increase the potential for the siting of meaningful nature based solutions (NBS). Restoration of important natural functions related to flood risk reduction and other NBS strategies may provide significant flood risk reduction in downstream areas. However, for these NBS strategies to be considered fully, staff believe that the study area should be expanded to include the entire eight digit hydrologic unit (HUC 8) for each, larger study area river known to pose significant flood risk to the community. Currently the study area is limited to parish boundaries; however, the catchments of the larger parish rivers extend well beyond that political boundary.

If alternatives and measures are able to address increased flood risk related to development, staff believe that the PDT should investigate impacts of development, the effectiveness of current mitigative measures, and consider modifications to existing stormwater infrastructure that may reduce flood risk. For instance, staff understand that some associated retention/detention ponds may have overly efficient connection to receiving waters and/or may offer very short detention times/volumes, which can create deleterious discharges that lead to extremely flashy receiving waterways and may ultimately contribute to downstream flood risk. Could existing, ponds and outfall devices that are found to be problematic be modified to increase freeboard and detention time, mimicking natural hydrology that existed prior to construction (not merely preconstruction hydrology)? If this project type were found to be cost effective, the measure could easily be reproduced throughout the watershed to have a greater, cumulative effect.

LDWF noted that several alternatives in the current array involve ring levees and large linear levees which potentially impact extensive areas of wetlands and other sensitive habitats (e.g., LASRs). Many of the residential structures that would be afforded protection by some of these alignments are currently constructed on pier and beam. Home elevation costs for these particular structures may be much lower when compared to lifting slab on grade homes. We suggest that direct comparisons of levee alternatives and the less environmentally damaging non-structural alternatives (home elevations) be made for these specific areas. When environmental impacts are accounted for, the PDT may find that the cost-benefit for the non-structural options is favorable in certain areas and that some version of the non-structural alternative is preferred.

LDWF submits these recommendations to the U.S. Army Corps of Engineers in accordance with provisions of the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.). Please do not hesitate to contact Habitat Section biologist Matthew Weigel at (985)543-4931 should you need further assistance.

Sincerely,

Randell S. Myers

Randell S. Myers
Assistant Secretary, Wildlife

Division mw

c: EPA, Marine & Wetlands
Section USFWS Ecological
Services

STPFS NWI Data Map

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

April 20, 2021

- 🟦 Estuarine and Marine Deepwater
- 🟩 Estuarine and Marine Wetland
- 🟩 Freshwater Emergent Wetland
- 🟩 Freshwater Forested/Shrub Wetland
- 🟦 Freshwater Pond
- 🟪 Lake
- 🟫 Other
- 🟦 Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

Representative Mammal Species Found in the Study Area	
Common Name	**Scientific Name**
Muskrat	*Ondatra zibethicus*
American mink	*Neovison vison*
River otter	*Lontra canadensis*
Raccoon	*Procyon lotor*
Swamp rabbit	*Sylvilagus aquaticus*
White-tailed deer	*Odocoileus virginianus*
Coyote	*Canis latrans*
Virginia Opossum	*Didelphis virginiana*
Nine-banded armadillo	*Dasypus novemcinctus*
Eastern cottontail	*Sylvilagus floridanus*
Gray squirrel	*Sciurus carolinensis*
Fox squirrel	*Sciurus niger*
Nutria	*Myocastor coypus*
Striped skunk	*Mephitis*
Bobcat	*Lynx rufus*
Gray fox	*Urocyon cinereoargenteus*
Red bat	*Lasiurus borealis*
Marsh rice rat	*Oryzomys palustris*
White-footed mouse	*Peromyscus leucopus*
Eastern wood rat	*Neotoma floridana*
Harvest mouse	*Micromys minutus*
Least shrew	*Cryptotis parva*
Southern flying squirrel	*Glaucomys volans*

Source: USFWS

Representative Nongame Species Found in the Study Area

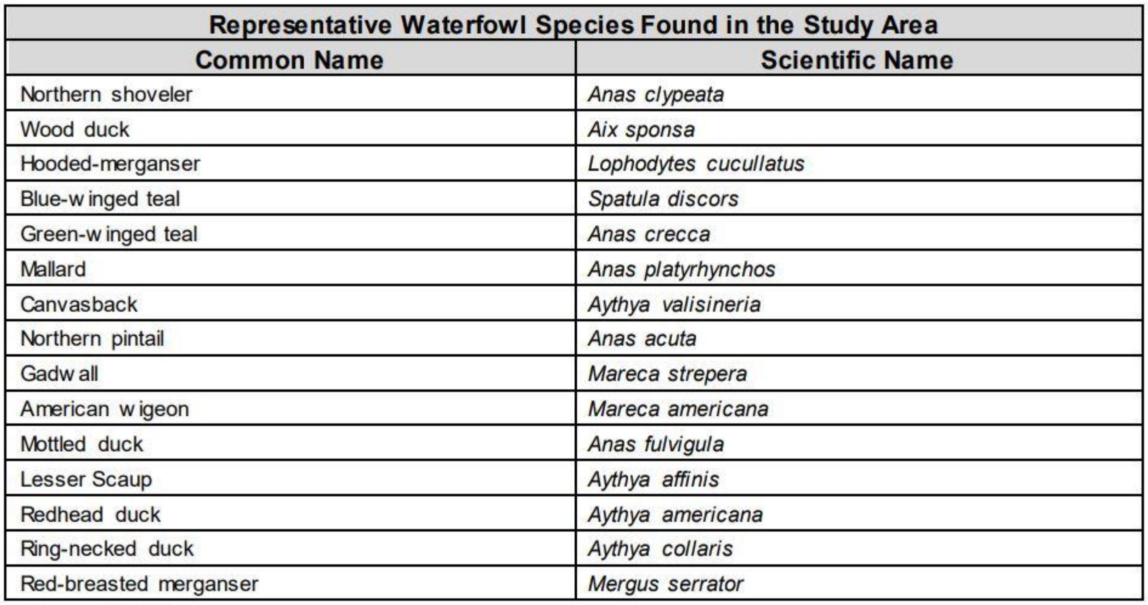
Common Name	Scientific Name
Little blue heron	*Egretta caerulea*
Great blue heron	*Ardea herodias*
Green-backed heron	*Butorides virescens*
Yellow-crowned night heron	*Nyctanassa violacea*
Black-crowned night heron	*Nycticorax*
Tricolored heron	*Egretta tricolor*
Great egret	*Ardea alba*
Snowy egret	*Egretta thula*
Cattle egret	*Bubulcus ibis*
White ibis	*Eudocimus albus*
Killdeer	*Charadrius vociferus*
Black-necked stilt	*Himantopus mexicanus*
Boat-tailed grackle	*Quiscalus major*
Red-winged blackbird	*Agelaius phoeniceus*
Northern harrier	*Circus hudsonius*
Glossy ibises	*Plegadis falcinellus*
Bald eagle	*Haliaeetus leucocephalus*
Screech owl	*Megascops asio*
Great horned owl	*Bubo virginianus*
Barred owl	*Strix varia*
Common snipe	*Gallinago*
Belted kingfisher	*Megaceryle alcyon*
Mockingbird	*Mimus polyglottos*
Yellow-billed cuckoo	*Coccyzus americanus*
Northern parula	*Setophaga americana*
Yellow-rumped warbler	*Setophaga coronata*
Prothonotary warbler	*Protonotaria citrea*
White-eyed vireo	*Vireo griseus*
Carolina chickadee	*Poecile carolinensis*
Tufted titmouse	*Baeolophus bicolor*
American woodcock	*Scolopax minor*
Common flicker	*Colaptes auratus*
Brown thrasher	*Toxostoma rufum*
Pileated woodpecker	*Dryocopus pileatus*
Red-headed woodpecker	*Melanerpes erythrocephalus*
Downy woodpecker	*Picoides pubescens*
Common grackle	*Quiscalus quiscula*
Common crow	*Corvus brachyrhynchos*
Red-tailed hawk	*Buteo jamaicensis*
Red-shouldered hawk	*Buteo lineatus*
Mississippi kite	*Ictinia mississippiensis*

Source: USFWS

Representative Reptile & Amphibian Species Found in the Study Area

Common Name	Scientific Name
American alligator	*Alligator mississippiensis*
Green anole	*Anolis carolinensis*
Water moccasin	*Agkistrodon piscivorus*
Speckled kingsnake	*Lampropeltis getula*
Copperhead	*Agkistrodon contortrix*
Southern leopard frog	*Lithobates sphenocephalus*
Ground skink	*Scincella lateralis*
Five-lined skink	*Plestiodon fasciatus*
Broad-headed skink	*Plestiodon laticeps*
Gulf coast ribbon snake	*Thamnophis proximus*
Yellow-bellied water snake	*Nerodia erythrogaster*
Western cottonmouth	*Agkistrodon piscivorus leucostoma*
Pygmy rattlesnake	*Sistrurus miliarius*
Broad-banded water snake	*Nerodia fasciata confluens*
Diamond-backed water snake	*Nerodia rhombifer*
Spiny softshell turtle	*Apalone spinifera*
Red-eared turtle	*Trachemys scripta elegans*
Southern painted turtle	*Chrysemys picta*
Mississippi mud turtle	*Kinosternon subrubrum*
Stinkpot turtle	*Sternotherus odoratus*
Common snapping turtle	*Chelydra serpentina*
Alligator snapping turtle	*Macrochelys temminckii*
Dwarf salamander	*Eurycea quadridigitata*
Three-toed amphiuma	*Amphiuma tridactylum*
Lesser western siren	*Siren intermedia*
Central newt	*Notophthalmus viridescens*
Gulf coast toad	*Incilius valliceps*
Eastern narrow-mouthed toad	*Gastrophryne carolinensis*
Green treefrog	*Hyla cinerea*
Squirrel treefrog	*Hyla squirella*
Pig frog	*Lithobates grylio*
Bullfrog	*Lithobates catesbeianus*
Bronze frog	*Rana clamitans*
Upland chorus frog	*Pseudacris feriarum*
Southern cricket frog	*Acris gryllus*
Spring peeper	*Pseudacris crucifer*

Source: USFWS



Representative Waterfowl Species Found in the Study Area	
Common Name	**Scientific Name**
Northern shoveler	*Anas clypeata*
Wood duck	*Aix sponsa*
Hooded-merganser	*Lophodytes cucullatus*
Blue-winged teal	*Spatula discors*
Green-winged teal	*Anas crecca*
Mallard	*Anas platyrhynchos*
Canvasback	*Aythya valisineria*
Northern pintail	*Anas acuta*
Gadwall	*Mareca strepera*
American wigeon	*Mareca americana*
Mottled duck	*Anas fulvigula*
Lesser Scaup	*Aythya affinis*
Redhead duck	*Aythya americana*
Ring-necked duck	*Aythya collaris*
Red-breasted merganser	*Mergus serrator*

Source: USFWS

Essential Fish Habitat (EFH) Summary for Projects in Louisiana Waters

The Gulf of Mexico Fishery Management Council (GMFMC) described EFH for each federally managed species, and further refined their designations by establishing five "eco-regions" subdividing the Gulf of Mexico (Figure 1). The Mississippi River serves as the line of demarcation for eco-regions 3 and 4; therefore, Louisiana's coastal waters east of the Mississippi River are in eco-region 3, whereas those waters west of the river are in eco-region 4.

Within each eco-region EFH was further defined as occurring in estuarine, nearshore, or offshore waters (Figure 2). EFH designations for each species managed by GMFMC are based on species-specific life stage associations with different habitat types. NMFS also manages highly migratory species (HMS) such as tunas, billfish, and sharks; however, EFH designations for HMS are primarily based on species distribution data and are identified by geographical areas rather than specific habitat types.

Projects occurring in Louisiana's estuarine and nearshore waters in eco-region 3 may potentially impact EFH for various life stages of the following federally-managed species (Tables 1-3): brown shrimp, white shrimp, pink shrimp, red drum, gray snapper, lane snapper, red snapper, vermilion snapper, gray triggerfish, Spanish mackerel, king mackerel, greater amberjack, cobia, hammerhead shark, scalloped hammerhead shark, blacktip shark, bull shark, spinner shark, Atlantic sharpnose shark, blacknose shark, and finetooth shark.

Projects occurring in Louisiana's estuarine and nearshore waters in eco-region 4 may potentially impact EFH for various life stages of the following federally-managed species (Tables 4-6): brown shrimp, white shrimp, red drum, gray snapper, lane snapper, red snapper, vermilion snapper, gray triggerfish, king mackerel, almaco jack, greater amberjack, cobia, scalloped hammerhead shark, blacktip shark, bull shark, spinner shark, Atlantic sharpnose shark, blacknose shark, and finetooth shark.

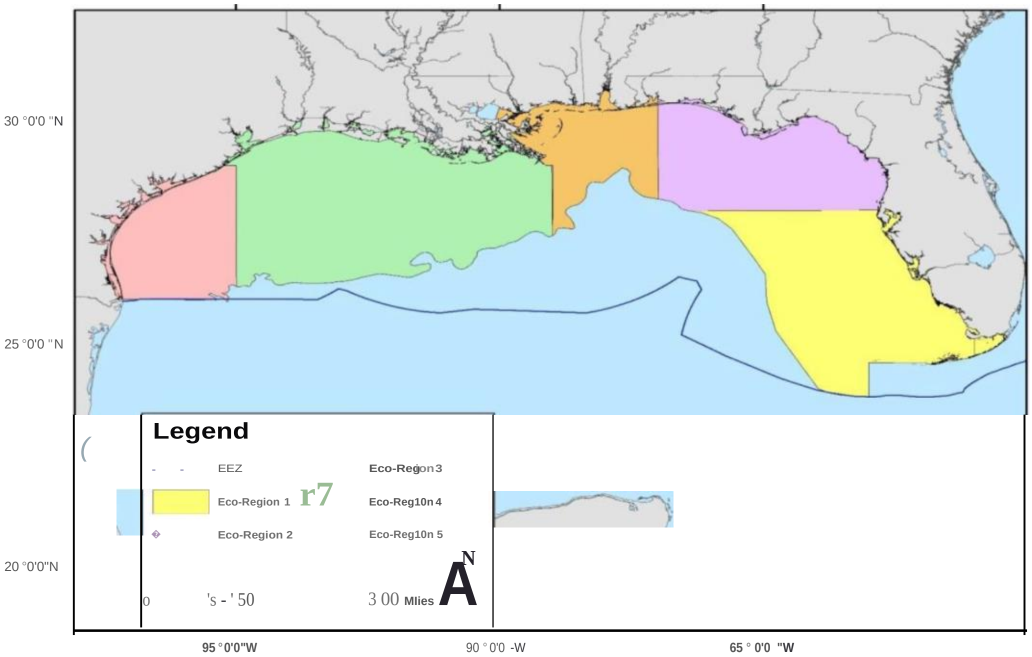


Figure 1. Map of eco-regions textually described in the table above and referenced in the habitat association tables

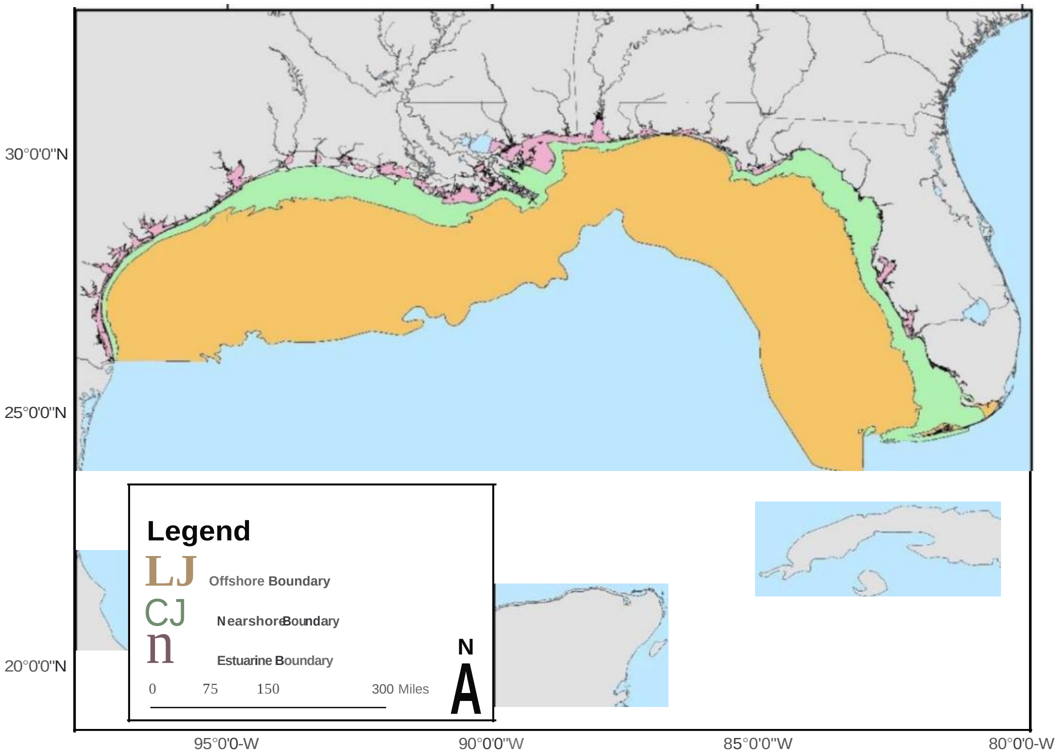


Figure 2. Spatial depiction of habitat zones: estuarine (inside barrier islands and estuaries) , nearshore (60 feet (18m) or less in depth) and offshore (greater than 60 feet (18m) in depth.

Table 1. Estuarine Habitats – Gulf Council Managed Species – Eco-Region 3
(● indicates habitat type designated as EFH for species' life stage)

Estuarine Emergent Marsh

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Red Drum			●	●		●	
Gray Snapper						●	
Brown Shrimp				●			
White Shrimp				●			

Mangrove

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Gray Triggerfish				●			
Lane Snapper				●	●		

Estuarine Submerged Aquatic Vegetation

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Red Drum		●	●		●	●	
Lane Snapper			●	●	●		
Brown Shrimp				●			
Pink Shrimp				●			

Estuarine Pelagic

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Spanish Mackerel				●	●	●	

Estuarine Oyster Reef

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Brown Shrimp				●			

Estuarine Sand and Shell Bottom

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Red Drum			●			●	
Gray Snapper						●	
Lane Snapper				●	●		
Brown Shrimp				●			

Estuarine Mud/Soft Bottom

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Red Drum		●	●	●		●	
Gray Snapper						●	
Lane Snapper				●	●		
Brown Shrimp				●			
White Shrimp				●			

Table 2. Nearshore Habitats – Gulf Council Managed Species – Eco-Region 3
(● indicates habitat type designated as EFH for species' life stage)

Nearshore Submerged Aquatic Vegetation

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Lane Snapper			●	●	●		
Pink Shrimp				●			

Nearshore Hardbottom

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Red Drum					●	●	
Gray Snapper						●	
Red Snapper				●			
Vermilion Snapper				●	●		

Nearshore Sand/Shell Bottom

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Red Drum					●	●	
Gray Snapper						●	
Gray Triggerfish						●	●
Lane Snapper				●	●	●	
Red Snapper				●			
Brown Shrimp						●	
Pink Shrimp	●	●				●	●
White Shrimp	●						

Nearshore Mud/Soft Bottom

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Gray Snapper						●	
Lane Snapper				●	●		
Brown Shrimp						●	
White Shrimp	●					●	●

Nearshore Shoal/Banks

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Gray Snapper							●
Lane Snapper						●	

Nearshore Reefs

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Gray Snapper						●	●
Gray Triggerfish	●				●	●	●
Lane Snapper			●	●	●	●	
Vermilion Snapper				●	●		

Nearshore Pelagic

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Cobia	●		●	●	●	●	●
King Mackerel				●	●		
Spanish Mackerel	●	●		●	●	●	●
Red Drum	●					●	
Greater Amberjack						●	
Red Snapper		●					
Pink Shrimp		●					
White Shrimp		●					

Nearshore Drift Algae (*Sargassum*)

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Gray Triggerfish		●	●	●	●		
Greater Amberjack				●	●		

Table 3. Highly Migratory Species EFH Designations – State Waters of Eco-Region 3

Species Common Name	Life Stage	EFH State Waters of Eco-Region 3
Atlantic Yellowfin Tuna	Juvenile	Mississippi River birdfoot delta
	Adult	Off the mouth of Mississippi River
Swordfish	Juvenile	Mississippi River birdfoot eelta
Sailfish	Juvenile	Off mouth of Mississippi River
Hammerhead Shark	All	Mississippi Sound west of Mobile Bay to Cat Island and south to Chandeleur Islands
Scalloped Hammerhead Shark	Neonate	All estuaries and nearshore waters
	Juvenile	Mississippi River birdfoot delta and all estuarine and nearshore waters east of Horn Island to Gulf Breeze
	Adult	Mississippi Sound Horn Island to Dauphin Island; nearshore waters Horn Island east to Gulf Breeze
Nurse Shark	Adult	Nearshore and offshore Pensacola and Perdido Bays
Bignose Shark	All	Seaward edge of state waters offshore Mississippi River birdfoot delta
Blacktip Shark	Neonate & Juvenile	All estuarine, nearshore, and offshore waters (ex. Lake Borgne)
	Adult	All estuarine, nearshore, and offshore waters (ex. Lake Borgne, Mobile, Perdido, and Pensacola Bays)
Bull Shark	Neonate & Juvenile	Lake Borgne east to waters around Ship Island; Lower Mobile Bay and nearshore waters off Dauphin Island to Gulf Breeze
	Juvenile	All waters Mississippi River delta to Perdido Bay (ex. portions of Chandeleur Sound and Lake Borgne)
	Adults	Estuarine waters of birdfood delta, Chandeleur Island; Lower Mobile Bay and Mississippi Sound around Dauphin Island and Perdido Bay; nearshore and offshore waters Hat Island east to Pensacola Bay

Species Common Name	Life Stage	EFH State Waters of Eco-Region 3
Dusky Shark	All	Gulf of Mexico nearshore and offshore water >30 feet off mouth of Pensacola Bay
Lemon Shark	Juvenile	Nearshore waters off Terrebonne Bay
Sandbar Shark	Neonate	Portions of Perdido Bay, Pensacola Bay and nearshore and offshore waters off mouth of Pensacola Bay
Silky Shark	All	Mississippi River birdfoot delta; nearshore and offshore waters off Escambia County
Spinner Shark	Juvenile	Mississippi River birdfoot delta, outer Chandeleur Sound, Mississippi Sound, Mobile Bay, and Perdido Bay; nearshore waters (ex. off Pensacola Bay)
	Adult	Mississippi River birdfoot delta, waters off Chandeleur Island, and nearshore waters off Pensacola Bay into East Pensacola Bay and Santa Rosa Sound
Tiger Shark	Neonate	Nearshore waters east of Gulf Shores; Perdido Bay, lower Pensacola Bay and Santa Rosa Sound
	Juvenile	Eastern Mississippi Sound from Pascagoula (ex. Grande and Portersville Bays), lower Mobile and Bon Secour Bays, Perdido and Escambia Bays; all nearshore waters east of Horn Island
Whale Shark	All	Waters off Mississippi River birdfoot delta; waters around Chandeleur Islands
Bonnethead Shark	Neonate and Juvenile	Mississippi Sound east of Ship Island; nearshore waters to 60 feet
	Adult	Mobile Bay; Mississippi Sound east of Ship Island; nearshore waters to 60 feet
Atlantic Sharpnose Shark	Neonate	Estuarine, nearshore, and offshore waters to 90 feet
	Juvenile	All NS and offshore waters to 90 feet; Estuarine waters W of Mobile Bay (ex. Lake Borgne)
	Adult	Estuarine waters west of Mobile Bay, nearshore and offshore waters to 200 feet
Blacknose Shark	Juvenile	Waters around Chandeleur and Dauphin Islands
	Adult	All nearshore waters Perdido Bay to Mississippi River birdfoot delta, estuarine waters of Mississippi Sound to Horn Island and seaward band of state waters around Chandeleur Islands
Finetooth Shark	Neonate	Nearshore waters west of Perdido Bay to Chandeleur Island; Mississippi Sound (ex. Lake Borgne)
	Juvenile & Adult	Nearshore and offshore waters Pensacola Bay to Mississippi River birdfoot delta; Mississippi Sound and Chandeleur Sound (ex. Lake Borgne)

Table 4. Estuarine Habitats – Gulf Council Managed Species – Eco-Region 4
(● indicates habitat type designated as EFH for species' life stage)

Estuarine Emergent Marsh

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Red Drum			●	●		●	
Gray Snapper						●	
Brown Shrimp				●			
White Shrimp				●			

Mangrove

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Gray Triggerfish				●			
Lane Snapper				●	●		

Estuarine Submerged Aquatic Vegetation

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Red Drum		●	●		●	●	
Lane Snapper			●	●	●		
Brown Shrimp				●			

Estuarine Hard Bottom

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
none							

Estuarine Oyster Reef

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Brown Shrimp				●			

Estuarine Sand and Shell Bottom

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Red Drum			●			●	
Gray Snapper						●	
Lane Snapper				●	●		
Brown Shrimp				●			

Estuarine Mud/Soft Bottom

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Red Drum		●	●	●		●	
Gray Snapper						●	
Lane Snapper				●	●		
Brown Shrimp				●			
White Shrimp				●			

Table 5. Nearshore Habitats – Gulf Council Managed Species – Eco-Region 4
(● indicates habitat type designated as EFH for species' life stage)

Nearshore Submerged Aquatic Vegetation

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Lane Snapper			●	●	●		

Nearshore Hardbottom

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Red Drum					●	●	
Gray Snapper						●	
Red Snapper				●			
Vermilion Snapper				●	●		

Nearshore Sand/Shell Bottom

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Red Drum					●	●	
Gray Snapper						●	
Gray Triggerfish						●	●
Lane Snapper				●	●	●	
Red Snapper						●	
Brown Shrimp						●	
White Shrimp	●						

Nearshore Mud/Soft Bottom

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Gray Snapper						●	
Lane Snapper				●	●		
Red Snapper				●			
Brown Shrimp						●	
White Shrimp	●					●	●

Nearshore Shoal/Banks

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Gray Snapper							●
Lane Snapper						●	

Nearshore Reefs

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Gray Snapper						●	●
Gray Triggerfish	●				●	●	●
Lane Snapper			●	●	●	●	
Vermilion Snapper				●	●		

Nearshore Pelagic

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Cobia	●		●	●	●	●	●
King Mackerel				●	●		
Red Drum	●					●	
Greater Amberjack						●	
Red Snapper		●					
White Shrimp		●					

Nearshore Drift Algae (*Sargassum*)

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Almaco Jack				●	●		
Gray Triggerfish		●	●	●	●		
Greater Amberjack				●	●		

Table 6. Highly Migratory Species EFH Designations – State Waters of Eco-Region 4

Species Common Name	Life Stage	EFH State Waters Eco-Region 4
Atlantic Yellowfin Tuna	Juvenile	Mississippi River birdfoot delta
	Adults	Off the mouth of the Mississippi River
Swordfish	Juvenile & Adult	Mississippi River birdfoot delta
Sailfish	Juvenile	Off the mouth of the Mississippi River
Hammerhead Shark	All	Nearshore and offshore Brazoria and Galveston Counties
Scalloped Hammerhead Shark	Neonate	Galveston Bay; Vermilion Bay to West Bay; All nearshore waters to 30 fathoms
	Juvenile	West Galveston Bay; nearshore off Galveston Island
	Adult	Mississippi River birdfoot delta
Bignose Shark	All	Seaward edge of state waters off Mississippi River birdfoot delta
Blacktip Shark	Neonate & Juvenile	Estuarine waters of Galveston, Terrebonne and Timbalier Bays; all nearshore and offshore waters
	Adult	Estuarine waters of Vermilion, Atchafalaya, Terrebonne and Timbalier Bays; all nearshore and offshore waters
Bull Shark	Neonate	All estuarine waters; nearshore waters Freeport to mouth of Sabine Lake; nearshore waters off west Cameron Parrish
	Juvenile	All estuarine waters; nearshore waters Freeport to mouth of Sabine Lake; nearshore waters off west Cameron Parrish; Terrebonne Bay to Mississippi River delta
	Adults	Estuarine waters Christmas Bay to Galveston Bay (ex. North Galveston/Trinity and East Bay); nearshore and offshore waters off Brazoria and Galveston Counties; Mississippi River birdfoot delta
Lemon Shark	Neonate	Estuarine waters from Freeport to Pelican Island; nearshore and offshore waters from Freeport to Pelican Island (ex. Waters off east Galveston Island)

Species Common Name	Life Stage	EFH State Waters Eco-Region 4
	Juvenile	Nearshore and offshore waters off Galveston and Brazoria Counties; estuarine waters of Galveston Bay, West Bay and Christmas Bay (ex. Portions of Galveston, Trinity and East Bays)
Silky Shark	ALL	Mississippi River birdfoot delta
Spinner Shark	Neonate	Galveston Bay (including East, West and Trinity Bays) and nearshore waters off Brazoria, Galveston, and Chambers Counties; Terrebonne Bay and estuarine and nearshore waters to Grand Isle
	Juvenile	Galveston Bay (including East, West and Trinity Bays) all nearshore waters (ex. off mouth of Mermentau River and between Vermilion and Atchafalaya Bays); Terrebonne and Barataria Bays and the Mississippi birdfoot delta
	Adult	Mississippi River birdfoot delta
Tiger Shark	Adult	Nearshore waters off Mississippi River birdfoot delta
Whale Shark	All	Waters off Mississippi River birdfoot delta
Atlantic Angel Shark	All	Offshore waters at seaward edge of state waters off West Pass
Bonnethead Shark	Neonate and Juvenile	Estuarine and nearshore waters of Brazoria and Galveston Counties
Atlantic Sharpnose Shark	Neonate	All nearshore and offshore waters Freeport to the mouth of the Mississippi, Christmas Bay, Galveston Bay (incl. West, Trinity and East Bays), Vermilion, West Cote Blanche, Atchafalaya, lower Terrebonne and Timbalier Bays and Barataria Bay
	Juvenile	All nearshore and offshore waters Freeport to the mouth of the Mississippi, Christmas Bay, West Bay, lower Terrebonne and Timbalier Bays
	Adult	All nearshore and offshore waters Freeport to the mouth of the Mississippi, Christmas Bay, Galveston Bay (incl. West, Trinity and East Bays), lower Terrebonne and Timbalier Bays and Barataria Bay
Blacknose Shark	Adult	Nearshore waters off Galveston Island and Mississippi River birdfoot delta
Finetooth Shark	Neonate	Lower Galveston Bay, West Bay and nearshore waters off Galveston Island and Boliver Peninsula; Timbalier Bay and waters offshore Timbalier islands
	Juvenile & Adult	Estuarine and nearshore waters E of Terrebonne Bay

NOAA FISHERIES

Southeast Region – Habitat Conservation Division

Appendix 3. Gulf of Mexico Essential Fish Habitat – Eco-Region 3

Pensacola Bay, Florida, west to the Mississippi River Delta.

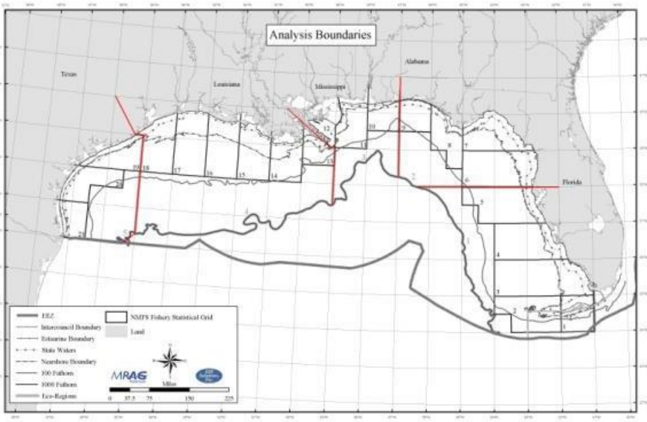
Purpose

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) requires regional fishery management councils, and NOAA's National Marine Fisheries Service (NMFS), to designate essential fish habitat (EFH) in fishery management plans for all federally managed fisheries. Some EFH designations extend beyond state territorial boundaries into the Gulf of Mexico and can extend to the 200-mile boundary of the United States' exclusive economic zone.

The Magnuson-Stevens Act also requires federal agencies which permit/license, fund, or carry out activities which may adversely affect EFH to consult with NMFS regarding potential impacts of their actions on EFH, and respond in writing to NMFS recommendations. Because the vast majority of activities requiring consultation occur in the coastal zone, the scope of this document is focused on estuarine and nearshore state waters.

Background Summary

The Gulf of Mexico Fishery Management Council (Gulf Council) manages over 40 species[1], plus corals, in the Gulf of Mexico. During the process of analyzing, identifying, and describing EFH for each managed species, the Gulf Council refined their designations by establishing five "eco-regions" utilizing an existing statistical grid system subdividing the Gulf of Mexico. Within each eco-region EFH was further defined as occurring either in estuarine (inside barrier islands and estuaries), nearshore (waters less than 18-meters/60-feet deep) or offshore waters (greater than 18-meters/60-feet deep).



Map of NOAA Fisheries Statistical Grids (black gridlines) and Gulf Council Eco-regions (red lines).

Eco-region 3 extends from Pensacola Bay, Florida, to the Mississippi River Delta. This eco-region is subject to nearshore salinity fluctuations influenced by the Mississippi and Atchafalaya Rivers. This eco-region contains predominantly soft bottom habitats and greater amounts of marsh and oyster reefs.

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[1] The Gulf Council designated EFH in 2005 for 55 species (plus corals) under management at that time. Since 2005, several fishery species have been identified as not requiring federal fishery management by the Gulf Council.

The Gulf Council utilized a variety of scientific literature to identify species distribution data, relative density information, and species-specific life stage associations with different habitat types. This information was analyzed to develop EFH designations for each species managed by the Council.

NMFS also manages highly migratory species (HMS) such as tunas, billfish, and sharks. EFH designations within state territorial waters of the Gulf Council's eco-region are also provided for HMS managed by NMFS. EFH designations for HMS are primarily based on species distribution data. Rather than specific habitat types, NMFS identified geographic areas as EFH. The spatial boundaries were established using a geographic information system analysis tool to desisnate areas containing a high percentage (95%) of spatial distribution information.

EFH Tables

The tables on the following pages summarize EFH categories for estuarine and nearshore state waters of eco-region 3. Table 1identifies Gulf Council managed species' life stages where distribution and density information was known and met the Gulf Council identified threshold for designating EFH (EFH was not designated for species or species life stages which did not occur, or occurred at a very low density, in an eco-region) and the preferred depth ranges, if known. Tables 2 and 3 identify estuarine and nearshore habitat types, respectively, identified and described as EFH by species' life stage. Table 4 identifies areas in state waters identified and described as EFH for HMS species.

Questions:

Questions regarding these EFH summary tables should be directed to David Dale, Southeast Regional Office EFH Coordinator at 727-824-5317 or david.dale@noaa.gov.

References:

16 U.S.C. §1853(a)(7)

50 Code of Federal Regulations Part 600

GMFMC. 1998. Generic amendment for addressing essential fish habitat requirements in the Fishery Management plans of the Gulf of Mexico. Gulf of Mexico Fishery Management Council, Tampa, Florida.

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NMFS. 2009. Final Amendment 1 to the 2006 Consolidated Atlantic Highly Migratory Species Fishery Management Plan, Essential Fish Habitat. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Office of Sustainable Fisheries, Highly Migratory Species Management Division, Silver Spring, MD. Public Document. pp. 395.

NMFS. 2011. Fisheries of the United States 2010. National Marine Fisheries Service, Office of Science and Technology, Silver Spring, MD. 118 pages.

Table 1. Gulf Council EFH Designations and Depth Preferences – Eco-Region 3

EFH Designations and Depth Preferences by Life Stage in meters (m)

NOTE: Gulf Council EFH designations extend to 182-m (100 fathoms) except for royal red shrimp (585-m or 325 fathoms).

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Cobia	ND	11-53	11-53	5-300	6-9	1-70	1-70
King Mackerel	35-180	35-180	ND	9 max	ND	35 min	35-180
Spanish Mackerel	50 max	9-84	ND	ND	50 max	3-75	50 max
Red Drum	ND	ND	ND	0-3	0-5	1-70	40-70
Almaco Jack	NE	NE	NE	15-160	15-160	15-160	NE
Gag Grouper	NE	NE	NE	NE	NE	20-100	50-120
Golden Tilefish	80-450	80-450	80-450	80-450	80-450	80-450	80-450
Goldface Tilefish	60-256	60-256	60-256	ND	ND	60-256	60-256
Gray Snapper	NE	NE	NE	NE	NE	0-180	0-180
Gray Triggerfish	10-100	ND	ND	ND	10-100	10-100	10-100
Greater Amberjack	1-360	1-360	1-360	1-360	1-360	1-360	1-360
Lane Snapper	4-132	4-132	ND	0-20	0-20	4-132	4-132
Lesser Amberjack	ND	ND	ND	55-130	55-130	55-130	55-130
Red Snapper	18-37	18-37	18-37	17-183	20-46	7-146	18-37
Vermillion Snapper	180-300	180-300	180-300	1-25	1-25	180-300	180-300
Warsaw Grouper	40-525	40-525	40-525	20-30	20-30	40-525	40-525
Wenchman	80-200	80-200	80-200	19-378	19-378	19-378	80-200
Brown Shrimp	18-110	0-82	NA	0-18	NA	14-110	18-110
Pink Shrimp	9-48	1-50	NA	1-65	NA	1-110	9-48
Royal Red Shrimp	250-550	250-550	NA	250-550	NA	140-730	520-550
White Shrimp	9-34	1-82	NA	1-30	NA	9-27	9-34
Spiny Lobster	NA	1-100	NA	NE	NE	NE	NA
Coral	EFH for coral consists of the total distribution of coral species and life stages throughout the Gulf of Mexico.						

NOTES:

ND = No Data

NA = Post Larvae and Late Juvenile life stages not utilized for Shrimp; Eggs, Post Larvae, and Spawning Adult life stages not utilized for Spiny Lobster

NE = EFH not designated; presence/absence or density threshold not met in this eco-region for this life statge

Table 2. Estuarine Habitats – Gulf Council Managed Species – Eco-Region 3

(● indicates habitat type designated as EFH for species' life stage)

Estuarine Emergent Marsh

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Red Drum			●	●		●	
Gray Snapper						●	
Brown Shrimp				●			
White Shrimp				●			

Estuarine Submerged Aquatic Vegetation

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Red Drum		●	●		●	●	
Lane Snapper			●	●	●		
Brown Shrimp				●			
Pink Shrimp				●			

Estuarine Pelagic

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Spanish Mackerel				●	●	●	

Estuarine Oyster Reef

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Brown Shrimp				●			

Estuarine Sand and Shell Bottom

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Red Drum			●			●	
Gray Snapper						●	
Lane Snapper				●	●		
Brown Shrimp				●			

Estuarine Mud/Soft Bottom

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Red Drum		●	●	●		●	
Gray Snapper						●	
Lane Snapper				●	●		
Brown Shrimp				●			
White Shrimp				●			

Table 3. Nearshore Habitats – Gulf Council Managed Species

(● indicates habitat type designated as EFH for species' life stage)

Nearshore Submerged Aquatic Vegetation

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Lane Snapper			●	●	●		
Pink Shrimp				●			

Nearshore Hardbottom

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Red Drum					●	●	
Gray Snapper						●	
Red Snapper				●			
Vermilion Snapper				●	●		

Nearshore Sand/Shell Bottom

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Red Drum					●	●	
Gray Snapper						●	
Gray Triggerfish						●	●
Lane Snapper				●	●	●	
Red Snapper				●			
Brown Shrimp						●	
Pink Shrimp	●	●				●	●
White Shrimp	●						

Nearshore Mud/Soft Bottom

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Gray Snapper						●	
Lane Snapper				●	●		
Brown Shrimp						●	
White Shrimp	●					●	●

Nearshore Shoal/Banks

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Gray Snapper							●
Lane Snapper						●	

Nearshore Reefs

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Gray Snapper						●	●
Gray Triggerfish	●				●	●	●
Goliath Grouper				●	●	●	
Lane Snapper			●	●	●	●	
Vermilion Snapper				●	●		

Nearshore Pelagic

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Cobia	●		●	●	●	●	●
King Mackerel				●	●		
Spanish Mackerel	●	●		●	●	●	●
Red Drum	●					●	
Greater Amberjack						●	
Red Snapper		●					
Pink Shrimp		●					
White Shrimp		●					

Nearshore Drift Algae (*Sargassum*)

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Gray Triggerfish		●	●	●	●		
Greater Amberjack				●	●		

Table 4. Highly Migratory Species EFH Designations – State Waters of Eco-Region 3

Species Common Name	**Life Stage**	**EFH State Waters of Eco-Region 3**
Atlantic Yellowfin Tuna	Juvenile	Mississippi River birdfoot delta
	Adult	Off the mouth of Mississippi River
Swordfish	Juvenile	Mississippi River birdfoot delta
Sailfish	Juvenile	Off mouth of Mississippi River
Hammerhead Shark	All	Mississippi Sound west of Mobile Bay to Cat Island and south to Chandeleur Islands
Scalloped Hammerhead Shark	Neonate	All estuaries and nearshore waters
	Juvenile	Mississippi River birdfoot delta and all estuarine and nearshore waters east of Horn Island to Gulf Breeze
	Adult	Mississippi Sound Horn Island to Dauphin Island; nearshore waters Horn Island east to Gulf Breeze
Nurse Shark	Adult	Nearshore and offshore Pensacola and Perdido Bays
Bignose Shark	All	Seaward edge of state waters offshore Mississippi River birdfoot delta

Blacktip Shark	Neonate & Juvenile	All estuarine, nearshore, and offshore waters (ex. Lake Borgne)
	Adult	All estuarine, nearshore, and offshore waters (ex. Lake Borgne, Mobile, Perdido, and Pensacola Bays)
Bull Shark	Neonate & Juvenile	Lake Borgne east to waters around Ship Island; Lower Mobile Bay and nearshore waters off Dauphin Island to Gulf Breeze
	Juvenile	All waters Mississippi River delta to Perdido Bay (ex. portions of Chandeleur Sound and Lake Borgne)
	Adults	Estuarine waters of birdfood delta, Chandeleur Island; Lower Mobile Bay and Mississippi Sound around Dauphin Island and Perdido Bay; nearshore and offshore waters Hat Island east to Pensacola Bay
Dusky Shark	All	Gulf of Mexico nearhsore and offshore water >30 feet off mouth of Pensacola Bay
Lemon Shark	Juvenile	Nearshore waters off Terrebonne Bay
Sandbar Shark	Neonate	Portions of Perdido Bay, Pensacola Bay and nearshore and offshore waters off mouth of Pensacola Bay

Species Common Name	**Life Stage**	**EFH State Waters of Eco-Region 3**
Silky Shark	All	Mississippi River Birdfoot Delta; nearshore and offshore waters off Escambia County
Spinner Shark	Juvenile	Mississippi River birdfoot delta, outer Chandaleur Sound, Mississippi Sound, Mobile Bay, and Perdido Bay; nearshore waters (Ex. off Pensacola Bay)
	Adult	Mississippi River birdfoot delta, waters off Chandeleur Island, and nearshore waters off Pensacola Bay into East Pensacola Bay and Santa Rosa Sound
Tiger Shark	Neonate	Nearshore waters east of Gulf Shores; Perdido Bay, lower Pensacola Bay and Santa Rosa Sound
	Juvenile	Eastern Mississippi Sound from Pascagoula (ex. Grande and Portersville Bays), lower Mobile and Bon Secour Bays, Perdido and Escambia Bays; all nearshore waters east of Horn Island
Whale Shark	All	Waters off Mississippi River birdfoot delta; waters around Chandeleur Islands
Bonnethead Shark	Neonate and Juvenile	Mississippi Sound east of Ship Island; nearshore waters to 60 feet
	Adult	Mobile Bay; Mississippi Sound east of Ship Island; nearshore waters to 60 feet
Atlantic Sharpnose Shark	Neonate	Estuarine, nearshore, and offshore waters to 90 feet
	Juvenile	All NS and offshore waters to 90 feet; Estuarine waters W of Mobile Bay (ex. Lake Borgne)
	Adult	Estuarine waters west of Mobile Bay, nearshore and offshore waters to 200 feet
Blacknose Shark	Juvenile	Waters around Chandeleur and Dauphin Islands
	Adult	All nearshore waters Perdido Bay to Mississippi River birdfoot delta, estuarine waters of Mississippi Sound to Horn Island and seaward band of state waters around Chandeleur Islands
Finetooth Shark	Neonate	Nearshore waters west of Perdido Bay to Chandeleur Island; Mississippi Sound (ex. Lake Borgne)
	Juvenile & Adult	Nearshore and offshore waters Pensacola Bay to Mississippi River birdfoot delta; Mississippi Sound and Chandeleur Sound (ex. Lake Borgne)

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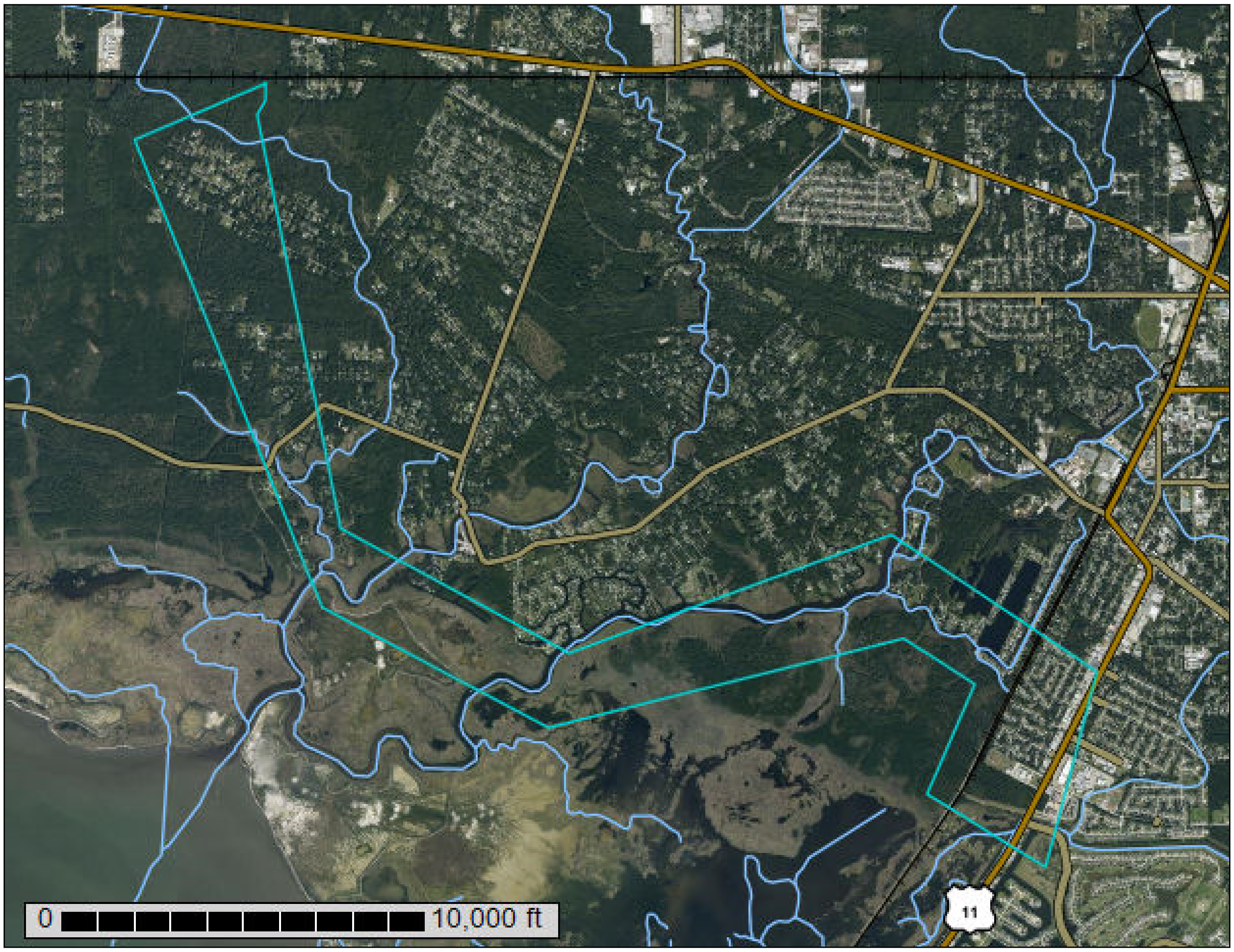


March 1, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

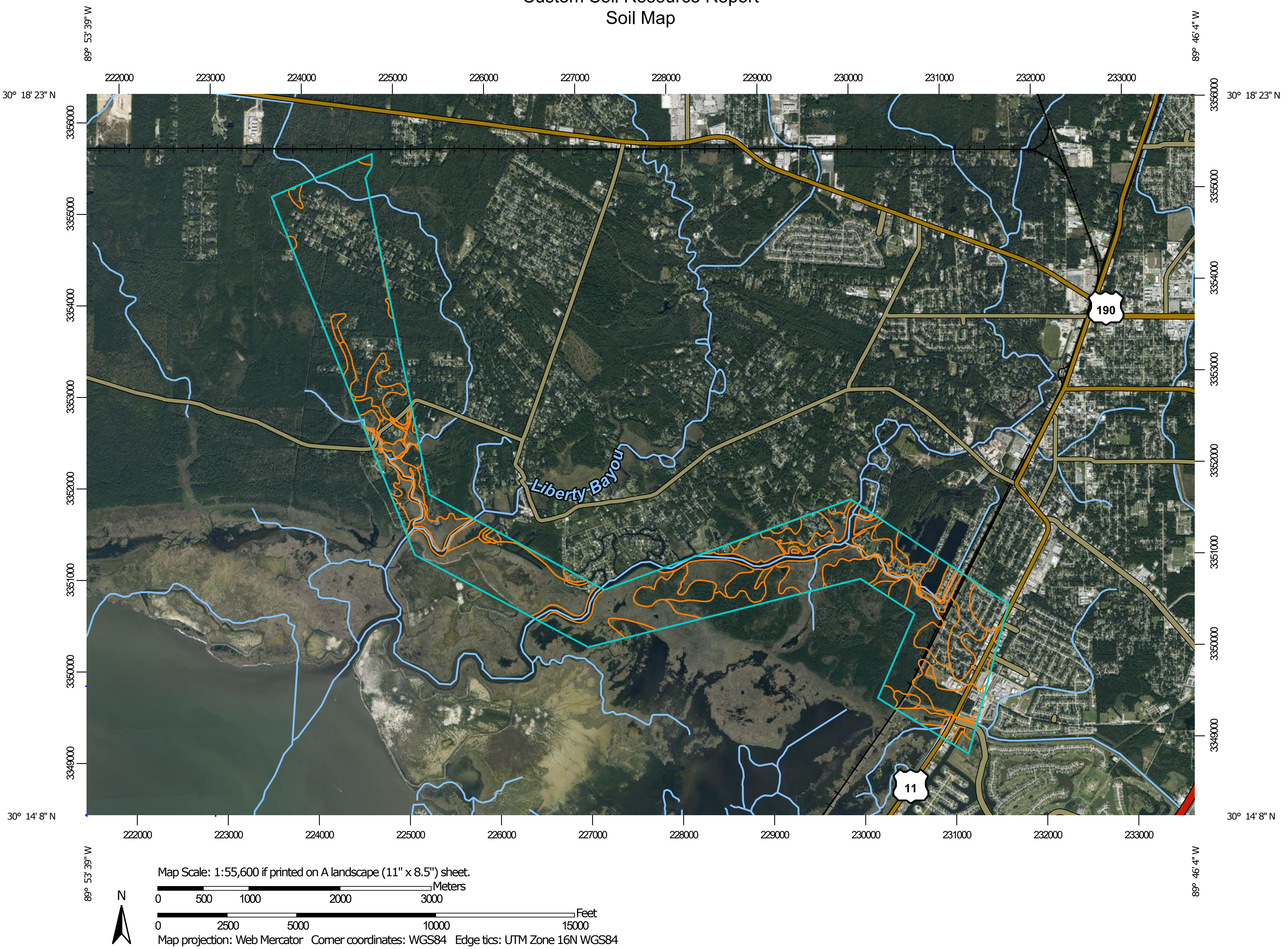
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:55,600 if printed on A landscape (11" x 8.5") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

MAP LEGEND

Area of Interest (AOI)

- ▭ Area of Interest (AOI)

Soils

- ▭ Soil Map Unit Polygons
- 〰 Soil Map Unit Lines
- ■ Soil Map Unit Points

Special Point Features

- ◉ Blowout
- ☒ Borrow Pit
- ✱ Clay Spot
- ◇ Closed Depression
- ✗ Gravel Pit
- ∴ Gravelly Spot
- ◍ Landfill
- Λ Lava Flow
- ≋ Marsh or swamp
- ⚒ Mine or Quarry
- ◎ Miscellaneous Water
- ○ Perennial Water
- ∨ Rock Outcrop
- + Saline Spot
- ⁘ Sandy Spot
- ⊖ Severely Eroded Spot
- ◇ Sinkhole
- ⊃ Slide or Slip
- ⊘ Sodic Spot
- ≡ Spoil Area
- ◊ Stony Spot
- ◊ Very Stony Spot
- ψ Wet Spot
- △ Other
- ━ Special Line Features

Water Features

- ~ Streams and Canals

Transportation

- ┼┼┼ Rails
- 〰 Interstate Highways
- 〰 US Routes
- 〰 Major Roads
- 〰 Local Roads

Background

- ■ Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: St. Tammany Parish, Louisiana
Survey Area Data: Version 14, Jun 5, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 3, 2018—Nov 16, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Aa	Abita silt loam, 0 to 2 percent slopes	152.1	7.1%
AC	Allemands muck	211.7	9.9%
Ad	Allemands muck, drained	6.4	0.3%
Ag	Aquents, dredged	65.2	3.0%
AR	Arat silty clay loam	8.3	0.4%
Bg	Brimstone-Guyton silt loams, 0 to 1 percent slopes, rarely flooded	41.3	1.9%
CV	Clovelly muck, 0 to 0.2 percent slopes, very frequently flooded	355.3	16.6%
Gt	Guyton silt loam, 0 to 1 percent slopes, rarely flooded	16.5	0.8%
Gy	Guyton silt loam, 0 to 1 percent slopes, occasionally flooded	201.4	9.4%
LF	Lafitte muck, 0 to 0.2 percent slopes, very frequently flooded	18.9	0.9%
Lt	Latonia fine sandy loam, 0 to 2 percent slopes	9.9	0.5%
Mt	Myatt fine sandy loam, 0 to 1 percent slopes	155.7	7.3%
My	Myatt fine sandy loam, frequently flooded	54.9	2.6%
Pr	Prentiss fine sandy loam, 0 to 1 percent slopes	86.3	4.0%
St	Stough fine sandy loam, 0 to 1 percent slopes	586.0	27.4%
W	Water	171.0	8.0%
Totals for Area of Interest		**2,141.0**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

St. Tammany Parish, Louisiana

Aa—Abita silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2rs47
Elevation: 0 to 30 feet
Mean annual precipitation: 55 to 76 inches
Mean annual air temperature: 55 to 79 degrees F
Frost-free period: 219 to 277 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Abita and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Abita

Setting

Landform: Flats
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Silty marine deposits

Typical profile

A - 0 to 5 inches: silt loam
Bt - 5 to 34 inches: silt loam
Btg1 - 34 to 45 inches: silty clay loam
Btg2 - 45 to 64 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 11.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Guyton

Percent of map unit: 2 percent
Landform: Depressions

Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: Yes

Stough

Percent of map unit: 2 percent
Landform: Ridges on stream terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Myatt

Percent of map unit: 2 percent
Landform: Depressions on stream terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Prentiss

Percent of map unit: 2 percent
Landform: Interfluves
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Brimstone

Percent of map unit: 2 percent
Landform: Terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

AC—Allemands muck

Map Unit Setting

National map unit symbol: bz80
Elevation: 0 to 10 feet
Mean annual precipitation: 55 to 73 inches
Mean annual air temperature: 55 to 79 degrees F
Frost-free period: 219 to 272 days
Farmland classification: Not prime farmland

Map Unit Composition

Allemands and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Allemands

Setting

Landform: Marshes
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Herbaceous organic material over fluid clayey alluvium

Typical profile

Oa - 0 to 48 inches: muck
Ag - 48 to 58 inches: clay
Cg - 58 to 75 inches: clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 15.0
Available water capacity: Very high (about 18.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Hydrologic Soil Group: A/D
Ecological site: R151XY008LA - Fresh Fluid Marsh 60-64 PZ
Hydric soil rating: Yes

Minor Components

Minor components

Percent of map unit: 15 percent
Hydric soil rating: No

Ad—Allemands muck, drained

Map Unit Setting

National map unit symbol: bz85
Elevation: 0 to 20 feet
Mean annual precipitation: 55 to 73 inches

Mean annual air temperature: 55 to 79 degrees F
Frost-free period: 219 to 272 days
Farmland classification: Not prime farmland

Map Unit Composition

Allemands and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Allemands

Setting

Landform: Marshes
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Herbaceous organic material over fluid clayey alluvium

Typical profile

Oa - 0 to 38 inches: muck
Cg - 38 to 74 inches: clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.60 in/hr)
Depth to water table: About 6 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water capacity: Very high (about 16.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A
Ecological site: R151XY008LA - Fresh Fluid Marsh 60-64 PZ
Hydric soil rating: Yes

Minor Components

Minor components

Percent of map unit: 10 percent
Hydric soil rating: No

Ag—Aquents, dredged

Map Unit Setting

National map unit symbol: bz86
Elevation: 0 to 70 feet

Mean annual precipitation: 55 to 73 inches
Mean annual air temperature: 55 to 79 degrees F
Frost-free period: 219 to 272 days
Farmland classification: Not prime farmland

Map Unit Composition

Aquents and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Aquents

Setting

Landform: Marshes
Down-slope shape: Convex
Across-slope shape: Linear

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None

AR—Arat silty clay loam

Map Unit Setting

National map unit symbol: bz81
Elevation: 0 to 160 feet
Mean annual precipitation: 55 to 73 inches
Mean annual air temperature: 55 to 79 degrees F
Frost-free period: 219 to 272 days
Farmland classification: Not prime farmland

Map Unit Composition

Arat and similar soils: 86 percent
Minor components: 14 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Arat

Setting

Landform: Swamps
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Semifluid loamy backswamp deposits

Typical profile

H1 - 0 to 10 inches: silty clay loam
H2 - 10 to 70 inches: silt loam

Properties and qualities

Slope: 0 to 1 percent

Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: High (about 11.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Minor Components

Minor components

Percent of map unit: 14 percent
Hydric soil rating: No

Bg—Brimstone-Guyton silt loams, 0 to 1 percent slopes, rarely flooded

Map Unit Setting

National map unit symbol: 2w8y6
Elevation: 10 to 200 feet
Mean annual precipitation: 57 to 69 inches
Mean annual air temperature: 61 to 70 degrees F
Frost-free period: 215 to 270 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Brimstone and similar soils: 55 percent
Guyton and similar soils: 35 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Brimstone

Setting

Landform: Flood-plain steps
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Late plisetocene age terraces with high exchangeable sodium loamy fluviomarine deposits

Typical profile

Ap - 0 to 5 inches: silt loam
Eg - 5 to 17 inches: silt loam

Btng/E - 17 to 33 inches: silt loam
Btng - 33 to 66 inches: silt loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: 10 to 31 inches to natric
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 18 inches
Frequency of flooding: NoneRare
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 30.0
Available water capacity: Low (about 3.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Description of Guyton

Setting

Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Late plisetocene age terraces with loamy alluvium derived from sedimentary rock

Typical profile

A - 0 to 3 inches: silt loam
E - 3 to 27 inches: silt loam
Btg/E - 27 to 41 inches: silty clay loam
Btg - 41 to 70 inches: silty clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 18 inches
Frequency of flooding: NoneRare
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 10.0
Available water capacity: Very high (about 12.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w

Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Minor Components

Myatt

Percent of map unit: 5 percent
Landform: Drainageways on stream terraces, depressions on stream terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: Yes

Abita

Percent of map unit: 5 percent
Landform: Fluviomarine terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

CV—Clovelly muck, 0 to 0.2 percent slopes, very frequently flooded

Map Unit Setting

National map unit symbol: 2tpng
Elevation: 0 feet
Mean annual precipitation: 43 to 75 inches
Mean annual air temperature: 57 to 79 degrees F
Frost-free period: 219 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Clovelly, very frequently flooded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Clovelly, Very Frequently Flooded

Setting

Landform: Marshes
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Moderately thick herbaceous organic material over very fluid clayey alluvium

Typical profile

Oa - 0 to 28 inches: muck

Cg - 28 to 79 inches: clay

Properties and qualities

Slope: 0 to 0 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.05 to 0.06 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Very frequent
Frequency of ponding: Frequent
Maximum salinity: Slightly saline to moderately saline (4.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 15.0
Available water capacity: Very high (about 12.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Hydrologic Soil Group: C/D
Ecological site: R151XY004LA - Brackish Fluid Marsh 60-64 PZ
Hydric soil rating: Yes

Minor Components

Scatlake, very frequently flooded

Percent of map unit: 10 percent
Landform: Marshes
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R151XY002LA - Saline Marsh 55-64 PZ
Hydric soil rating: Yes

Bancker, very frequently flooded

Percent of map unit: 3 percent
Landform: Marshes
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R151XY004LA - Brackish Fluid Marsh 60-64 PZ
Hydric soil rating: Yes

Gentilly, frequently flooded

Percent of map unit: 2 percent
Landform: Marshes
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R151XY005LA - Brackish Firm Mineral Marsh 55-64 PZ
Hydric soil rating: Yes

Gt—Guyton silt loam, 0 to 1 percent slopes, rarely flooded

Map Unit Setting

National map unit symbol: 2w8y3
Elevation: 10 to 200 feet
Mean annual precipitation: 57 to 69 inches
Mean annual air temperature: 61 to 70 degrees F
Frost-free period: 215 to 270 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Guyton and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Guyton

Setting

Landform: Flood-plain steps
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Late plisetocene age terraces with loamy alluvium derived from sedimentary rock

Typical profile

A - 0 to 3 inches: silt loam
E - 3 to 27 inches: silt loam
Btg/E - 27 to 41 inches: silty clay loam
Btg - 41 to 70 inches: silty clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 18 inches
Frequency of flooding: NoneRare
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 10.0
Available water capacity: Very high (about 12.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D

Hydric soil rating: Yes

Minor Components

Myatt

Percent of map unit: 4 percent
Landform: Depressions on stream terraces, drainageways on stream terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Hydric soil rating: Yes

Abita

Percent of map unit: 4 percent
Landform: Flats
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Stough

Percent of map unit: 2 percent
Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Gy—Guyton silt loam, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

National map unit symbol: 2w8y4
Elevation: 10 to 200 feet
Mean annual precipitation: 57 to 69 inches
Mean annual air temperature: 61 to 70 degrees F
Frost-free period: 215 to 270 days
Farmland classification: Not prime farmland

Map Unit Composition

Guyton and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Guyton

Setting

Landform: Flood-plain steps
Landform position (three-dimensional): Tread
Down-slope shape: Concave

Across-slope shape: Linear
Parent material: Late plisetocene age terraces with loamy alluvium derived from sedimentary rock

Typical profile

A - 0 to 3 inches: silt loam
E - 3 to 27 inches: silt loam
Btg/E - 27 to 41 inches: silty clay loam
Btg - 41 to 70 inches: silty clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 18 inches
Frequency of flooding: OccasionalNone
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 10.0
Available water capacity: Very high (about 12.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Minor Components

Myatt

Percent of map unit: 6 percent
Landform: Drainageways, flood-plain steps, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, convex
Across-slope shape: Concave
Hydric soil rating: Yes

Abita

Percent of map unit: 6 percent
Landform: Flats
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Stough

Percent of map unit: 3 percent
Landform: Flood-plain steps
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Linear

Hydric soil rating: No

LF—Lafitte muck, 0 to 0.2 percent slopes, very frequently flooded

Map Unit Setting

National map unit symbol: 2tpbw
Elevation: 0 feet
Mean annual precipitation: 59 to 67 inches
Mean annual air temperature: 59 to 79 degrees F
Frost-free period: 290 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Lafitte, very frequently flooded, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lafitte, Very Frequently Flooded

Setting

Landform: Marshes
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Herbaceous organic material over clayey alluvium

Typical profile

Oa - 0 to 75 inches: muck
Cg - 75 to 79 inches: clay

Properties and qualities

Slope: 0 to 0 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.28 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
Maximum salinity: Slightly saline to moderately saline (4.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 10.0
Available water capacity: Very high (about 19.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Hydrologic Soil Group: A/D
Hydric soil rating: Yes

Minor Components

Clovelly, very frequently flooded

Percent of map unit: 15 percent
Landform: Marshes
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Kenner, very frequently flooded

Percent of map unit: 5 percent
Landform: Marshes
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R151XY008LA - Fresh Fluid Marsh 60-64 PZ
Hydric soil rating: Yes

Lt—Latonia fine sandy loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2vy0p
Elevation: 20 to 300 feet
Mean annual precipitation: 57 to 69 inches
Mean annual air temperature: 61 to 70 degrees F
Frost-free period: 215 to 270 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Latonia and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Latonia

Setting

Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy over sandy alluvium

Typical profile

A - 0 to 5 inches: fine sandy loam
Bt - 5 to 36 inches: sandy loam
C - 36 to 80 inches: loamy sand

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (1.28 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: NoneVery rare
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water capacity: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Stough

Percent of map unit: 5 percent
Landform: Stream terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Myatt

Percent of map unit: 5 percent
Landform: Drainageways, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear, concave
Across-slope shape: Concave
Hydric soil rating: Yes

Prentiss

Percent of map unit: 3 percent
Landform: Fluviomarine terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Cahaba

Percent of map unit: 2 percent
Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Mt—Myatt fine sandy loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2syw2
Elevation: 20 to 430 feet
Mean annual precipitation: 57 to 71 inches
Mean annual air temperature: 55 to 79 degrees F
Frost-free period: 215 to 291 days
Farmland classification: Not prime farmland

Map Unit Composition

Myatt and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Myatt

Setting

Landform: Stream terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Pleistocene fluviomarine deposits

Typical profile

A - 0 to 16 inches: fine sandy loam
Btg - 16 to 50 inches: sandy clay loam
Cg - 50 to 64 inches: sandy clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 0 to 11 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: High (about 9.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

Minor Components

Fluker

Percent of map unit: 5 percent
Landform: Stream terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Stough

Percent of map unit: 5 percent
Landform: Stream terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

My—Myatt fine sandy loam, frequently flooded

Map Unit Setting

National map unit symbol: bz8q
Elevation: 0 to 150 feet
Mean annual precipitation: 55 to 73 inches
Mean annual air temperature: 55 to 79 degrees F
Frost-free period: 219 to 272 days
Farmland classification: Not prime farmland

Map Unit Composition

Myatt and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Myatt

Setting

Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Pleistocene fluviomarine deposits

Typical profile

H1 - 0 to 14 inches: fine sandy loam
H2 - 14 to 58 inches: loam
H3 - 58 to 68 inches: sandy clay loam

Properties and qualities

Slope: 0 to 1 percent

Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: NoneFrequent
Frequency of ponding: None
Available water capacity: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

Minor Components

Minor components

Percent of map unit: 15 percent
Hydric soil rating: No

Pr—Prentiss fine sandy loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2w8y7
Elevation: 10 to 200 feet
Mean annual precipitation: 57 to 69 inches
Mean annual air temperature: 59 to 70 degrees F
Frost-free period: 215 to 270 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Prentiss and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Prentiss

Setting

Landform: Interfluves
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest, tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Pliestocene age, loamy fluviomarine deposits

Typical profile

Ap - 0 to 8 inches: fine sandy loam
Bt - 8 to 26 inches: loam
Btx - 26 to 81 inches: loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: 24 to 35 inches to fragipan
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 24 to 35 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Stough

Percent of map unit: 3 percent
Landform: Terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Myatt

Percent of map unit: 2 percent
Landform: Drainageways on stream terraces, depressions on stream terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: Yes

St—Stough fine sandy loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2t42l
Elevation: 10 to 100 feet
Mean annual precipitation: 57 to 69 inches
Mean annual air temperature: 61 to 70 degrees F
Frost-free period: 215 to 270 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Stough and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Stough

Setting

Landform: Flatwoods, terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear, convex
Across-slope shape: Linear
Parent material: Loamy alluvium derived from sedimentary rock

Typical profile

A - 0 to 3 inches: fine sandy loam
E - 3 to 6 inches: fine sandy loam
Bt - 6 to 15 inches: loam
Btx1 - 15 to 29 inches: loam
Btx2 - 29 to 70 inches: sandy clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: 12 to 18 inches to fragipan
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 9 to 13 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Very low (about 1.7 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Myatt

Percent of map unit: 10 percent
Landform: Stream terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Prentiss

Percent of map unit: 5 percent
Landform: Coastal plains
Landform position (two-dimensional): Shoulder

Landform position (three-dimensional): Crest, tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

W—Water

Map Unit Setting

National map unit symbol: bz92
Mean annual precipitation: 55 to 73 inches
Mean annual air temperature: 55 to 79 degrees F
Frost-free period: 219 to 272 days
Farmland classification: Not prime farmland

Map Unit Composition

Water, large: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Soil Information for All Uses

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Land Classifications

This folder contains a collection of tabular reports that present a variety of soil groupings. The reports (tables) include all selected map units and components for each map unit. Land classifications are specified land use and management groupings that are assigned to soil areas because combinations of soil have similar behavior for specified practices. Most are based on soil properties and other factors that directly influence the specific use of the soil. Example classifications include ecological site classification, farmland classification, irrigated and nonirrigated land capability classification, and hydric rating.

Prime and other Important Farmlands

This table lists the map units in the survey area that are considered important farmlands. Important farmlands consist of prime farmland, unique farmland, and farmland of statewide or local importance. This list does not constitute a recommendation for a particular land use.

In an effort to identify the extent and location of important farmlands, the Natural Resources Conservation Service, in cooperation with other interested Federal, State, and local government organizations, has inventoried land that can be used for the production of the Nation's food supply.

Prime farmland is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil quality, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. The water supply is dependable and of adequate quality. Prime farmland is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

For some of the soils identified in the table as prime farmland, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures.

A recent trend in land use in some areas has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

Unique farmland is land other than prime farmland that is used for the production of specific high-value food and fiber crops, such as citrus, tree nuts, olives, cranberries, and other fruits and vegetables. It has the special combination of soil quality, growing season, moisture supply, temperature, humidity, air drainage, elevation, and aspect needed for the soil to economically produce sustainable high yields of these crops when properly managed. The water supply is dependable and of adequate quality. Nearness to markets is an additional consideration. Unique farmland is not based on national criteria. It commonly is in areas where there is a special microclimate, such as the wine country in California.

In some areas, land that does not meet the criteria for prime or unique farmland is considered to be *farmland of statewide importance* for the production of food, feed, fiber, forage, and oilseed crops. The criteria for defining and delineating farmland of statewide importance are determined by the appropriate State agencies. Generally, this land includes areas of soils that nearly meet the requirements for prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some areas may produce as high a yield as prime farmland if conditions are favorable. Farmland of statewide importance may include tracts of land that have been designated for agriculture by State law.

In some areas that are not identified as having national or statewide importance, land is considered to be *farmland of local importance* for the production of food, feed, fiber, forage, and oilseed crops. This farmland is identified by the appropriate local agencies. Farmland of local importance may include tracts of land that have been designated for agriculture by local ordinance.

Report—Prime and other Important Farmlands

Prime and other Important Farmlands–St. Tammany Parish, Louisiana		
Map Symbol	**Map Unit Name**	**Farmland Classification**
Aa	Abita silt loam, 0 to 2 percent slopes	All areas are prime farmland
AC	Allemands muck	Not prime farmland
Ad	Allemands muck, drained	Not prime farmland
Ag	Aquents, dredged	Not prime farmland
AR	Arat silty clay loam	Not prime farmland
Bg	Brimstone-Guyton silt loams, 0 to 1 percent slopes, rarely flooded	All areas are prime farmland
CV	Clovelly muck, 0 to 0.2 percent slopes, very frequently flooded	Not prime farmland
Gt	Guyton silt loam, 0 to 1 percent slopes, rarely flooded	All areas are prime farmland
Gy	Guyton silt loam, 0 to 1 percent slopes, occasionally flooded	Not prime farmland
LF	Lafitte muck, 0 to 0.2 percent slopes, very frequently flooded	Not prime farmland
Lt	Latonia fine sandy loam, 0 to 2 percent slopes	All areas are prime farmland
Mt	Myatt fine sandy loam, 0 to 1 percent slopes	Not prime farmland
My	Myatt fine sandy loam, frequently flooded	Not prime farmland
Pr	Prentiss fine sandy loam, 0 to 1 percent slopes	All areas are prime farmland
St	Stough fine sandy loam, 0 to 1 percent slopes	All areas are prime farmland
W	Water	Not prime farmland

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Natural
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Custom Soil Resource Report for
Hancock County, Mississippi

MS-1 Borrow Site

April 29, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map

Map Scale: 1:4,850 if printed on A portrait (8.5" x 11") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Hancock County, Mississippi
Survey Area Data: Version 17, Jun 3, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 3, 2018—Nov 16, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Be	Beauregard silt loam	61.0	67.8%
Gu	Guyton silt loam, 0 to 1 percent slopes, rarely flooded	28.9	32.2%
Totals for Area of Interest		**89.9**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Hancock County, Mississippi

Be—Beauregard silt loam

Map Unit Setting

National map unit symbol: c4w3
Elevation: 50 to 450 feet
Mean annual precipitation: 48 to 75 inches
Mean annual air temperature: 63 to 70 degrees F
Frost-free period: 200 to 335 days
Farmland classification: Not prime farmland

Map Unit Composition

Beauregard and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Beauregard

Setting

Landform: Coastal plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium

Typical profile

H1 - 0 to 9 inches: silt loam
H2 - 9 to 19 inches: silt loam
H3 - 19 to 60 inches: silt loam
H4 - 60 to 64 inches: silty clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very high (about 12.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Smithton

Percent of map unit: 6 percent
Landform: Terraces

Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Atmore

Percent of map unit: 3 percent
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Escambia

Percent of map unit: 3 percent
Landform: Coastal plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Harleston

Percent of map unit: 3 percent
Landform: Stream terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Gu—Guyton silt loam, 0 to 1 percent slopes, rarely flooded

Map Unit Setting

National map unit symbol: 2w8y3
Elevation: 10 to 200 feet
Mean annual precipitation: 57 to 69 inches
Mean annual air temperature: 61 to 70 degrees F
Frost-free period: 215 to 270 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Guyton and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Guyton

Setting

Landform: Flood-plain steps
Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Late plisetocene age terraces with loamy alluvium derived from sedimentary rock

Typical profile

A - 0 to 3 inches: silt loam
E - 3 to 27 inches: silt loam
Btg/E - 27 to 41 inches: silty clay loam
Btg - 41 to 70 inches: silty clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 18 inches
Frequency of flooding: NoneRare
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 10.0
Available water capacity: Very high (about 12.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Minor Components

Abita

Percent of map unit: 4 percent
Landform: Flats
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Myatt

Percent of map unit: 4 percent
Landform: Depressions on stream terraces, drainageways on stream terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: Yes

Stough

Percent of map unit: 2 percent
Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex

Across-slope shape: Linear
Hydric soil rating: No

Soil Information for All Uses

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Land Classifications

This folder contains a collection of tabular reports that present a variety of soil groupings. The reports (tables) include all selected map units and components for each map unit. Land classifications are specified land use and management groupings that are assigned to soil areas because combinations of soil have similar behavior for specified practices. Most are based on soil properties and other factors that directly influence the specific use of the soil. Example classifications include ecological site classification, farmland classification, irrigated and nonirrigated land capability classification, and hydric rating.

Prime and other Important Farmlands (MS-1 Borrow Site)

This table lists the map units in the survey area that are considered important farmlands. Important farmlands consist of prime farmland, unique farmland, and farmland of statewide or local importance. This list does not constitute a recommendation for a particular land use.

In an effort to identify the extent and location of important farmlands, the Natural Resources Conservation Service, in cooperation with other interested Federal, State, and local government organizations, has inventoried land that can be used for the production of the Nation's food supply.

Prime farmland is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil quality, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. The water supply is dependable and of adequate quality. Prime farmland is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

For some of the soils identified in the table as prime farmland, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures.

A recent trend in land use in some areas has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

Unique farmland is land other than prime farmland that is used for the production of specific high-value food and fiber crops, such as citrus, tree nuts, olives, cranberries, and other fruits and vegetables. It has the special combination of soil quality, growing season, moisture supply, temperature, humidity, air drainage, elevation, and aspect needed for the soil to economically produce sustainable high yields of these crops when properly managed. The water supply is dependable and of adequate quality. Nearness to markets is an additional consideration. Unique farmland is not based on national criteria. It commonly is in areas where there is a special microclimate, such as the wine country in California.

In some areas, land that does not meet the criteria for prime or unique farmland is considered to be *farmland of statewide importance* for the production of food, feed, fiber, forage, and oilseed crops. The criteria for defining and delineating farmland of statewide importance are determined by the appropriate State agencies. Generally, this land includes areas of soils that nearly meet the requirements for prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some areas may produce as high a yield as prime farmland if conditions are favorable. Farmland of statewide importance may include tracts of land that have been designated for agriculture by State law.

In some areas that are not identified as having national or statewide importance, land is considered to be *farmland of local importance* for the production of food, feed, fiber, forage, and oilseed crops. This farmland is identified by the appropriate local agencies. Farmland of local importance may include tracts of land that have been designated for agriculture by local ordinance.

Report—Prime and other Important Farmlands (MS-1 Borrow Site)

Prime and other Important Farmlands–St. Tammany Parish, Louisiana		
Map Symbol	**Map Unit Name**	**Farmland Classification**
Mt	Myatt fine sandy loam, 0 to 1 percent slopes	Not prime farmland
My	Myatt fine sandy loam, frequently flooded	Not prime farmland
Pr	Prentiss fine sandy loam, 0 to 1 percent slopes	All areas are prime farmland

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United States
Department of
Agriculture

Natural
Resources
Conservation
Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for
Hancock County, Mississippi

MS-2 Borrow Site

April 29, 2021

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The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

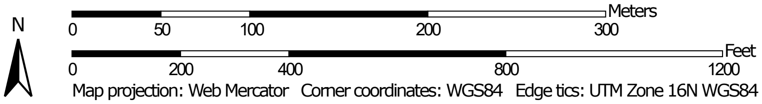
identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map

Map Scale: 1:4,250 if printed on A portrait (8.5" x 11") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Hancock County, Mississippi
Survey Area Data: Version 17, Jun 3, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 3, 2018—Nov 16, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Be	Beauregard silt loam	2.9	8.7%
Gu	Guyton silt loam, 0 to 1 percent slopes, rarely flooded	30.3	91.3%
Totals for Area of Interest		**33.2**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Hancock County, Mississippi

Be—Beauregard silt loam

Map Unit Setting

National map unit symbol: c4w3
Elevation: 50 to 450 feet
Mean annual precipitation: 48 to 75 inches
Mean annual air temperature: 63 to 70 degrees F
Frost-free period: 200 to 335 days
Farmland classification: Not prime farmland

Map Unit Composition

Beauregard and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Beauregard

Setting

Landform: Coastal plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium

Typical profile

H1 - 0 to 9 inches: silt loam
H2 - 9 to 19 inches: silt loam
H3 - 19 to 60 inches: silt loam
H4 - 60 to 64 inches: silty clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very high (about 12.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Smithton

Percent of map unit: 6 percent
Landform: Terraces

Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Atmore

Percent of map unit: 3 percent
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Escambia

Percent of map unit: 3 percent
Landform: Coastal plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Harleston

Percent of map unit: 3 percent
Landform: Stream terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Gu—Guyton silt loam, 0 to 1 percent slopes, rarely flooded

Map Unit Setting

National map unit symbol: 2w8y3
Elevation: 10 to 200 feet
Mean annual precipitation: 57 to 69 inches
Mean annual air temperature: 61 to 70 degrees F
Frost-free period: 215 to 270 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Guyton and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Guyton

Setting

Landform: Flood-plain steps
Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Late plisetocene age terraces with loamy alluvium derived from sedimentary rock

Typical profile

A - 0 to 3 inches: silt loam
E - 3 to 27 inches: silt loam
Btg/E - 27 to 41 inches: silty clay loam
Btg - 41 to 70 inches: silty clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 18 inches
Frequency of flooding: NoneRare
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 10.0
Available water capacity: Very high (about 12.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Minor Components

Abita

Percent of map unit: 4 percent
Landform: Flats
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Myatt

Percent of map unit: 4 percent
Landform: Depressions on stream terraces, drainageways on stream terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: Yes

Stough

Percent of map unit: 2 percent
Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex

Across-slope shape: Linear
Hydric soil rating: No

Soil Information for All Uses

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Land Classifications

This folder contains a collection of tabular reports that present a variety of soil groupings. The reports (tables) include all selected map units and components for each map unit. Land classifications are specified land use and management groupings that are assigned to soil areas because combinations of soil have similar behavior for specified practices. Most are based on soil properties and other factors that directly influence the specific use of the soil. Example classifications include ecological site classification, farmland classification, irrigated and nonirrigated land capability classification, and hydric rating.

Prime and other Important Farmlands (MS-2 Borrow Site)

This table lists the map units in the survey area that are considered important farmlands. Important farmlands consist of prime farmland, unique farmland, and farmland of statewide or local importance. This list does not constitute a recommendation for a particular land use.

In an effort to identify the extent and location of important farmlands, the Natural Resources Conservation Service, in cooperation with other interested Federal, State, and local government organizations, has inventoried land that can be used for the production of the Nation's food supply.

Prime farmland is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil quality, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. The water supply is dependable and of adequate quality. Prime farmland is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

For some of the soils identified in the table as prime farmland, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures.

A recent trend in land use in some areas has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

Unique farmland is land other than prime farmland that is used for the production of specific high-value food and fiber crops, such as citrus, tree nuts, olives, cranberries, and other fruits and vegetables. It has the special combination of soil quality, growing season, moisture supply, temperature, humidity, air drainage, elevation, and aspect needed for the soil to economically produce sustainable high yields of these crops when properly managed. The water supply is dependable and of adequate quality. Nearness to markets is an additional consideration. Unique farmland is not based on national criteria. It commonly is in areas where there is a special microclimate, such as the wine country in California.

In some areas, land that does not meet the criteria for prime or unique farmland is considered to be *farmland of statewide importance* for the production of food, feed, fiber, forage, and oilseed crops. The criteria for defining and delineating farmland of statewide importance are determined by the appropriate State agencies. Generally, this land includes areas of soils that nearly meet the requirements for prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some areas may produce as high a yield as prime farmland if conditions are favorable. Farmland of statewide importance may include tracts of land that have been designated for agriculture by State law.

In some areas that are not identified as having national or statewide importance, land is considered to be *farmland of local importance* for the production of food, feed, fiber, forage, and oilseed crops. This farmland is identified by the appropriate local agencies. Farmland of local importance may include tracts of land that have been designated for agriculture by local ordinance.

Report—Prime and other Important Farmlands (MS-2 Borrow Site)

Prime and other Important Farmlands–St. Tammany Parish, Louisiana		
Map Symbol	**Map Unit Name**	**Farmland Classification**
Mt	Myatt fine sandy loam, 0 to 1 percent slopes	Not prime farmland
My	Myatt fine sandy loam, frequently flooded	Not prime farmland
Pr	Prentiss fine sandy loam, 0 to 1 percent slopes	All areas are prime farmland

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United States
Department of
Agriculture

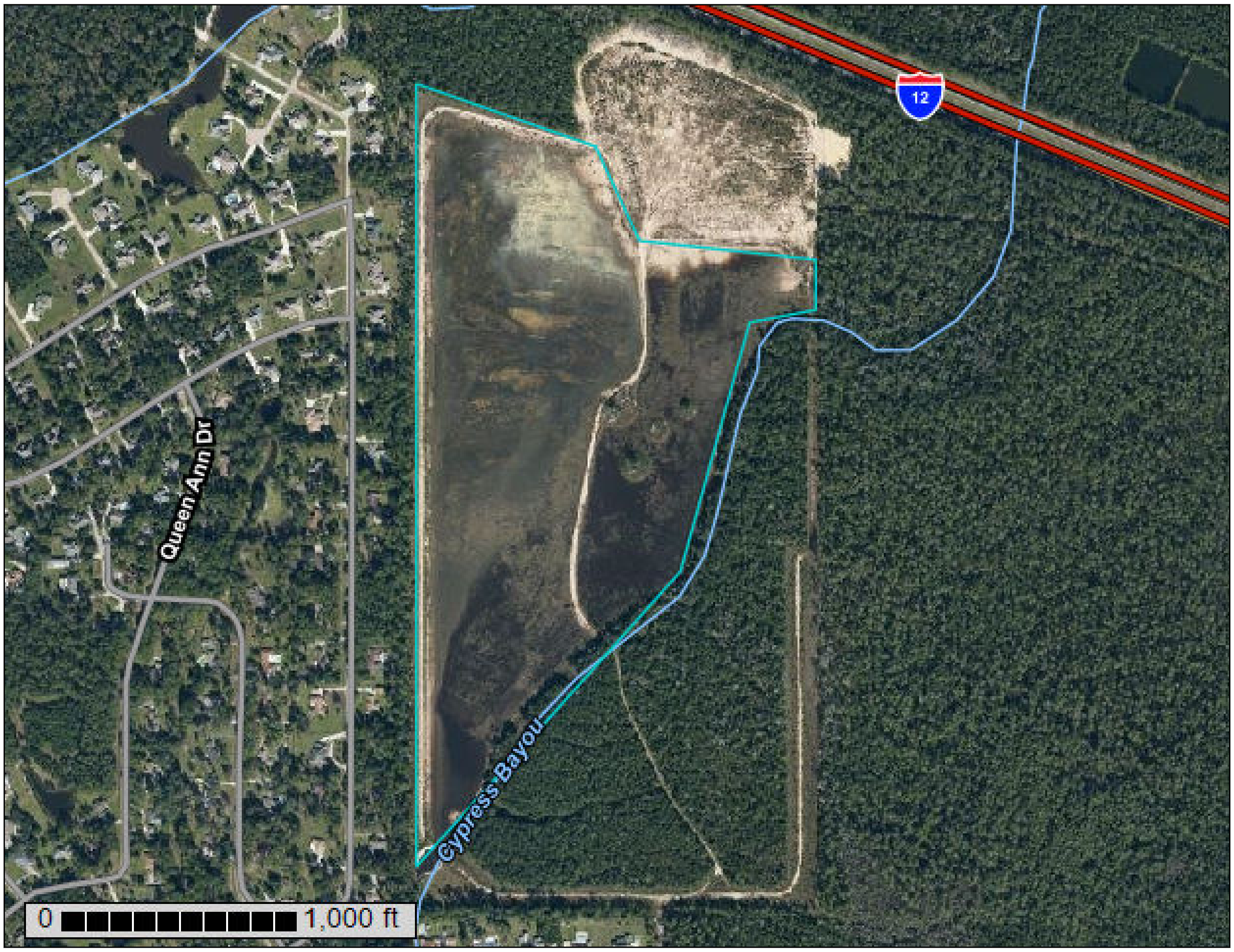
Natural
Resources
Conservation
Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

St. Tammany Parish, Louisiana

STP-5 Borrow Site



April 29, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

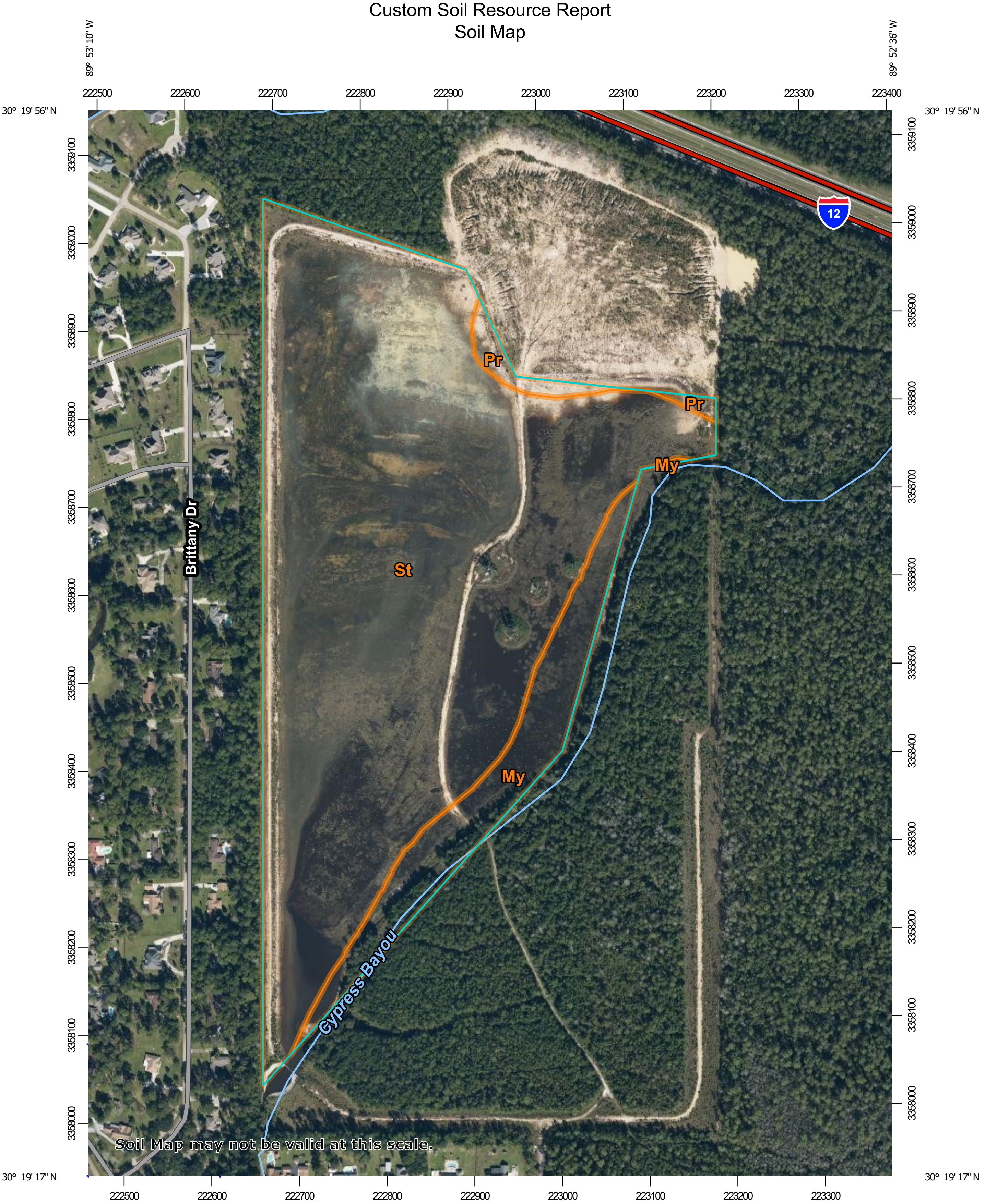
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map



N

Map Scale: 1:5,910 if printed on A portrait (8.5" x 11") sheet.

Meters
0 50 100 200 300

Feet
0 250 500 1000 1500

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

MAP LEGEND

Area of Interest (AOI)
- □ Area of Interest (AOI)

Soils
- □ Soil Map Unit Polygons
- 〰 Soil Map Unit Lines
- ■ Soil Map Unit Points

Special Point Features
- ⊙ Blowout
- ⊠ Borrow Pit
- ✱ Clay Spot
- ◇ Closed Depression
- ✕ Gravel Pit
- ∴ Gravelly Spot
- ◉ Landfill
- Λ Lava Flow
- ψ Marsh or swamp
- ⚒ Mine or Quarry
- ◎ Miscellaneous Water
- ○ Perennial Water
- ∨ Rock Outcrop
- + Saline Spot
- ⁘ Sandy Spot
- ⊖ Severely Eroded Spot
- ◇ Sinkhole
- ⊳ Slide or Slip
- ⊘ Sodic Spot
- ≡ Spoil Area
- ◊ Stony Spot
- ◊◊ Very Stony Spot
- ψ Wet Spot
- △ Other
- ▪ Special Line Features

Water Features
- ~ Streams and Canals

Transportation
- ┼┼┼ Rails
- 〰 Interstate Highways
- 〰 US Routes
- 〰 Major Roads
- 〰 Local Roads

Background
- ▨ Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: St. Tammany Parish, Louisiana
Survey Area Data: Version 14, Jun 5, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 3, 2018—Nov 16, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
My	Myatt fine sandy loam, frequently flooded	7.6	10.9%
Pr	Prentiss fine sandy loam, 0 to 1 percent slopes	1.2	1.8%
St	Stough fine sandy loam, 0 to 1 percent slopes	60.6	87.3%
Totals for Area of Interest		**69.4**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

St. Tammany Parish, Louisiana

My—Myatt fine sandy loam, frequently flooded

Map Unit Setting

National map unit symbol: bz8q
Elevation: 0 to 150 feet
Mean annual precipitation: 55 to 73 inches
Mean annual air temperature: 55 to 79 degrees F
Frost-free period: 219 to 272 days
Farmland classification: Not prime farmland

Map Unit Composition

Myatt and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Myatt

Setting

Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Pleistocene fluviomarine deposits

Typical profile

H1 - 0 to 14 inches: fine sandy loam
H2 - 14 to 58 inches: loam
H3 - 58 to 68 inches: sandy clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: NoneFrequent
Frequency of ponding: None
Available water capacity: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

Minor Components

Minor components

Percent of map unit: 15 percent
Hydric soil rating: No

Pr—Prentiss fine sandy loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2w8y7
Elevation: 10 to 200 feet
Mean annual precipitation: 57 to 69 inches
Mean annual air temperature: 59 to 70 degrees F
Frost-free period: 215 to 270 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Prentiss and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Prentiss

Setting

Landform: Interfluves
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest, tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Pliestocene age, loamy fluviomarine deposits

Typical profile

Ap - 0 to 8 inches: fine sandy loam
Bt - 8 to 26 inches: loam
Btx - 26 to 81 inches: loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: 24 to 35 inches to fragipan
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 24 to 35 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Stough

Percent of map unit: 3 percent
Landform: Terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Myatt

Percent of map unit: 2 percent
Landform: Drainageways on stream terraces, depressions on stream terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: Yes

St—Stough fine sandy loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2t42l
Elevation: 10 to 100 feet
Mean annual precipitation: 57 to 69 inches
Mean annual air temperature: 61 to 70 degrees F
Frost-free period: 215 to 270 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Stough and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Stough

Setting

Landform: Flatwoods, terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear, convex
Across-slope shape: Linear
Parent material: Loamy alluvium derived from sedimentary rock

Typical profile

A - 0 to 3 inches: fine sandy loam
E - 3 to 6 inches: fine sandy loam
Bt - 6 to 15 inches: loam
Btx1 - 15 to 29 inches: loam

Btx2 - 29 to 70 inches: sandy clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: 12 to 18 inches to fragipan
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 9 to 13 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Very low (about 1.7 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Myatt

Percent of map unit: 10 percent
Landform: Stream terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Prentiss

Percent of map unit: 5 percent
Landform: Coastal plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest, tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Soil Information for All Uses

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Land Classifications

This folder contains a collection of tabular reports that present a variety of soil groupings. The reports (tables) include all selected map units and components for each map unit. Land classifications are specified land use and management groupings that are assigned to soil areas because combinations of soil have similar behavior for specified practices. Most are based on soil properties and other factors that directly influence the specific use of the soil. Example classifications include ecological site classification, farmland classification, irrigated and nonirrigated land capability classification, and hydric rating.

Prime and other Important Farmlands (STP-5 Borrow Site)

This table lists the map units in the survey area that are considered important farmlands. Important farmlands consist of prime farmland, unique farmland, and farmland of statewide or local importance. This list does not constitute a recommendation for a particular land use.

In an effort to identify the extent and location of important farmlands, the Natural Resources Conservation Service, in cooperation with other interested Federal, State, and local government organizations, has inventoried land that can be used for the production of the Nation's food supply.

Prime farmland is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil quality, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. The water supply is dependable and of adequate quality. Prime farmland is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

For some of the soils identified in the table as prime farmland, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures.

A recent trend in land use in some areas has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

Unique farmland is land other than prime farmland that is used for the production of specific high-value food and fiber crops, such as citrus, tree nuts, olives, cranberries, and other fruits and vegetables. It has the special combination of soil quality, growing season, moisture supply, temperature, humidity, air drainage, elevation, and aspect needed for the soil to economically produce sustainable high yields of these crops when properly managed. The water supply is dependable and of adequate quality. Nearness to markets is an additional consideration. Unique farmland is not based on national criteria. It commonly is in areas where there is a special microclimate, such as the wine country in California.

In some areas, land that does not meet the criteria for prime or unique farmland is considered to be *farmland of statewide importance* for the production of food, feed, fiber, forage, and oilseed crops. The criteria for defining and delineating farmland of statewide importance are determined by the appropriate State agencies. Generally, this land includes areas of soils that nearly meet the requirements for prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some areas may produce as high a yield as prime farmland if conditions are favorable. Farmland of statewide importance may include tracts of land that have been designated for agriculture by State law.

In some areas that are not identified as having national or statewide importance, land is considered to be *farmland of local importance* for the production of food, feed, fiber, forage, and oilseed crops. This farmland is identified by the appropriate local agencies. Farmland of local importance may include tracts of land that have been designated for agriculture by local ordinance.

Report—Prime and other Important Farmlands (STP-5 Borrow Site)

Prime and other Important Farmlands–St. Tammany Parish, Louisiana		
Map Symbol	**Map Unit Name**	**Farmland Classification**
My	Myatt fine sandy loam, frequently flooded	Not prime farmland
Pr	Prentiss fine sandy loam, 0 to 1 percent slopes	All areas are prime farmland
St	Stough fine sandy loam, 0 to 1 percent slopes	All areas are prime farmland

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United States
Department of
Agriculture

Natural
Resources
Conservation
Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for St. Tammany Parish, Louisiana

STP-6 Borrow Site

April 29, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: St. Tammany Parish, Louisiana
Survey Area Data: Version 14, Jun 5, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 3, 2018—Nov 16, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
My	Myatt fine sandy loam, frequently flooded	12.5	99.6%
St	Stough fine sandy loam, 0 to 1 percent slopes	0.0	0.4%
Totals for Area of Interest		**12.6**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

St. Tammany Parish, Louisiana

My—Myatt fine sandy loam, frequently flooded

Map Unit Setting

National map unit symbol: bz8q
Elevation: 0 to 150 feet
Mean annual precipitation: 55 to 73 inches
Mean annual air temperature: 55 to 79 degrees F
Frost-free period: 219 to 272 days
Farmland classification: Not prime farmland

Map Unit Composition

Myatt and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Myatt

Setting

Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Pleistocene fluviomarine deposits

Typical profile

H1 - 0 to 14 inches: fine sandy loam
H2 - 14 to 58 inches: loam
H3 - 58 to 68 inches: sandy clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: NoneFrequent
Frequency of ponding: None
Available water capacity: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

Minor Components

Minor components

Percent of map unit: 15 percent
Hydric soil rating: No

St—Stough fine sandy loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2t42l
Elevation: 10 to 100 feet
Mean annual precipitation: 57 to 69 inches
Mean annual air temperature: 61 to 70 degrees F
Frost-free period: 215 to 270 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Stough and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Stough

Setting

Landform: Flatwoods, terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear, convex
Across-slope shape: Linear
Parent material: Loamy alluvium derived from sedimentary rock

Typical profile

A - 0 to 3 inches: fine sandy loam
E - 3 to 6 inches: fine sandy loam
Bt - 6 to 15 inches: loam
Btx1 - 15 to 29 inches: loam
Btx2 - 29 to 70 inches: sandy clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: 12 to 18 inches to fragipan
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 9 to 13 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Very low (about 1.7 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Myatt

Percent of map unit: 10 percent
Landform: Stream terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Prentiss

Percent of map unit: 5 percent
Landform: Coastal plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest, tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Soil Information for All Uses

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Land Classifications

This folder contains a collection of tabular reports that present a variety of soil groupings. The reports (tables) include all selected map units and components for each map unit. Land classifications are specified land use and management groupings that are assigned to soil areas because combinations of soil have similar behavior for specified practices. Most are based on soil properties and other factors that directly influence the specific use of the soil. Example classifications include ecological site classification, farmland classification, irrigated and nonirrigated land capability classification, and hydric rating.

Prime and other Important Farmlands (STP-6 Borrow Site)

This table lists the map units in the survey area that are considered important farmlands. Important farmlands consist of prime farmland, unique farmland, and farmland of statewide or local importance. This list does not constitute a recommendation for a particular land use.

In an effort to identify the extent and location of important farmlands, the Natural Resources Conservation Service, in cooperation with other interested Federal, State, and local government organizations, has inventoried land that can be used for the production of the Nation's food supply.

Prime farmland is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil quality, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. The water supply is dependable and of adequate quality. Prime farmland is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

For some of the soils identified in the table as prime farmland, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures.

A recent trend in land use in some areas has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

Unique farmland is land other than prime farmland that is used for the production of specific high-value food and fiber crops, such as citrus, tree nuts, olives, cranberries, and other fruits and vegetables. It has the special combination of soil quality, growing season, moisture supply, temperature, humidity, air drainage, elevation, and aspect needed for the soil to economically produce sustainable high yields of these crops when properly managed. The water supply is dependable and of adequate quality. Nearness to markets is an additional consideration. Unique farmland is not based on national criteria. It commonly is in areas where there is a special microclimate, such as the wine country in California.

In some areas, land that does not meet the criteria for prime or unique farmland is considered to be *farmland of statewide importance* for the production of food, feed, fiber, forage, and oilseed crops. The criteria for defining and delineating farmland of statewide importance are determined by the appropriate State agencies. Generally, this land includes areas of soils that nearly meet the requirements for prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some areas may produce as high a yield as prime farmland if conditions are favorable. Farmland of statewide importance may include tracts of land that have been designated for agriculture by State law.

In some areas that are not identified as having national or statewide importance, land is considered to be *farmland of local importance* for the production of food, feed, fiber, forage, and oilseed crops. This farmland is identified by the appropriate local agencies. Farmland of local importance may include tracts of land that have been designated for agriculture by local ordinance.

Report—Prime and other Important Farmlands (STP-6 Borrow Site)

Prime and other Important Farmlands–St. Tammany Parish, Louisiana		
Map Symbol	**Map Unit Name**	**Farmland Classification**
My	Myatt fine sandy loam, frequently flooded	Not prime farmland
St	Stough fine sandy loam, 0 to 1 percent slopes	All areas are prime farmland

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United States
Department of
Agriculture

Natural
Resources
Conservation
Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for
St. Tammany Parish, Louisiana

STP-9 Borrow Site

April 29, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

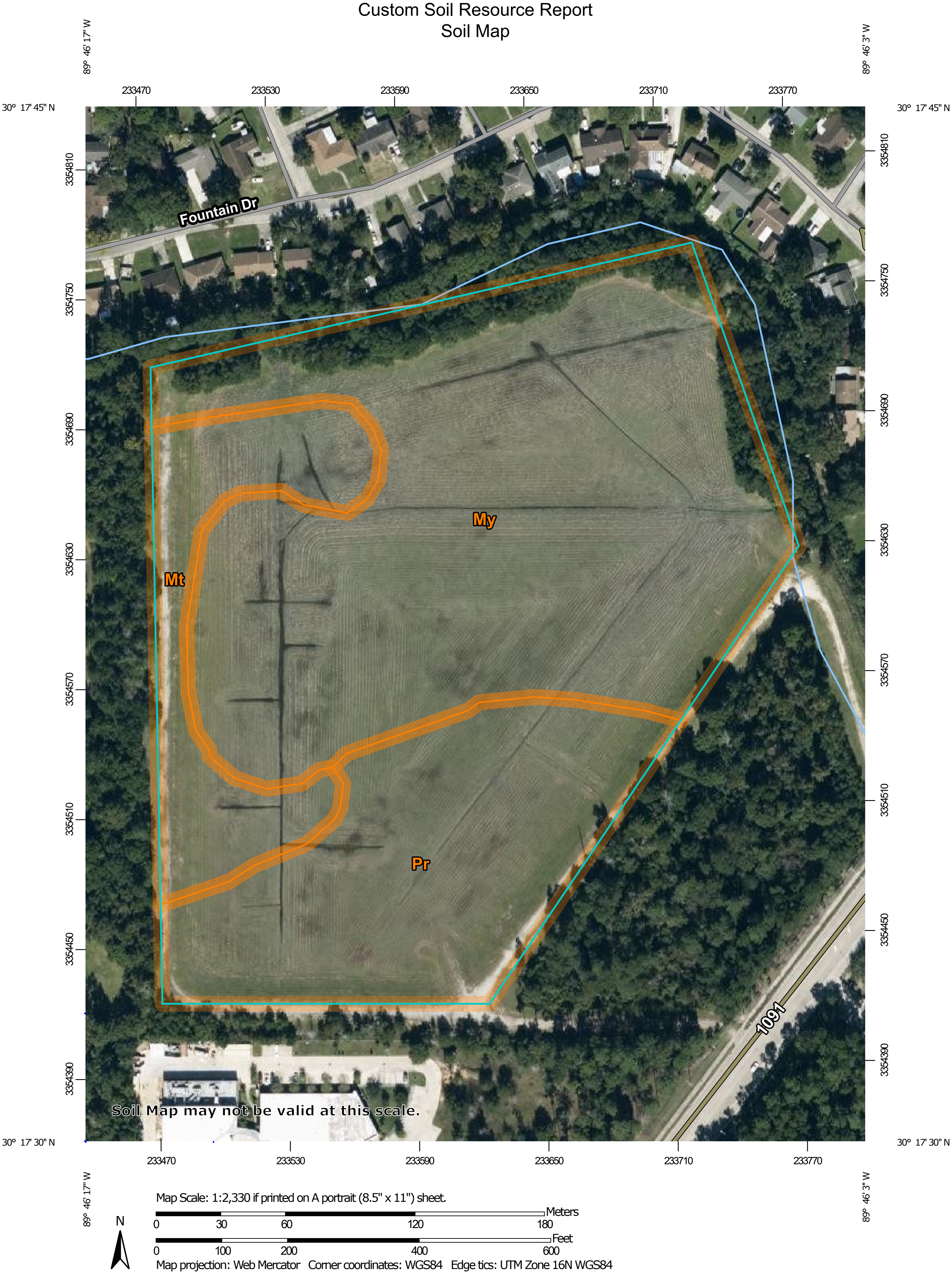
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map



Map Scale: 1:2,330 if printed on A portrait (8.5" x 11") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

MAP LEGEND

Area of Interest (AOI)

- ▭ Area of Interest (AOI)

Soils

- ▭ Soil Map Unit Polygons
- ～ Soil Map Unit Lines
- ■ Soil Map Unit Points

Special Point Features

- ◎ Blowout
- ⊠ Borrow Pit
- ✱ Clay Spot
- ◇ Closed Depression
- ✕ Gravel Pit
- ∴ Gravelly Spot
- ● Landfill
- ʎ Lava Flow
- ⩩ Marsh or swamp
- ⚒ Mine or Quarry
- ◎ Miscellaneous Water
- ○ Perennial Water
- ∨ Rock Outcrop
- + Saline Spot
- ⁘ Sandy Spot
- ⊖ Severely Eroded Spot
- ◇ Sinkhole
- ⊃ Slide or Slip
- ⌀ Sodic Spot
- ≡ Spoil Area
- ● Stony Spot
- ●● Very Stony Spot
- ψ Wet Spot
- △ Other
- ▪▪ Special Line Features

Water Features

- ～ Streams and Canals

Transportation

- +++ Rails
- ～ Interstate Highways
- ～ US Routes
- ～ Major Roads
- ～ Local Roads

Background

- ■ Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: St. Tammany Parish, Louisiana
Survey Area Data: Version 14, Jun 5, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 3, 2018—Nov 16, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Mt	Myatt fine sandy loam, 0 to 1 percent slopes	2.5	12.8%
My	Myatt fine sandy loam, frequently flooded	12.0	61.2%
Pr	Prentiss fine sandy loam, 0 to 1 percent slopes	5.1	25.9%
Totals for Area of Interest		**19.6**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

St. Tammany Parish, Louisiana

Mt—Myatt fine sandy loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2syw2
Elevation: 20 to 430 feet
Mean annual precipitation: 57 to 71 inches
Mean annual air temperature: 55 to 79 degrees F
Frost-free period: 215 to 291 days
Farmland classification: Not prime farmland

Map Unit Composition

Myatt and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Myatt

Setting

Landform: Stream terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Pleistocene fluviomarine deposits

Typical profile

A - 0 to 16 inches: fine sandy loam
Btg - 16 to 50 inches: sandy clay loam
Cg - 50 to 64 inches: sandy clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 0 to 11 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: High (about 9.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

Minor Components

Fluker

Percent of map unit: 5 percent
Landform: Stream terraces

Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Stough

Percent of map unit: 5 percent
Landform: Stream terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

My—Myatt fine sandy loam, frequently flooded

Map Unit Setting

National map unit symbol: bz8q
Elevation: 0 to 150 feet
Mean annual precipitation: 55 to 73 inches
Mean annual air temperature: 55 to 79 degrees F
Frost-free period: 219 to 272 days
Farmland classification: Not prime farmland

Map Unit Composition

Myatt and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Myatt

Setting

Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Pleistocene fluviomarine deposits

Typical profile

H1 - 0 to 14 inches: fine sandy loam
H2 - 14 to 58 inches: loam
H3 - 58 to 68 inches: sandy clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: NoneFrequent

Frequency of ponding: None
Available water capacity: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

Minor Components

Minor components

Percent of map unit: 15 percent
Hydric soil rating: No

Pr—Prentiss fine sandy loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2w8y7
Elevation: 10 to 200 feet
Mean annual precipitation: 57 to 69 inches
Mean annual air temperature: 59 to 70 degrees F
Frost-free period: 215 to 270 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Prentiss and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Prentiss

Setting

Landform: Interfluves
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest, tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Pliestocene age, loamy fluviomarine deposits

Typical profile

Ap - 0 to 8 inches: fine sandy loam
Bt - 8 to 26 inches: loam
Btx - 26 to 81 inches: loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: 24 to 35 inches to fragipan
Drainage class: Moderately well drained
Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 24 to 35 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Stough

Percent of map unit: 3 percent
Landform: Terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Myatt

Percent of map unit: 2 percent
Landform: Drainageways on stream terraces, depressions on stream terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: Yes

Soil Information for All Uses

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Land Classifications

This folder contains a collection of tabular reports that present a variety of soil groupings. The reports (tables) include all selected map units and components for each map unit. Land classifications are specified land use and management groupings that are assigned to soil areas because combinations of soil have similar behavior for specified practices. Most are based on soil properties and other factors that directly influence the specific use of the soil. Example classifications include ecological site classification, farmland classification, irrigated and nonirrigated land capability classification, and hydric rating.

Prime and other Important Farmlands (STP-9 Borrow Site)

This table lists the map units in the survey area that are considered important farmlands. Important farmlands consist of prime farmland, unique farmland, and farmland of statewide or local importance. This list does not constitute a recommendation for a particular land use.

In an effort to identify the extent and location of important farmlands, the Natural Resources Conservation Service, in cooperation with other interested Federal, State, and local government organizations, has inventoried land that can be used for the production of the Nation's food supply.

Prime farmland is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil quality, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. The water supply is dependable and of adequate quality. Prime farmland is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

For some of the soils identified in the table as prime farmland, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures.

A recent trend in land use in some areas has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

Unique farmland is land other than prime farmland that is used for the production of specific high-value food and fiber crops, such as citrus, tree nuts, olives, cranberries, and other fruits and vegetables. It has the special combination of soil quality, growing season, moisture supply, temperature, humidity, air drainage, elevation, and aspect needed for the soil to economically produce sustainable high yields of these crops when properly managed. The water supply is dependable and of adequate quality. Nearness to markets is an additional consideration. Unique farmland is not based on national criteria. It commonly is in areas where there is a special microclimate, such as the wine country in California.

In some areas, land that does not meet the criteria for prime or unique farmland is considered to be *farmland of statewide importance* for the production of food, feed, fiber, forage, and oilseed crops. The criteria for defining and delineating farmland of statewide importance are determined by the appropriate State agencies. Generally, this land includes areas of soils that nearly meet the requirements for prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some areas may produce as high a yield as prime farmland if conditions are favorable. Farmland of statewide importance may include tracts of land that have been designated for agriculture by State law.

In some areas that are not identified as having national or statewide importance, land is considered to be *farmland of local importance* for the production of food, feed, fiber, forage, and oilseed crops. This farmland is identified by the appropriate local agencies. Farmland of local importance may include tracts of land that have been designated for agriculture by local ordinance.

Report—Prime and other Important Farmlands (STP-9 Borrow Site)

Prime and other Important Farmlands–St. Tammany Parish, Louisiana		
Map Symbol	**Map Unit Name**	**Farmland Classification**
My	Myatt fine sandy loam, frequently flooded	Not prime farmland
St	Stough fine sandy loam, 0 to 1 percent slopes	All areas are prime farmland

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Alternative	Measure	Measure Acres	Wetland Type	Classification	Impacted Acres	Wetland Type	Classification	Impacted Acres
4	Bayou Lacombe Ring Levee	130.7	Estuarine and Marine Deepwater	E1UBL	1.25	Freshwater Forested/S	PFO1C	1.17
			Estuarine and Marine Wetland	E2EM1N	3.87	Freshwater Forested/S	PSS1C	1.08
			Estuarine and Marine Wetland	E2EM1P	9.62	Freshwater Forested/S	PSS1F	1.77
			Estuarine and Marine Wetland	E2SS4P	0.56	Freshwater Forested/S	PSS4C	0.34
			Freshwater Emergent Wetland	PEM1F	8.74	Levee footprint		93.01
			Freshwater Emergent Wetland	PEM1Rh	2.25	Total acres		97.37
			Riverine	R1UBV	0.20	AAHU	HSI = .96	93.47904
			Riverine	R1UBVx	1.14	Mitigation Acreage		161.1707586
			Riverine	R4SBC	0.06	BLH Mitigation Cost		$ 35,457,567
			Total acres		27.69			
			AAHU	HSI = .9	24.92			
			Mitigation Acreage		76.21			
			Marsh Mitigation Cost		$ 6,096,881			
	4a.1 Bayou Lacombe Ring Levee Short	116.37	Estuarine and Marine Deepwater	E1UBL	1.25	Freshwater Forested/S	PSS1C	1.08
			Estuarine and Marine Wetland	E2EM1N	3.87	Freshwater Forested/S	PSS1F	1.78
			Estuarine and Marine Wetland	E2EM1P	9.60	Freshwater Forested/S	PSS4C	0.32
			Estuarine and Marine Wetland	E2SS4P	0.58	Levee footprint		83.67
			Freshwater Emergent Wetland	PEM1F	8.70	Total acres		86.85
			Freshwater Emergent Wetland	PEM1Rh	2.25	AAHU	HSI = .96	83.376
			Riverine	R1UBV	0.21	Mitigation Acreage		143.7517241
			Riverine	R1UBVx	1.18	BLH Mitigation Cost		$ 31,625,379
			Riverine	R4SBC	0.06			
			Total acres		27.70			
			AAHU	HSI = .9	24.93			
			Mitigation Acreage		76.24			
			Marsh Mitigation Cost		$ 6,099,083			
	4b Combined Ring Levee	215.54	Estuarine and Marine Deepwater	E1UBL	5.17	Freshwater Forested/S	PFO1A	0.43
			Estuarine and Marine Wetland	E2EM1N	3.70	Freshwater Forested/S	PFO4A	0.00
			Estuarine and Marine Wetland	E2EM1P	36.22	Freshwater Forested/S	PFO4C	0.00
			Estuarine and Marine Wetland	E2SS4P	0.82	Freshwater Forested/S	PSS1C	1.10
			Freshwater Emergent Wetland	PEM1C	0.19	Freshwater Forested/S	PSS1F	1.99
			Freshwater Emergent Wetland	PEM1F	9.48	Freshwater Forested/S	PSS1T	7.47
			Freshwater Emergent Wetland	PEM1R	3.61	Freshwater Forested/S	PSS4/1S	1.39
			Freshwater Emergent Wetland	PEM1Rh	2.31	Freshwater Forested/S	PSS4C	0.34
			Freshwater Emergent Wetland	PEM1T	11.82	Levee footprint		138.32
			Freshwater Emergent Wetland	PEM1Th	0.02	Total acres		151.04
			Freshwater Pond	PABV	0.36	AAHU	HSI = .96	144.9984
			Freshwater Pond	PUBV	0.81	Mitigation Acreage		249.9972414
			Riverine	R1UBV	1.90	BLH Mitigation Cost		$ 54,999,393
			Riverine	R1UBVx	0.75			
			Riverine	R4SBC	0.06			
			Riverine	R5UBH	0.00			
			Total acres		77.22			
			AAHU	HSI = .9	69.50			
			Mitigation Acreage		212.53			
			Marsh Mitigation Cost		$ 17,002,569			
5	Bayou Bonfouca Detention Pond	109.44				Freshwater Forested/S	PFO1/4A	0.65
						Freshwater Forested/S	PFO1/4C	8.30
						Freshwater Forested/S	PSS1/4C	0.49
						Total acres		109.44
						AAHU	HSI = .96	105.06
						Mitigation Acreage		181.14
						BLH Mitigation Cost		$ 39,851,255
	Bayou Liberty Snagging and Clearing	122.44	Estuarine and Marine Deepwater	E1UBL	15.80	Freshwater Forested/S	PFO1R	0.01
			Estuarine and Marine Wetland	E2EM1P	0.00	Freshwater Forested/S	PFO3A	0.01
			Freshwater Emergent Wetland	PEM1A	0.01	Freshwater Forested/S	PFO4/1R	0.13
			Freshwater Emergent Wetland	PEM1R	0.07	Freshwater Forested/S	PSS1R	0.07
			Freshwater Emergent Wetland	PEM1T	0.45	Freshwater Forested/S	PSS1T	0.16
			Freshwater Pond	PUBVx	0.01	Total acres		0.38
			Riverine	R1UBV	59.15	AAHU	HSI = .96	0.3648
			Riverine	R1UBVx	0.19	Mitigation Acreage		0.628965517
			Riverine	R2UBH	26.86	BLH Mitigation Cost		$ 138,372
			Riverine	R4SBC	0.02			
			Total acres		102.56			
			AAHU	HSI = .9	92.30			
			Mitigation Acreage		282.28			
			Marsh Mitigation Cost		$ 22,582,018			
	Bayou Patassat	2.27	Riverine	R1UBV	0.46			
			Total acres		0.46			
			AAHU	HSI = .9	0.41			
			Mitigation Acreage		1.27			
			Marsh Mitigation Cost		$ 101,284			
	West Slidell Ring Levee	101.85	Estuarine and Marine Deepwater	E1UBL	3.12	Freshwater Forested/S	PSS1R	0.25
			Estuarine and Marine Wetland	E2EM1N	2.45	Freshwater Forested/S	PSS1T	6.90
			Estuarine and Marine Wetland	E2EM1P	20.19	Freshwater Forested/S	PSS4/1S	1.03
			Freshwater Emergent Wetland	PEM1R	2.11	Levee footprint		9.61
			Freshwater Emergent Wetland	PEM1T	11.93	Total acres		17.79
			Freshwater Pond	PABV	0.21	AAHU	HSI = .96	17.0784
			Freshwater Pond	PABH	0.05	Mitigation Acreage		29.44551724
			Freshwater Pond	PABV	0.56	BLH Mitigation Cost		$ 6,478,014
			Riverine	R1UBV	6.53			
			Riverine	R1UBVx	0.48			
			Riverine	R4SBC	0.06			
			Levee footprint		45.00			
			Total acres		92.69			
			AAHU	HSI = .9	83.42			
			Mitigation Acreage		255.11			
			Marsh Mitigation Cost		$ 20,408,807			

6	Eden Isle Ring Levee	36.09	Estuarine and Marine Deepwater	E1UBL	0.41			
			Estuarine and Marine Deepwater	E1UBLx	8.44			
			Levee footprint		37.00			
			Total acres		45.85			
			AAHU	HSI = .9	41.27			
			Mitigation Acreage		126.19			
			Marsh Mitigation Cost		$ 10,095,413			
	Staging Area Eden Isle Ring Levee	0.06	None		0.00			
	Staging Area New W-14 Pump	2	Riverine	R1UBVx	0.44			
			Riverine	R2ABHx	0.25			
			Total acres		0.69			
			AAHU	HSI = .9	0.62			
			Mitigation Acreage		1.90			
			Marsh Mitigation Cost		$ 151,927			
	Slidell Levee	134.02	Estuarine and Marine Deepwater	E1UBL	0.01	Freshwater Forested/S	PFO4A	3.96
			Estuarine and Marine Deepwater	E1UBLx	0.03	Freshwater Forested/S	PSS1/EM1R	0.03
			Freshwater Emergent Wetland	PEM1Cx	0.20	Total acres		3.99
			Freshwater Emergent Wetland	PEM1Fx	0.02	AAHU	HSI = .96	3.8304
			Freshwater Pond	PABHx	1.62	Mitigation Acreage		6.604137931
			Freshwater Pond	PUBHx	1.21	BLH Mitigation Cost		$ 1,452,910
			Lake	L1UBHx	0.35			
			Riverine	R1UBV	0.03			
			Riverine	R1UBVx	0.63			
			Riverine	R2ABHx	0.01			
			Riverine	R2UBHx	0.36			
			Levee footprint		125.03			
			Total acres		129.50			
			AAHU	HSI = .9	116.55			
			Mitigation Acreage		356.42			
			Marsh Mitigation Cost		$ 28,513,761			
7	Gum Bayou Diversion	36.28	Riverine	R2UBH	2.34	Freshwater Forested/S	PFO1/2C	4.42
			Riverine	R4SBC	0.09	Freshwater Forested/S	PFO1A	0.80
			Total acres		2.43	Freshwater Forested/S	PFO1C	3.76
			AAHU	HSI = .9	2.19	Freshwater Forested/S	PFO1F	8.68
			Mitigation Acreage		6.69	Total acres		17.66
			Marsh Mitigation Cost		$ 535,046	AAHU	HSI = .96	16.95
						Mitigation Acreage		29.23
						BLH Mitigation Cost		$ 6,430,676
	Poor Boy Canal Improvements	16.11	Riverine	R2UBH	0.15	Freshwater Forested/S	PFO1/3C	0.40
			Riverine	R2UBHx	2.76	Total acres		0.40
			Riverine	R4SBC	0.30	AAHU	HSI = .96	0.384
			Total acres		3.21	Mitigation Acreage		0.662068966
			AAHU	HSI = .9	2.89	BLH Mitigation Cost		$ 145,655
			Mitigation Acreage		8.83			
			Marsh Mitigation Cost		$ 706,789			
	Doubloon Bayou	42.96	Riverine	R1UBVx	9.95	Freshwater Forested/S	PFO1/2C	1.56
			Riverine	R2UBH	2.83	Freshwater Forested/S	PFO1/2Cd	13.81
			Riverine	R2UBHx	1.56	Freshwater Forested/S	PFO1C	0.30
			Riverine	R5UBH	0.08	Freshwater Forested/S	PFO4A	1.35
			Total acres		14.42	Freshwater Forested/S	PFO4Ad	1.80
			AAHU	HSI = .9	12.98	Total acres		18.82
			Mitigation Acreage		39.69	AAHU	HSI = .96	18.0672
			Marsh Mitigation Cost		$ 3,175,046	Mitigation Acreage		31.15034483
						BLH Mitigation Cost		$ 6,853,076
	Pearl River Levee	68.35	Freshwater Pond	PUBHh	0.04	Freshwater Forested/S	PFO1/2C	17.77
			Freshwater Pond	PUBHx	0.15	Freshwater Forested/S	PFO1/2F	0.11
			Riverine	R2UBH	2.05	Freshwater Forested/S	PFO1C	15.28
			Levee footprint		20.45	Freshwater Forested/S	PFO1F	1.50
			Total acres		22.69	Levee footprint		11.00
			AAHU	HSI = .9	20.42	Total acres		45.66
			Mitigation Acreage		62.45	AAHU	HSI = .96	43.83
			Marsh Mitigation Cost		$ 4,995,963	Mitigation Acreage		75.58
						BLH Mitigation Cost		$ 16,626,538
	Staging Area Pearl River Pump Station	12.29	Riverine	R2UBH	0.21	Freshwater Forested/S	PFO1C	7.48
			Total acres		0.21	Total acres		7.48
			AAHU	HSI = .9	0.19	AAHU	HSI = .96	7.18
			Mitigation Acreage		0.58	Mitigation Acreage		12.38
			Marsh Mitigation Cost		$ 46,239	BLH Mitigation Cost		$ 2,723,752
8	Mile Branch Channel Improvements	33.84	Riverine	R1UBV	0.09	Freshwater Forested/S	PFO1A	1.93
			Riverine	R4SBC	0.01	Total acres		1.93
			Riverine	R5UBH	2.68	AAHU	HSI = .96	1.8528
			Total acres		2.78	Mitigation Acreage		3.194482759
			AAHU	HSI = .9	2.50	BLH Mitigation Cost		$ 702,786
			Mitigation Acreage		7.65			
			Marsh Mitigation Cost		$ 612,110			
	Mile Branch Lateral A Channel Improvements	26.98	Riverine	R1UBV	0.04	Freshwater Forested/S	PFO1/4A	2.29
			Riverine	R4SBC	3.96	Freshwater Forested/S	PFO1A	0.01
			Total acres		4.00	Total acres		2.30
			AAHU	HSI = .9	3.60	AAHU	HSI = .96	2.21
			Mitigation Acreage		11.01	Mitigation Acreage		3.81
			Marsh Mitigation Cost		$ 880,734	BLH Mitigation Cost		$ 837,517
	Mandeville Seawall Replacement	22.97	Estuarine and Marine Deepwater	E1UBL5	13.17	Freshwater Emergent V	PEM1R	0.02
			Total acres		13.17	Total acres		0.02
			AAHU	HSI = .9	11.85	AAHU	HSI = .96	0.02
			Mitigation Acreage		36.25	Mitigation Acreage		0.03
			Marsh Mitigation Cost		$ 2,899,817	BLH Mitigation Cost		$ 7,283
			Estuarine and Marine Deepwater	E1UBL5	0.03	Freshwater Forested/S	PFO1/2Cd	4.91
			Riverine	R1UBV	0.24	Total acres		4.91

9	Little Bayou Castine	18.41	Total acres		0.27	AAHU	HSI = .96	4.7136
			AAHU	HSI = .9	0.24	Mitigation Acreage		8.126896552
			Mitigation Acreage		0.08	BLH Mitigation Cost	$	1,787,917
			Marsh Mitigation Cost	$	6,357			
	20ft by 20ft staging area for floodgate construction at Lakeshore Drive west side of Little Bayou Castine	0.01	Estuarine and Marine Deepwater	E1UBL5	0.01			
			Total acres		0.01			
			AAHU	HSI = .9	0.01			
			Mitigation Acreage		0.03			
			Marsh Mitigation Cost	$	2,202			
	Ravine Au Coquille East	3.97	Estuarine and Marine Deepwater	E1UBL5	0.01			
			Freshwater Emergent Wetland	PEM1R	0.08			
			Riverine	R5UBH	0.06			
			Total acres		0.15			
			AAHU	HSI = .9	0.14			
			Mitigation Acreage		0.41			
			Marsh Mitigation Cost	$	33,028			
	Ravine Au Coquille West	2.35	Estuarine and Marine Deepwater	E1UBL5	0.02	Freshwater Emergent W	PEM1R	0.18
			Total acres		0.02	Total acres		0.18
			AAHU	HSI = .9	0.00	AAHU	HSI = .96	0.17
			Mitigation Acreage		0.00	Mitigation Acreage		0.27
			Marsh Mitigation Cost	$	98	BLH Mitigation Cost	$	59,400
	20ft by 20ft staging area for floodgate construction at Jefferson Street					Freshwater Emergent W	PEM1R	0.01
						Total acres		0.01
						AAHU	HSI = .96	0.01
	Mandeville Flood Barrier	4.74	Estuarine and Marine Deepwater	E1UBL5	0.08	Mitigation Acreage		0.012207031
			Riverine	R1UBV	0.07	BLH Mitigation Cost	$	2,686
			Total acres		0.15			
			AAHU	HSI = .9	0.14			
			Mitigation Acreage		0.41			
			Marsh Mitigation Cost	$	33,028			

Alternative 4	Lacombe	Estuarine and Marine Deepwater		106.21	Freshwater Forested/Shrub Wetland		22.34	
		Estuarine and Marine Wetland		14.70	Freshwater Forested/Shrub Wetland		4.83	
		Estuarine and Marine Wetland		70.72	Freshwater Forested/Shrub Wetland		0.54	
		Estuarine and Marine Wetland		3.19	Freshwater Forested/Shrub Wetland		52.76	
		Freshwater Emergent Wetland		15.57	Freshwater Forested/Shrub Wetland		50.79	
		Freshwater Emergent Wetland		1.83	Freshwater Forested/Shrub Wetland		33.11	
		Freshwater Emergent Wetland		16.74	Freshwater Forested/Shrub Wetland		26.60	
		Freshwater Emergent Wetland		2.83	Freshwater Forested/Shrub Wetland		2.65	
		Freshwater Emergent Wetland		60.65	Freshwater Forested/Shrub Wetland		10.53	
		Freshwater Pond		1.65	Freshwater Forested/Shrub Wetland		51.48	
		Freshwater Pond		19.61	Freshwater Forested/Shrub Wetland		21.12	
		Riverine		0.12	Freshwater Forested/Shrub Wetland		1.83	
		Riverine		10.06	Freshwater Forested/Shrub Wetland		4.54	
		Riverine		94.80	Freshwater Forested/Shrub Wetland		9.55	
		Riverine		1.97	Freshwater Forested/Shrub Wetland		0.93	
		Riverine		58.48	Freshwater Forested/Shrub Wetland		1.34	
		Riverine		7.69	Freshwater Forested/Shrub Wetland		14.39	
		Riverine		0.01	Freshwater Forested/Shrub Wetland		12.72	
		Riverine		3.04	Freshwater Forested/Shrub Wetland		15.99	
		Total Acreage		489.87	Freshwater Forested/Shrub Wetland		0.20	
		Development -50%		244.9341238	Freshwater Forested/Shrub Wetland		3.89	
		AAHU		7.348023713	Freshwater Forested/Shrub Wetland		4.41	
		Mitigation Acreage		22.47102053	Total Acreage		346.55	Total Acrea
		Marsh Mitigation Cost	$	1,797,682	Development -50%		173.2763036	31.43359
					AAHU		5.198289108	
					Mitigation Acreage		8.962567427	
					BLH Mitigation Cost	$	1,971,765	
Alternative 4a	Combined Lacombe Slidell Levee	Estuarine and Marine Deepwater		113.98	Freshwater Forested/Shrub Wetland		22.34	
		Estuarine and Marine Wetland		16.19	Freshwater Forested/Shrub Wetland		4.83	
		Estuarine and Marine Wetland		112.44	Freshwater Forested/Shrub Wetland		0.54	
		Estuarine and Marine Wetland		2.92	Freshwater Forested/Shrub Wetland		54.81	
		Freshwater Emergent Wetland		1.35	Freshwater Forested/Shrub Wetland		24.35	
		Freshwater Emergent Wetland		1.04	Freshwater Forested/Shrub Wetland		63.31	
		Freshwater Emergent Wetland		1.90	Freshwater Forested/Shrub Wetland		71.48	
		Freshwater Emergent Wetland		23.37	Freshwater Forested/Shrub Wetland		35.04	
		Freshwater Emergent Wetland		5.73	Freshwater Forested/Shrub Wetland		2.65	
		Freshwater Emergent Wetland		63.15	Freshwater Forested/Shrub Wetland		26.21	
		Freshwater Emergent Wetland		3.48	Freshwater Forested/Shrub Wetland		12.15	
		Freshwater Emergent Wetland		287.15	Freshwater Forested/Shrub Wetland		1.56	
		Freshwater Pond		4.93	Freshwater Forested/Shrub Wetland		84.55	
		Freshwater Pond		0.76	Freshwater Forested/Shrub Wetland		8.14	
		Freshwater Pond		1.87	Freshwater Forested/Shrub Wetland		11.03	
		Freshwater Pond		3.68	Freshwater Forested/Shrub Wetland		28.01	
		Freshwater Pond		54.79	Freshwater Forested/Shrub Wetland		18.86	
		Freshwater Pond		5.15	Freshwater Forested/Shrub Wetland		4.54	
		Freshwater Pond		0.67	Freshwater Forested/Shrub Wetland		15.46	
		Freshwater Pond		1.24	Freshwater Forested/Shrub Wetland		14.37	
		Lake		139.26	Freshwater Forested/Shrub Wetland		2.96	
		Riverine		320.66	Freshwater Forested/Shrub Wetland		1.88	
		Riverine		166.60	Freshwater Forested/Shrub Wetland		1.93	
		Riverine		1.97	Freshwater Forested/Shrub Wetland		51.08	
		Riverine		92.76	Freshwater Forested/Shrub Wetland		14.33	
		Riverine		8.38	Freshwater Forested/Shrub Wetland		1.33	
		Riverine		17.70	Freshwater Forested/Shrub Wetland		54.86	
		Riverine		3.89	Freshwater Forested/Shrub Wetland		15.99	
		Riverine		12.40	Freshwater Forested/Shrub Wetland		1.15	
		Total Acreage		1469.43	Freshwater Forested/Shrub Wetland		9.62	
		Development -50%		734.7130933	Freshwater Forested/Shrub Wetland		4.41	
		AAHU		22.0413928	Total Acreage		663.76	
		Mitigation Acreage		67.40487095	AAHU		19.91280984	Total Acrea
		Marsh Mitigation Cost	$	5,392,390	Mitigation Acreage		34.33243075	101.7373
					BLH Mitigation Cost	$	7,553,135	
Alternative 5	West Slidell	Estuarine and Marine Deepwater		7.61	Freshwater Forested/Shrub Wetland		2.03	
		Estuarine and Marine Deepwater		39.52	Freshwater Forested/Shrub Wetland		26.30	
		Freshwater Emergent Wetland		1.35	Freshwater Forested/Shrub Wetland		12.53	
		Freshwater Emergent Wetland		1.04	Freshwater Forested/Shrub Wetland		13.96	
		Freshwater Emergent Wetland		1.90	Freshwater Forested/Shrub Wetland		9.18	
		Freshwater Emergent Wetland		1.86	Freshwater Forested/Shrub Wetland		15.69	
		Freshwater Emergent Wetland		3.90	Freshwater Forested/Shrub Wetland		12.15	
		Freshwater Emergent Wetland		45.54	Freshwater Forested/Shrub Wetland		1.56	
		Freshwater Emergent Wetland		227.40	Freshwater Forested/Shrub Wetland		19.25	
		Freshwater Pond		4.93	Freshwater Forested/Shrub Wetland		7.66	
		Freshwater Pond		0.76	Freshwater Forested/Shrub Wetland		11.03	
		Freshwater Pond		1.97	Freshwater Forested/Shrub Wetland		11.66	
		Freshwater Pond		2.03	Freshwater Forested/Shrub Wetland		17.03	
		Freshwater Pond		33.67	Freshwater Forested/Shrub Wetland		15.46	
		Freshwater Pond		5.49	Freshwater Forested/Shrub Wetland		2.96	
		Freshwater Pond		0.67	Freshwater Forested/Shrub Wetland		1.53	
		Freshwater Pond		1.13	Freshwater Forested/Shrub Wetland		36.69	
		Lake		141.41	Freshwater Forested/Shrub Wetland		14.33	
		Riverine		310.17	Freshwater Forested/Shrub Wetland		1.33	
		Riverine		70.73	Freshwater Forested/Shrub Wetland		44.74	
		Riverine		34.30	Freshwater Forested/Shrub Wetland		2.09	
		Riverine		8.42	Freshwater Forested/Shrub Wetland		5.72	
		Riverine		9.75	Total Acreage		284.86	
		Riverine		3.88	Development -50%		142.4309507	
		Riverine		9.56	AAHU		4.272928522	
		Total Acreage		969.01	Mitigation Acreage		7.367118141	
		Development -50%		484.50	BLH Mitigation Cost	$	1,620,766	Total Acrea
		AAHU		14.54				51.82
		Mitigation Acreage		44.45				
		Marsh Mitigation Cost	$	3,555,993				
Alternative 5	Bonfouca and Liberty Improvements	Estuarine and Marine Deepwater		0.009016024	Freshwater Forested/Shrub Wetland		0.00212602	
		Estuarine and Marine Wetland		0.04	Freshwater Forested/Shrub Wetland		0.034418911	
		Estuarine and Marine Wetland		0.000720208	Freshwater Forested/Shrub Wetland		2.815383573	
		Freshwater Pond		4.23106475	Freshwater Forested/Shrub Wetland		15.5991903	
		Lake		31.95140483	Freshwater Forested/Shrub Wetland		8.408212962	
		Riverine		0.994730309	Total Acreage		26.85933176	
		Riverine		0.668549301	AAHU		0.805779953	
		Riverine		0.755303115	Mitigation Acreage		1.389275781	
		Total Acreage		38.65078854	BLH Mitigation Cost	$	305,641	
		AAHU		1.159523656				36.84871
		Mitigation Acreage		35.45943903				
		Marsh Mitigation Cost	$	2,836,755				
		Estuarine and Marine Deepwater		158.3876424	Freshwater Forested/Shrub Wetland		1.025752342	
		Estuarine and Marine Deepwater		1.693523312	Freshwater Forested/Shrub Wetland		23.77790444	
		Estuarine and Marine Wetland		55.47390687	Freshwater Forested/Shrub Wetland		0.974648982	
		Estuarine and Marine Wetland		54.62973434	Freshwater Forested/Shrub Wetland		8.926503652	
		Freshwater Emergent Wetland		1.353118942	Freshwater Forested/Shrub Wetland		15.37274096	
		Freshwater Emergent Wetland		0.36443821	Freshwater Forested/Shrub Wetland		12.06185864	
		Freshwater Emergent Wetland		21.33991747	Freshwater Forested/Shrub Wetland		0.860607635	
		Freshwater Emergent Wetland		129.9671606	Freshwater Forested/Shrub Wetland		17.72529217	
		Freshwater Pond		0.759180567	Freshwater Forested/Shrub Wetland		0.15945508	

Alternative 5	Bonfouca and Liberty Improvements	Freshwater Pond		2.643297269	Freshwater Forested/Shrub Wetland		11.02778904	
		Freshwater Pond		0.667496116	Freshwater Forested/Shrub Wetland		29.42179105	
		Freshwater Pond		5.131301165	Freshwater Forested/Shrub Wetland		12.57824694	
		Freshwater Pond		1.396600652	Freshwater Forested/Shrub Wetland		0.002796681	
		Freshwater Pond		0.654527994	Freshwater Forested/Shrub Wetland		4.298423623	
		Freshwater Pond		1.128036405	Freshwater Forested/Shrub Wetland		0.016752602	
		Lake		108.2678236	Freshwater Forested/Shrub Wetland		16.18503208	
		Riverine		261.1167622	Freshwater Forested/Shrub Wetland		14.00953224	
		Riverine		59.04644059	Freshwater Forested/Shrub Wetland		1.328191374	
		Riverine		30.78856967	Freshwater Forested/Shrub Wetland		49.62667162	
		Riverine		5.679655611	Freshwater Forested/Shrub Wetland		0.551571795	
		Riverine		1.537979519	Freshwater Forested/Shrub Wetland		3.775239175	
		Riverine		4.614975997	Total Acreage		223.7068021	
		Riverine		1.249994736	Development -50%		111.8534011	
		Total Acreage		907.8920842	AAHU		3.355602032	
		Development -50%		453.9460421	Mitigation Acreage		5.785520744	
		AAHU		13.61838126	BLH Mitigation Cost	$	1,272,815	9.141123
		Mitigation Acreage		41.64642588				
		Marsh Mitigation Cost	$	3,331,714				
Alternative 6	CPRA Ring Levee	Estuarine and Marine Deepwater		4.38	Freshwater Forested/Shrub Wetland		4.63	
		Freshwater Emergent Wetland		2.70	Freshwater Forested/Shrub Wetland		1.43	
		Freshwater Emergent Wetland		3.02	Freshwater Forested/Shrub Wetland		15.53	
		Freshwater Emergent Wetland		1.49	Freshwater Forested/Shrub Wetland		35.17	
		Freshwater Emergent Wetland		0.57	Freshwater Forested/Shrub Wetland		8.86	
		Freshwater Emergent Wetland		13.35	Freshwater Forested/Shrub Wetland		49.90	
		Freshwater Emergent Wetland		1.39	Total Acreage		115.53	
		Freshwater Pond		11.88	Development -50%		57.76392877	
		Freshwater Pond		6.64	AAHU		1.732917863	
		Freshwater Pond		0.25	Mitigation Acreage		2.987789419	
		Freshwater Pond		1.63	BLH Mitigation Cost	$	657,314	
		Freshwater Pond		13.30				
		Freshwater Pond		1.23				
		Freshwater Pond		142.30				
		Lake		74.55				
		Riverine		0.04				
		Riverine		8.86				
		Riverine		5.15				
		Riverine		4.55				
		Riverine		25.54				
		Riverine		5.32				
		Riverine		1.02				
		Riverine		7.56				
		Total Acreage		336.73				
		Development -50%		168.37				
		AAHU		5.050984793				
		Mitigation Acreage		15.44643667				
		Marsh Mitigation Cost	$	12,357,149				
Alternative 6	Eden Isle Slidell	Estuarine and Marine Deepwater		29.94	Freshwater Emergent Wetland		6.15	
		Estuarine and Marine Deepwater		0.00	Total Acreage		6.15	
		Estuarine and Marine Wetland		573.16	AAHU		0.184441425	
		Estuarine and Marine Wetland		0.06	Mitigation Acreage		0.318002457	
		Freshwater Pond		4015.17	BLH Mitigation Cost	$	69,961	
		Lake		29.86				
		Riverine		0.35				
		Riverine		1.28				
		Riverine		0.18				
		Total Acreage		4650.00				
		Development -50%		2325.00				
		AAHU		69.75				
		Mitigation Acreage		120.26				
		Marsh Mitigation Cost	$	9,620,694				
Alternative 7	Pearl River Levee Inducements	Freshwater Pond		4.461531829	Freshwater Forested/Shrub Wetland		4.782035639	
		Freshwater Pond		0.547746143	Freshwater Forested/Shrub Wetland		0.249221278	
		Riverine		1.76152828	Freshwater Forested/Shrub Wetland		0.898711058	
		Riverine		0.676366345	Freshwater Forested/Shrub Wetland		7.849984251	
		Riverine		0.404014735	Freshwater Forested/Shrub Wetland		1.095655338	
		Total Acreage		7.851187332	Total Acreage		14.87560756	
		AAHU		0.23553562	AAHU		0.446268227	
		Mitigation Acreage		0.720292416	Mitigation Acreage		0.769427977	
		Marsh Mitigation Cost	$	57,623	BLH Mitigation Cost	$	169,274	
Alternative 7	Pearl River Levee Improvements	Freshwater Emergent Wetland		8.546625732	Freshwater Forested/Shrub Wetland		53.71218969	
		Freshwater Pond		0.811719764	Freshwater Forested/Shrub Wetland		0.332458406	
		Freshwater Pond		0.499893351	Freshwater Forested/Shrub Wetland		24.41365646	
		Riverine		19.8034659	Freshwater Forested/Shrub Wetland		12.5547076	
		Riverine		0.049919672	Freshwater Forested/Shrub Wetland		292.1000599	
		Riverine		2.405766252	Freshwater Forested/Shrub Wetland		59.56188539	
		Riverine		0.310266462	Freshwater Forested/Shrub Wetland		11.23595019	
		Total Acreage		32.42765713	Freshwater Forested/Shrub Wetland		0.559688138	
		Development -50%		16.21382857	Freshwater Forested/Shrub Wetland		1.798361959	
		AAHU		0.972829714	Total Acreage		456.2689577	
		Mitigation Acreage		2.975014416	Development -50%		228.1344789	
		Marsh Mitigation Cost	$	238,001	AAHU		6.844034366	
					Mitigation Acreage		11.80005925	
					BLH Mitigation Cost	$	2,596,013	
Alternative 7	Dredging Inducements	Estuarine and Marine Deepwater		35.89025684	Freshwater Forested/Shrub Wetland		76.29369483	
		Estuarine and Marine Deepwater		3.698951494	Freshwater Forested/Shrub Wetland		6.031793466	
		Estuarine and Marine Wetland		19.02168035	Freshwater Forested/Shrub Wetland		129.7456984	
		Estuarine and Marine Wetland		73.84395989	Freshwater Forested/Shrub Wetland		7.103891155	
		Estuarine and Marine Wetland		9.554352267	Freshwater Forested/Shrub Wetland		10.16170887	
		Freshwater Emergent Wetland		1.127293311	Freshwater Forested/Shrub Wetland		1.636621455	
		Freshwater Emergent Wetland		0.726915225	Freshwater Forested/Shrub Wetland		10.07933775	
		Freshwater Emergent Wetland		2.311673873	Freshwater Forested/Shrub Wetland		4.632972552	
		Freshwater Emergent Wetland		11.23028298	Freshwater Forested/Shrub Wetland		2.305973208	
		Freshwater Emergent Wetland		4.744233739	Freshwater Forested/Shrub Wetland		8.621184972	
		Freshwater Emergent Wetland		94.53697048	Freshwater Forested/Shrub Wetland		14.89440923	
		Freshwater Emergent Wetland		150.1630095	Freshwater Forested/Shrub Wetland		54.84124675	
		Freshwater Pond		13.30285831	Freshwater Forested/Shrub Wetland		7.233952742	
		Freshwater Pond		0.800367964	Freshwater Forested/Shrub Wetland		10.37283128	
		Freshwater Pond		1.232700467	Freshwater Forested/Shrub Wetland		5.835097631	
		Freshwater Pond		93.42347047	Freshwater Forested/Shrub Wetland		48.06455561	
		Freshwater Pond		11.68538891	Freshwater Forested/Shrub Wetland		0.515305682	
		Lake		85.60999033	Freshwater Forested/Shrub Wetland		17.97574989	
		Lake		41.97818481	Freshwater Forested/Shrub Wetland		4.363703958	
		Riverine		3.152855506	Freshwater Forested/Shrub Wetland		39.62981719	
		Riverine		30.28640292	Freshwater Forested/Shrub Wetland		1.276989836	
		Riverine		5.154225126	Total Acreage		461.6165365	
		Riverine		15.47226039	Development -50%		230.8082682	
		Riverine		4.451917121	AAHU		6.924248047	
		Riverine		1.538256631	Mitigation Acreage		11.9383587	
		Riverine		0.083277938	BLH Mitigation Cost	$	2,626,439	

		Total Acreage		715.0217368			
		Development -50%		357.5108684			
		AAHU		10.72532605			
		Mitigation Acreage		32.79916224			
		Marsh Mitigation Cost	$	2,623,933			
Alternative 7	Dredging Improvements	Riverine		3.458476969	Freshwater Forested/Shrub Wetland		0.864542484
		Riverine		0.031688652	Freshwater Forested/Shrub Wetland		2.400044074
		Riverine		0.036026593	Total Acreage		3.264586558
		Total Acreage		3.526192214	AAHU		0.097937597
		AAHU		0.105785766	Mitigation Acreage		0.168857925
		Mitigation Acreage		0.323503873	BLH Mitigation Cost	$	37,149
		Marsh Mitigation Cost	$	25,880			
Alternative 7	Gum Bayou Diversion Inducements	Freshwater Pond		0.35378374			
		Riverine		0.763205477			
		Total Acreage		1.116989217			
		AAHU		0.033509677			
		Mitigation Acreage		0.102476075			
		Marsh Mitigation Cost	$	8,198			
Alternative 7	Gum Bayou Diversion Improvements	Riverine		0.123889321	Freshwater Forested/Shrub Wetland		0.003891188
		Total Acreage		0.123889321	Total Acreage		0.003891188
		AAHU		0.00371668	AAHU		0.000116736
		Mitigation Acreage		0.011365993	Mitigation Acreage		0.000201268
		Marsh Mitigation Cost	$	909.28	BLH Mitigation Cost	$	44
Alternative 8	Mile Branch Inducements	Riverine		0.003901			
		Total Acreage		0.003901			
		AAHU		0.00011703			
		Mitigation Acreage		0.00035789			
		Marsh Mitigation Cost	$	29			
Alternative 8	Mile Branch Improvements	Riverine		2.301812534	Freshwater Forested/Shrub Wetland		14.05605272
		Riverine		4.759093184	Freshwater Forested/Shrub Wetland		1.829691965
		Total Acreage		7.060905718	Total Acreage		15.88574469
		AAHU		0.211827172	AAHU		0.476572341
		Mitigation Acreage		0.647789515	Mitigation Acreage		0.821676449
		Marsh Mitigation Cost	$	51,823	BLH Mitigation Cost	$	180,769
Alternative 9	Mandeville	Estuarine and Marine Deepwater		1.40	Freshwater Forested/Shrub Wetland		47.04
		Freshwater Emergent Wetland		1.14	Total Acreage		47.04
		Riverine		2.48	AAHU		1.411166154
		Riverine		1.61	Mitigation Acreage		2.433045094
		Total Acreage		6.63	BLH Mitigation Cost	$	535,270
		AAHU		0.198888364			
		Mitigation Acreage		0.608221297			
		Marsh Mitigation Cost	$	48,658			

Environmental Justice Appendix

Environmental Justice (EJ) is institutionally significant because of Executive Order 12898 of 1994 (E.O. 12898) and the Department of Defense's Strategy on Environmental Justice of 1995, which direct Federal agencies to identify and address any disproportionately high adverse human health or environmental effects of Federal actions to minority and/or low-income populations and to those populations challenged with environmental hazards. Minority populations are those persons who identify themselves as Black, Hispanic, Asian American, American Indian/Alaskan Native, Pacific Islander, some other race, or a combination of two or more races. A minority population exists where the percentage of minorities in an affected area either exceeds 50 percent or is meaningfully greater than in the general population. Low-income populations as of 2017 are those whose income are $25,094 for a family of four and are identified using the Census Bureau's statistical poverty threshold. The Census Bureau defines a "poverty area" as a census tract or block group with 20 percent or more of its residents below the poverty threshold and an "extreme poverty area" as one with 40 percent or more below the poverty level.

This resource is technically significant because the social and economic welfare of minority and low-income populations may be positively or disproportionately impacted by the proposed actions. This resource is publicly significant because of public concerns about the fair and equitable treatment (fair treatment and meaningful involvement) of all people with respect to environmental and human health consequences of Federal laws, regulations, policies, and actions. EJ is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people should bear a disproportionate share of the negative environmental consequences resulting from industrial, governmental, and commercial operations or policies.(https://www.epa.gov/environmentaljustice/learn-about-environmental-justice, accessed 10/16/2014).

The methodology, consistent with E.O. 12898, to accomplish this EJ analysis includes identifying populations that are exposed to high levels of environmental stressors and are low-income or minority populations within the project area using up-to-date economic statistics, aerial photographs, and U.S. Census Bureau 2013-2017 American Community Survey (ACS) estimates. EPA has developed a EJ mapping and screening tool called EJSCREEN, which is based on nationally consistent data and an approach that combines environmental and demographic indicators in the form of EJ indexes. EJSCREEN relies on the 2013-2017 ACS 5-year summary file data. This information can help to highlight geographic areas and the extent to which they may be candidates for further review, including additional consideration, analysis, or outreach. The tools also allow users to explore locations at a detailed geographic level, across broad areas or across the entire nation. Environmental indicators typically are direct or proxy estimates of risk, pollution levels or potential exposure (e.g., due to nearby facilities). Demographic indicators are often used as proxies for a community's health status and potential susceptibility to pollution. Environmental and demographic data and indicators may be viewed separately or in combination.

As shown in Table 2 below, EPA selected the following environmental indicators for use in the 2017 version of EJSCREEN:
1. Air pollution
a. PM2.5 level in air.
b. Ozone level in air.
c. NATA air toxics:
i. Diesel particulate matter level in air.
ii. Air toxics cancer risk.
iii. Air toxics respiratory hazard index.
2. Traffic proximity and volume: Amount of vehicular traffic nearby, and distance from roads.
3. Lead paint indicator: Percentage of housing units built before 1960, as an indicator of potential exposure to lead.
4. Proximity to waste and hazardous chemical facilities or sites: Number of significant industrial facilities and/or hazardous waste sites nearby, and distance from those:
a. National Priorities List (NPL) sites.
b. Risk Management Plan (RMP) Facilities.
c. Hazardous waste Treatment, Storage and Disposal Facilities (TSDFs).
5. Wastewater discharge indicator: Proximity to toxicity-weighted wastewater discharges

If an EJ area’s exposure to the environmental indicators listed previously is above the 80th percentile in the state and the Federal action exacerbates any of those environmental risks, a potential disproportionate impact may occur. Specifically, a disproportionate impact occurs when a proposed project impacts a much higher percentage of minority and low-income populations than other communities located within the project area or when the benefits and impacts are not evenly distributed between EJ and non EJ communities. The EJ study area includes St. Tammany Parish.

Implementation of the TSP or any of the final array alternatives are not expected to cause high, adverse direct disproportionate impacts to EJ communities. See Table 1, below, for a summary of impacts. EJ communities near the proposed system are identified in the EJ section of the main report. Adverse impacts that the EJ communities may experience are also discussed in the main report, but in summary are expected to include positive permanent flood risk or coast storm risk reduction benefits. The construction activities associated with building the proposed risk reduction system are considered adverse, indirect impacts and may include the following: transportation and traffic delays, noise, and dust and air quality impacts. Mitigation of these indirect, temporary impacts are discussed below.

Transportation and Traffic Delays

In general, construction of the TSP or any of the final array alternatives may cause adverse temporary impacts on the road network near the project site due to increased congestion, accelerated roadway wear-and-tear, and traffic delays resulting from re-routing major and local access roads in the project area. Temporary impacts on transportation due to increased congestion may occur and is dependent on road closures required to construct levee repairs. Road closures may not occur at every project site, and if closures are required, they will be for the short-term. On those segments of roads where traffic must be re-routed, minor to moderate delays, particularly during peak hours, may occur especially in more congested areas. Several impact avoidance features are included as integral components of the proposed action to minimize impacts to vehicular transportation. Specific routes would be designated for construction-related traffic to minimize residential disturbance and traffic congestion. USACE contracts would designate specific routes for construction-related traffic to avoid residential areas, to the maximum extent practicable, and staging areas for construction equipment and personnel would be located away from heavily populated areas. Streets that would serve construction-related traffic would be resurfaced, if needed and as appropriate, prior to initiation of construction activities; and maintenance of those streets would be provided during the project construction period. Appropriate detour signage would be placed in order to preserve access to local streets during construction activities. Off-street parking would be provided for construction workers, and shuttle vans would be used to transport construction workers to the work sites, if necessary. Streets that are damaged by any and all construction activities would be repaired.

Noise

Noise along all segments of levee and floodwall construction would increase due to the temporary operation of equipment and vehicles used in the construction of the alternatives. While noise impacts may cause a temporary inconvenience to EJ residents and facilities in the immediate area, noise levels associated with construction activities would be temporary and monitored to ensure acceptable standards are maintained. Best Management Practices will be implemented to minimize noise impacts. No permanent noise impacts are anticipated, and all noise emissions are expected to be short-term, lasting only as long as construction activities. No long-term indirect effects on noise are anticipated with implementation of proposed actions. For more information on Noise, refer to section 5.3.1.11 of the main report.

Dust and Air Quality

Air Quality impacts to EJ communities are expected to be minor and short term. With the implementation of the proposed action there would be adverse, short-term direct and indirect impacts to air quality. Additional effects may also arise from an increase in traffic required to deliver equipment, materials, and construction workers to the project area. However, due to the short duration of the proposed work, any adverse impacts to ambient air quality are expected to be short-term and minor and are not expected to cause or contribute to a violation of Federal or state ambient air quality standards. More information on air quality is detailed in the Air Quality section 5.3.1.8 in the main report.

Table 1: EJ Communities, Level of EJ Impact and Alignment Adjustments

		EJ Impact Level			
Alternative	**EJ Community**	**Temporary Impacts**	**Permanent**	**Alignment Mod to reduce EJ impacts**	**Communities just outside of protection**
Alternative 4	Yes	moderate construction impacts	positive flood risk reduction	Move western-most alignment south of Monique Rd and Ferrier Este St. Move alignment west of Barringer Rd. Move alignment south of Lazy K Dr and west of Transmitter Rd.	Community on Lucille Dr, Mandane Dr and Mildred Dr are minority (50.4%). Community aroud Lazy K Dr is not EJ. Both of these communities are currently located outside of proposed levee risk reduction alternative.
Alt 5	Yes	minor construction impacts	positive flood risk reduction	Detention Pond near EJ community (low-income). No need to change pond footprint since avoids property.	N/A
Alt 6					
Eden Isle Ring Levee	No		positive flood risk reduction		
Slidell Levee	Yes	minor construction impacts	positive flood risk reduction	Use Best Management Practices to minimize construction impacts to nearby housing.	EJ and non EJ communities are located outside of propoed levee alignment. No disproportionate impacts to EJ communities outside of protection since non EJ also outside of protection.
Alt 7					
Bayou Channel Impr.	No		positive flood risk reduction		
Gum Bayou Diversion	No		positive flood risk reduction		
Pearl River Levee	No		positive flood risk reduction		
Poor Bayou Canal	No		positive flood risk reduction		
Alt 8					
Mile Branch Channel Impr	Yes	moderate construction impacts	Assuming all of the improvements will be made within the ROW, housing will not be direcxtly impacted, there will be no high adverse direct impacts	Use Best Management Practices to minimize construction impacts to nearby housing.	EJ community north of W 21st Ave, non EJ south
Mile Branch Lateral A	No		positive flood risk reduction		
Alt 9					
Mandeville Seawall	No		positive flood risk reduction	none	
Revine au Coquilles East Floodwall	No		positive flood risk reduction	none	
Little Bayou Castine West Floodwall	No		positive flood risk reduction	none	
Alt 2					
NS Plan	Yes	Potential high adverse impacts due to criteria used at PED.	positive flood risk reduction	none	At this time in the planning process, structures eligible for elevation are located in EJ and non EJ communities across the Parish. Structures determined at PED to be not eligible for elevation may result in a high, adverse disproportionate impact, which needs to be evaluated during PED.

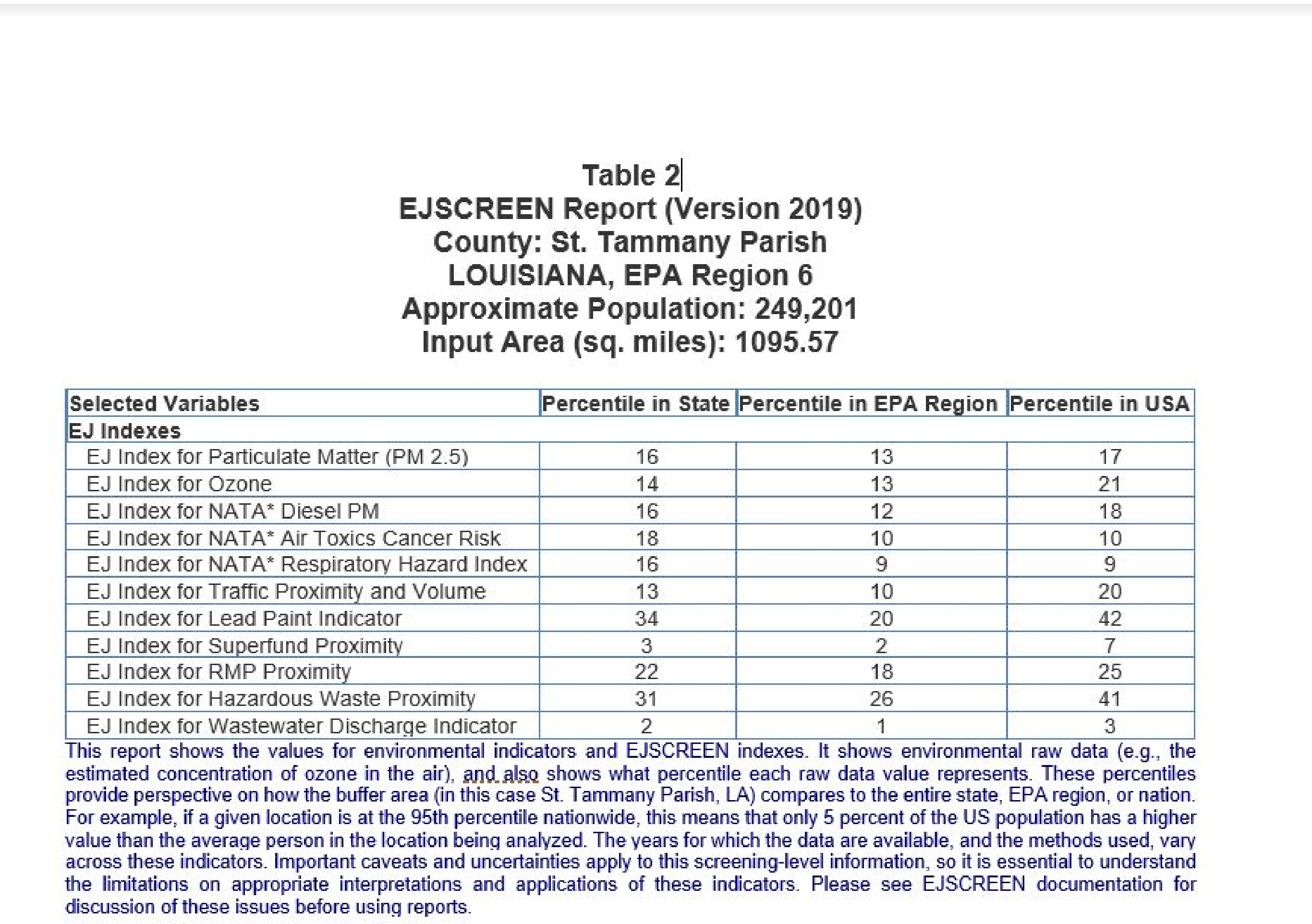


Table 2
EJSCREEN Report (Version 2019)
County: St. Tammany Parish
LOUISIANA, EPA Region 6
Approximate Population: 249,201
Input Area (sq. miles): 1095.57

Selected Variables	Percentile in State	Percentile in EPA Region	Percentile in USA
EJ Indexes			
EJ Index for Particulate Matter (PM 2.5)	16	13	17
EJ Index for Ozone	14	13	21
EJ Index for NATA* Diesel PM	16	12	18
EJ Index for NATA* Air Toxics Cancer Risk	18	10	10
EJ Index for NATA* Respiratory Hazard Index	16	9	9
EJ Index for Traffic Proximity and Volume	13	10	20
EJ Index for Lead Paint Indicator	34	20	42
EJ Index for Superfund Proximity	3	2	7
EJ Index for RMP Proximity	22	18	25
EJ Index for Hazardous Waste Proximity	31	26	41
EJ Index for Wastewater Discharge Indicator	2	1	3

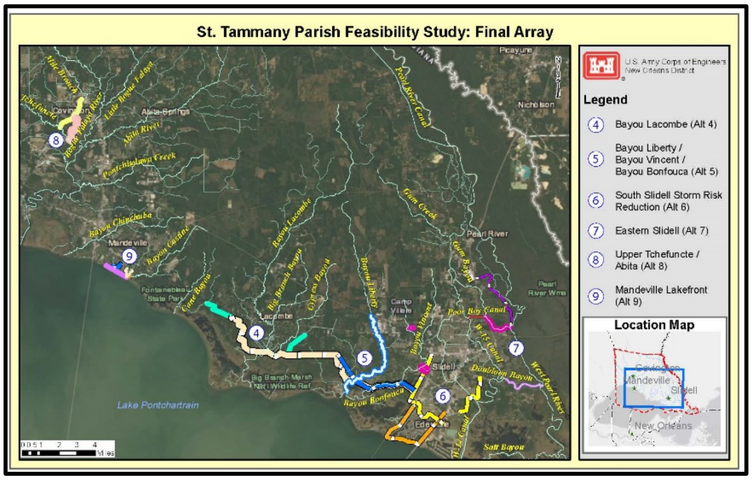
This report shows the values for environmental indicators and EJSCREEN indexes. It shows environmental raw data (e.g., the estimated concentration of ozone in the air), and also shows what percentile each raw data value represents. These percentiles provide perspective on how the buffer area (in this case St. Tammany Parish, LA) compares to the entire state, EPA region, or nation. For example, if a given location is at the 95th percentile nationwide, this means that only 5 percent of the US population has a higher value than the average person in the location being analyzed. The years for which the data are available, and the methods used, vary across these indicators. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports.

Public Notice NHPA/NEPA[1]
Notice of Intent to Prepare Programmatic Agreement Regarding St. Tammany Parish, Louisiana Feasibility Study

The United States Army Corps of Engineers (USACE), New Orleans District (CEMVN), is initiating the process to develop a Programmatic Agreement (PA) for the St. Tammany Parish, Louisiana Feasibility Study pursuant to Section 106 of the National Historic Preservation Act (NHPA), as amended (54 U.S.C. § 300101 et seq.), and Section 110 of the NHPA, that require Federal agencies to take into account the effect of their undertakings on historic properties during the planning process and consult with stakeholders regarding these effects.

The study area encompasses all of St. Tammany Parish with a focus on the areas impacted by flooding from rainfall and riverine bank overtopping, waves, and storm surge. St. Tammany Parish is approximately 1,124 square miles in size in southeastern Louisiana, and is located on the northeast shore of Lake Pontchartrain. The study area is located along the border with the state of Mississippi, with the Pearl River along the eastern boundary of the Parish. Lake Pontchartrain serves as the southern border, and is one of the largest estuaries in the United States. Tangipahoa Parish is located along the western boundary, and Washington Parish is located to the north. USACE began providing to the public NEPA compliance documentation on the designated project website at https://www.mvn.usace.army.mil/About/Projects/BBA-2018/studies/St-Tammany/. CEMVN intends to continue to use this website to post additional project information.

CEMVN is investigating the best comprehensive solutions that meet the study objective: to reduce the severity of flood damages and risks to human life in St. Tammany Parish to residents, businesses, and critical infrastructure. The USACE will evaluate a range of reasonable alternatives for the proposed action to reduce flood damages from rainfall and storm surge. Both structural and nonstructural measures are being considered in the study process. Additional information and maps regarding initial alternatives under consideration can be accessed at: https://www.mvn.usace.army.mil/About/Projects/BBA-2018/studies/St-Tammany/.



CEMVN has determined that the proposed action constitutes an Undertaking as defined in 36 CFR § 800.16(y) and has the potential to cause effects on historic properties. Accordingly, CEVMN proposes to develop a project-specific PA pursuant to 36 CFR § 800.14(b)(3) to provide a framework for addressing this complex Undertaking and establish protocols for continuing consultation with the LA State Historic Preservation Officer (LA SHPO), Tribal Governments, and other stakeholders. The PA would identify consulting parties, define applicability, establish review timeframes, stipulate roles and responsibilities of stakeholders, summarize Tribal consultation procedures, consider the views of the SHPO/ Tribal Historic Preservation Officer and other consulting parties, afford for public participation, develop programmatic allowances to exempt certain actions from Section 106 review, provide the measures CEMVN will implement to develop an Area of Potential Effects (APE) in consultation with external stakeholders, outline a standard review process for plans and specifications as they are developed, determine an appropriate level of field investigation to identify and evaluate historic properties and/or sites of religious and cultural significance within the APE, streamline the assessment and resolution of Adverse Effects through avoidance, minimization, and programmatic treatment approaches for mitigation, establish reporting frequency and schedule, provide provisions for post-review unexpected discoveries and unmarked burials, and incorporate the procedures for amendments, duration, termination, dispute resolution, and implementation.

To help further develop a course of action for this project CEMVN is requesting your input by September 30, 2020, concerning the proposed Undertaking and its potential to significantly affect historic properties and/or of relevant parties who may have an interest in participating in this consultation. Comments can be sent electronically to:
sttammanyfs@usace.army.mil or, mail comments to: Cultural & Social Resources Section (CEMVN-PDP-CSR), USACE, Room 140, 7400 Leake Ave., New Orleans, LA 70118-3651.

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[1] CEMVN is issuing this public notice as part of its responsibilities under the Advisory Council on Historic Preservation's regulations, 36 CFR Part 800, implementing Section 106 of the NHPA of 1966, as amended (54 U.S.C. § 306108). This notice applies to activities carried out under the Congressional authority for the St. Tammany Parish, Louisiana Feasibility Study under the standing authority of The Bipartisan Budget Act of 2018 (Pub. L. 115-123), Division B, Subdivision 1, H. R. 1892-13, Title IV, Corps of Engineers-Civil, Department of the Army, Investigations, for flood and storm damage risk reduction. CEMVN is also required to fulfill the Council of Environmental Quality regulations (NEPA regulations, 43 FR 55978 (1978)) that provide policy and procedures to enable CEMVN officials to be informed and to take into account environmental considerations when authorizing or approving CEMVN actions that may significantly affect the environment of the United States. It is the intent of NEPA that federal agencies encourage and facilitate public involvement to the extent practicable in decisions that may affect the quality of the environment.

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, NEW ORLEANS DISTRICT
7400 LEAKE AVE
NEW ORLEANS LA 70118-3651

August 24, 2020

Regional Planning and
Environment Division, South
Environmental Planning Branch
Attn: CEMVN-PDS-N

Kristin Sanders, SHPO
LA State Historic Preservation Officer
P.O. Box 44247
Baton Rouge, LA 70804-4241

RE: Notice of Intent to Prepare Programmatic Agreement Regarding St. Tammany Parish, Louisiana Feasibility Study.

Dear Ms. Sanders:

The United States Army Corps of Engineers (USACE), New Orleans District (CEMVN), is initiating the process to develop a Programmatic Agreement (PA) for the St. Tammany Parish, Louisiana Feasibility Study pursuant to Section 106 of the National Historic Preservation Act (NHPA), as amended (54 U.S.C. § 300101 et seq.), and Section 110 of the NHPA, that require Federal agencies to take into account the effect of their undertakings on historic properties during the planning process and consult with stakeholders regarding these effects. This letter is intended to notify the LA State Historic Preservation Officer (LA SHPO) pursuant to 36 CFR Part 800.14(b) of our plan to develop a project-specific PA that establishes procedures to satisfy the CEMVN's Section 106 responsibilities with regard to the programmatic review of this feasibility study and allows CEMVN to coordinate Section 106 reviews with its evaluation of the proposed action's potential for significant impacts to the human and natural environment required by the National Environmental Policy Act (NEPA), as amended (42 U.S.C. § 4321 et seq.). The PA will address the potential to effect historic properties that are eligible for or listed in the National Register of Historic Places (NRHP), including archaeological sites, districts, buildings, structures, and objects that are significant in American history, architecture, archaeology, engineering, and/or sites of religious and cultural significance on or off Tribal Lands [as defined in 36 CFR § 800.16(x)] that may be affected by this undertaking. We invite the LA SHPO to participate in this consultation since it may involve important questions of policy or interpretation and will result in the development of a PA that governs the application of the Section 106 process with regards to the proposed Undertaking.

Study Authority

Sections 1201 and 1207 of the Water Infrastructure Improvements Act of 2016 authorize the St. Tammany Parish, Louisiana Study for water resource development and conservation that include determining the feasibility of implementing projects for multiple purposes, including but not limited to, flood risk management as set forth in the 2015 and 2016 Reports to Congress on Future Water Resources Development. The St. Tammany Parish Louisiana Feasibility Study was authorized for inclusion as a funded study in the *Bipartisan Budget Act of 2018 (Pub. L. 115-123), Division B, Subdivision 1, H. R. 1892-13, Title IV, Corps of Engineers-Civil,* *Department of the Army, Investigations* in a Memorandum from the Office of the Deputy Commanding General for Civil and Emergency Operations. The Memorandum provided that plan formulation will be limited to Coastal Storm Risk Management and Flood Risk Management in accordance with BBA 2018. The Government is authorized by BBA 2018 to conduct the Study at full Federal expense to the extent that appropriations provided under the Investigations heading of the BBA 2018 are available and used for such purpose. The lead Federal agency for this proposed action is the USACE. The Louisiana Coastal Protection and Restoration Authority (CPRA) Board is the non-Federal sponsor.

Study Area

The study area encompasses all of St. Tammany Parish with a focus on the areas impacted by flooding from rainfall and riverine bank overtopping, waves, and storm surge. St. Tammany Parish is approximately 1,124 square miles in size in southeastern Louisiana, and is located on the northeast shore of Lake Pontchartrain. The study area is located along the border with the state of Mississippi, with the Pearl River along the eastern boundary of the Parish. Lake Pontchartrain serves as the southern border, and is one of the largest estuaries in the United States. Tangipahoa Parish is located along the western boundary, and Washington Parish is located to the north.

The majority of St. Tammany Parish’s population resides in communities along the edge of Lake Pontchartrain, and many residents commute into New Orleans. Major communities in the study area include: Abita Springs, Covington, Madisonville, Mandeville, Pearl River and Slidell. A map depicting the study area is included as Figure 1.

Study Purpose and Background

Increased resiliency to flood events is the primary identified need for the affected communities within the study area. In addition, the study area’s topography, low elevation, and proximity to the Gulf of Mexico are all contributing factors causing flooding and erosion, and degradation of wetland systems within the Parish. Without additional coastal storm and flood risk management measures, the people, economy, environment, and cultural heritage of St. Tammany Parish are at risk from reoccurring flooding.

The scoping, public involvement, and interagency coordination processes will help identify and define the range of the areas within the Parish that experience repetitive flood events, the types of damages caused by such events, and suggested alternatives to reduce the risk of flooding caused by such events.

Smart Planning Framework

CEMVN is conducting this study according to the Specific, Measurable, Attainable, Risk Informed, Timely (SMART) planning framework for civil works feasibility studies for water resources development projects. The SMART planning process is intended to improve and streamline feasibility studies, reduce their cost, and expedite their completion. The study works progressively through a six-step planning process: 1) identifying problems and opportunities, 2) inventorying and forecasting conditions, 3) formulating alternative plans, 4) evaluating alternative plans, 5) comparing alternative plans, and 6) selecting a plan. From a NHPA/NEPA perspective, the SMART planning process, as shown in Figure 2, is broken out into four (4) separate phases over the course of the study: Scoping; Alternative Evaluation and Analysis; Feasibility-Level Analysis; and Integrated Feasibility Report (IFR)/Environmental Impact Statement (EIS) development. On June 19, 2020, CEMVN published a Notice of Intent to Prepare an Integrated Feasibility Report and Environmental Impact Statement for the St. Tammany Parish, Louisiana Feasibility Study in the Federal Register (Vol. 85, No. 119) and

USACE began providing to the public NEPA compliance documentation on the designated project website at https://www.mvn.usace.army.mil/About/Projects/BBA-2018/studies/St-Tammany/.

CEMVN intends to continue to use this website to post additional project information throughout the development of the IFR/EIS. The IFR/EIS examines the existing condition of environmental and cultural resources within the study area and analyzes potential impacts to those resources as a result of implementing the alternatives. At the feasibility level, there may be insufficient funding and time to conduct required NHPA cultural resources studies and/or mitigation and typically additional feasibility work still remains to be completed on the cultural, environmental, engineering, cost estimating, economic, real estate, and construction elements of the plan. Therefore, prior to approving the Undertaking, the agency may propose to develop a project-specific PA in consultation with stakeholders when the federal agency cannot fully determine how the Undertaking may affect historic properties or the location of historic properties and their significance and character.

There are five (5) key milestones that mark significant decisions in the SMART planning process as shown in Figure 2: Alternatives Milestone; Tentatively Selected Plan (TSP) Milestone; Agency Decision Milestone; Civil Works Review Board; and Chief's Report Milestone. Table 1 below provides a schedule of proposed milestone dates for the St. Tammany Parish, Louisiana Feasibility Study:

Table 1. Proposed Study Milestone Schedule

Milestone	Scheduled	Actual	Complete
Alternatives Milestone	April 14, 2020	April 13, 2020	Yes
Tentatively Selected Plan	Jan 13, 2021	TBD	No
Release Draft Report to Public	Mar 12, 2021	TBD	No
Agency Decision Milestone	July 16, 2021	TBD	No
Division Engineer's Transmittal Letter	July 20, 2022	TBD	No
Chief's Report Milestone	Jan 13, 2023	TBD	No

Upon the completion of the Draft IFR/EIS a stakeholder/public comment period will be initiated in conjunction with technical, peer, and policy reviews. Subsequently, results of the reviews and additional feasibility work will be incorporated into the final Chief's Report, which will again be made available for stakeholder/public review. Following the execution of a PA, USACE may then proceed with making a final recommendation on the project and issuing a Record of Decision (ROD) in compliance with NHPA and NEPA.

Consideration of Alternates

CEMVN is investigating the best comprehensive solutions that meet the study objective: to reduce the severity of flood damages and risks to human life in St. Tammany Parish to residents, businesses, and critical infrastructure. The USACE will evaluate a range of reasonable alternatives for the proposed action to reduce flood damages from rainfall and storm surge. Both structural and nonstructural measures are being considered in the study process.

Structural measures (Figure 3) recommended for consideration presently include:

- Bayou Lacombe (Alt 4). Detention Ponds at Big Branch and Bayou Lacombe LA 434 to retain riverine and rainfall flows and a ring levee, shoreline protection and marsh creation to reduce coastal flooding;

- Bayou Liberty (Alt 5). To address riverine flooding a combination of detention ponds and channel improvements will be considered. Detention ponds include Upper Watershed Detention Pond, Bayou Bonfouca Regional Detention Pond, Belair North and South Detention Pond, Camp Villerie, and the Salmen Property Detention Pond. Channels improvements will be considered on Bayou Liberty (north of 1-12), Bayou Vincent/W-13 channel, and Bayou Bonfouca. A ring levee with a gate or pump station and marsh creation and shoreline protection is proposed to reduce storm surge impacts;
- South Slidell (Alt 6). Combination of ring levees, flood walls, pump stations, and shoreline protection or breakwaters to reduce tidal surge from storm events;
- Eastern Slidell (Alt 7). Measures include a W-15 Detention Pond, Gum Bayou Diversion, Poor Boy Canal Improvements and channel improvements to reduce riverine flooding downstream on the W-15 canal, and a ring levee and channel improvements on the lower French Branch and Doubloon Bayou to prevent flooding from the Pearl River.
- Upper Tchefuncte (Alt 8). Upper Tchefuncte Detention Pond, Mile Branch Channel Improvements, and diverting water west from the Tchefuncte River and then south to Lake Pontchartrain to reduce riverine flooding;
- Mandeville Lakefront (Alt 9). Variations of the 2012 USACE and City of Mandeville Silver Jackets report, which includes 2 feet Concrete Cap on the Existing Seawall; Swing Gates at Little Bayou Castine and Ravine aux Coquille; Barrier from Little Bayou Castine to Jackson Avenue; Steel Sheet Pile Wall with Concrete Cap at Galvez Canal; vinyl sheet pile wall at the Galvez Canal Berm; Duckbill Gates on Storm Water Drainage Pipes; pump stations (full pump and partial pump will be evaluated); marsh creation and Living Shoreline West of Galvez Canal. This alternative would address tidal and storm surge flooding.

The USACE is also considering nonstructural measures. These include:

- Flood proofing
- Structure raising
- Buyouts
- Relocations

Additional information and maps regarding initial alternatives under consideration can be accessed at: https://www.mvn.usace.army.mil/About/Projects/BBA-2018/studies/St-Tammany/. The alternatives will be further developed in the IFR/EIS.

Section 106 Consultation

CEMVN has determined that the proposed action constitutes an Undertaking as defined in 36 CFR § 800.16(y) and has the potential to cause effects on historic properties. This letter initiates formal Section 106 consultation pursuant to 36 CFR § 800.3(c). Due to time and budget constraints for this Undertaking associated with the SMART Planning framework, CEVMN proposes to develop a project-specific PA pursuant to 36 CFR § 800.14(b)(3).The goal of this Section 106 consultation is to provide a project-specific framework for addressing this complex Undertaking and establish protocols for continuing consultation with the LA SHPO, Tribal Governments, and other stakeholders. The PA would identify consulting parties, define applicability, establish review timeframes, stipulate roles and responsibilities of stakeholders, summarize Tribal consultation procedures, consider the views of the SHPO/THPO and any other consulting parties, afford for public participation, develop programmatic allowances to exempt certain actions from Section 106 review, provide the measures CEMVN will implement to develop an Area of Potential Effects (APE) in consultation with external stakeholders, outline a standard review process for plans and specifications as they are developed, determine an appropriate level of field investigation to identify and evaluate historic properties within the APE and the potential to affect historic properties and/or sites of religious and cultural significance, streamline the assessment and resolution of Adverse Effects through avoidance, minimization, and programmatic treatment approaches for mitigation, establish reporting frequency and schedule, provide provisions for post-review unexpected discoveries and unmarked burials, and incorporate the procedures for amendments, duration, termination, dispute resolution, and implementation.

CEMVN proposes to send future notices, draft agreements, and other background information to consulting parties by e-mail to minimize communication delays and expedite the development of the PA. Please let CEMVN know if this is impractical, so we can make alternative arrangements.

A date and time for the initial Section 106 consultation meeting has not been set. Upon selection of a TSP, CEMVN will schedule a teleconference with consulting parties. The purpose of the initial meeting will be to discuss the proposed Undertaking, the APE, and determine the appropriate steps to identify, evaluate, avoid, minimize, and mitigate potential adverse effects. CEMVN will notify the ACHP and other likely consulting parties regarding the meeting as soon as possible and forward information regarding the meeting location, a conference call-in number, and the Agenda.

Please do not hesitate to notify CEMVN regarding any information your office may wish to provide at this time concerning the proposed undertaking and its potential to significantly affect historic properties and/or of any other relevant parties who you feel may have an interest in participating in this consultation. Should you have any questions or need additional information regarding this undertaking or the SMART Planning Framework, please contact Jill Enersen, Architectural Historian, at (504)862-1741 or Jill.A.Enersen@usace.army.mil.

Sincerely,

HARPER.MARSHALL.KEVIN.1536114358

Digitally signed by HARPER.MARSHALL.KEVIN.1536114358
Date: 2020.08.25 17:53:40 -05'00'

MARSHALL K. HARPER
Chief, Environmental Planning Branch

CC: File
LA SHPO
An electronic copy of this letter with enclosures will be provided to the Section 106 Inbox, section106@crt.la.gov.

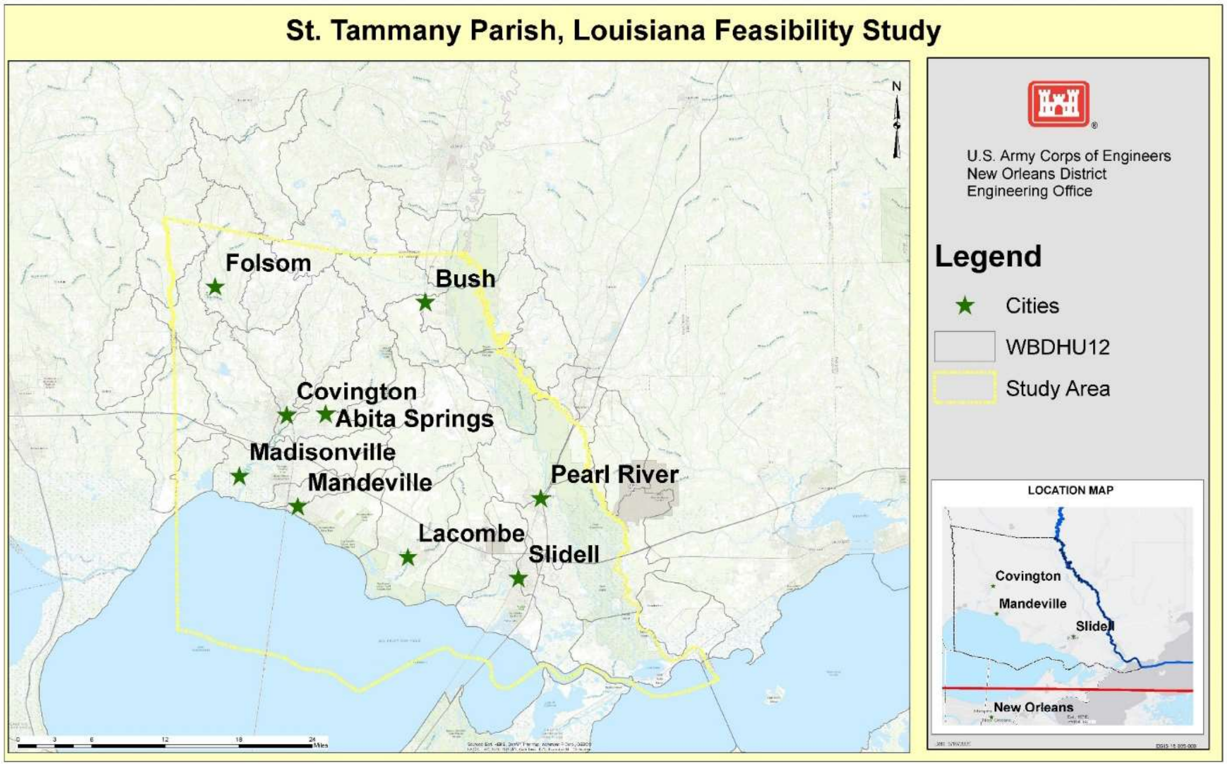
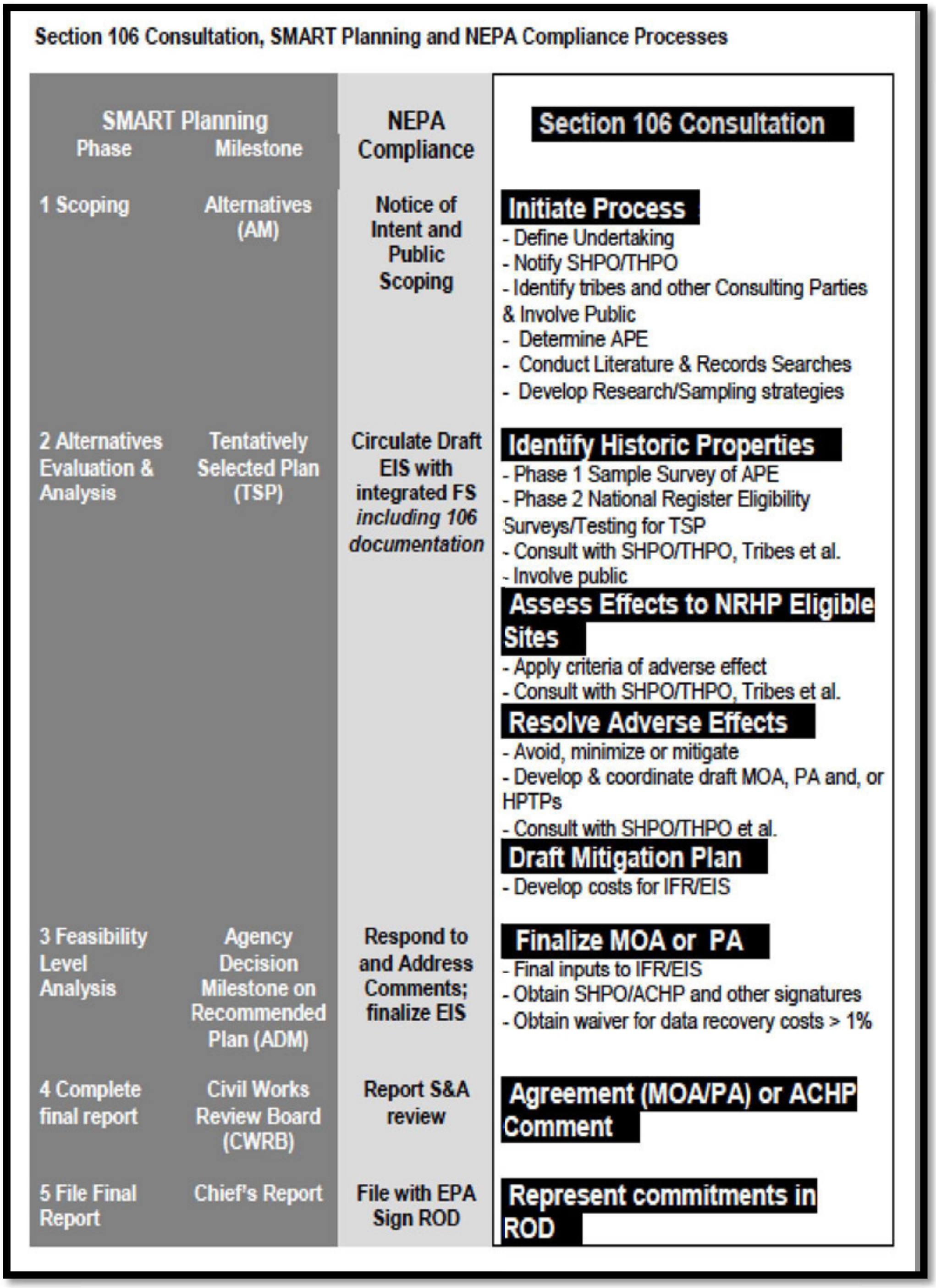


Figure 1. St. Tammany Parish, Louisiana Feasibility Study Area Map. The U.S. Geological Survey Watershed Boundary Dataset (WBDHU12) is included to delineate the hydrologic sub basins in the Study Area.



Section 106 Consultation, SMART Planning and NEPA Compliance Processes

SMART Planning		NEPA Compliance	Section 106 Consultation
Phase	Milestone		
1 Scoping	Alternatives (AM)	Notice of Intent and Public Scoping	**Initiate Process** - Define Undertaking - Notify SHPO/THPO - Identify tribes and other Consulting Parties & Involve Public - Determine APE - Conduct Literature & Records Searches - Develop Research/Sampling strategies
2 Alternatives Evaluation & Analysis	Tentatively Selected Plan (TSP)	Circulate Draft EIS with integrated FS *including 106 documentation*	**Identify Historic Properties** - Phase 1 Sample Survey of APE - Phase 2 National Register Eligibility Surveys/Testing for TSP - Consult with SHPO/THPO, Tribes et al. - Involve public **Assess Effects to NRHP Eligible Sites** - Apply criteria of adverse effect - Consult with SHPO/THPO, Tribes et al. **Resolve Adverse Effects** - Avoid, minimize or mitigate - Develop & coordinate draft MOA, PA and, or HPTPs - Consult with SHPO/THPO et al. **Draft Mitigation Plan** - Develop costs for IFR/EIS
3 Feasibility Level Analysis	Agency Decision Milestone on Recommended Plan (ADM)	Respond to and Address Comments; finalize EIS	**Finalize MOA or PA** - Final inputs to IFR/EIS - Obtain SHPO/ACHP and other signatures - Obtain waiver for data recovery costs > 1%
4 Complete final report	Civil Works Review Board (CWRB)	Report S&A review	**Agreement (MOA/PA) or ACHP Comment**
5 File Final Report	Chief's Report	File with EPA Sign ROD	**Represent commitments in ROD**

Figure 2. Section 106 Consultation, SMART Planning, and NEPA Compliance Process.

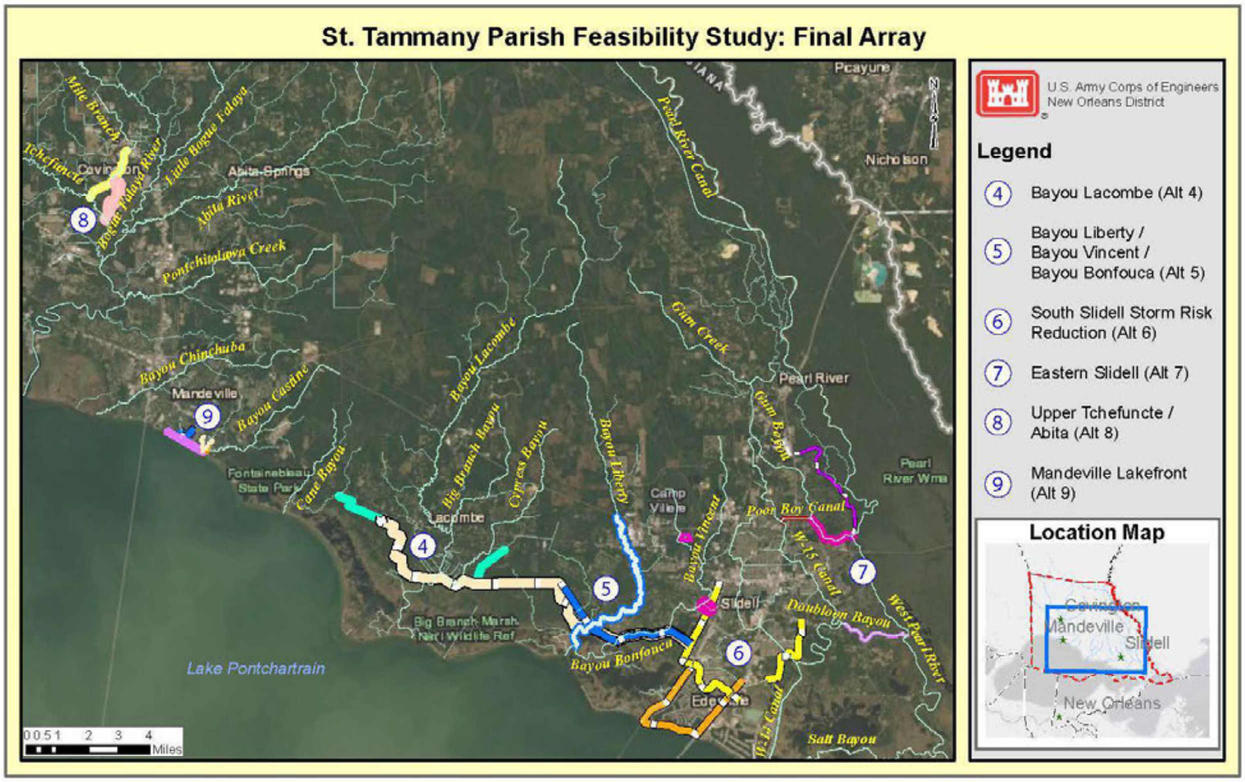


Figure 3. St. Tammany Parish, Louisiana Feasibility Study Final Array Alternatives.

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, NEW ORLEANS DISTRICT
7400 LEAKE AVE
NEW ORLEANS LA 70118-3651

May 12, 2021

Regional Planning and
Environment Division, South
Environmental Planning Branch
Attn: CEMVN-PDS-N

Kristin Sanders, SHPO
LA State Historic Preservation Officer
P.O. Box 44247
Baton Rouge, LA 70804-4241

RE: Continued Consultation: Development of Section 106 Programmatic Agreement Regarding St. Tammany Parish, Louisiana Flood Risk Reduction Feasibility Study.

Dear Ms. Sanders:

The United States Army Corps of Engineers (USACE), New Orleans District (CEMVN), is continuing consultation to develop a Programmatic Agreement (PA) for the St. Tammany Parish, Louisiana Feasibility Study pursuant to Section 106 of the National Historic Preservation Act (NHPA), as amended (54 U.S.C. § 300101 et seq.), that requires Federal agencies to take into account the effect of their undertakings on historic properties during the planning process and consult with stakeholders regarding these effects. This letter is intended to provide information regarding CEMVN's Tentatively Selected Plan (TSP) for West Slidell and South Slidell Levees, Bayou Patassat Channel Improvements-Clearing and Snagging, Mile Branch Channel Improvements, and Nonstructural Elevations and Flood Proofing, and notify the LA State Historic Preservation Officer pursuant to 36 CFR Part 800.14(b) of our proposal to develop a project-specific PA that establishes procedures to satisfy the CEMVN's Section 106 responsibilities with regard to the programmatic review of this feasibility study and allows CEMVN to coordinate Section 106 reviews with its evaluation of the proposed action's potential for significant impacts to the human and natural environment required by the National Environmental Policy Act (NEPA), as amended (42 U.S.C. § 4321 et seq.). The PA will address the potential to effect historic properties that are eligible for or listed in the National Register of Historic Places (NRHP), including archaeological sites, districts, buildings, structures, and objects that are significant in American history, architecture, archaeology, engineering, and/or sites of religious and cultural significance on or off Tribal Lands [as defined in 36 CFR § 800.16(x)] that may be affected by this undertaking. We invite the LA State Historic Preservation Officer to participate in this consultation since it may involve important questions of policy or interpretation and will result in the development of a PA that governs the application of the Section 106 process with regards to the proposed Undertaking. Documentation in this letter is consistent with the requirements in 36 CFR §800.11(e).

Study Authority

Sections 1201 and 1207 of the Water Infrastructure Improvements Act (WIIN Act) of 2016 authorize the St. Tammany Parish, Louisiana Study for water resource development and conservation that include determining the feasibility of implementing projects for multiple purposes, including but not limited to, flood risk management as set forth in the 2015 and 2016 Reports to Congress on Future Water Resources Development. The St. Tammany Parish Louisiana Feasibility Study was authorized for inclusion as a funded study in the *Bipartisan Budget Act of 2018 (Pub. L. 115-123), Division B, Subdivision 1, H. R. 1892-13, Title IV, Corps of Engineers-Civil, Department of the Army, Investigations* in a Memorandum from the Office of the Deputy Commanding General for Civil and Emergency Operations. Pursuant to the study authorization (Section 1201(14) of the 2016 WIIN Act) and the BBA 2018 Implementation Guidance, the authorized Study is for the purpose of flood and storm damage reduction. The lead Federal agency for this proposed action is the USACE. The State of Louisiana, acting by and through, the Coastal Protection and Restoration Authority Board of Louisiana (CPRAB) is the non-Federal sponsor (NFS).

Study Area

The study area encompasses all of St. Tammany Parish, which is approximately 1,124 square miles and located in southeastern Louisiana. St. Tammany Parish is located on the northeast shore of Lake Pontchartrain and is home to over 258,110 residents. The parish is uniquely located at the crossroads of three interstates (I-10, I-12, and I-59) and transportation waterways to the Gulf of Mexico. A map depicting the study area is included as Figure 1.

Study Purpose

St. Tammany Parish has experienced repeated, widespread flooding from rainfall and riverine bank overtopping, waves, and storm surge, including historic impacts during Hurricane Katrina in August of 2005 and recently with the flood of August of 2016.

Study objectives are to:

- Reduce the risk to public health and safety by reducing flood impacts to structures, evacuation routes, and critical infrastructure in St. Tammany Parish;
- Reduce flood damage to structures (i.e. businesses, residential, commercial, and public structures) from flooding in St. Tammany Parish;
- Reduce interruption to the maximum extend practicable to the Nation’s transportation corridor, e.g. the I-10, I-12, and the I-10 interchange in St. Tammany Parish;
- Increase community resiliency, the sustained ability of a community to use available resources, before, during, and after significant rainfall and/or coastal events;
- Increase resiliency of coastal and riparian habitats as natural resources to reduce flood damages.

Background

On August 26, 2020, CEMVN submitted an initial Section 106 consultation letter entitled: *Notice of Intent to Prepare Programmatic Agreement Regarding St. Tammany Parish, Louisiana Feasibility Study* to the Louisiana State Historic Preservation Officer (SHPO), affected Tribes (the Alabama-Coushatta Tribe of Texas (ACTT), Choctaw Nation of Oklahoma (CNO), Coushatta Tribe of Louisiana (CT), Jena Band of Choctaw Indians (JBCI), Mississippi Band of Choctaw Indians (MBCI), and the Tunica-Biloxi Tribe of Louisiana (TBTL); collectively referenced as “Tribes”), and the Advisory Council on Historic Preservation (ACHP). The letter provided information regarding the study area, initial array of alternatives being considered, alternative evaluation criteria, the Specific, Measurable, Attainable, Risk Informed, Timely (SMART) planning framework for civil works feasibility studies for water resources development projects, plan formulation milestones, and CEVMN’s proposal to develop a project-specific PA pursuant to 36 CFR § 800.14(b) to fulfill its responsibilities under Section 106 of the NHPA.

Additionally, this letter invited stakeholders to provide input regarding the proposed Undertaking and its potential to significantly affect historic properties and/or sites of religious and cultural significance and requested potential consulting parties' assistance with identifying other relevant entities who may have an interest in participating in this consultation.

On September 10, 2020, CEMVN received a written response from the ACHP stating that "Based upon the information you provided, we have concluded that Appendix A, *Criteria for Council Involvement in Reviewing Individual Section 106 Cases*, of our regulations, "Protection of Historic Properties" (36 CFR Part 800), does not apply to this undertaking. Accordingly, we do not believe that our participation in the consultation to resolve adverse effects is needed." On September 25, 2020, the CNO responded that "St. Tammany Parish lies in our area of historic interest. The Choctaw Nation has sites of significance, including village locations, located in St. Tammany Parish. We request to be a consulting party on the project PA." To date, no other response has been received from the other stakeholders consulted.

Additionally, on August 31, 2020, CEMVN posted a NHPA/NEPA Public Notice to the designated project website (https://www.mvn.usace.army.mil/About/Projects/BBA-2018/studies/St-Tammany/) for a 30-day comment period requesting the public's input concerning the proposed Undertaking and its potential to significantly affect historic properties, assistance in identifying any relevant parties who may have an interest in participating in this consultation, and CEMVN's proposal to develop a project-specific PA pursuant to 36 CFR § 800.14(b). No comments were received. The web page also includes background information regarding purpose, array of alternatives, project planning, and project status. CEMVN intends to continue to use this website to post additional project information throughout the development of the Draft Integrated Feasibility Report (IFR)/Environmental Impact Statement (EIS).

Description of the Undertaking

CEMVN has determined that the proposed action constitutes an Undertaking as defined in 36 CFR § 800.16(y). CEMVN has now completed its initial screening of alternatives and has developed a TSP that meets the study's' purpose and need.

The TSP is a comprehensive plan to address flooding parish-wide, which includes Coastal Storm Risk Management (CSRM), Flood Risk Management (FRM), and nonstructural measures.

- <u>West Slidell and South Slidell Levees (from Alternative 6c)</u>

  The levee floodwall system compromises approximately 16.3 miles (85,900 feet) of alignment with a combination of 14 miles of levees (73,700 feet) and 2.3 miles (12,200 feet) of floodwall. The I-10 would be raised to the preliminary design elevation of 15 feet. The levee alignment would impact approximately 85 acres of construction area. The levee alignment would require approximately 1,112,000 cubic yards of fill. There would be five pump stations, four gate complexes, and one channel floodgate. There would also be a total of three sluicegates, seven vehicular gates, one railroad gate, and seven ramps (Figure 2).

- <u>Bayou Patassat Channel Improvements-Clearing and Snagging (from Alternative 5)</u>

  Bayou Patassat is a small tributary of Bayou Bonfouca also located in Slidell, Louisiana. The preliminary design of the channel improvements assumes an existing bank elevation of 1 foot, a 10 feet bottom width at elevation (-) 5 feet. The bank is at 1V:3H slope. The work will be located between Bayou Vincent pump station and Highway 11. Approximately 0.17 miles (900 feet) of clearing and snagging will occur in Bayou Patassat (Figure 2).

- Mile Branch Channel Improvements (from Alternative 8)

  The Mile Branch channel improvements start at the intersection of Mile Branch and Highway 190, crossing Highway 190 Business, and end at the intersection of Mile Branch and the Tchefuncte River. This alternative consists of channel improvements on the lower 2.15 miles (11,341 feet channel) of Mile Branch in Covington. The preliminary design assumes an existing bank elevation of 1 foot, a 10-feet bottom width at elevation (-) 5 feet. The bank is at 1V:3H slope. The improvements include clearing and grubbing and mechanical dredging of the channel. The channel bottom will be lowered by 5 feet. Approximately 20 acres of channel will be cleared and grubbed prior to mechanical dredging. An assumed maximum of 130,000 cubic yards of material may be mechanically dredged from the channel. Figure 3.

- Nonstructural Elevations and Flood Proofing (from Alternative 2)

  A total of 8,498 homes will be elevated to the future 100-year stage up to 13 feet and nonresidential buildings floodproofed up to 3 feet. The floodproofing of these resources address the buildings in the 50-year floodplain that are not included in the areas benefitted from the structural measures of the TSP. It is estimated that 6,632 homes will be raised and 1,855 buildings floodproofed. These building counts are preliminary and will continue to be evaluated and refined and are not absolute (Figure 4).

Area of Potential Effects (APE)

CEMVN proposes to adopt a programmatic approach in accordance with 36 CFR § 800.14(b) to determine APEs for structural and nonstructural measures in consultation with SHPO and participating Tribe(s) pursuant to 36 CFR § 800.16(d). The APE will incorporate both direct effects (e.g., access, staging, and construction areas) and indirect effects (e.g., visual), including all areas of proposed ground disturbance. Furthermore, CEMVN may consider information provided by other parties, such as the NFS, local governments, and the public, when establishing APEs. In this consultation, the "study area" is referenced in place of a formal APE for discussion and planning purposes.

Historic Property Identification and Evaluation Efforts

The CEMVN identified historic properties within the study area based on a review of the National Register of Historic Places (NRHP) database, the Louisiana Division of Archaeology (LDOA) Louisiana Cultural Resources Map (LDOA website), historic maps, pertinent regional and local cultural resources investigations, historic aerial photography, and other appropriate sources. This review revealed a total of 43 historic properties listed in the NRHP are located within St. Tammany Parish. These include 5 historic districts, 35 individual buildings, and 3 sites. Three historic districts are located in Covington and include the Division of St. John Historic District (Covington Historic District), Bogue Falaya Park (Wayside Park), the St. Scholastica Priory and Cemetery. The remaining two historic districts are Fontainebleau State Park (Tchefuncte State Park) in Mandeville and the Abita Springs Historic District in Abita Springs. Three sites in St. Tammany Parish include the Williams Cemetery in Lacombe, and the Pottery Hill and Tchefuncte sites in Mandeville.

CEMVN identified the following historic properties within or adjacent to the TSP measures:

- West Slidell and South Slidell Levees (from Alternative 6c)
  Site 16ST20 and Site 16ST42 are located within the levee footprint and would require further investigation as to whether they may be adversely affected by construction. No previously recorded historic built resources are located within the proposed alternative.

  Site 16ST152 (Salmen Brick Factory) is located on the east bank of Bayou Bonfouca adjacent to the proposed alternative and would require further investigation as to whether it may be adversely affected by the channel improvements. Site 16ST153 (Guzman) is located within the proposed alternative; however, the historic site was recommended not eligible due to disturbance and lack or research potential. Previously recorded historic built resources are located adjacent to the proposed alternative. This alternative also includes components within the local Slidell Olde Town Preservation District.

- Bayou Patassat Channel Improvements-Clearing and Snagging (from Alternative 5)
  No known archaeological sites are within the proposed alternative. No previously recorded historic built resources are located within the proposed alternative.

- Mile Branch Channel Improvements (from Alternative 8)
  In 1996, R. Christopher Goodwin & Associates, Inc. conducted cultural resources field investigations for Mile Branch (22-1996). Approximately 14 percent of the project corridor was determined to have a high potential for the presence of prehistoric and historic archaeological resources. Survey was conducted on 5.4 acres. The remaining 23.7 acres were not surveyed because right-of-entry was denied by landowners. No cultural resources sites were recorded as a result of the survey and testing. Two historic built resources were recorded adjacent to Mile Branch. Both were recommended not eligible for nomination to the NRHP. Site 16ST273 (Wilson Cemetery) is located within the project right-of-way on North Columbia Street. The cemetery is still in use and should be avoided.

- Nonstructural Elevations and Flood Proofing (from Alternative 2)
  The distribution of buildings within the preliminary 50-year floodplain fall within locations that possess a high potential to contain additional unrecorded built-environment resources and/or archaeological deposits and identification and evaluation for these properties is ongoing.

Assessment of the Undertaking’s Potential to Effect Historic Properties
A review of the TSP indicates that the considered action includes ground disturbing activities involving access, staging, clearing and snagging, mechanical dredging, replacement of culverts or bridges, construction of structural features (levee, floodwall, pump stations, floodgate, gate complex , control structures, road ramp), borrow fill, and/or other direct effects to above-ground historic properties (elevation, flood proofing, relocations, and/or acquisition (demolition)). These activities may directly impact both known and undocumented cultural resources listed or eligible for listing in the NRHP that exist both within the project footprint and associated areas in a way that will diminish the integrity of these property’s location, design, setting, materials, workmanship, feeling, or association.

A review of the TSP also indicates that the considered action includes the introduction of new visual elements (levee, floodwall, pump stations, floodgate, gate complex, control structures, road ramp) to the project area’s viewshed that have the potential to indirectly impact known and previously undocumented cultural resources that may be listed or eligible for listing in the NRHP. The considered action also includes elevation, flood proofing, relocations, and/or acquisition (demolition) measures that may introduce new visual elements and/or modifications to built-environment resources that may directly affect both known and previously undocumented cultural resources that may be listed or eligible for listing in the NRHP. The introduction of new visual elements that are inconsistent with the historic or cultural character of these resources could indirectly diminish the integrity of the property's setting, feeling, or association and/or cause changes to the integrity of feeling or character associated with a historic resource or TCP.

Potential negative cumulative impacts may include direct damage to built-environment resources or destruction of archaeological resources as well as the potential successive introduction of new visual elements and/or modifications to the viewshed and overall visual landscape of known and previously undocumented cultural resources significant at the state, local, and national level and/or of significance to Tribes that may be listed or eligible for the NRHP; including archaeological sites, historic structures, NRHDs, NHLs, other built-environment resources (see above) and/or TCPs. Alternatively, potential positive cumulative impacts may include preservation of at-risk cultural resources within the study area.

Consulting Parties

This letter continues formal Section 106 consultation pursuant to 36 CFR § 800.3(c). In addition to the LA SHPO, CEMVN has identified the following Tribal governments as having an interest in the project: ACTT, CNO, CT, JBCI, MBCI, TBTL, and the NFS, CPRAB. CEMVN has not identified any other preservation interests. Should you know of additional Tribal governments or preservation groups, please do not hesitate to communicate these to CEMVN.

CEMVN proposes to send future notices, draft agreements, and other background information to consulting parties by e-mail to minimize communication delays and expedite the development of the PA. Please let CEMVN know if this is impractical, so we can make alternative arrangements.

Conclusion

In conclusion, CEMVN has determined that the proposed action constitutes an Undertaking as defined in 36 CFR § 800.16(y) and has the potential to cause effects to historic properties. However, no determination of effect under the NHPA is being made at this time. As the federal agency cannot fully determine how the Undertaking may affect historic properties, the location of historic properties, or their significance and character at the present time [36 CFR § 800.14(b)(1)(ii)], prior to approving the Undertaking, CEMVN proposes to develop a project-specific PA pursuant to 36 CFR § 800.14(b) in consultation with the NFS, SHPO, Tribes, and other interested parties, to satisfy CEMVN's Section 106 responsibilities for this Undertaking.

The goal of this Section 106 consultation is to provide a framework for addressing this Undertaking and establish protocols for continuing consultation with the LA SHPO, Tribal governments, and other stakeholders. The PA would identify consulting parties, define applicability, establish review timeframes, stipulate roles and responsibilities of stakeholders, include Tribal consultation procedures, consider the views of the SHPO/THPO(s) and any other consulting parties, afford for public participation, develop programmatic allowances to exempt certain actions from Section 106 review, outline a standard review process, determine an appropriate level of field investigation to identify and evaluate historic properties and determine the potential to affect historic properties and/or sites of religious and cultural significance, streamline the assessment and resolution of Adverse Effects through avoidance, minimization, and programmatic treatment approaches for mitigation, establish reporting frequency and schedule, provide provisions for post-review unexpected discoveries and unmarked burials, and incorporate the procedures for amendments, duration, termination, dispute resolution, and implementation. The PA would then govern CEMVN's subsequent NHPA compliance efforts. Following the execution of a PA, the Chief of Engineers may then proceed with making a final recommendation on the project and issuing a Record of Decision (ROD) in compliance with NHPA and in coordination with NEPA.

Table 1 (below) provides the Updated Plan Formulation Milestones for the St. Tammany Parish, Louisiana Study. Schedule updates will continue to be provided to stakeholders in subsequent Section 106 documentation and consultation meetings.

Table 1. Proposed Study Milestone Schedule

Milestone	**Scheduled**	**Actual**	**Complete**
Alternatives Milestone	April 14, 2020	April 13, 2020	Yes
Tentatively Selected Plan	Jan 13, 2021	Jan 13, 2021	Yes
Release Draft Report to Public	June 11, 2021	TBD	No
Agency Decision Milestone	Aug 27, 2021	TBD	No
Division Engineer's Transmittal Letter	July 20, 2022	TBD	No
Chief's Report Milestone	Jan 13, 2023	TBD	No

A date and time for the initial Section 106 consultation meeting has not yet been set. The purpose of the initial meeting will be to discuss the properties being considered as part of the TSP, the historic properties, and to gather feedback from your organization regarding the proposed Undertaking and the potential to affect significant cultural/Tribal resources, and begin development of the PA. CEMVN will notify SHPO, Tribes, and other likely consulting parties regarding the meeting as soon as possible and forward information regarding a conference call-in number and the agenda.

CEMVN is providing the available TSP information and seeking any information your office may wish to provide at this time concerning:

- The proposed Undertaking and its potential to significantly affect historic properties and/or sites of religious and cultural significance;

- Any other relevant parties who you feel may have an interest in participating in this consultation.

- Your organization's continued interest in participating in the development of this PA.

Additionally, CEMVN requests your response regarding:

- Concurrence with CEMVN's proposal to develop a project-specific PA in accordance with 36 CFR § 800.14(b) that establishes procedures to satisfy CEMVN's Section 106 responsibilities with regard to the programmatic review of this feasibility study;

- Concurrence with CEMVN's proposal to adopt a programmatic approach in accordance with 36 CFR § 800.14(b) to determining APEs for structural and nonstructural measures in consultation with SHPO and participating Tribe(s) pursuant to 36 CFR § 800.16(d);

CEMVN is forwarding this letter and the attached documentation for your review and comment and requests your comments within 30-days. CEMVN looks forward to your organization's review of this information and working with you and your staff to ensure that CEMVN fulfills its historic preservation responsibilities. Should you have any questions or need additional information regarding this Undertaking, please contact Jill Enersen, Architectural Historian, at (504)862-1741 or Jill.A.Enersen@usace.army.mil, or, Jason A. Emery, Archaeologist and Tribal Liaison at (504) 862-2364 or jason.a.emery@usace.army.mil.

Sincerely,

HARPER.MARSHALL.KEVIN.1536114358 Digitally signed by HARPER.MARSHALL.KEVIN.1536114358 Date: 2021.05.21 10:46:41 -05'00'

MARSHALL K. HARPER
Chief, Environmental Planning Branch

CC:File
An electronic copy of this letter with enclosures will be provided to the Section 106 Inbox, section106@crt.la.gov.

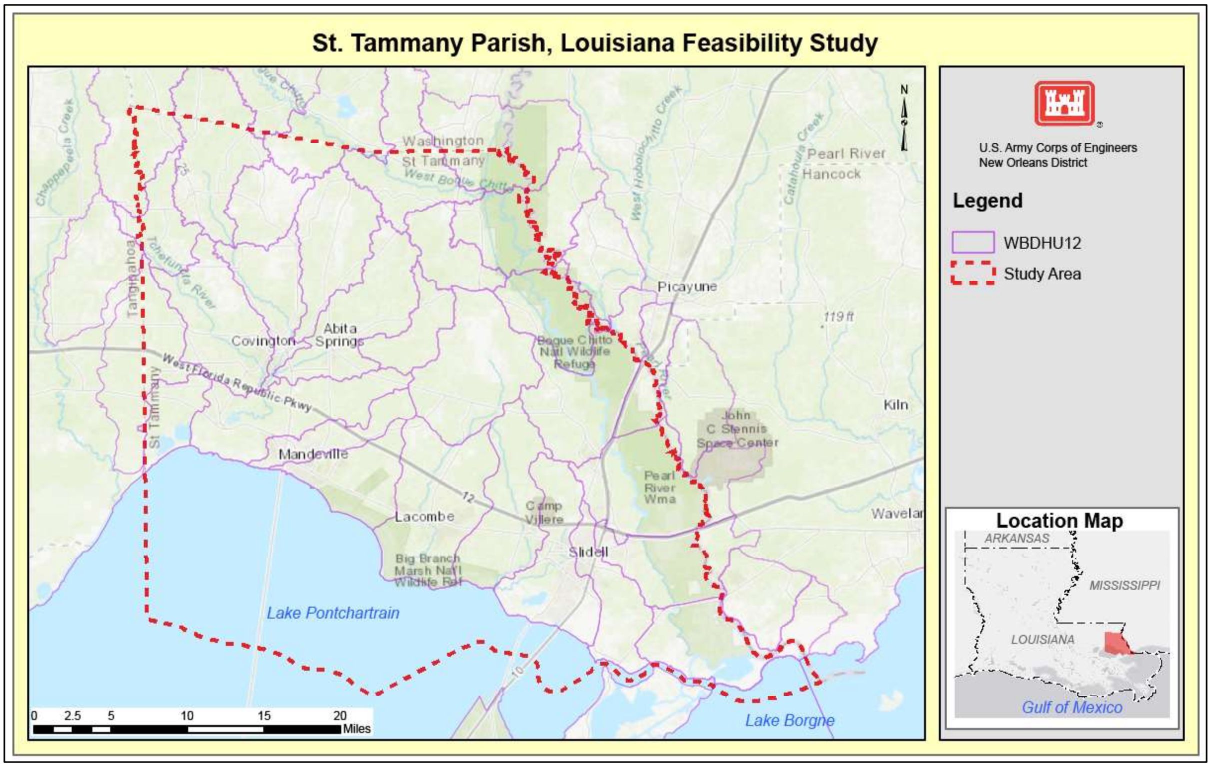


Figure 1. St. Tammany Parish, Louisiana Feasibility Study Area.

Note:The U.S. Geological Survey Watershed Boundary Dataset (WBDHU12) is included to delineate the hydrologic sub basins in the Study Area.

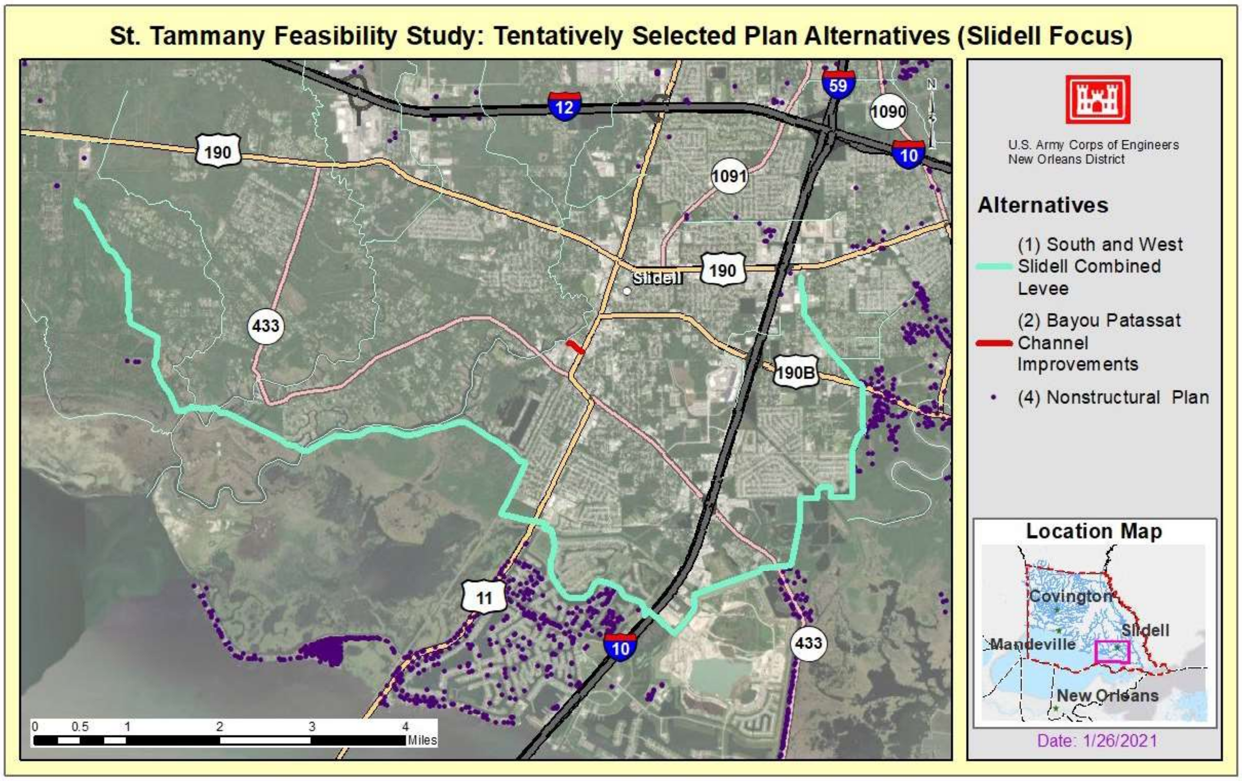


Figure 2. Slidell Region of the TSP (West Slidell and South Slidell Levees and Bayou Patassat).

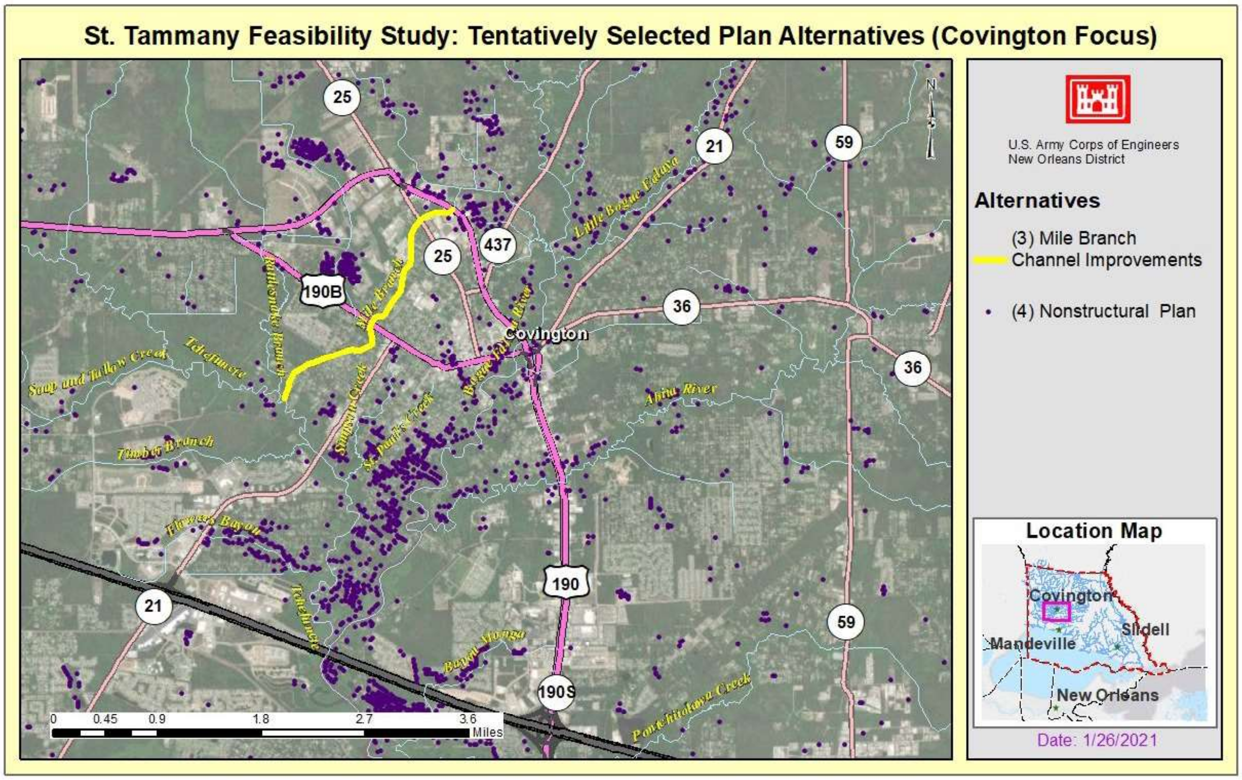


Figure 3. Mile Branch Region of the TSP (Mile Branch Channel Improvements).

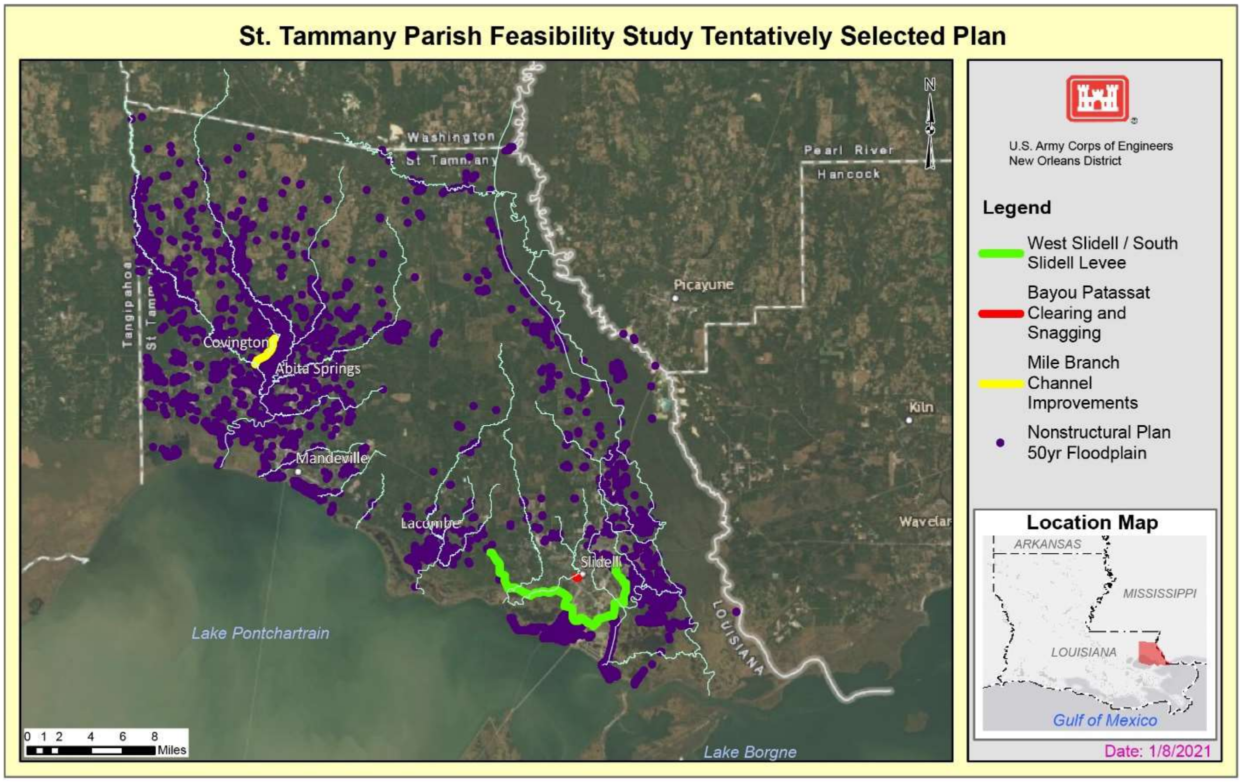


Figure 4. Preliminary geographic distribution of Nonstructural Plan in the 50-year floodplain.

UPDATE MEMORANDUM

HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE (HTRW) EVALUATION TO THE FEASIBILITY STUDY WITH INTEGRATED ENVIRONMENTAL IMPACT STATEMENT (IEIS) ST. TAMMANY PARISH, LOUISIANA

Background:

This HTRW evaluation supports the St. Tammany Parish, Louisiana Feasibility Study with IEIS to identifying and evaluating a full range of reasonable alternatives to reduce flood damages from rainfall, and storm surge. The total study area is 1,124 square miles. The proposed activities include flood proofing, structure raising, buyouts/relocations, closure gates and weirs, combination of ring levees, and improvements to surrounding levees.

Methodology:

The purpose of a Phase I Environmental Site Assessment (ESA) is to identify, to the extent feasible in the absence of sampling and analysis, the range of contaminants (i.e., *Recognized Environmental Conditions* [RECs]) within the scope of the U.S. Environmental Protection Agency’s (EPA) Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and petroleum products. The 2002 Brownfields Amendments to the CERCLA require EPA to promulgate regulations establishing standards and practices for conducting “all appropriate inquiries”. “All appropriate inquiries” is a process of evaluating a property’s environmental conditions and assessing potential liability for any contamination. “All appropriate inquiries” must be conducted to obtain certain protections from liability under the federal Superfund Law (i.e., CERCLA). As directed by the EPA, the results of an “all appropriate inquiries” investigation must be documented in a report. The EPA requires no specific format, length, or structure of the written report. However, the EPA recommends utilizing the American Society for Testing and Materials (ASTM) E 1527-13 standard as it is consistent with the requirements and provisions in the “all appropriate inquiries” rule.

An abridged Phase I ESA was conducted to assess the potential for HTRW materials within the proposed project footprints for each of the work items included in the IEIS and the results of each are presented in this Update Memorandum. This Update Memorandum includes the following tasks: 1) the review of HTRW Phase I Environmental Database Review Corridor Reports and state and federal databases (e.g., Resource Conservation and Recovery Act Information, Toxic Release Inventory, Superfund Enterprise Management System, Assessment, Cleanup and Redevelopment Exchange System, and state databases on underground storage tanks and hazardous waste programs, etc.) to identify RECs, and 2) site reconnaissance to accessible regions of the subject areas to determine if RECs are within the work item right-of-way (ROW). The site reconnaissance was conducted via public access roads and public parks due to no active right of entry (ROE) for this feasibility study.

Work Item Description:

Fourteen alternatives were investigated within this Update Memorandum: Alternative 4. Lacombe, Alternative 4a- Bayou Lacombe Levee, Ring Levee, Alternative 4a.1 Shorter Lacombe Levee_Alternative 4b- Combined Levee from Lacombe to West Slidell, Alternative 5. Bayou Liberty/ Bayou Vincent/Bayou Bonfouca, Alterative 6. South Slidell Storm Surge Risk

Reduction, Alternative 6a. PO-167 Slidell Levees, Alternative 6b. Slidell levee and Eden Isles floodwall, Alternative 7. Eastern Slidell, Alternative 8. Upper Tchefuncte/Covington, Alternative 9. Mandeville Lakefront, Alternative 9a: Mandeville 7.3 ft Seawall with Passive Drainage System, Alternative 9b- Mandeville Seawall (7.3 ft) with Pump Station on Bayou Ravine au Coquilles, Alternative 9c- Mandeville Seawall (18 ft) with Pump Station on Bayou Ravine au Coquilles.

Task 1 Results:
A thorough review of online databases of each alternative was done and the results are shown below:

Alternatives 4, 4a,4a.1,4b: No RECs were found within a one-mile radius of the study area. (Figure 1)

Alternative 5: No RECs were found within a one-mile radius of the study area. (Figure 2)

Alternatives 6, 6a, 6b: One Superfund (NPL) site, one Toxic Substances Control Act (TSCA) site, two Brownfield (ACRES) sites, and six Toxic Releases Inventory (TRI) sites were found within a one-mile radius of the study area. (Figure 3)

Alternative 7.: No RECs were found within a one-mile radius of the study area. (Figure 4)

Alternative 8.: One ACRES site was found within a one-mile radius of the study area. (Figure 5)

Alternatives 9, 9a, 9b, 9c: No RECs were found within a one-mile radius of the study area. (Figure 6)

Task 2 Results:
CEMVN-PD-C personnel Mr. David Day made site visits to the subject areas on 21 October 2020 and 22 October 2020. The public crossing of the creeks and bayous were inspected for the presence of pipes, containers, tanks or drums, ponds or lagoons, car bodies, tires, refrigerators, trash dumps, electrical equipment, oil drilling equipment, gas or oil wells, discoloration of vegetation or water sheens, discoloration of soils, out-of-place dirt mounds or depressions in the landscape, evidence of fire, stressed soils with lack of vegetation, discoloration of vegetation, animal remains, unusual animal behavior, biota indicative of a disturbed environment, and odors indicative of poor water quality or chemical presence. Aforementioned indicators were found during the site visits.

Within Alternative 8, two waste tires were found on the northeast side of the bridge within the channel of Mile Branch. (Picture 1 and Picture 3) A rusted 50-gallon drum was found on the southwest side within channel of Mile Branch. (Picture 2)

Based on the results of Task 1 and Task 2 described above, the probability of encountering HTRW during the construction would be low. Though HTRW indicators were found within the channels, the discovery of these items is labeled as de minimis but should be addressed prior to any construction. It is recommended that a Full Phase I ESA be conducted prior to construction.

David J. Day
CEMVN-PDC-C
504-862-2944
26 October 2020

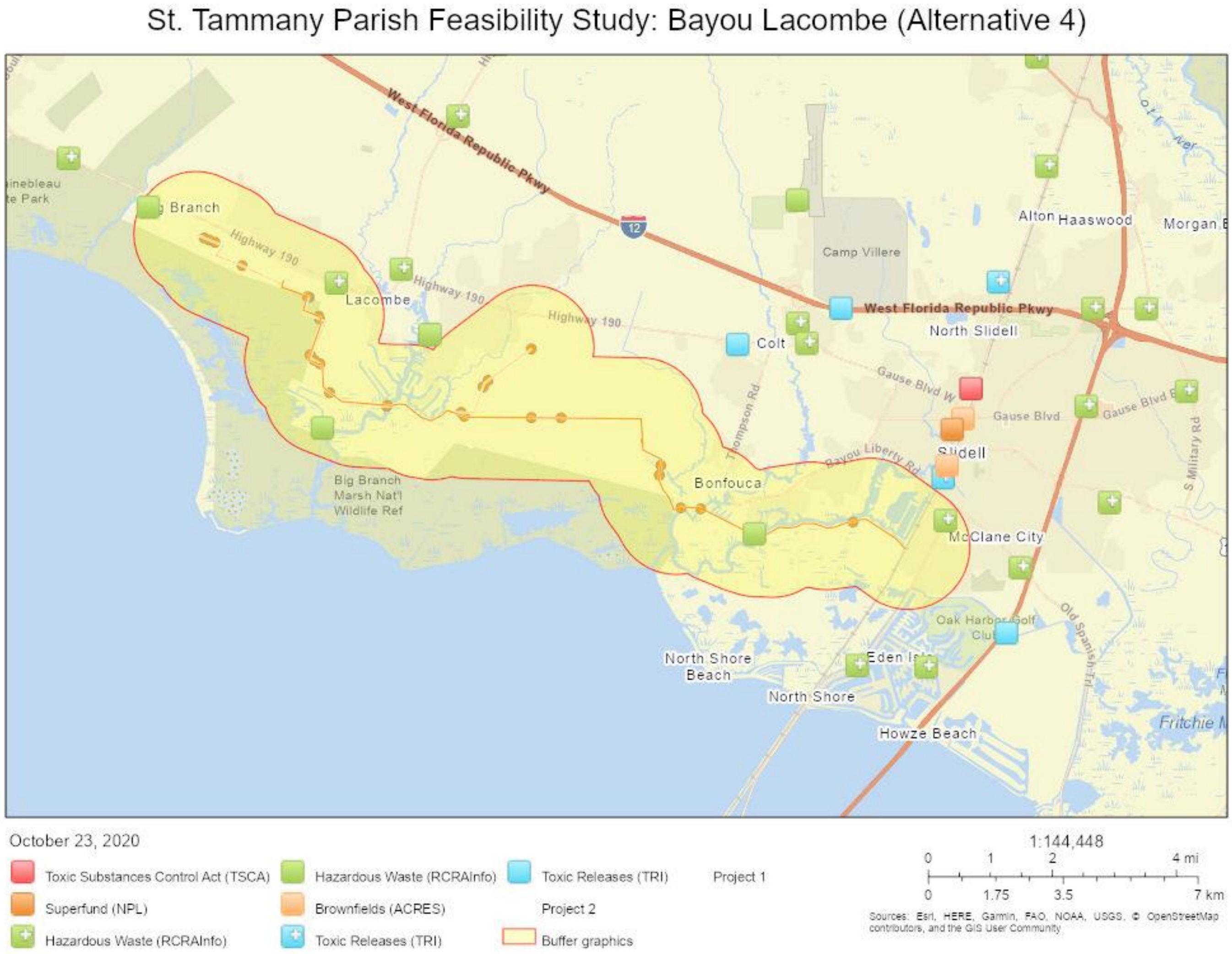


Figure 1: Alternative 4. Lacombe, Alternative 4a- Bayou Lacombe Levee, Ring Levee, Alternative 4a.1 Shorter Lacombe Levee Alternative 4b- Combined Levee from Lacombe to West Slidell, St. Tammany Parish, Louisiana.

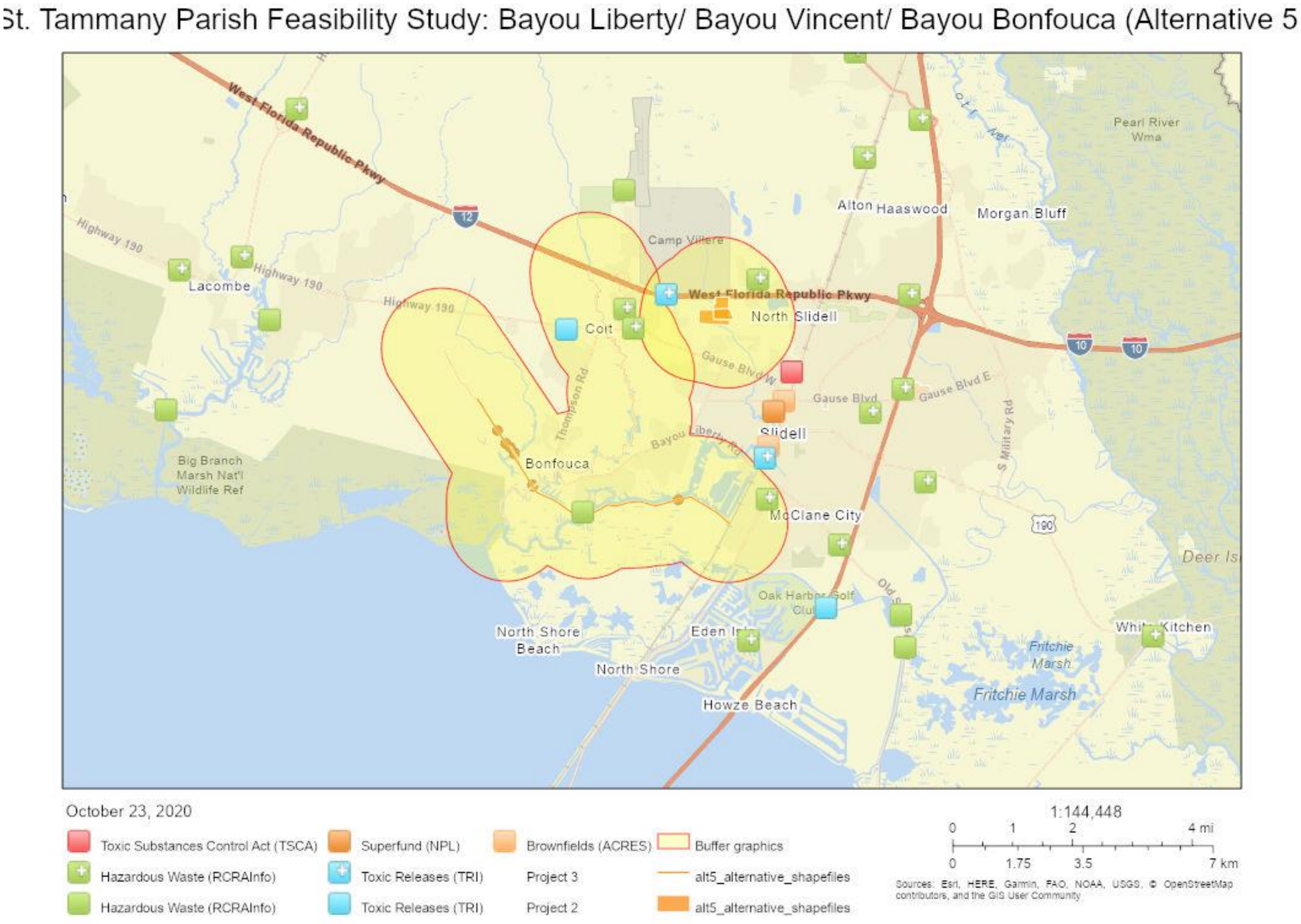


Figure 2: Alternative 5. Bayou Liberty/ Bayou Vincent/Bayou Bonfouca,St. Tammany Parish, Louisiana

St. Tammany Parish Feasibility Study: South Slidell Storm Surge Risk Reduction (Alternative 6)

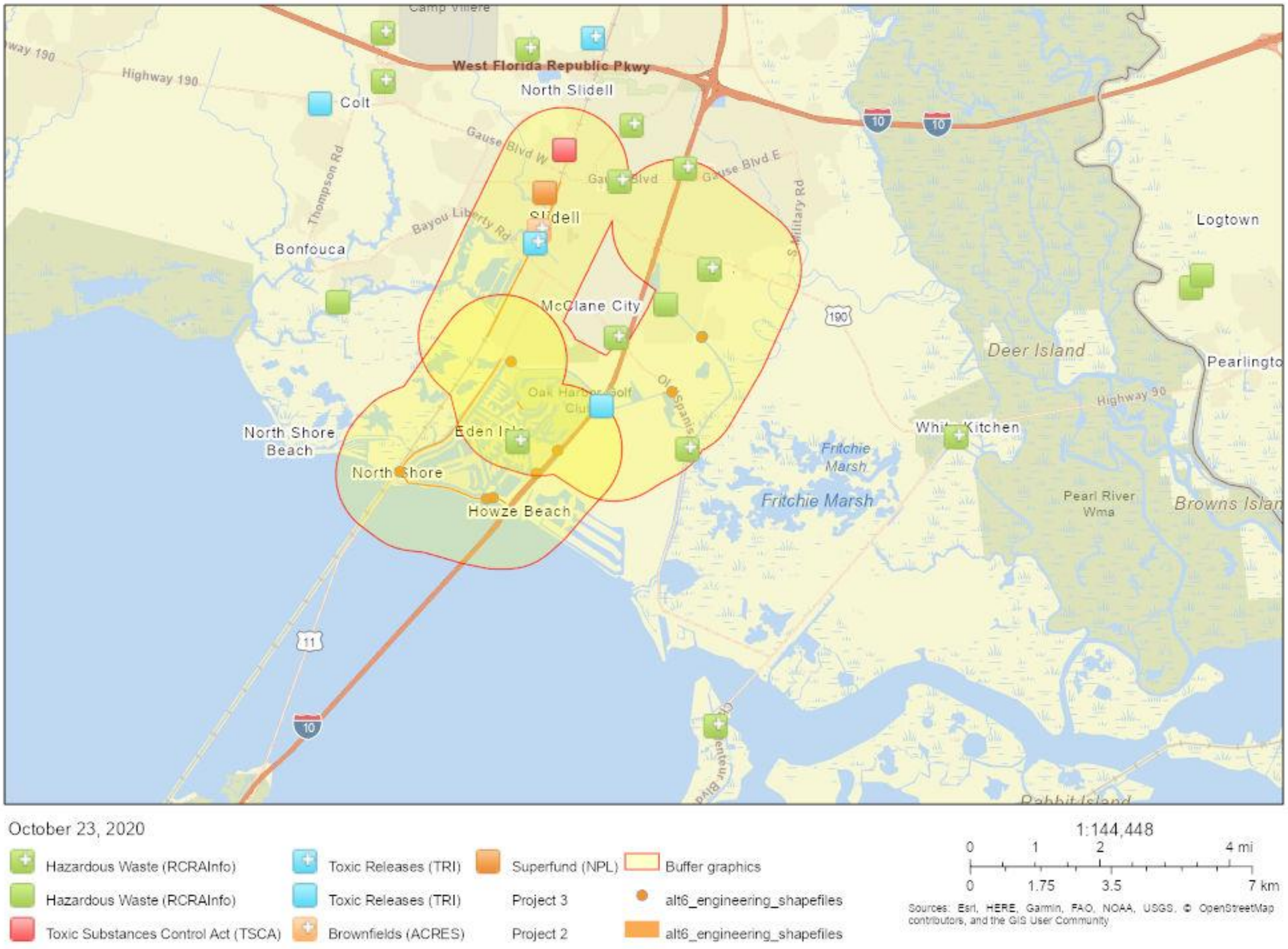


Figure 3: Alterative 6. South Slidell Storm Surge Risk Reduction, Alternative 6a. PO-167 Slidell Levees, Alternative 6b. Slidell levee and Eden Isles floodwall, St. Tammany Parish, Louisiana.

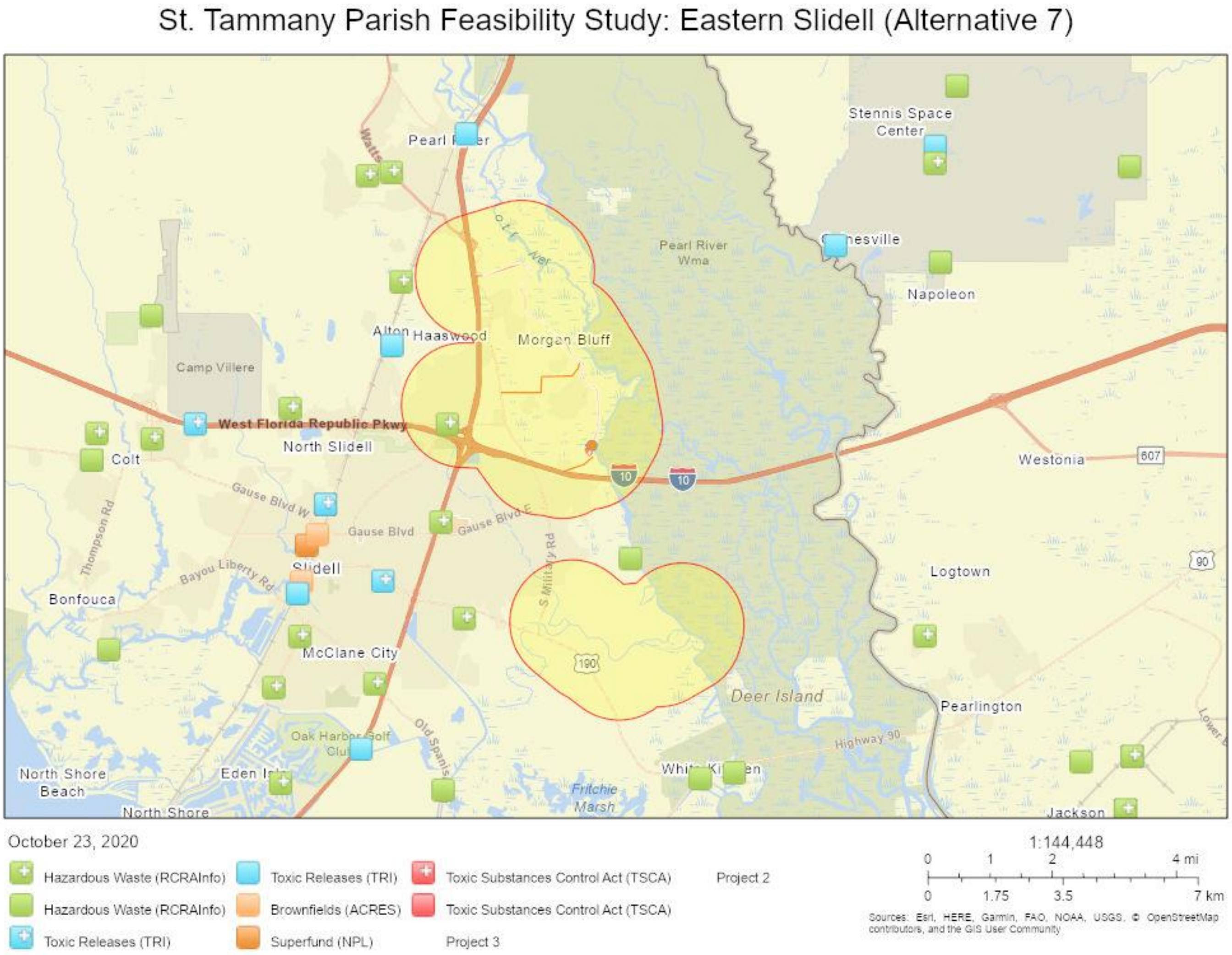


Figure 4: Alternative 7. Eastern Slidell, St. Tammany Parish, Louisiana.

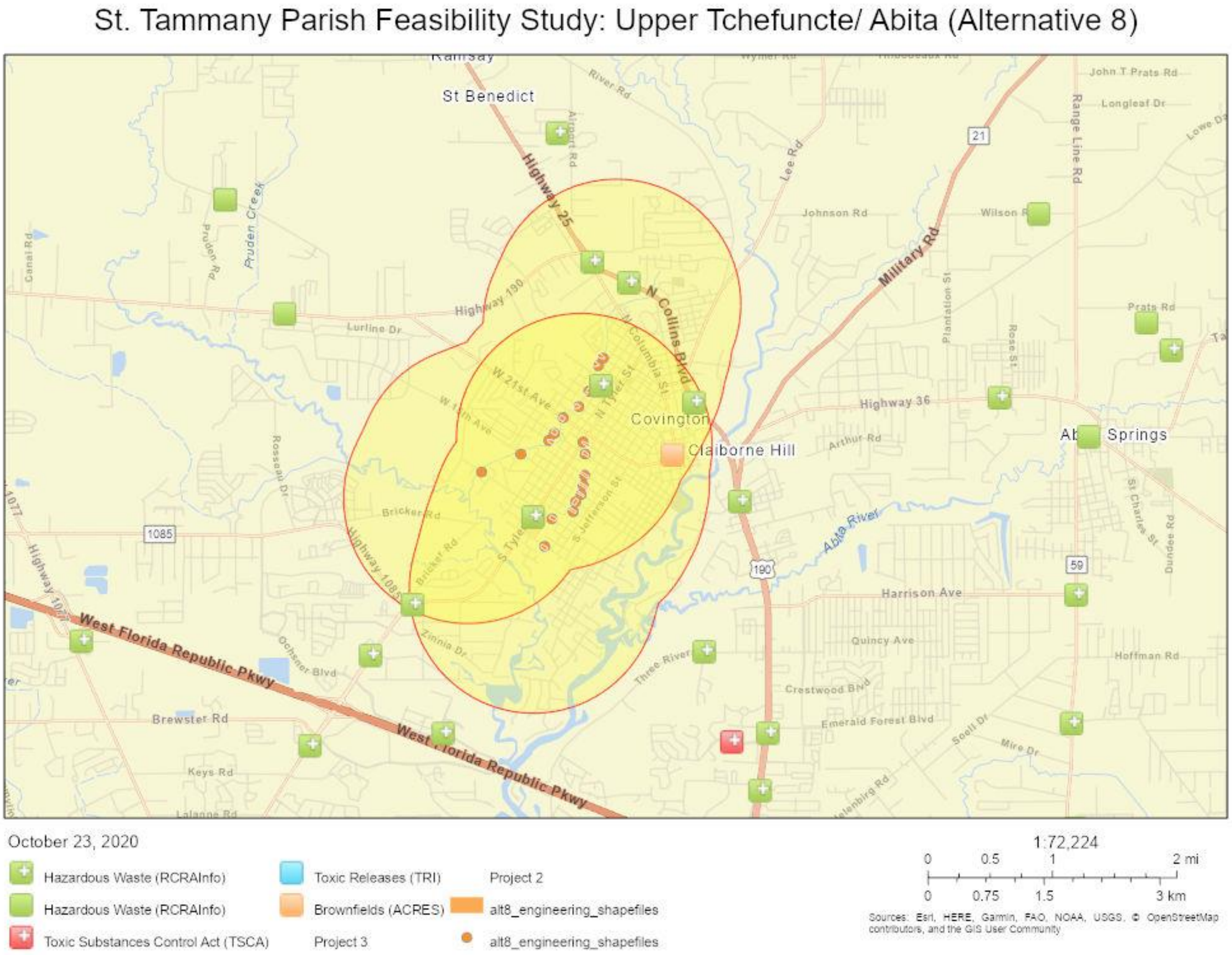


Figure 6: Alternative 8. Upper Tchefuncte/Covington, St. Tammany Parish, Louisiana.

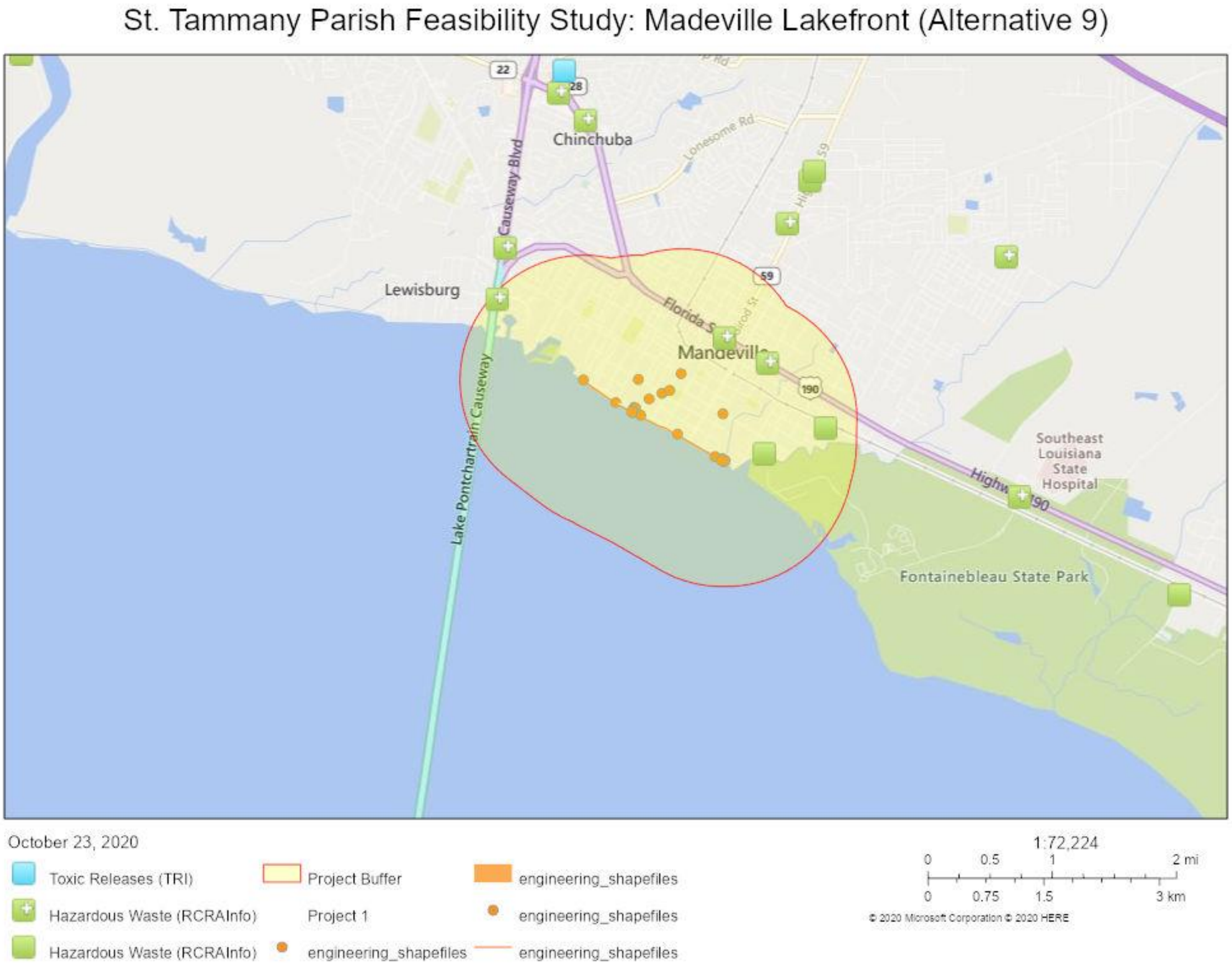


Figure 6: Alternative 9. Mandeville Lakefront, Alternative 9a: Mandeville 7.3 ft Seawall with Passive Drainage System, 9b- Mandeville Seawall (7.3 ft) with Pump Station on Bayou Ravine au Coquilles, 9c- Mandeville Seawall (18 ft) with Pump Station on Bayou Ravine au Coquilles, St. Tammany Parish, Louisiana.

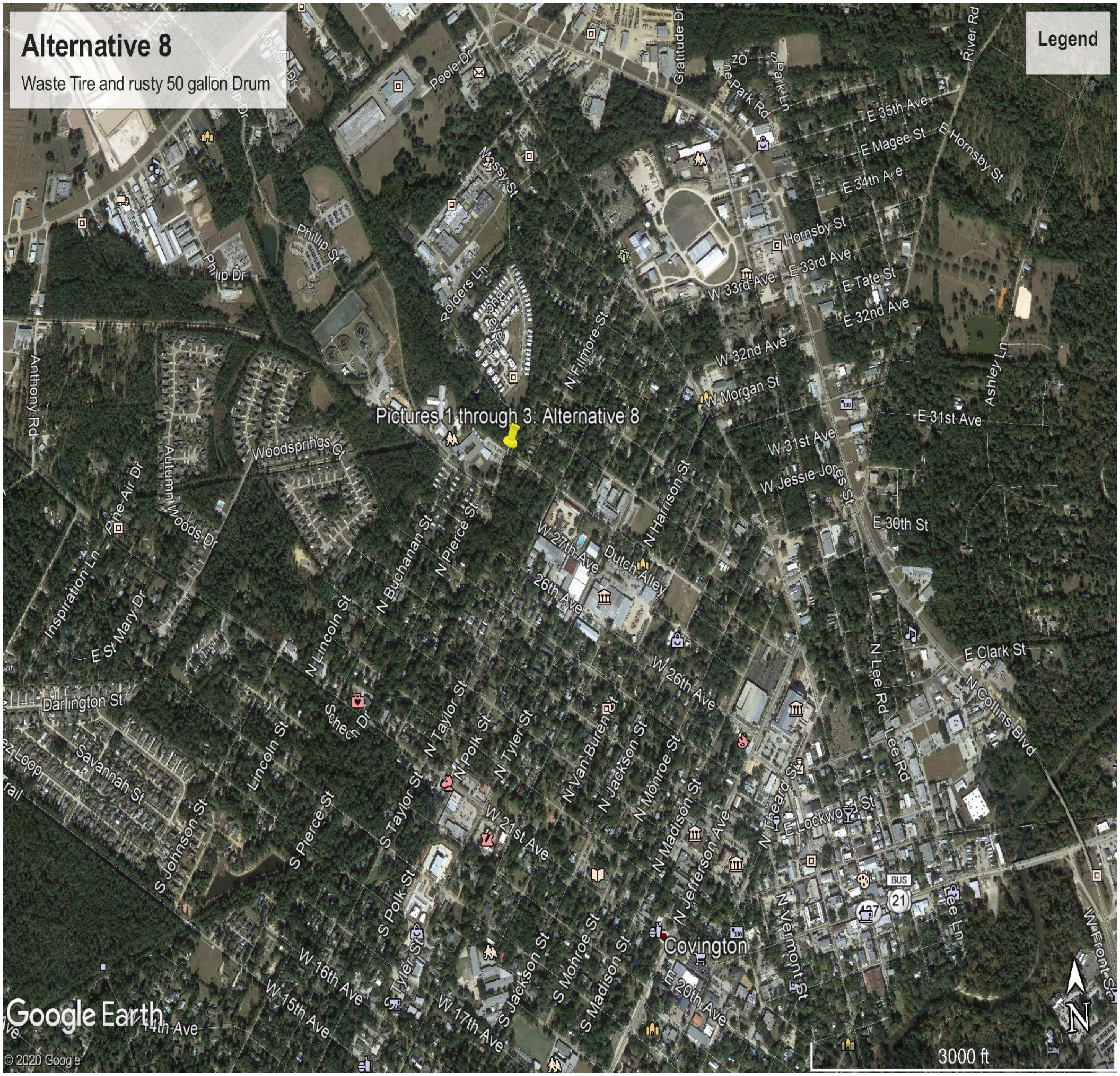


Figure 7: Alternative 8: Google earth of potential RECs

Picture 1: Alternative 8. Facing south. Waste tire found within the left descending bank of Mile Branch. Covington, LA.

Picture 2: Alternative 8. Facing east. Rusted 50 gallon found within the left descending bank of Mile Branch. Covington, LA.

LA.

Picture 3: Alternative 8: Facing North. Waster tire within the middle of Mile Branch. Covington, LA.

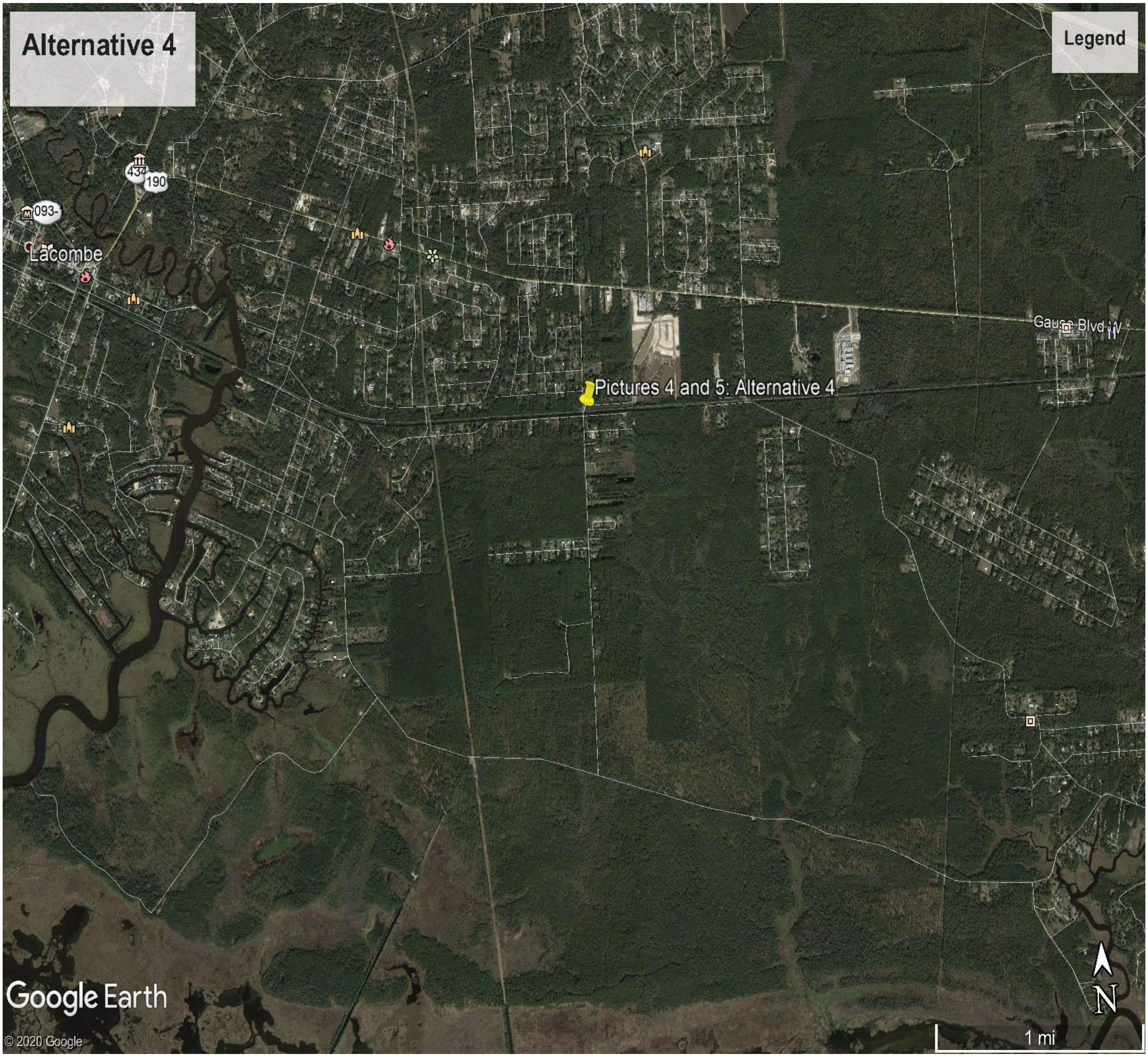


Figure 8: Alternative 4: Google earth location of pictures.

Picture 4: Alternative 4. Facing east. Picture taken from Transmitte Road. Lacombe, LA.

Picture 5: Alternative 4. Facing west. Picture taken from Transmitte Road. Lacombe, LA.

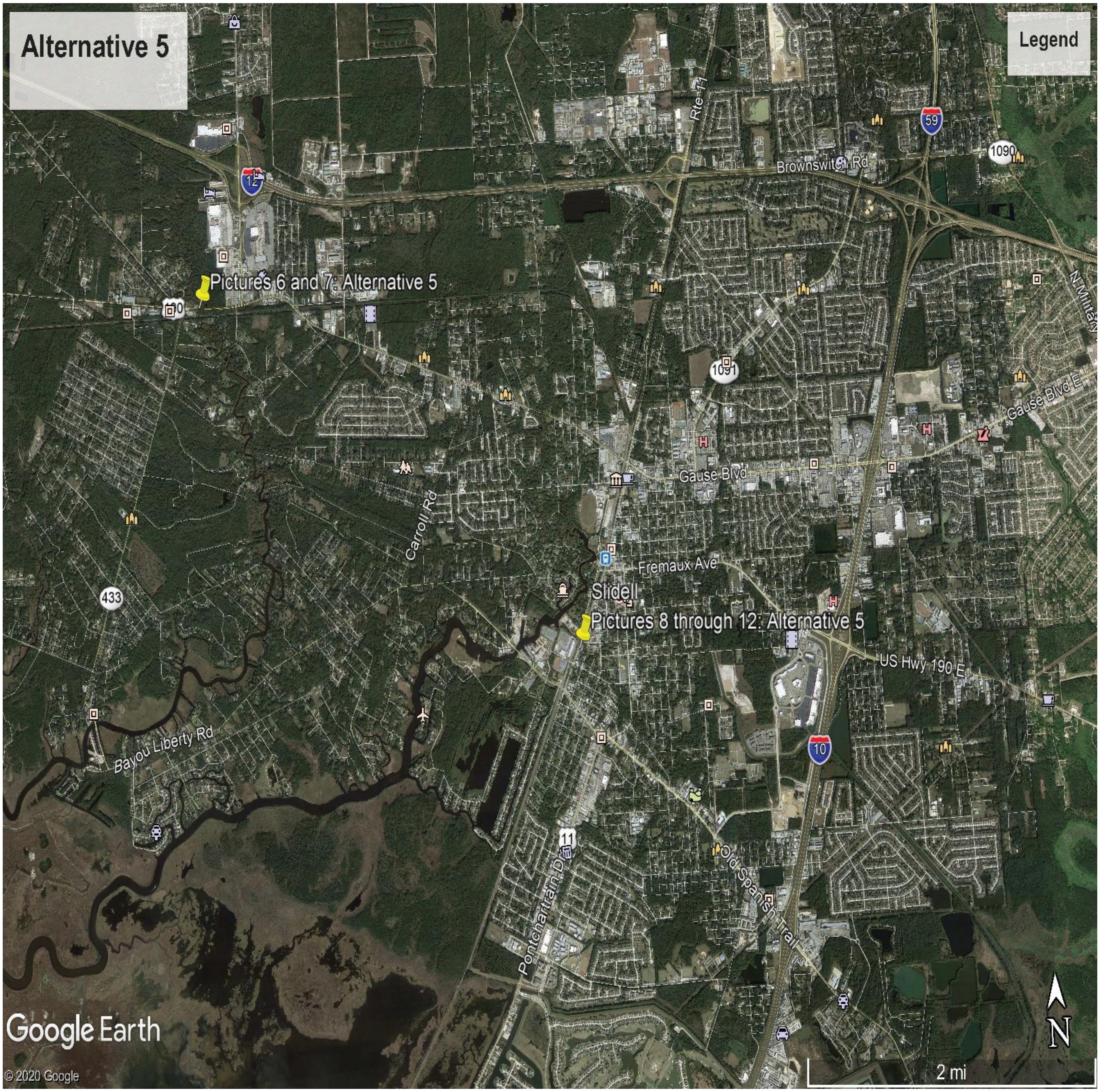


Figure 9: Alternative 5: Google earth location of pictures.

Picture 6: Alternative 5. Facing south. Picture taken from Highway 190. Slidell, LA.

Picture 7: Alternative 5. Facing south. Picture taken from Highway 190. Slidell, LA.

Picture 8: Alternative 5. Facing south. Picture taken near Highway 11: Bayou Patassat. Slidell, LA.

Picture 9: Alternative 5. Facing east. Picture taken near Highway 11: Bayou Patassat ._Slidell, LA.

Picture 10: Alternative 5. Facing north. Picture taken near Highway 11: Bayou Patassat. Slidell, LA.

Picture 10: Alternative 5. Facing west. Picture taken near Highway 11: Bayou Patassat. Slidell, LA.

Picture 11: Alternative 5. Facing west. Picture taken near Highway 11: Bayou Patassat. Slidell, LA.

Picture 12: Alternative 5. Facing northwest. Bayou Patassat is less than a .08 mile west of Slidell Public yard ACRES site, approximately .75 mile southeast of Bayou Bonfouca NPL site, and approximately .96 mile southeast of Old Concrete Plant ACRES site. Slidell, LA.

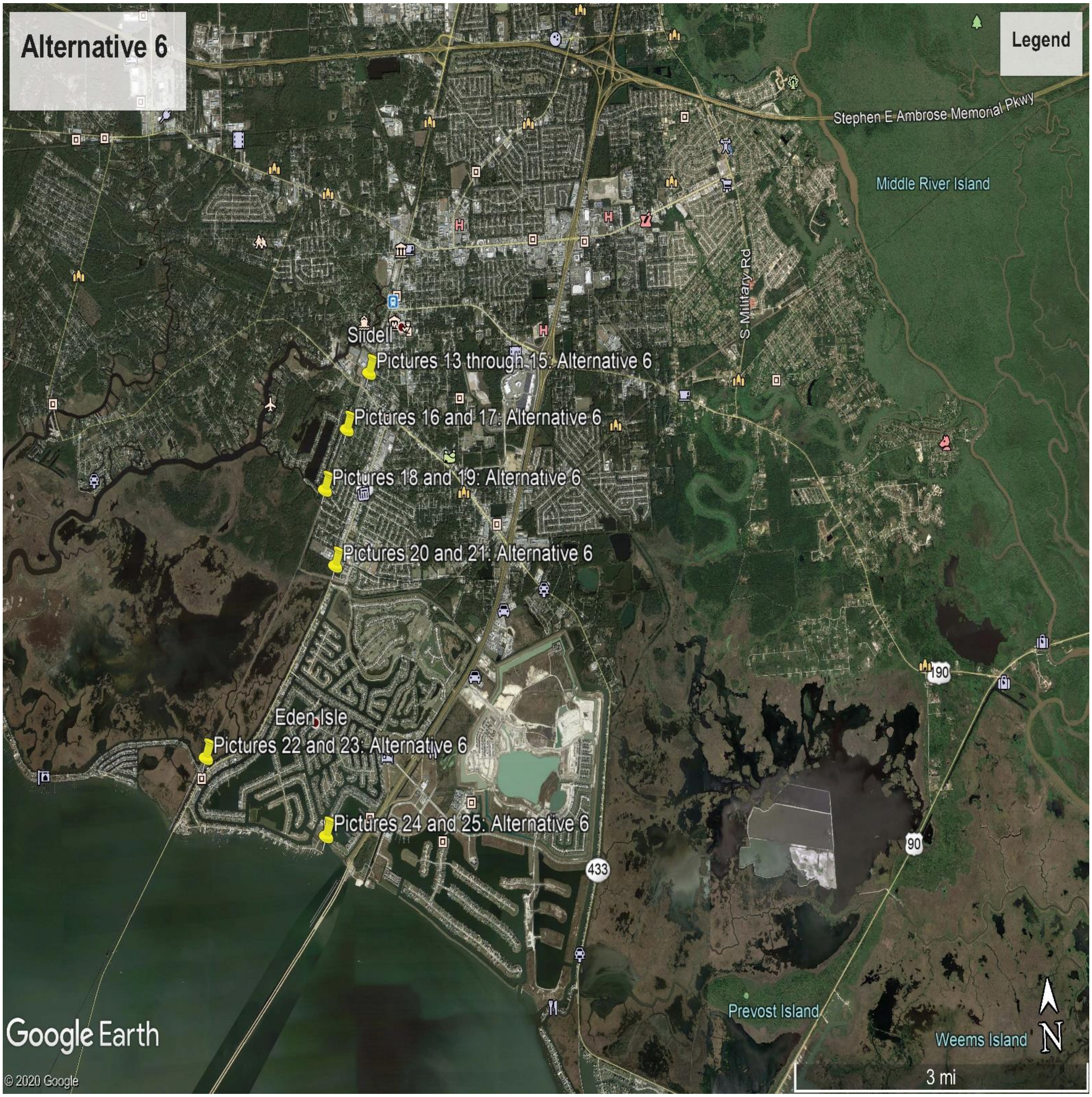


Figure 10: Alternative 6: Google earth location of pictures.

Picture 13: Alternative 6. Facing north. Picture taken near Highway 11. Slidell, LA.

Picture 14: Alternative 6. Facing south. Picture taken near Highway 11. Slidell, LA.

Picture 15: Alternative 6. Facing northwest. Appears to be asphalt. Picture taken near Highway 11. Slidell, LA.

Picture 16: Alternative 6. Facing north. Picture taken near Front Street. Slidell, LA.

Picture 16: Alternative 6. Facing north. Picture taken near Front Street. Slidell, LA.

Picture 17: Alternative 6. Facing south. Picture taken near Front Street. Slidell, LA.

Picture 17: Alternative 6. Facing south. Picture taken near Front Street. Slidell, LA.

Picture 18: Alternative 6. Facing north. Picture taken near Front Street. Slidell, LA.

Picture 19: Alternative 6. Facing south. Picture taken near Front Street. Slidell, LA.

Picture 19: Alternative 6. Facing south. Picture taken near Front Street. Slidell, LA.

Picture 20: Alternative 6. Facing east. Schneider Canal Pump Station. Picture taken from Highway 11. Slidell, LA.

Picture 21: Alternative 6. Facing west. Picture taken from Highway 11. Slidell, LA.

Picture 22: Alternative 6. Facing north. Picture taken from Highway 11.Eden Isle, LA.

Picture 23: Alternative 6. Facing south._Picture taken from Highway 11. Eden Isle, LA.

Picture 24: Alternative 6. Facing east. Picture taken from Lakeview Drive. Eden Isle, LA

Picture 25: Alternative 6. Facing southeast. Picture taken from Lakeview Drive. Eden Isle, LA

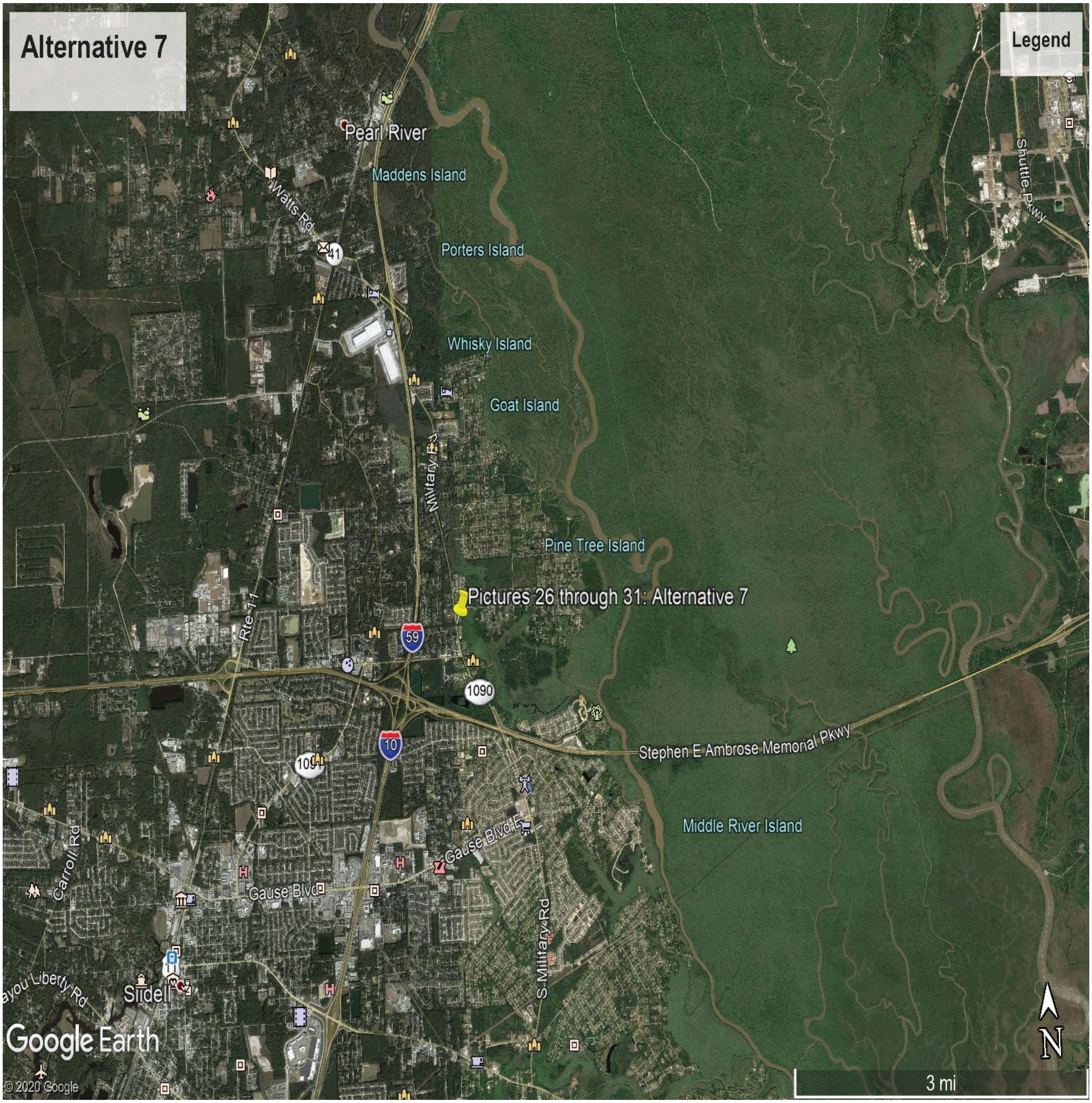


Figure 11: Alternative 7: Google earth location of pictures.

Picture 26: Alternative 7. Facing north. Trash found within Gum Bayou banks. Slidell, LA.

Picture 27: Alternative 7. Facing west. Trash within Gum Bayou: Television. Slidell, LA.

Picture 28: Alternative 7. Facing south. Trash found within banks of Gum Bayou. Slidell, LA.

Picture 29: Alternative 7. Facing north. Trash found within banks of Gum Bayou. Slidell, LA.

Picture 30: Alternative 7. Facing east. Gum Bayou. Slidell, LA.

Picture 31: Alternative 7. Facing south. Gum Bayou. Slidell, LA.

Picture 31: Alternative 7. Facing south. Gum Bayou. Slidell, LA.

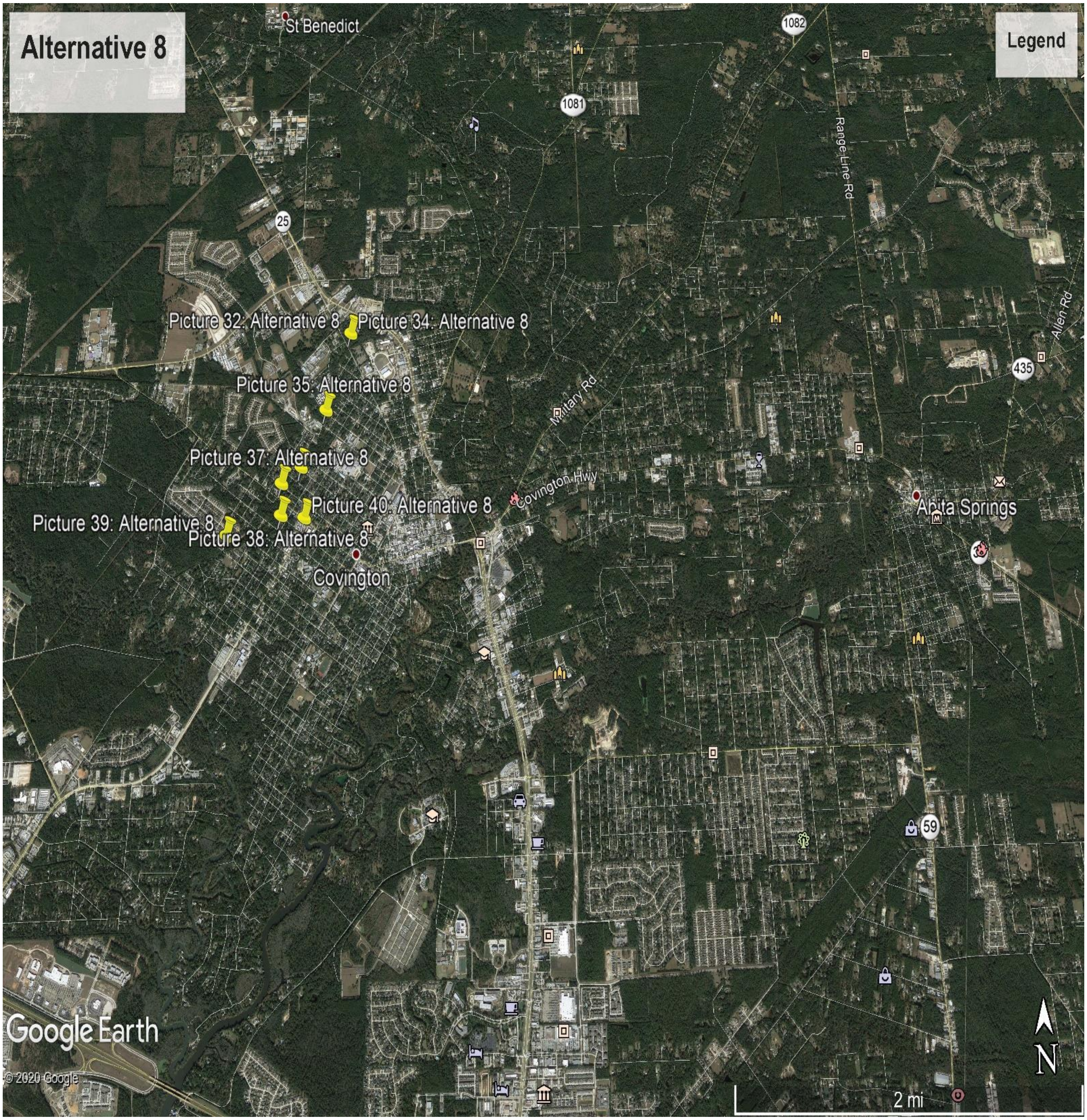


Figure 12: Alternative 8: Google earth location of pictures.

Picture 32: Alternative 8. Facing west. Trash found within Mile Branch Channel. Covington, LA.

Picture 33: Alternative 8. Facing east. Trash found within Mile Branch Channel. Covington, LA.

Picture 33: Alternative 8. Facing east. Trash found within Mile Branch Channel. Covington, LA.

Picture 34: Alternative 8. Facing south. Trash found within Mile Branch Channel. Covington, LA.

Picture 35: Alternative 8. Facing east. Trash found within Mile Branch Channel banks. Covington, LA.

Picture 36: Alternative 8. Facing north. Trash and pipes found within Mile Branch Channel. Covington, LA.

Picture 37: Alternative 8. Facing south. Mile Branch Channel. Covington, LA.

Picture 38: Alternative 8. Facing south. Mile Branch Channel. Covington, LA.

Picture 39: Alternative 8. Facing south. Drainage pipe from neighboring subdivision into Mile Branch Channel. Covington, LA.

Picture 40: Alternative 8. Facing southeast. Trash found within Mile Branch Channel banks. Covington, LA.

Figure 13: Alternative 9: Google earth location of pictures.

Picture 41: Alternative 9. Facing west. Mandeville Seawall. Mandeville, LA.

Picture 42: Alternative 9. Facing east. Mandeville Seawall. Mandeville, LA.

Picture 43: Alternative 9. Facing west. Mandeville Seawall. Mandeville, LA.

Picture 44: Alternative 9. Facing east. Mandeville Seawall. Mandeville, LA.

Picture 45: Alternative 9. Facing west. Mandeville Seawall. Mandeville, LA.

Picture 46: Alternative 9. Facing east. Mandeville Seawall. Mandeville, LA.

Picture 47: Alternative 9. Facing north. Ravine Aux Coquilles Passive Barrier. Mandeville, LA.

Picture 48: Alternative 9. Facing southwest. Ravine Aux Coquilles Passive Barrier. Mandeville, LA.

Picture 48: Alternative 9. Facing southwest. Ravine Aux Coquilles Passive Barrier. Mandeville, LA.

Picture 49: Alternative 9. Facing west. Ravine Aux Coquilles Passive Barrier. Mandeville, LA.

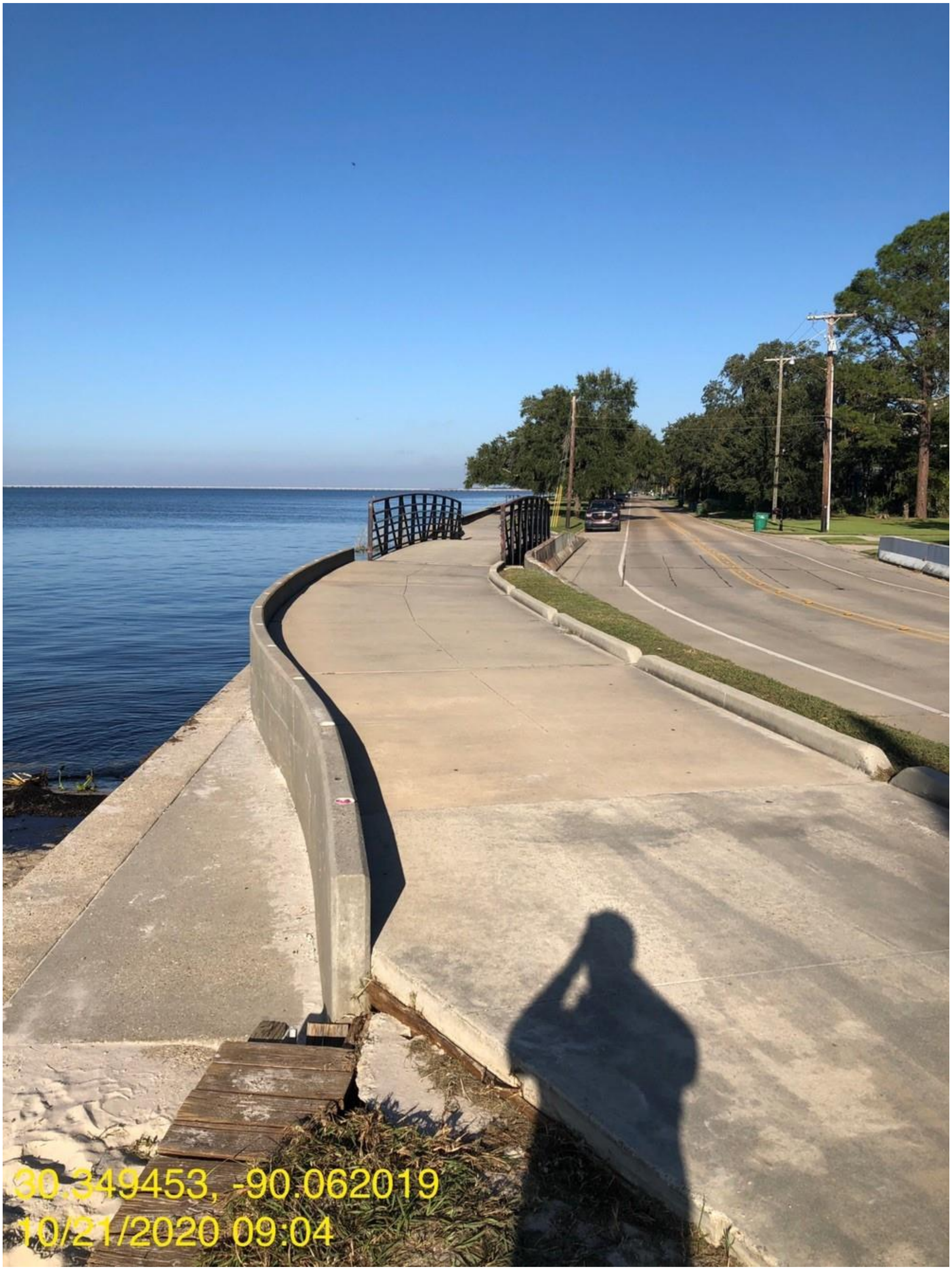
Picture 50: Alternative 9. Facing south. Ravine Aux Coquilles Passive Barrier. Mandeville, LA.

Picture 51: Alternative 9. Facing south. Ravine Aux Coquilles Passive Barrier. Mandeville, LA.

Picture 52: Alternative 9. Facing north. Ravine Aux Coquilles Passive Barrier. Mandeville, LA.

Picture 53: Alternative 9. Facing west. Mandeville Seawall. Mandeville, LA.

Picture 54: Alternative 9. Facing east. Mandeville Seawall. Mandeville, LA.

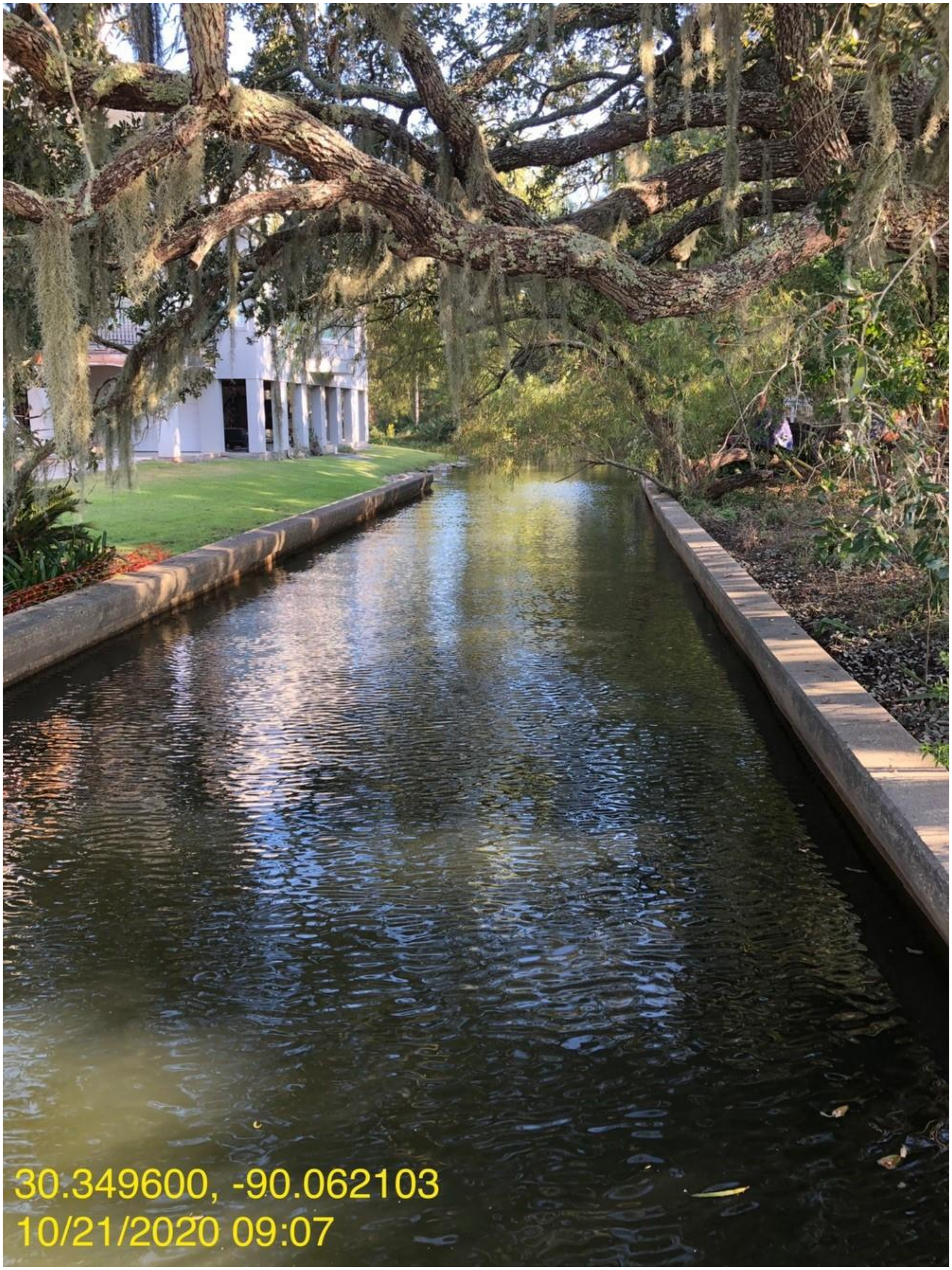


Picture 55: Alternative 9. Facing west. Mandeville Seawall. Mandeville, LA.

Picture 56: Alternative 9. Facing southeast. Mandeville Seawall. Mandeville, LA.

Picture 57: Alternative 9. Facing east. Mandeville Seawall. Mandeville, LA.

Picture 58: Alternative 9. Facing east. Little Bayou Castine Passive Barrier. Mandeville, LA.



Picture 59: Alternative 9. Facing north. Little Bayou Castine Passive Barrier. Mandeville, LA.

Picture 60: Alternative 9. Facing north. Little Bayou Castine Passive Barrier. Mandeville, LA.

Picture 61: Alternative 9. Trash found within Ravine Aux Coquilles Passive Barrier banks. Mandeville, LA.

Picture 62: Alternative 9. Facing north. Trash and concrete blocks found within Ravine Aux Coquilles Passive Barrier. Mandeville, LA..

Picture 63: Alternative 9. Facing southeast. Trash found within Ravine Aux Coquilles Passive Barrier banks. Mandeville, LA.

From: DEQ Water Quality Certifications
To: Meden, Daniel C CIV USARMY CEMVN (USA); DEQ Water Quality Certifications
Cc: BAKER, EVERARD CIV USARMY CEMVN (USA); Behrens, Elizabeth H CIV USARMY CEMVN (USA)
Subject: [Non-DoD Source] RE: Pre-filing Meeting Request for St. Tammany Parish, Louisiana Feasibility Study
Date: Monday, April 12, 2021 1:26:47 PM

Thank you for submitting the Clean Water Act (CWA), Section 401 Water Quality Certification (WQC) pre-filing meeting request for the West Shore Lake Pontchartrain Environmental Mitigation project. The pre-filling request was received April 9, 2021.

LDEQ serves as the certifying authority for the state of Louisiana for CWA Section 401 WQC. At this time we do not require a scheduled pre-filing meeting.

No sooner than 30 days after submittal of the pre-filing meeting request, application may be made to LDEQ for water quality certification. Please submit the ENG 4345 (application or equivalent) and attachments submitted for Section 404 permitting no sooner than May 9, 2021 to:

DEQ-WaterQualityCertifcations@la.gov

From: Meden, Daniel C CIV USARMY CEMVN (USA) [mailto:Daniel.C.Meden@usace.army.mil]
Sent: Friday, April 9, 2021 1:41 PM
To: DEQ Water Quality Certifications <DEQ-WaterQualityCertifications@la.gov>
Cc: BAKER, EVERARD CIV USARMY CEMVN (USA) <Everard.Baker@usace.army.mil>; Behrens, Elizabeth H CIV USARMY CEMVN (USA) <Elizabeth.H.Behrens@usace.army.mil>
Subject: Pre-filing Meeting Request for St. Tammany Parish, Louisiana Feasibility Study

EXTERNAL EMAIL: Please do not click on links or attachments unless you know the content is safe.

Regarding the Pre- Filing Meeting Request requirement, we, the US Army Corps of Engineers, New Orleans District, respectfully make this request:

The project, St. Tammany Parish, Louisiana Feasibility Study, is located in St Tammany Parish. The project is the tentatively selected plan in response to the 2016 original study authority for investigating flood damage reduction and coastal storm reduction alternatives in St. Tammany Parish. The tentatively selected plan (TSP) involves 3 combined features:

1. Alternative 6c – A combined alternative of levee alignments, comprising approximately 16.3 miles (85,900 ft) of alignment with a combination of 14 miles of levees (73,700 ft) and 2.3 miles (12,200 ft) of floodwall located in the City of Slidell, Louisiana. The total proposed levee alignment will impact approximately 162 acres of construction area and require approximately 1,528,000 cubic yards of fill.
2. Bayou Patassat Channel Improvements – Located in a small tributary of Bayou Bonfouca, this feature involves approximately 0.17 miles (900 feet) of clearing and snagging (debris, trees, etc.) in this channel with approximately 2.6 acres of right-of-way total for improvements. All trees and debris cleared will likely be

chipped on site and then hauled to the nearest landfill.

3. Mile Branch Channel Improvements - This alternative consists of channel improvements on the lower 2.15 miles (11,341 ft channel) of Mile Branch in Covington with clearing and grubbing and approximately 130,000 cubic yards of material mechanically dredged from the channel. The Mile Branch channel improvements may also include bridge replacements or culverts.

The Applicant is the US Army Corps of Engineers, New Orleans District

Planning, Programs and Programs and Project Management Division
CEMVN-PDN-CEP
7400 Leake Avenue
New Orleans, LA 70118
ATTN: Daniel Meden
Daniel.c.meden@usace.army.mil
504-862-1014

The Agent or Point of Contact is the same as the Applicant.

Regards,

Daniel Meden
Biologist, Coastal Environmental Planning
RPEDS, New Orleans District
Office: 504-862-1014

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT

(33 CFR 325)

OMB APPROVAL NO. 0710-003
Expires October 1996

Public reporting burden for this collection of information is estimated to average 5 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters Service Directorate of Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0710-0003), Washington, DC 20503. Please DO NOT RETURN your form to either of those addresses. Completed applications must be submitted to the District Engineer having jurisdiction over the location of the proposed activity.

PRIVACY ACT STATEMENT

Authority: 33 USC 401, Section 10; 1413, Section 404. Principal Purpose: These laws require permits authorizing activities in, or affecting, navigable waters of the United States, the discharge of dredged of fill material into waters of the United States, and the transportation of dredged material for the purpose of dumping it into ocean waters. Routine Uses: Information provided on this form will be used in evaluating the application or a permit. Disclosure: Disclosure of requested information is voluntary. If information is not provided, however, the permit application cannot be processed nor can a permit be issued.

One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO.	***2. FIELD OFFICE CODE***	***3. DATE RECEIVED***	***4. DATE APPLICATION COMPLETED***

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME US Army Corps of Engineers, New Orleans District	*8. AUTHORIZED AGENT'S NAME AND TITLE (an agent is not required)* Same as Applicant
6. APPLICANT'S ADDRESS Planning , Programs and Programs and Project Management Division CEMVN-PDN-CEP 7400 Leake Avenue New Orleans, LA 70118 ATTN: Daniel Meden	***9. AGENT'S ADDRESS***
7. APPLICANT'S PHONE NOS. W/AREA CODE	*10. AGENT'S PHONE NOS. W/AREA CODE*
a. Residence ***b. Business*** (504) 862-1014	*a. Residence* *b. Business*

11. STATEMENT OF AUTHORIZATION

HARPER.MARSHALL.KEVIN.1536114358 Digitally signed by HARPER.MARSHALL.KEVIN.1536114358 Date: 2021.06.03 16:00:06 -05'00'

APPLICANT'S SIGNATURE *DATE*

NAME, LOCATION AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (see instructions)

St. Tammany Parish, Louisiana Feasibility Study

13. NAME OF WATERBODY, IF KNOWN (if applicable) *Bayou Patassat, Mile Branch*	*14. PROJECT STREET ADDRESS (if applicable)* *Not applicable. See #16 and #17 below for project coordinates and location.*
15. LOCATION OF PROJECT *St. Tammany* *Louisiana* *COUNTY* *STATE*	

17. DIRECTIONS TO SITES:

The proposed levee and floodwall alignments are contiguous with the existing Slidell levee alignment that crosses LA Hwy 10, west of Eden Isle. See Figure 2 (attached). Land access to the Bayou Patassat channel improvement site is through Bayou Lane or the existing pump station. The Mile Branch channel improvements start at the intersection of Mile Branch and Highway 190, crossing Highway 190 Business, and end at the intersection of Mile Branch and the Tchefuncte River.

18. Nature of Activity (Description of project, include all features.)

1 - Alternative 6c

This measure is a combination two alternatives with portions of levee alignment located within and west of Slidell (alternatives 5 and 6a). The two alignments are tied together with a railroad gate across the railroad tracks. The levee comprises approximately 16.3 miles (85,900 ft) of alignment with a combination of 14 miles of levees (73,700 ft) and 2.3 miles (12,200 ft) of floodwall located in the City of Slidell, Louisiana. The levee elevation varies depending on location. The total levee alignment will impact approximately 162 acres of construction area. This levee alignment will require approximately 1,528,000 cubic yards of fill.

The floodwall alignment consists of approximately 2 miles of floodwall segments. The typical T-wall section consists of a 3 ft thick, 8.5 ft wide slab with a 1.5 ft thick stem. The height of the stem varies. Preliminary assumptions are 1H:3V battered H12 x 74 piles, 60 ft deep, paired every 5 ft, and 30 ft deep steel PZ sheetpile. Approximately 1,850 square ft of slope protection will be provided at floodwall/levee tie-ins. The design of the T-wall including the foundation is subject to change once detailed geotechnical investigations are conducted.

Additional constructible features are included in this alternative: 5 pump stations and control structures, 3 sluicegates, 7 vehicular gates, 1 railroad gate, and 7 ramps. Interstate-10 will also be elevated.

See Figure 2 (attached) for the alignment of the levees, floodwalls, and additional features.

2 - Bayou Patassat channel improvements:

Bayou Patassat is a small tributary of Bayou Bonfouca. The preliminary design of the channel improvements assumes an existing bank elevation of 1 ft, a 10 ft bottom width at elevation (-) 5 ft. The bank is at 1V:3H slope. The work is located between Bayou Vincent pump station and Highway 11. Possible staging areas include the city owned land around the bayou and pump station or at the grassy area at the end of Bayou Lane. It will be assumed that access to the bayou will be via the city owned property along the channel. If necessary, a temporary culvert can be placed in the channel to allow for crossing over to the southernmost bank. Approximately 0.17 miles (900 ft) of clearing and snagging will occur in the channel. Material removed may include trees, debris, trash, or other obstructions within the waterway. For the channel improvement, approximately 2 acres of Right of Way (ROW) will be needed for a temporary easement within the channel. Approximately 0.6 acres of ROW will be tree clearing, with the majority of the work taking place on the southernmost bank. All trees and debris cleared will likely be chipped on site and then hauled to the nearest landfill. The nearest landfills are the Slidell Landfill and Waste Management.

3 - The Mile Branch channel improvements

This alternative consists of channel improvements on the lower 2.15 miles (11,341 ft channel) of Mile Branch in Covington. The preliminary design assumes an existing bank elevation of 1 ft, a 10-ft bottom width at elevation (-) 5ft. The bank is at 1V:3H slope. The improvements include clearing and grubbing and mechanical dredging of the channel. The channel bottom will be lowered by 5 ft. Approximately 20 acres of channel will be cleared and grubbed prior to mechanical dredging. An assumed maximum of 130,000 cubic yards of material may be mechanically dredged from the channel. Material removed may include sediment, trees, debris, or other obstructions within the waterway. For the channel improvements, approximately 34 acres of ROW will be needed for a temporary easement.

The Mile Branch channel improvements may include bridge replacements or culverts (starting from north to south) at 29th, 28th, 25th, 23rd, 21st, 19th, and 18th Avenues. No work is anticipated at the 15th and 11th Avenue channel crossings as those bridges have been replaced prior to this study (and the new bridges were designed to safely pass higher flows on Mile Branch).

19. Project Purpose (Describe the reason or purpose of the project, (see instruction.)

The project is the tentatively selected plan in response to the 2016 original study authority for investigating flood damage reduction and coastal storm reduction alternatives in St. Tammany Parish. Recent disasters and predicted future events will continue to negatively impact the region without some form of flood risk management solution.

See Figure 1 (attached) for the study area.

USE BLOCKS 20-22 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. Reason(s) for Discharge

The discharge is needed for the levee construction of Alternative 6c, and removing sediment for the channel improvement features following clearing and grubbing.

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards.

Approximately 1,528,000 cyd of levee grade material for construction of Alternative 6c levee alignment and approximately 130,000 cyd of levee grade material for the channel improvement features.

The project will follow the soil standards set for suitable levee grade material outlined in the USACE Hurricane Storm Damage Risk Reduction System (HSDRRS) Guidelines. Suitable borrow material is defined as meeting the following current criteria after placement as levee fill: soils classified as clays (CH or CL) are allowed as per the Unified Soils Classification System, soils with organic contents greater than 9% are not allowed, soils with plasticity indices (PI) less than 10 are not allowed, soils classified as Silts (ML) are not allowed, and clays will not have more than 35% sand content. A comprehensive list of regulations and authorities dictating the acquisition of borrow material can be viewed in the Borrow Source Investigations writeup. At this point in time, no soil testing has occurred for any of the five potential borrow sites. Additionally, there is no reason to believe any of the five sites hold contaminants as none are in close proximity to environmentally hazardous areas. Prior to use, the selected borrow site will be tested for contaminants.

22. Surface Area in Acres of Wetlands or Other Waters Filled (see instructions)

Placement of fill and construction materials at staging sites and along the footprint of the proposed hurricane storm damage risk reduction project will directly impact 111 acres of marsh on the western portion of the alignment. Fill placement will convert nearly all aquatic habitat within the footprint to upland habitat. There are 46 acres of marsh, BLH and swamp habitat along the southern half of the alignment that will be directly impacted. Additionally, the alignment crosses the northern extents of Big Branch Wildlife Refuge, and will directly impact existing substrate characteristics in that area.

23. Is Any Portion of the Work Already Complete? Yes _____ No _X___ IF YES, DESCRIBE THE COMPLETED WORK

24. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (If more than can be entered here, please attach a supplemental list.

25. List of Other Certifications or Approvals/Denials Received from other Federal, State or Local Agencies for Work Described in This Application.

AGENCY	***TYPE APPROVAL***	***IDENTIFICATION NO.***	***DATE APPLIED***	***DATE APPROVED***	***DATE DENIED***

To the best of my knowledge the proposed activity described in my permit application complies with and will be conducted in a manner that is consistent with the LA Coastal management Program.
**Would include but is not restricted to zoning, building and flood plain permits.*

26. Application is hereby made for a permit or permits to authorize the work described in this application. I certify that the information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

HARPER.MARSHALL.KEVIN.1536114358
Digitally signed by HARPER.MARSHALL.KEVIN.1536114358
Date: 2021.06.03 16:00:56 -05'00'

SIGNATURE OF APPLICANT __________ *DATE* __________ *SIGNATURE OF AGENT* __________ *DATE*

The application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency The United States knowingly and willfully falsifies, conceals, or covers up by any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statement or entry, shall be fined not more than $10,000 or imprisoned not more than five years, or both.

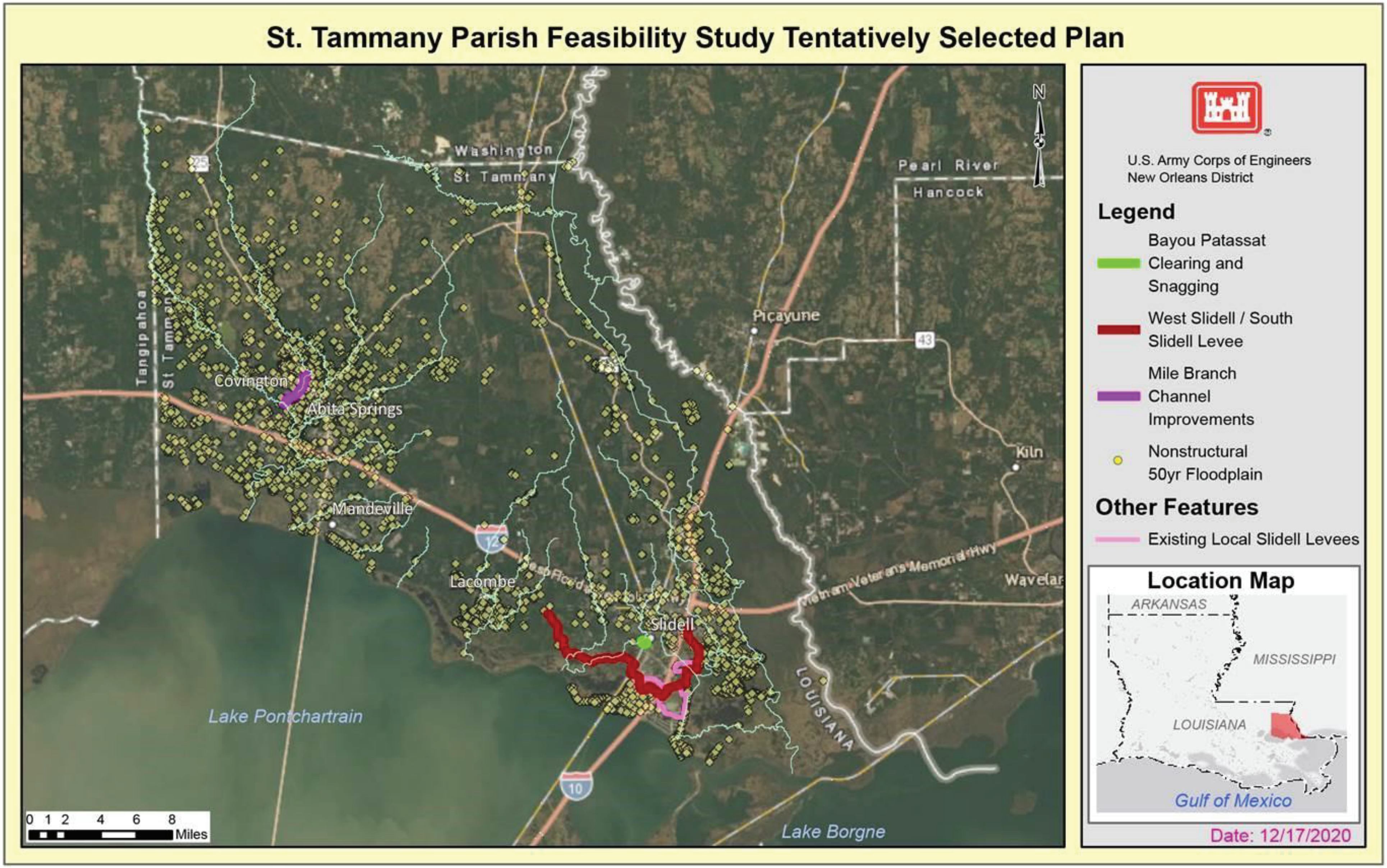


Figure 1. St. Tammany Study Area

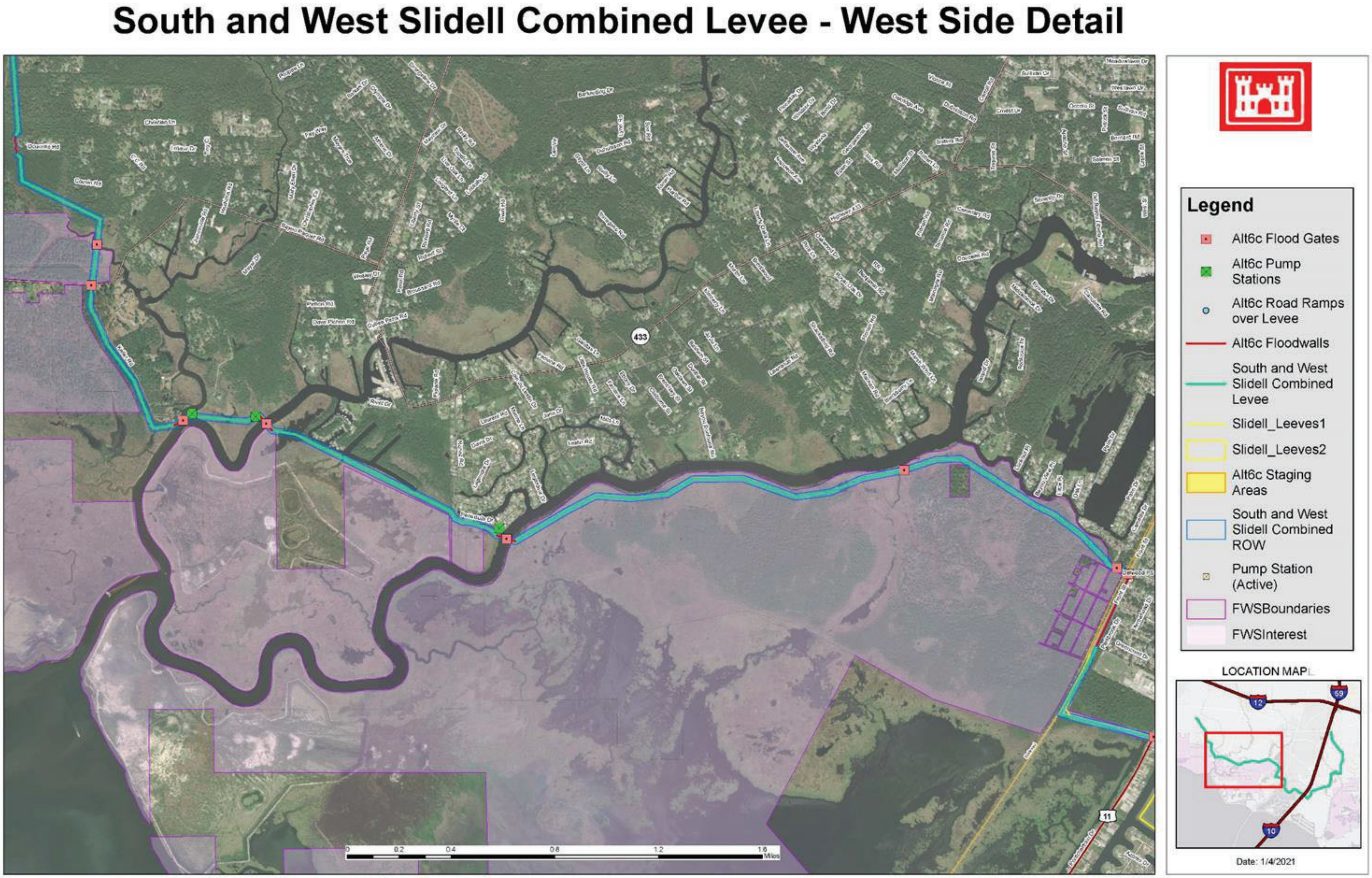


Figure 2. Project levee and floodwall alignment

Recreation Appendix

Within the study area there are two federal and five state public areas, comprising 143 square miles, which have been set aside to provide high quality recreation opportunities centered on natural resources: Big Branch National Wildlife Refuge, Bogue Chitto National Wildlife Refuge, Fairview-Riverside State Park, Fontainbleau State Park, Lake Ramsey Savannah Wildlife Management Area, Pearl River Wildlife Management Area, and St. Tammany Wildlife Refuge. Many of the parks offer hiking/biking trails, camping, and wildlife observation. Additionally, there are nearly 100 parish and city public areas within the study area consisting of green spaces, ball fields, playgrounds, indoor recreation facilities, paths and trails

The source of the information below can be found at the websites for each managing agency listed where applicable. An inventory was collected during October 2020 through GIS reference, website reference, and aerial imagery. Recreation resources within the study area are not limited to this list.

Table C:3-1. Public Recreation Resources within the Study Area

Federal, State, or Parish	Town or City	Name of Public Area	Managing Agency	Consumptive Recreation	Non-consumptive Recreation	Boat Launch	Additional Notes
National Wildlife Refuge (NWR)							
Federal	Lacombe, Eden Isle	Big Branch National Wildlife Refuge	US Fish and Wildlife	Fishing and Hunting	Hiking, Interpretation, Wildlife Observation, Nature Photography	Yes	15,000 acres LWCF
Federal	Pearl River, Bush, Sun	Bogue Chitto National Wildlife Refuge	US Fish and Wildlife	Fishing and Hunting	Hiking, Wildlife Observation, Nature Photography	Yes	36, 000 acres LWCF
Louisiana State Parks							
State	Madisonville	Fairview - Riverside State Park	Louisiana State Parks	Fishing	Hiking, Camping, Playground, Swimming, Interpretation, Wildlife Observation, Nature Photography	Yes	99 acres LWCF (1969)
State	Mandeville	Fontainbleau State Park	Louisiana State Parks	Fishing	Hiking, Biking, Camping, Interpretation, Wildlife Observation, Nature Photography	Yes	2,800 acres LWCF (1972, 1973)
Wildlife Management Areas (WMA)							
State	Covington	Lake Ramsey Savannah Wildlife Management Area	Louisiana Department of Wildlife & Fisheries	Fishing and Hunting	Hiking, Camping, Wildlife Observation, Nature Photography	No	796 acres

Federal, State, or Parish	Town or City	Name of Public Area	Managing Agency	Consumptive Recreation	Non-consumptive Recreation	Boat Launch	Additional Notes
State	Slidell, Pearl River	Pearl River Wildlife Management Area	Louisiana Department of Wildlife and Fisheries	Fishing and Hunting	Hiking, Camping, Wildlife Observation, Nature Photography	No	35,619 acres LWCF (1979)
State	Lacombe	St. Tammany Wildlife Refuge	Louisiana Department of Wildlife & Fisheries	Fishing and Hunting	Wildlife Observation, Nature Photography	No	1,310 acres LWCF (1972, 1974)
Parish and City Recreation							
Parish	Abita Springs	Recreation District #11 / Charlie Finn Memorial Ballpark	St Tammany Parish	None	Ballfields, Indoor Rec. Center	No	LWCF (1980)
Parish	Abita Springs	Abita Springs Park	St Tammany Parish	None	Playground, Pavilion, Splash Pad	No	LWCF (1973)
City	Abita Springs	Abita Springs Trailhead (Tammany Trace)	City of Abita Springs	None	Trailhead, Interpretation, Playground, Walking, Hiking, Biking, Horseback Riding, Wildlife Observation, Nature Photography	No	Tourist Park and Trailhead Museum
Parish	Bush	Recreation District #2	St Tammany Parish	None	Ballfields, Indoor Rec. Center	No	None
Parish	Bush	Ball Field (near Hwy 41 @ Watts-Thomas Rd)	St Tammany Parish	None	Ballfield	No	None
Parish	Covington	Recreation District #14 / Coquille Parks and Recreation	St Tammany Parish	None	Ballfields, Tennis Courts, Playgrounds, Splash Pad, Indoor Rec. Center	No	LCWF (2010, 2014)
Parish	Covington, Abita Springs, Mandeville, Lacombe, Slidell	Tammany Trace	St Tammany Parish	None	Walking, Hiking, Biking, Horseback Riding, Interpretation Wildlife Observation, Nature Photography	No	31 Miles
Parish	Covington	Recreation District #6 / Lee Road Recreation / Johnny F. Smith Memorial Park	St Tammany Parish	None	Ballfields, Indoor Rec. Center	No	None
City	Covington	Covington Trailhead	City of Covington	None	Interpretation, Amphitheater, Walking, Hiking, Biking, Horseback	No	None

Federal, State, or Parish	Town or City	Name of Public Area	Managing Agency	Consumptive Recreation	Non-consumptive Recreation	Boat Launch	Additional Notes
		(Tammany Trace)			Riding, Wildlife Observation, Nature Photography		
City	Covington	Bogue Falaya Park	City of Covington	Fishing	Boardwalk, Playground, Wildlife Observation, Nature Photography	Yes	None
City	Covington	Rev. Peter S. Atkins Memorial Park	City of Covington	None	Playground, Pavilion, Pool	No	None
City	Covington	1st Avenue Park (Nose Park)	City of Covington	None	Playground, Walking Track, Boardwalk, Wildlife Observation, Nature Photography	No	LCWF (1995)
City	Covington	Bogue Chitto Park	City of Covington	None	Pavilion, Wildlife Observation, Nature Photography	No	None
City	Covington	Columbia Street Landing	City of Covington	Fishing	Pavilion, Wildlife Observation, Nature Photography	Yes	None
City	Covington	Menetre Public Boat Launch	City of Covington	Fishing	Wildlife Observation, Nature Photography	Yes	None
City	Covington	Hubie Gallagher Park	City of Covington	None	Playground, Tennis Courts	No	None
City	Covington	Covington Recreational Complex	City of Covington	None	Ballfields, Playground	No	None
City	Covington	Ozone Ballfield	City of Covington	None	Ballfields	No	None
Parish	Covington	Pretty Acres Dog Park & Walking Trail	St Tammany Parish	None	Walking Track, Dog Park	No	None
Parish	Covington	Covington Pathways Park/Ball field	St Tammany Parish	Fishing	Canoe/Kayak Launch	Yes	None
Parish	Covington	3 Rivers Road Boat Launch	St Tammany Parish	Fishing	Boat Launch	Yes	None
Parish	Folsom	Ball Fields (near Folsom Junior High)	St Tammany Parish	None	Ballfields	No	None
Parish	Folsom	Recreation District #12 / Magnolia Park	St Tammany Parish	None	Ballfields, Indoor Rec. Center, Walking Track, Fitness Equipment, Playground	No	None

Federal, State, or Parish	Town or City	Name of Public Area	Managing Agency	Consumptive Recreation	Non-consumptive Recreation	Boat Launch	Additional Notes
Parish	Lacombe	Lacombe Trailhead (Tammany Trace)	St Tammany Parish	None	Trailhead, Interpretation, Walking, Hiking, Biking, Horseback Riding, Wildlife Observation, Nature Photography	No	None
Parish	Lacombe	Recreation District #4 / Bayou Lacombe Park	St Tammany Parish	None	Playground, Indoor Rec. Center	No	None
Parish	Lacombe	John Davis Park	St Tammany Parish	None	Park	No	None
Parish	Lacombe	John Davis Gym & Community Center	St Tammany Parish	None	Indoor Rec. Center	No	None
Parish	Lacombe	Henry Keller Memorial Park	St Tammany Parish	None	Ballfields	No	None
Parish	Lacombe	Main Street Boat Launch	St Tammany Parish	Fishing	Boat Launch	Yes	None
Parish	Madisonville	Recreational Center & Ball Field (Main St. @ Bordeaux Ct.)	St Tammany Parish	None	Ballfield, Tennis Courts, Walking Trail	No	None
Parish	Madisonville	Ball Fields (Pine St. @ Jahncke St.)	St Tammany Parish	None	Ballfields	No	None
Parish	Madisonville	Joseph S. Koepp Playground	St Tammany Parish	None	Playground	No	None
Parish	Madisonville	Freedom Boat Club	St Tammany Parish	Fishing	Marina	Yes	None
City	Mandeville	Mandeville Trailhead (Tammany Trace)	City of Mandeville	None	Trailhead, Splash Park, Interpretation, Walking, Hiking, Biking, Horseback Riding, Wildlife Observation, Nature Photography	No	None
Parish	Mandeville	Pelican Park - Recreation District #1	St Tammany Parish	None	Ballfields, Courts, Gyms, Dog Park, Indoor Recreation, Skate Park, Walking Trail	No	LCWF (1991, 1995)
Parish	Mandeville	Koop Drive Trailhead and Kids Connection Playground	St Tammany Parish	None	Playground, Trailhead, Interpretation, Walking, Hiking, Biking, Horseback Riding,	No	None

Federal, State, or Parish	Town or City	Name of Public Area	Managing Agency	Consumptive Recreation	Non-consumptive Recreation	Boat Launch	Additional Notes
		(Tammany Trace)					
Parish	Mandeville	Paul Cordes Park	St Tammany Parish	None	Tennis Courts, Basketball Court, Playgrounds, Pavilions	No	None
City	Mandeville	E. Lakefront Children's Park	City of Mandeville	None	Playground, Splash Pad	No	None
City	Mandeville	Neighborwoods	City of Mandeville	None	Hiking, Interpretation, Wildlife Observation, Nature Photography	No	LDEQ Funding
City	Mandeville	Sunset Point and Fishing Pier	City of Mandeville	Fishing	Wildlife Observation, Nature Photography	No	None
City	Mandeville	Tyler Thomas Park	City of Mandeville	None	Covered Basketball Court, Playground	No	None
City	Mandeville	Mandeville Lakefront Park	City of Mandeville	Fishing	Walking / Jogging Path, Gazebo, Playground, Wildlife Observation, Nature Photography	No	None
City	Mandeville	Harbor Field (Moore Field)	City of Mandeville	None	Ballfield	No	None
Parish	Mandeville	Lake Pontchartrain Yacht Club	St Tammany Parish	Fishing	Boat Launch	Yes	None
City	Pearl River	Pearl River Park	City of Pearl River	None	Playground, Pavilions, Wildlife Observation, Nature Photography	No	None
Parish	Pearl River	Hickory Recreation Center / Poitevent Park / Cavenham Park	St Tammany Parish	None	Ballfield	No	LWCF (1987)
City	Pearl River	Children’s Playground (Town Hall)	Town of Pearl River	None	Playground	No	None
Parish	Slidell	Camp Salmen Nature Park	St Tammany Parish	None	Hiking, Playground, Interpretation, Wildlife Observation, Nature Photography	No	LWCF (Interpretive Trails 2008, 2010)
City	Slidell	Heritage Park	City of Slidell	Fishing	Boardwalk, Walking /Paths, Playgrounds, Splash Pad, Amphitheater, Boating, Wildlife Observation, Nature Photography	Yes	Bayou Bonfouca Superfund site, LDEQ Funding

Federal, State, or Parish	Town or City	Name of Public Area	Managing Agency	Consumptive Recreation	Non-consumptive Recreation	Boat Launch	Additional Notes
City	Slidell	John Slidell Park	City of Slidell	None	Ballfields, Playground, Pavilion, Walking Trail	No	LWCF (1991)
City	Slidell	Fritchie Park	City of Slidell	None	Ballfields, Indoor Recreation, Gazebo, Pavilion, Walking, Hiking	No	None
City	Slidell	Possom Hollow Park (Rufus Viner Center)	City of Slidell	None	Playground, Ballfields, Walking Trail with Workout Stations, Ballcourt, Pavilions	No	LCWF (1967, 1970, 1979)
City	Slidell	Griffith Park	City of Slidell	None	Playground, Gazebo, Pavilion	No	None
City	Slidell	Country Club Tot Land	City of Slidell	None	Playground	No	None
City	Slidell	Grafton Park	City of Slidell	None	Gazebo	No	None
City	Slidell	Cawthorne Park	City of Slidell	None	Playground	No	None
City	Slidell	Veterans Memorial Park	City of Slidell	None	Memorial Park	No	None
City	Slidell	Duckworth Park	City of Slidell	None	Playground, Ballfield, Pavilion	No	LWCF (1986)
City	Slidell	Wimbledon Park	City of Slidell	None	Playground	No	None
City	Slidell	Rue Rochelle Park	City of Slidell	None	Playground	No	None
City	Slidell	Rue Miramon (Bon Village)	City of Slidell	None	Playground	No	None
City	Slidell	Village North Park	City of Slidell	None	Playground	No	None
City	Slidell	Breckenridge Park I	City of Slidell	None	Playground	No	None
City	Slidell	Breckenridge Park II	City of Slidell	None	Greenspace	No	None
City	Slidell	Breckenridge Trail	City of Slidell	None	Walking Trail	No	None
City	Slidell	Cardinal Drive Lot	City of Slidell	None	Greenspace	No	None
City	Slidell	Forest Manor Park	City of Slidell	None	Greenspace	No	None
City	Slidell	St. Christopher Lot	City of Slidell	None	Greenspace	No	None
City	Slidell	Brugier Park	City of Slidell	None	Gazebo	No	None

Federal, State, or Parish	Town or City	Name of Public Area	Managing Agency	Consumptive Recreation	Non-consumptive Recreation	Boat Launch	Additional Notes
City	Slidell	Griffith Park	City of Slidell	None	Gazebo, Playground	No	None
City	Slidell	Sam Bosco Park	City of Slidell	None	Playground	No	None
City	Slidell	Lakewood Park	City of Slidell	None	Playground	No	None
City	Slidell	Park Place	City of Slidell	None	Greenspace	No	None
City	Slidell	South Street Park	City of Slidell	None	Greenspace	No	None
City	Slidell	Reine Avenue Park	City of Slidell	None	Playground	No	None
City	Slidell	Riviera Park	City of Slidell	None	Playground	No	None
City	Slidell	Olive Drive Park	City of Slidell	None	Playground	No	None
Parish	Slidell	Slidell/Carollo Trailhead (Tammany Trace)	St Tammany Parish	None	Walking, Hiking, Biking, Horseback Riding, Wildlife Observation, Nature Photography	No	None
Parish	Slidell	St Tammany Fishing Pier	St Tammany Parish	Fishing	Fishing Pier	No	None
Parish	Slidell	White Kitchen Swamp	St Tammany Parish	Fishing	Boardwalk	Yes	None
Parish	Slidell	Old Pearl River Boat Launch	St Tammany Parish	Fishing	Boating	Yes	None
Parish	Slidell	East Pearl River Boat Launch	St Tammany Parish	Fishing	Boating	Yes	None
Parish	Slidell	Crawford Landing	St Tammany Parish	Fishing	Boating	Yes	None
Parish	Slidell	Lake Road Boat Launch	St Tammany Parish	Fishing	Boating	Yes	None
Parish	Slidell	Bayou Liberty Boat Launch	St Tammany Parish	Fishing	Boating	Yes	None
Parish	Slidell	The Dock N Bait Shop	St Tammany Parish	Fishing	Boating	Yes	None

Federal, State, or Parish	Town or City	Name of Public Area	Managing Agency	Consumptive Recreation	Non-consumptive Recreation	Boat Launch	Additional Notes
Parish	Slidell	Trestles Boat Launch	St Tammany Parish	Fishing	Boating	Yes	None

USFWS data source: http://www.fws.gov/refuges/?ref=topbar
USFS data source: http://www.fs.usda.gov/
LDWF data source: http://www.wlf.louisiana.gov/page/wmas-refuges-and-conservation-areas
St. Tammany Parish data source: http://www.stpgov.org/residents/parks-and-recreation

According to the United States Department of the Interior National Park Service Land & Water Conservation Fund (LWCF), approximately $3.75 million in LWCF funds has supported 31 recreation projects within the study area since 1965. LWCF recreation projects in the study area since 1965 are listed in Table C:3-2.

Table C:3-2. Land & Water Conservation Fund: Study Area Recreation Projects since 1965

State	County	Grant ID Element	Grant Element Title	Grant Sponsor	Fiscal Year	Amount
Louisiana	St. Tammany	N/A	Big Branch Marsh National Wildlife Refuge	US Fish and Wildlife	N/A	N/A
Louisiana	St. Tammany	N/A	Bogue Chitto National Wildlife Refuge	US Fish and Wildlife	N/A	N/A
Louisiana	St. Tammany	N/A	Southeast Louisiana NWR Complex	US Fish and Wildlife	N/A	N/A
Louisiana	St. Tammany	81	Possum Hollow Acquisition	City of Slidell	1967	$21,017.77
Louisiana	St. Tammany	84	Pearl River Boat Ramp	St. Tammany Parish Police Jury	1967	$18,912.84
Louisiana	St. Tammany	129	Fairview Camping Area	La Office of State Parks	1969	$49,028.13
Louisiana	St. Tammany	130	Possum Hollow Development	City of Slidell	1970	$75,536.32
Louisiana	St. Tammany	170	Poitevent Game Management Area	La Wildlife & Fisheries Comm.	1972	$737,806.28
Louisiana	St. Tammany	208	Fontainebleau Camping	La Office of State Parks	1972	$143,798.86
Louisiana	St. Tammany	231	Abita Springs Park	Town of Abita Springs	1973	$10,893.30
Louisiana	St. Tammany	250	Fontainebleau Picnic Shelter	La Office of State Parks	1973	$13,151.74
Louisiana	St. Tammany	252	Poitevent Addition	La Wildlife & Fisheries Comm.	1974	$369,523.38
Louisiana	St. Tammany	323	Mandeville Recreation Area	Town of Mandeville	1976	$55,869.58

State	County	Grant ID Element	Grant Element Title	Grant Sponsor	Fiscal Year	Amount
Louisiana	St. Tammany	490	Mandeville Recreation Areas	Town of Mandeville	1978	$10,832.60
Louisiana	St. Tammany	511	Possum Hollow Additions	City of Slidell	1979	$75,654.03
Louisiana	St. Tammany	575	Pearl River WMA Addition	Louisiana Wildlife & Fisheries Comm.	1979	$935,003.00
Louisiana	St. Tammany	598	C. J. Finn Field	Town of Abita Springs	1980	$0.00
Louisiana	St. Tammany	609	Pearl River Development	Town of Pearl River	1980	$0.00
Louisiana	St. Tammany	625	Pearl River - Boyet	Town of Pearl River, La.	1980	$12,889.00
Louisiana	St. Tammany	632	Slidell Northeast Park	City of Slidell	1980	$369,827.79
Louisiana	St. Tammany	647	Madisonville Donation	Town of Madisonville	1981	$134,034.96
Louisiana	St. Tammany	721	Ducksworth Park	City of Slidell	1986	$22,094.39
Louisiana	St. Tammany	738	Pearl River/Hickory Park	St. Tammany Parish Dist. Rec. Bd. 7	1987	$0.00
Louisiana	St. Tammany	783	John C. Slidell Park	City of Slidell	1991	$18,046.29
Louisiana	St. Tammany	784	St. Tammany Dist. 1 Recreation Complex	St. Tammany Rec. Dist.1	1991	$52,040.33
Louisiana	St. Tammany	811	First Avenue Park	City of Covington	1995	$30,769.04
Louisiana	St. Tammany	818	Pelican Park Improvements	Rec. Dist. 1/Health & Human Services	1995	$49,663.82
Louisiana	St. Tammany	908	Camp Ridge Interpretive Trail	St. Tammany Parish	2008	$97,685.55
Louisiana	St. Tammany	912	Camp Salmen Interpretive Trail	St. Tammany Parish Government	2010	$46,647.50
Louisiana	St. Tammany	917	The Great Park at Coquille	St. Tammany Recreation	2010	$150,000.00
Louisiana	St. Tammany	931	Coquille Park Playground	St. Tammany Recreation District #14	2014	$250,000.00

Source: https://www.lwcfcoalition.com/map-of-lwcf
Data accessed October 2020

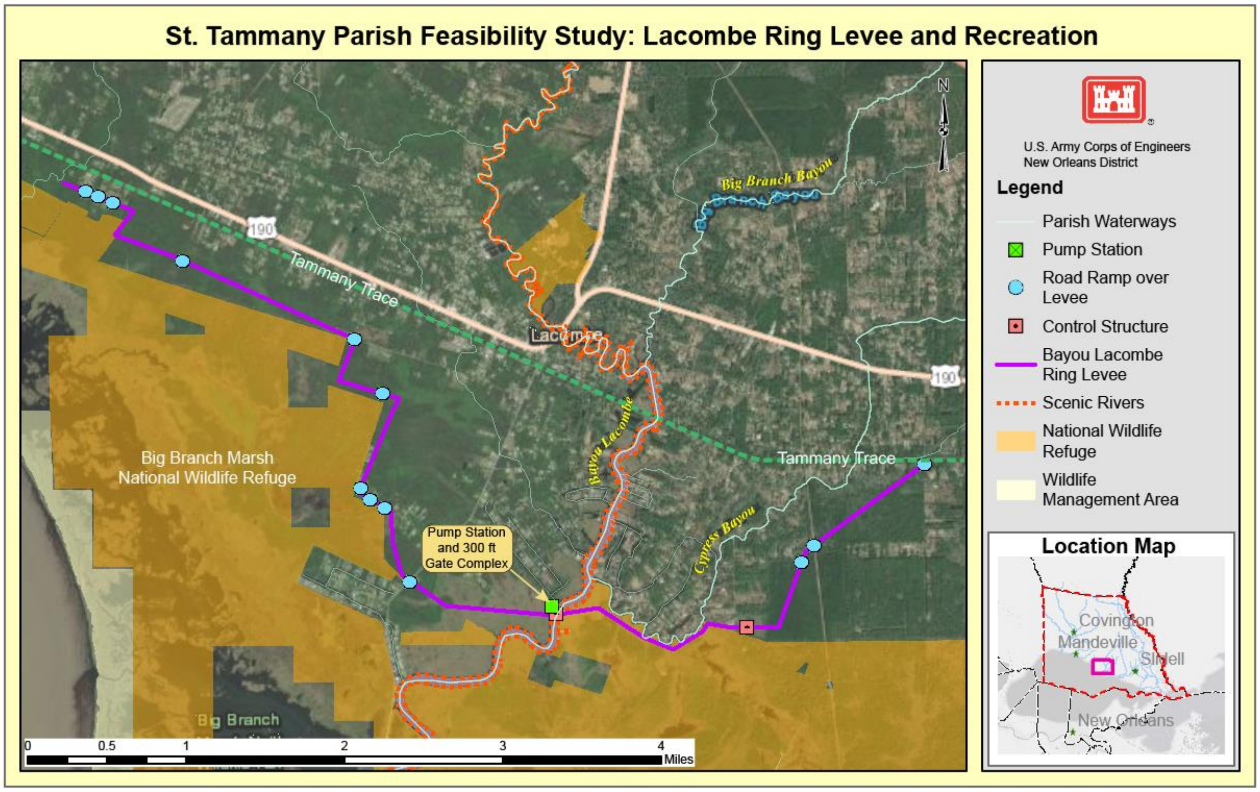


Figure C:3-3. Bayou Lacombe Ring Levee and Recreation

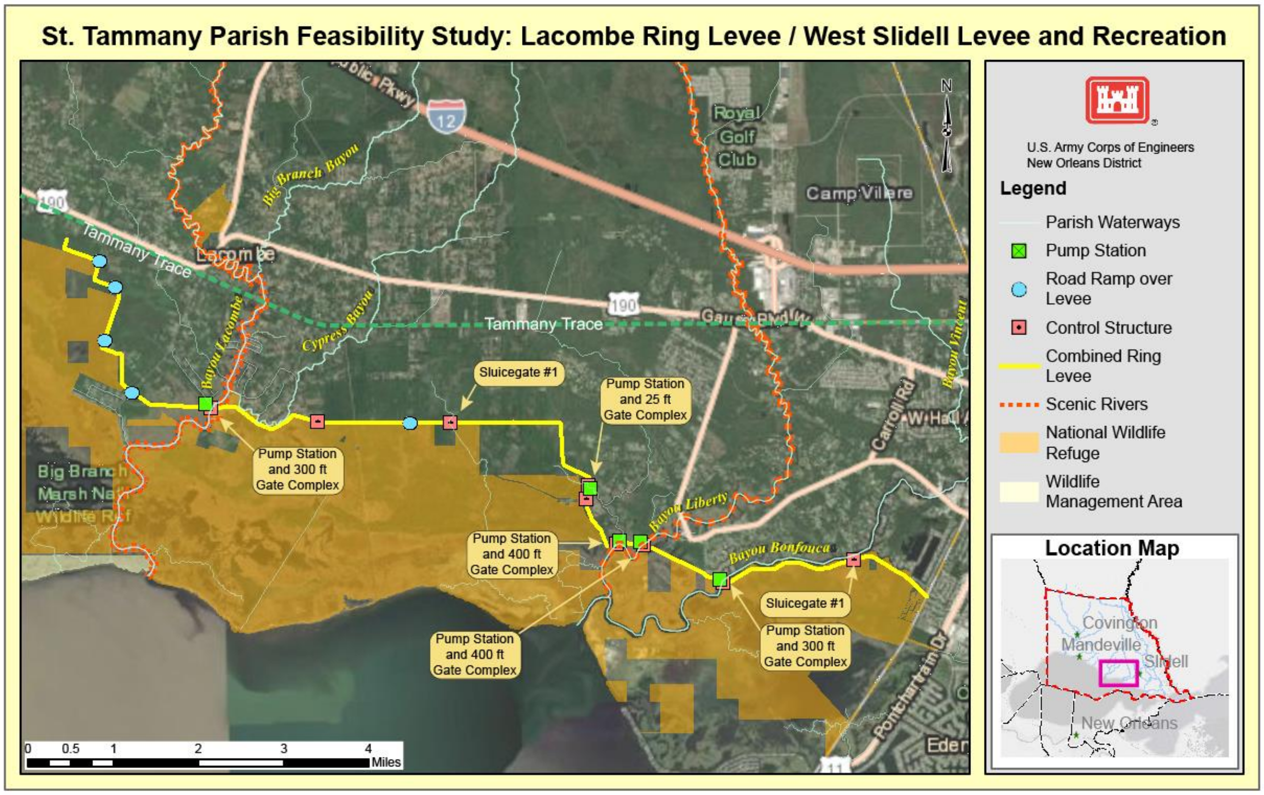


Figure C:3-4. Lacombe Ring Levee Combined with West Slidell Levee

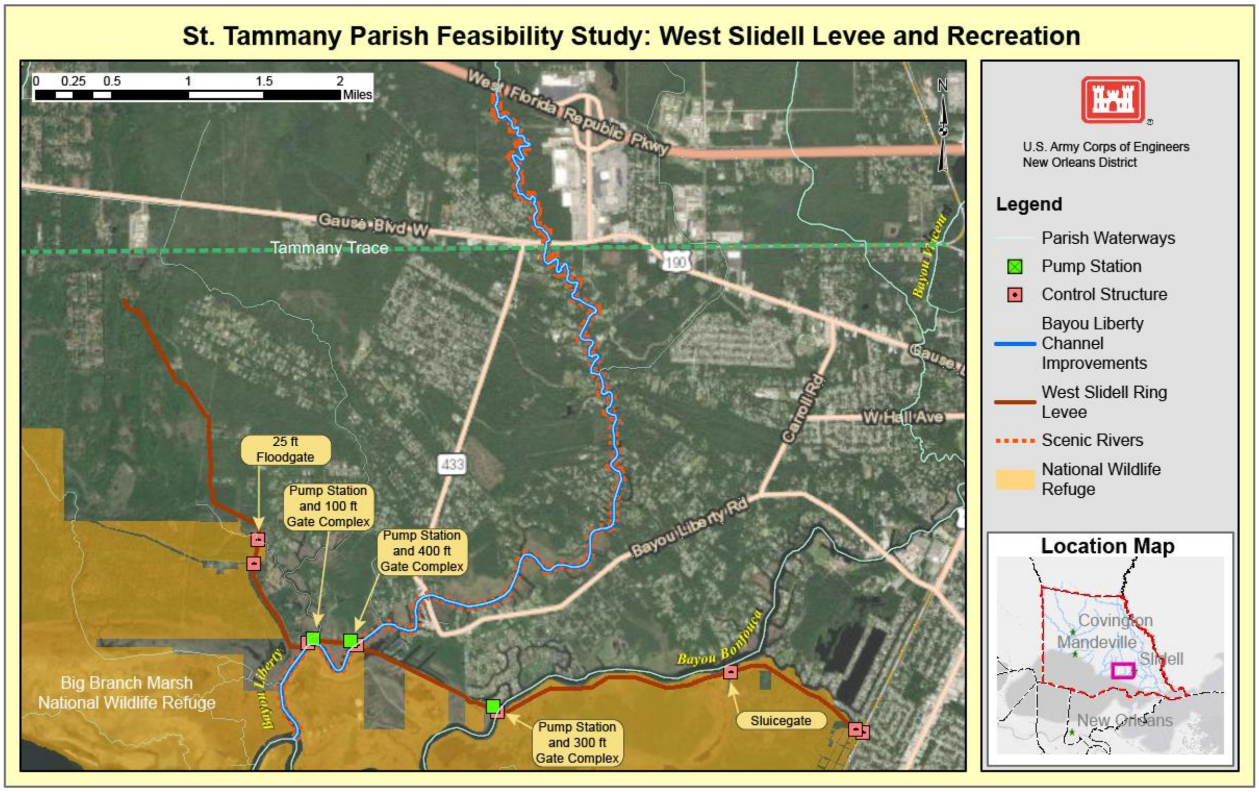


Figure C:3-5. West Slidell Levee and Recreation

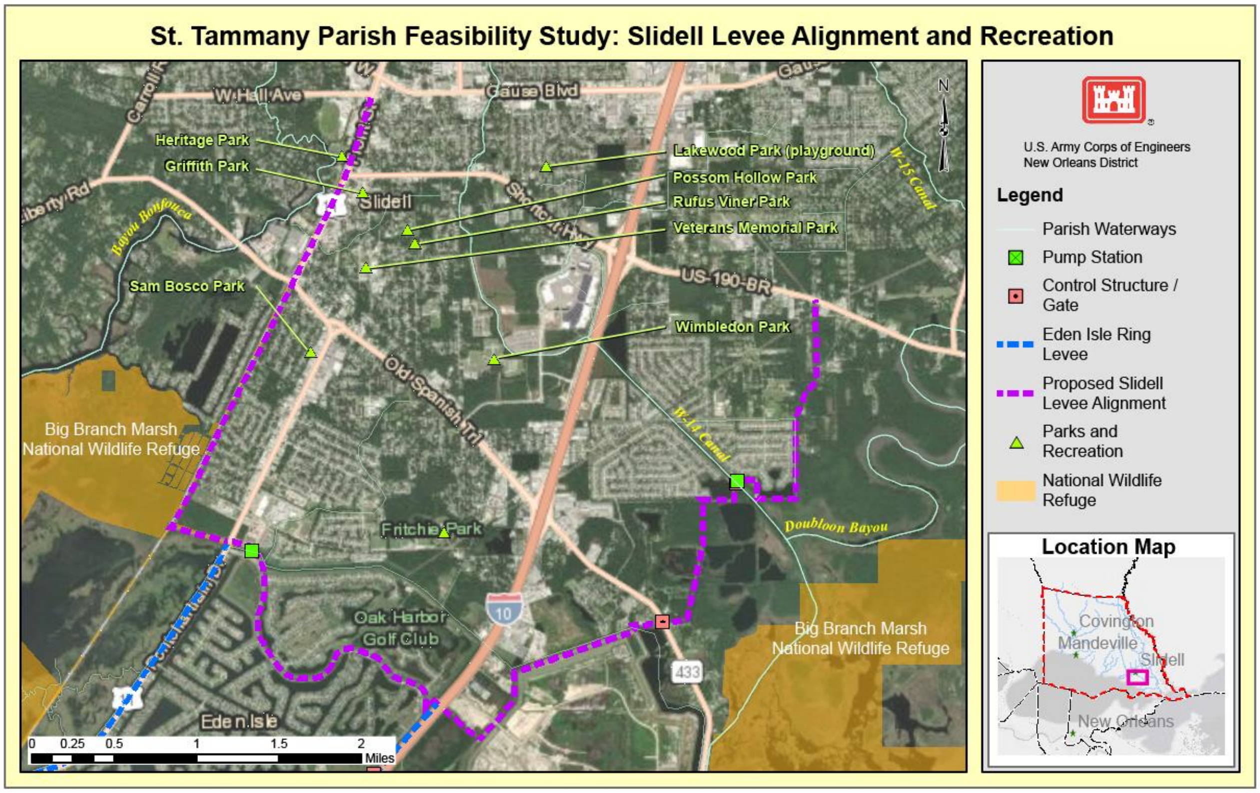


Figure C:3-6. Slidell Levee and Recreation

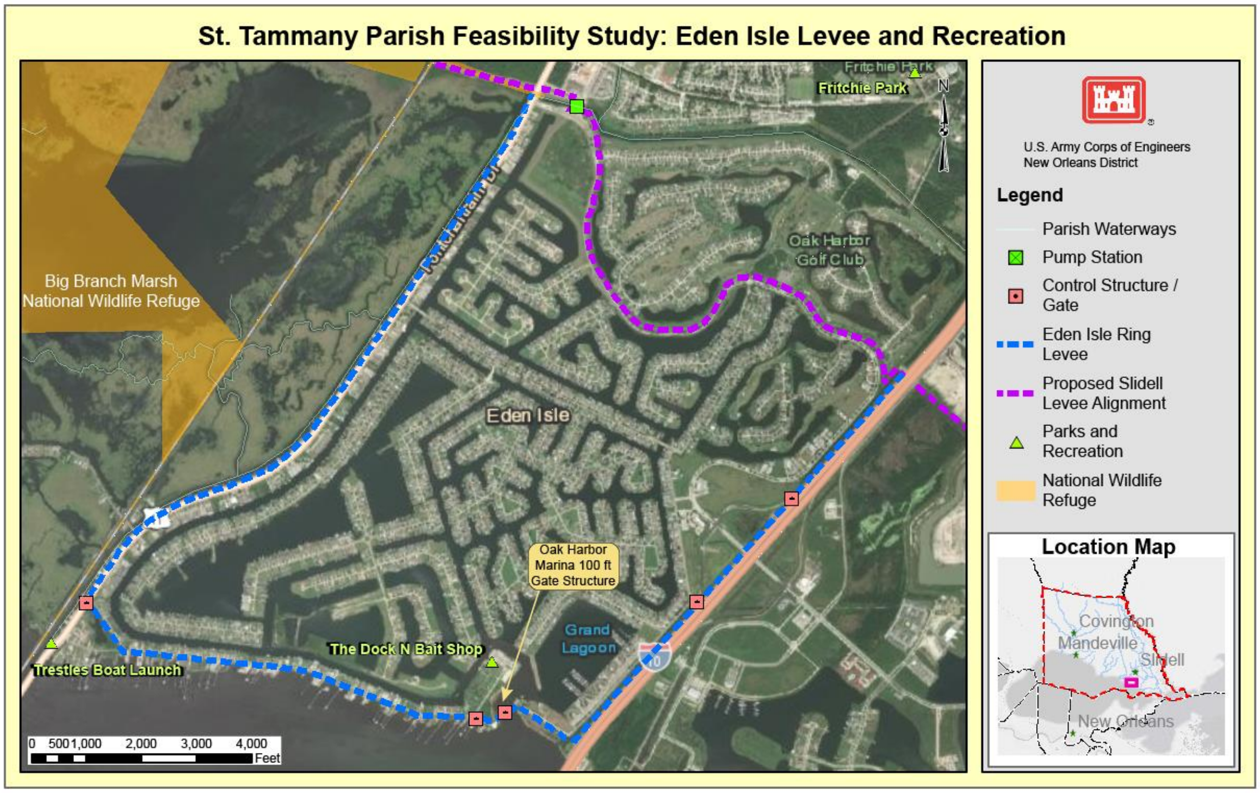


Figure C:3-7. Eden Isle Levee and Recreation

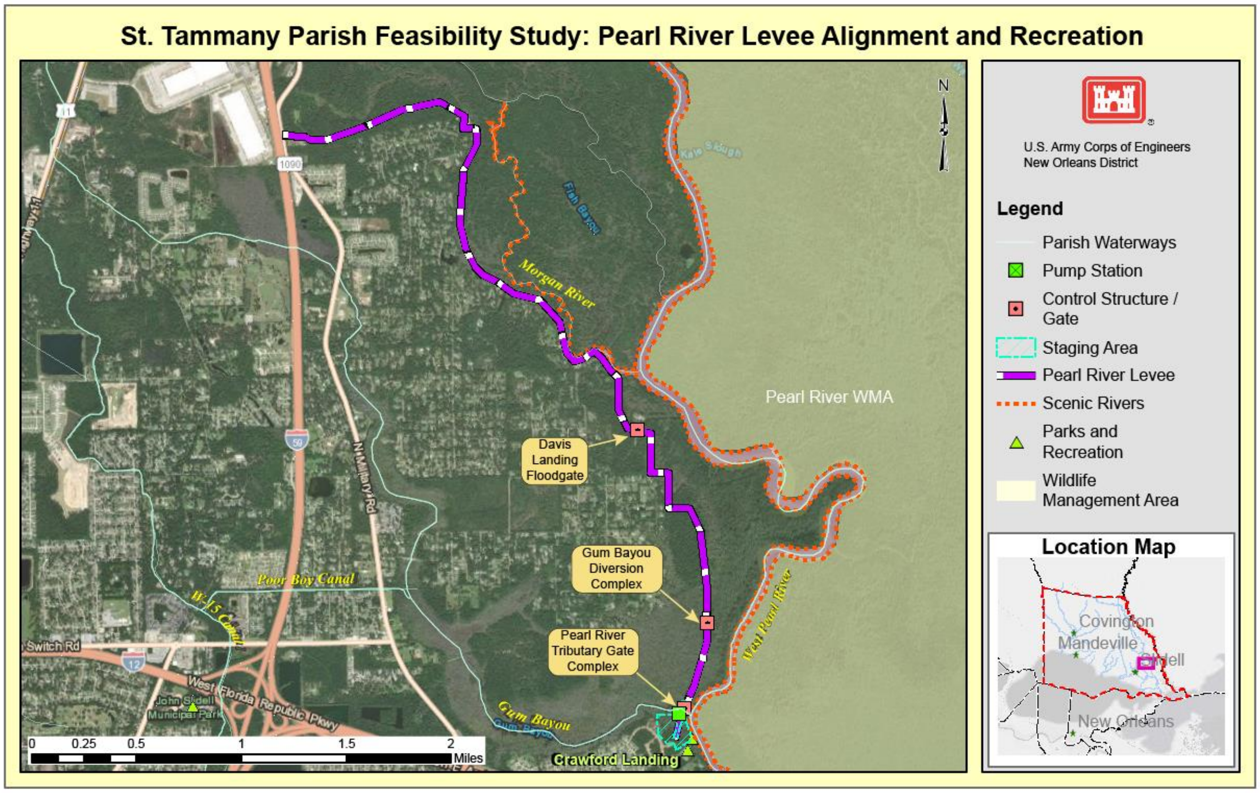


Figure C:3-8. Pearl River Levee and Recreation

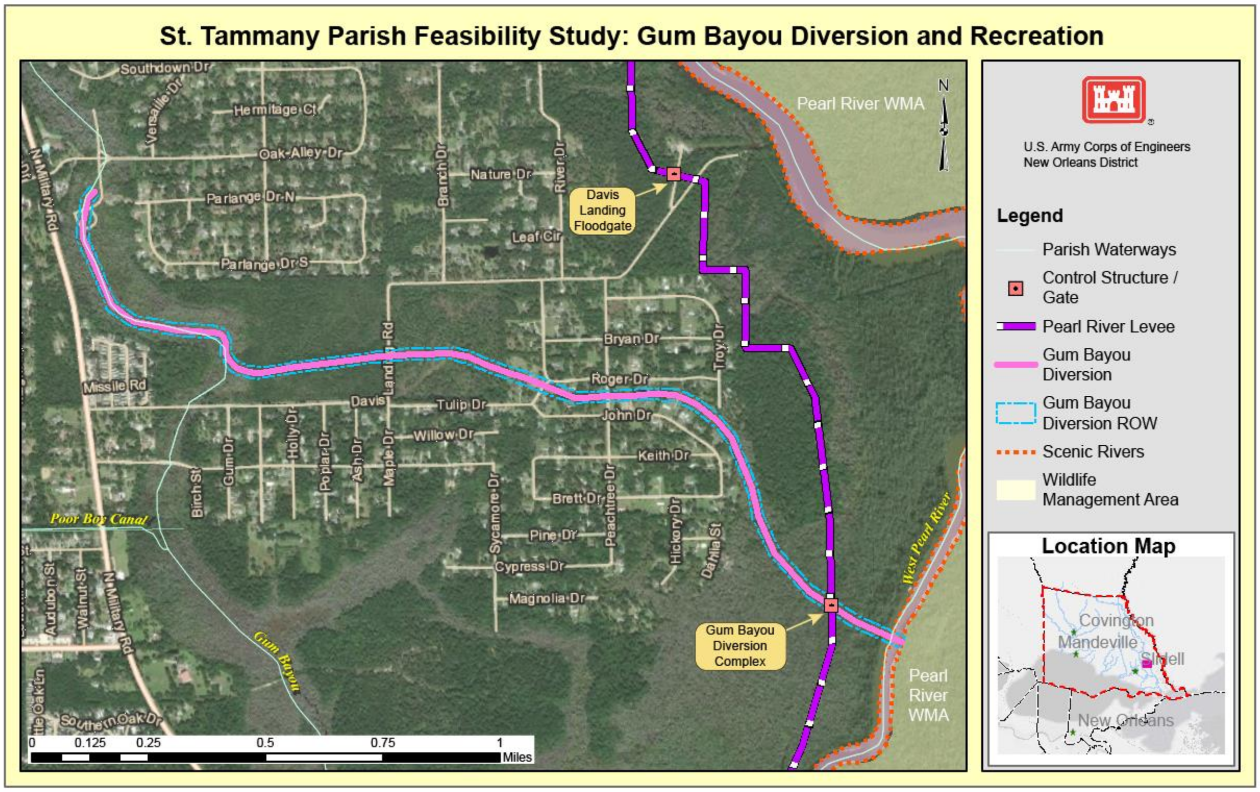


Figure C:3-9. Gum Bayou Diversion and Recreation

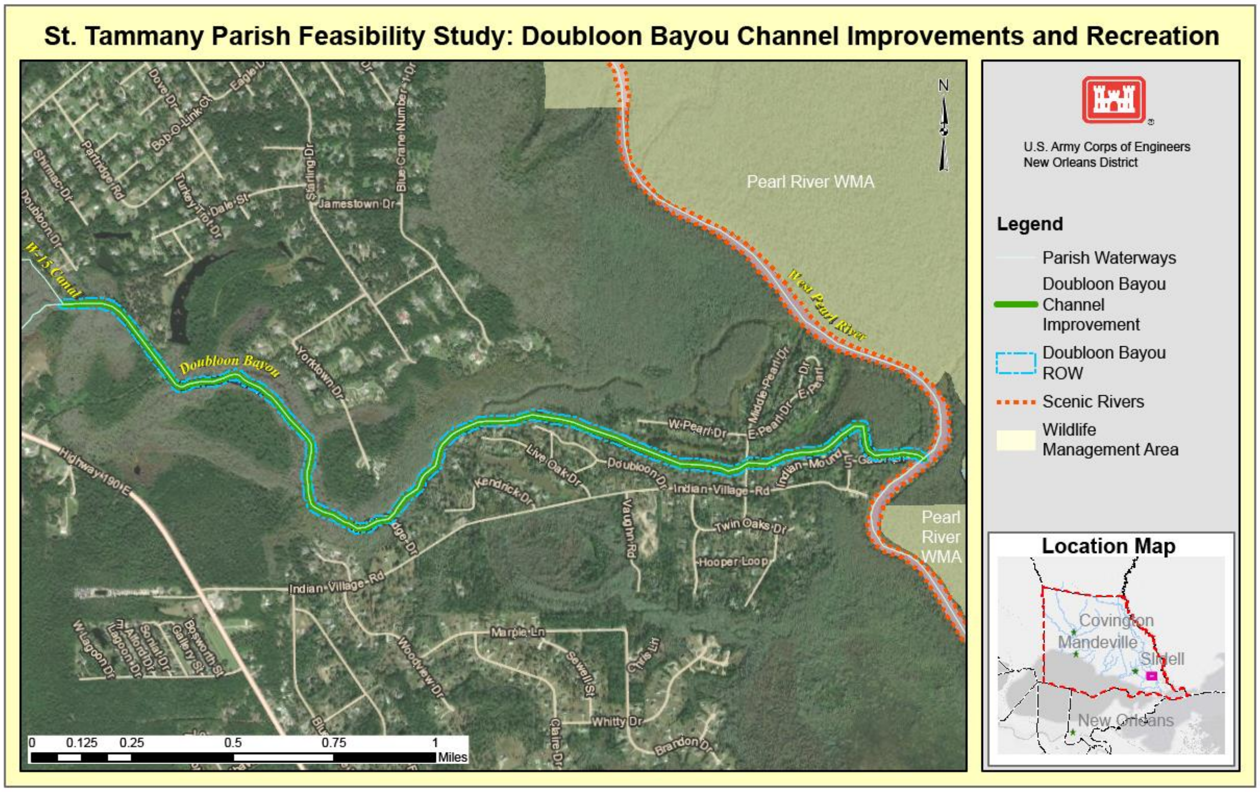


Figure C:3-10. Doubloon Bayou Channel Improvements and Recreation

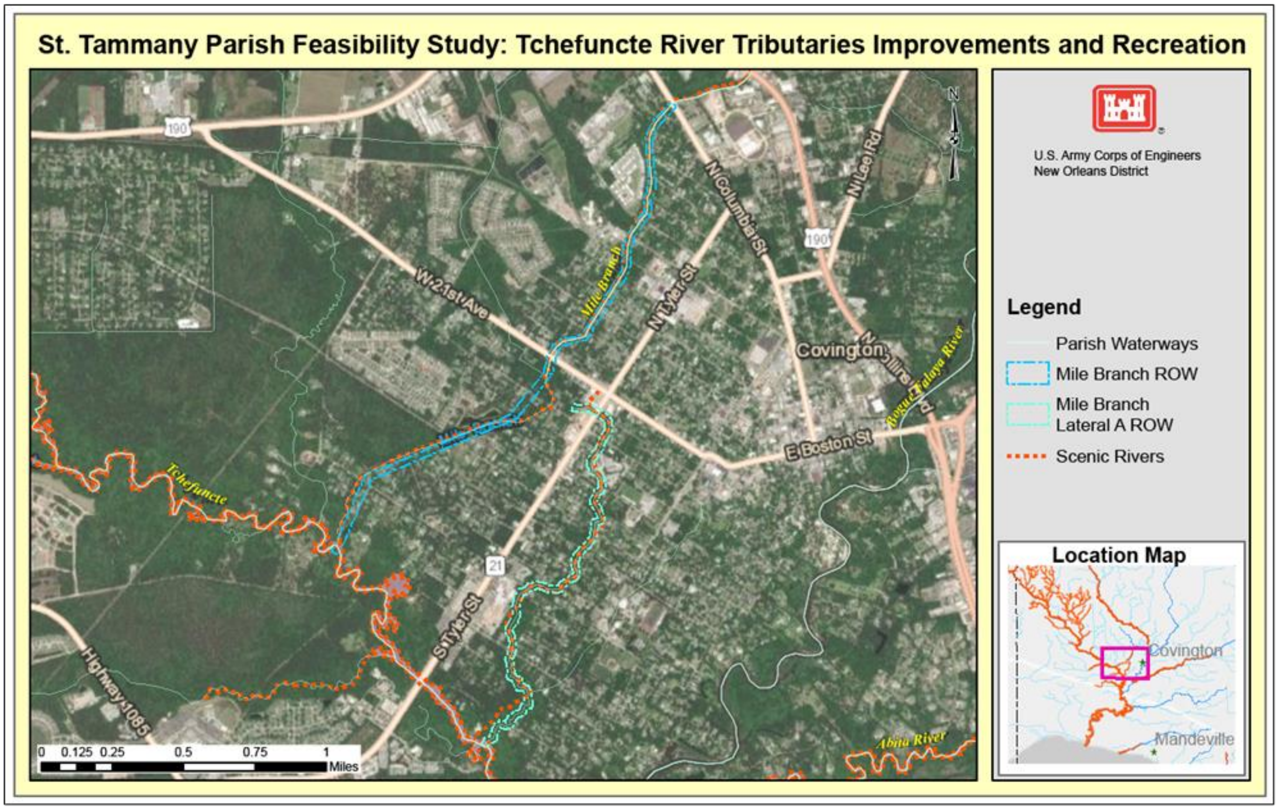


Figure C:3-11. Mile Branch and Mile Branch Lateral A Channel Improvements

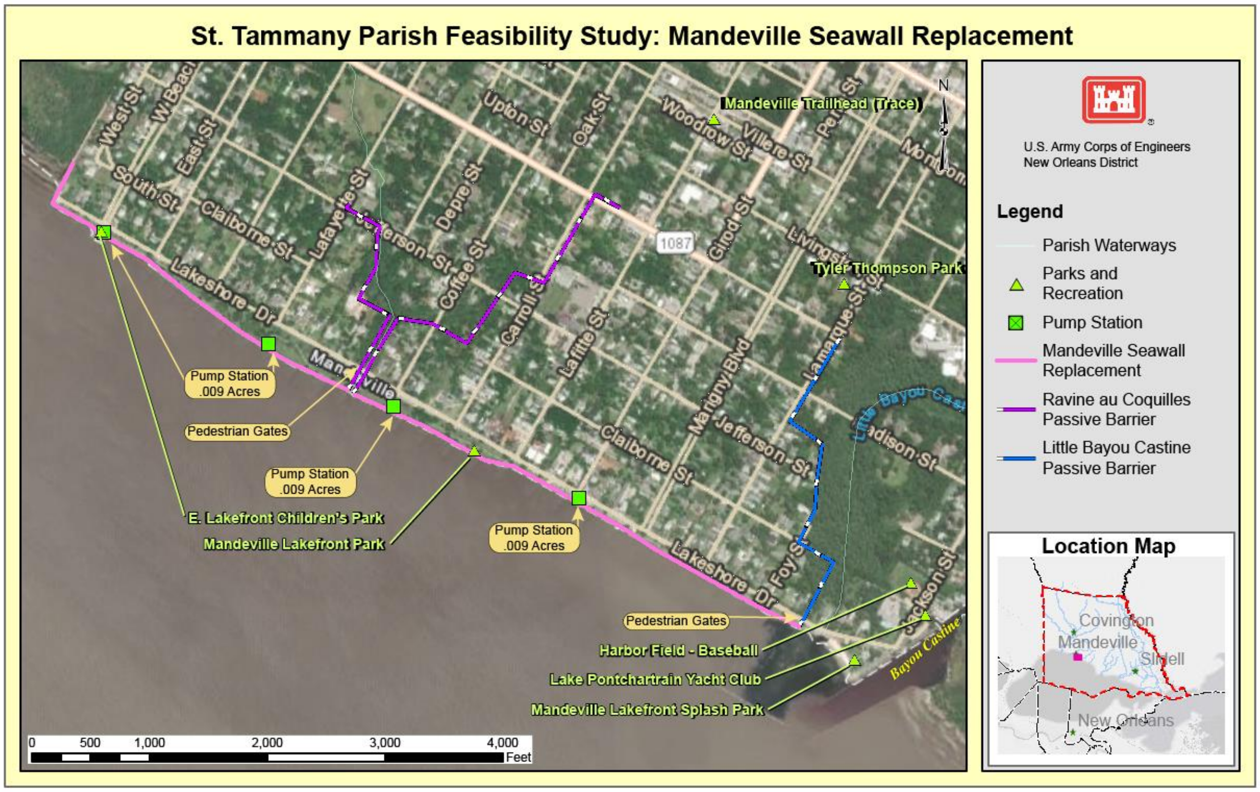


Figure C:3-12. Mandeville Seawall Replacement with Passive Barrier and Recreation

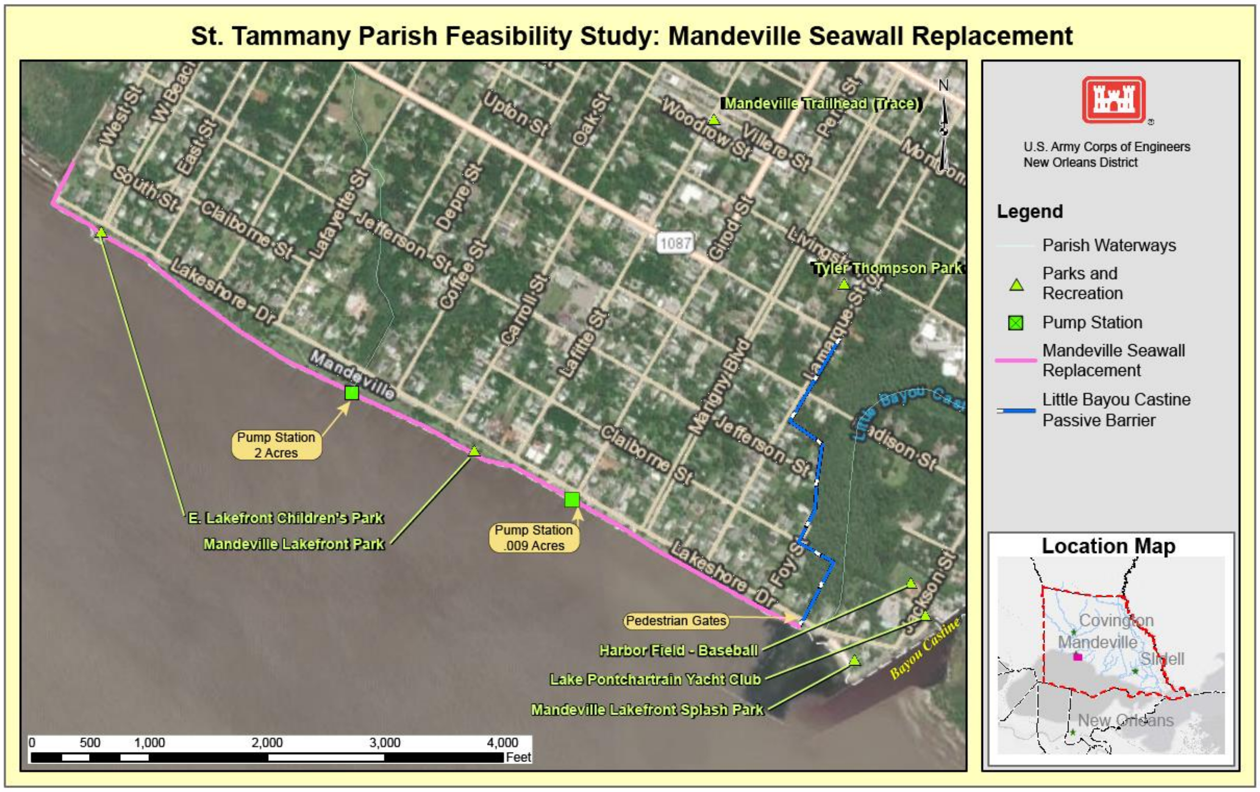


Figure C:3-13. Mandeville Seawall Replacement with Pump Stations and Recreation

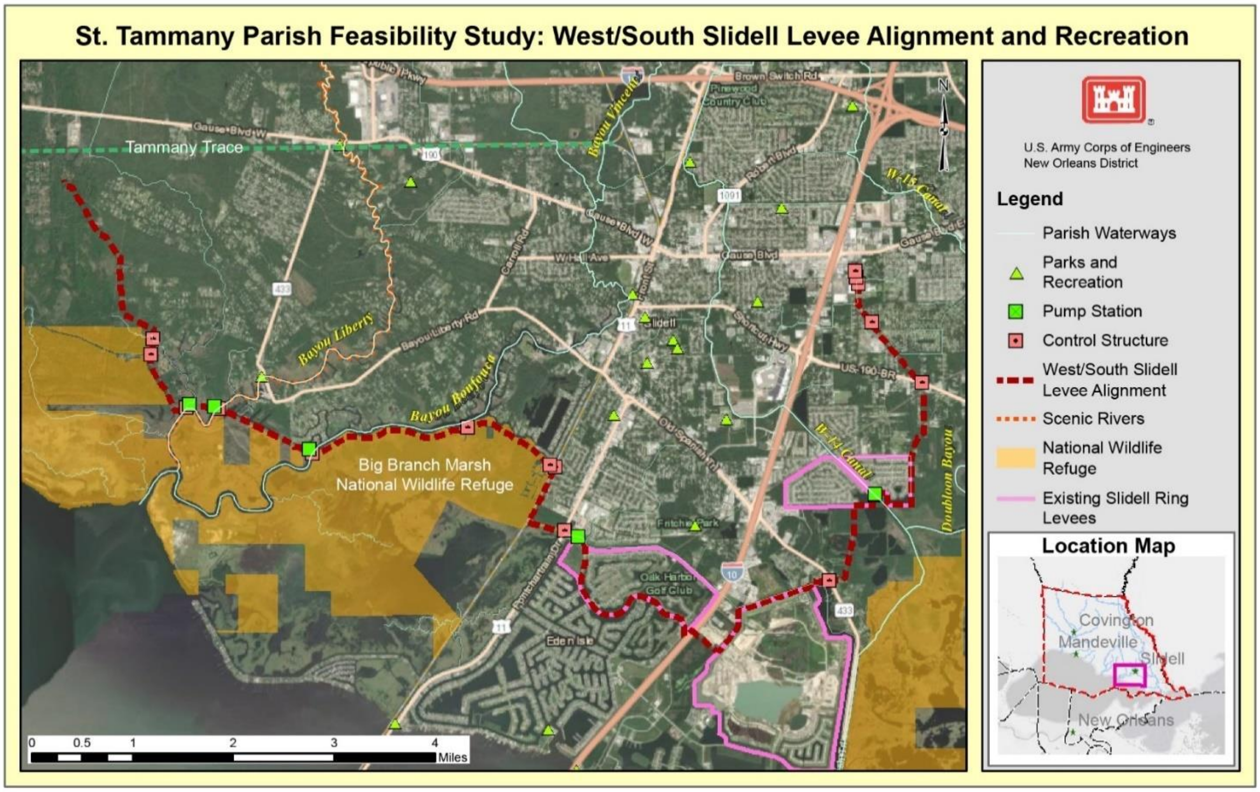


Figure C:3-14. TSP West / South Slidell Levee and Recreation

Prescoping Public Meeting Notes

02/11/2020 Mandeville

Amy:

Parish Council Members highly concerned over how the Water Shed Initiative will affect the study. Parish council members aware of the lack of parish wide flood plain management plan. Planning on developing a plan, but concerned the state will end up sending out regulations that will trump whatever plan they create… "St. Tammany parish has some of the strictest building codes/requirements, but we can't do anything about what Washington Parish does to their part of the watershed." I would like to see the requirements; I will attempt to make friends with the council member, Maureen Obrien, however she wants us to come to her planning meetings.

Silver Jackets is a thing for the lakefront. Is there a full report? What parts do we have?

Michelle:

- Mayor and others supportive of plans in the silver jackets report which included elevations would of Monroe Street
- Northern parts of the parish have drainage concerns
- Levee district project to shore up Galvez to reduce erosion. Included a 71/2 wall instead of 5 feet. Has pictures to show waves overtopping the parts of the wall that were not raised.
- 1ft increase seawall was not supported by residents even thought it was going to reducetheir flood insurance rates.
- Levee board president is lead engineer for the city of Mandeville
- Levee board president- there needs to be an analysis done of the impact of the local leveesand the impacts of those levees on surrounding areas
    - Are they inducing flooding in other areas
- Support for analysis of the flood gate at the rigolets

2/12/2020-Slidell

Michelle:

- Residents wanted to talk to FEMA about insurance rates
    - looking to reduce flood insurance premiums
- induced flooding from local ring levees
- Doubloon Bayou flooding/ River Oaks Subdivision
    - 2 channels; the one that goes to west pearl river silted in and have had resistance getting it dredged due to scenic river restrictions?
- MRA-Military Road Alliance of home owners encompasses 14 subdivisions
    - Jerry Whitman [redacted]
        - Has data that they have sent to USACE and Levee District but can provide data to us if needed
- Barrier islands and marsh restoration needed
- Need floodplain management plans
- Need better permitting

Elizabeth 02/12/2020- Slidell Public Meeting

-Cathy Domangue

-[redacted]

-Bayou Liberty UNO Studies

Oak Harbor

-major hurricane, coastal, N.O./Slidell

Inlets outside levee

-2 feet water in their house

East Side of the Pearl

-stopped dredging, backed everything up Glass Beach

-No dredging affecting neighborhoods

French Branch, I-10/ I-12, Pearl River

I-10 levee system

-Torres Levee

-Oak Harbor Levee

-Elevate I-10 to connect levees

Rigolets Old Spanish Trail

-Floodgates I-10 Interstate Exit 236 elevate this portion

Railroad through lake

-eye wall, lake existing, levee run towards Gause Blvd.

Enter off Lake Pontchartrain Marina

-Cement walls knocked down during Hurricane Katrina

-Could we repair these walls? Who owns these walls?

-Contact [redacted]

Lakeview Drive

-levee Eden Isles, Natural levee

-hit wall and comeback into the subdivisions

I-12 Bayou Liberty

-water comes rapidly

-Uninsured individuals

-Small house South Bayou Liberty Wildlife Refuge

-Who will maintain maintanence?

Area	Comment	
Bayou Liberty	Bayou Liberty Vs US Army Corps of Engineers; converged ACE permit to fill wetlands two build Walmart and sams club; camp salmon and other land on bayou liberty were set aside after 2000 for flood control; jeanne.strangle@gmail.com 9852591188 Camp Salmon Nature Park	flooding
s of 112; n of 190, east of 434	developed 6000 acres of wetlands in Lacombe	environme
south of paquet rd.	"protect these wetlands"	idea
cc rd.	20" of water in home	opposition
110 LeFleur Dr n of bayou paquet rd. w of hwy 433	2.5 Ft of water in Katrina	
s of bayou paquet rd. w of 433	new invasive species of plant	
s of bayou paquet rd. W of 433	seeing flooding I area now even without rain events, entire neighborhood ingress and egress issues	
s of bayou paquet rd. e of 433 gain rd. by bayou liberty	Louis Monte property floods for each TS and hurricane	
s of bayou paquet rd. e of 433	noted increase in the # of flood events in last 24-36 months	
s of bayou paquet rd. e of 433	perhaps dredge bayou bonfouca to deepen and fill marsh	
s of bayou paquet rd. e of 433	water over road w south wind and high tide	
s of bayou paquet rd. e of 433 105 marina Ln. coin du lestin	flooding east wind	
s of bayou paquet rd. e of 433	flooding with wind and rain	
s of bayou paquet rd. e of 433	in 67 years I have never seen water as high as it has been in 2019	
s of bayou paquet rd. e of 433	put breakwaters off of lake dr	
34222 Laurent Rd	flooding (vic trenchard)	
Reilly rd.	please tour Reilly rd. cannot get in or out of home (Francois Cousin)	
south of 190 at Northshore Blvd.	friends of camp salmon: flooding in Katrina and 1995	
south of 190 at Northshore Blvd.	historical sites camp salmon François cousin's home	
BELOW HERE IS EDEN ISLES		
between hwy 11 and i10	build breakwaters with wind turbines	
hwy 11 at the lake	install flood wall along rail road track	
between hwy 11 and i10	need structural flood wall here	
homer street and hwy 11	? Flooding? No comment	
Lakeview dr	very much opposed to barrier	

between hwy 11 and i10	put breakwaters here	
I 10 at the lake	put flood gate here	
i10 at lake west side	opposed to any barrier on roads, build breakwaters	
200 Lakeview dr	cj molaison (no comment just name)	
340 Moonraker	flooding john cervini	
115 Moonraker	3.5 feet of flooding with Katrina (12 foot elevation)	
139 Moonraker	Katrina flooded home street flooding in heavy rain	
201 MOONRAKER	flooded	
Eden isles	the Slidell levee is making Eden isles more at risk for surge	
2005 Clipper Estates	Katrina Flooded	
marina dr entrance to Eden isles	floods badly in heavy rains	
Eden isles	Eden isles is the most vulnerable community in st. tammany	
2005 clipper estates Slidell	Katrina flooding	
marina dr entrance to Eden isles	very slow drainage with rain	
1102 Clipper	4 feet in house with Katrina since levees built in Slidell and NO East water comes up significantly higher than ever	
104 Moonraker	(flooding) southeast wind and heavy rain	
1102 Clipper	Eden isles Blvd. floods with all storms and traps us in subdivision. It is significantly more frequent and greater amount since Slidell and NO East levees built	
120 Moonraker	flooding mostly with southeast winds	
clipper estates	flooding with Katrina 6-8" and I am at 13.87'	
Eden isles	we need a flood barrier as we are out of any protection a surge barrier	
114 Moonraker	southeast wind flood	
232 Blackfin Cove	George renciker; flood and high water protection is much needed in our area	
211 valiant lane	4 feet of water in house 15 feet surge flooding in street (tropical storms)	
123 Chamaera Ln.	Katrina flooded	
108 ordine lane	4 feet in house Katrina house 12 ft above water over docks 3-4 times a year Hwy 11 floods	
constellation	southeast winds	
1216 clipper	4 feet of water in house	
Eden isles (northern)	inlets 22" water in house	
123 chimaera	pam young flood Katrina	
north Eden isles	raising levees behind oak harbor will result in higher flood water to homes not behind levee	

I 10 at northern Eden idles	elevate 1-10 to connect tarnes levee and oak harbor levee	
below here is above Eden isles between hwy 11 and I 10		
hwy 11 at the lake	homes docks and outbuildings (flooded?)	
northern Eden isles	no wall on Lakeview dr close with gates @cack (?) and Rigolets pass	
northern Eden isles	lost 1st floor	
123 magnolia bend	9" Katrina	
2001 First Street	ilowny Dunham insurance 4.5' in Katrina	
i10 and 433	flood gate by old Spanish trail and i10 exit to stop water coming from Rigolets	
carey st. and hwy 11	flooding	
190 E @ hwy 11	flooded	
190 E @ hwy 11	chamale bayou Vincent floods every storm since 2002	
1064 Michigan ave	please help I lost my house Jason shafleae #justiceforshaflette	
E of i10, s & W of hwy 433		
on hwy 433	Suzanne's house	
145 medley Ln.	flooding at high tide; storm surge; wind from south; flooding due to flood plain turned into lakeshore estates; property at 4.5-5.5' above sea level; > 3000' from canal; see high tide all ditches in neighborhood flow into my property must stop over to drain; lakeshore estates pump station pump to canal less than 1//4 mil from my home; house was elevated to 9.5' 10(?) years ago; hwy 433 drains into my neighborhood no relevant impact study when lakeshore estates levee erected was all wetlands; canal overtopped and flowed into marsh ; wetlands significantly reduced storm surge (Vincent knaver 9852156560	
East of i59/i10/i12 interchange		
in the lake east of i10	need to stop the water from coming into lake pontchartrain	
190/90	apple pie ridge civil war sites?	
Fritichie marsh	SELA dredging zydeco fill 14/15 happening?	
west of 190 above Fritichie marsh	"target zone"	
Fritichie marsh	"retention pond"	
w of 1090 n of 190E Frenchman's estates	flooding Katrina now street flooding with heavy rains	
pearl river	dredge bayou Vincent and pearl done historically not maintained now flooding	
pearl south of 90	dredge west pearl at glass beach	

pearl north of 190/90 interchange	dredge ;bayou doubloon into west pearl	
Eden Isles	5 feet of water inside home. Lived in since 1991. Lost house and all contents.	
Chubasco Lane	Flooded one time with Katrina. Water Higher now after Katrina. Property Value poor.	
Chamale Drive 70460	Street flooding. Lateral drainage issues. Flooding of Bayou Vincent and Bayou Bonfouca every time wind blows from South and storms	
106 Belle Helene	Flooding at Katrina. Low Elevation. Flood insurance cost.	
Eden Isles	Strong south winds pushes extensive water in backyards.	
Clipper Estates	Living in a bowl. Katrina. High Taxes. High Property Values.	
Camp Salmen Nature Park	Set aside by St. Tammany Parish for Flood Control- really helps	
428 Eden Isles Drive	Lost Home and 2 businesses.	
Eden Isle	Surge flooding. High Cost Insurance. Lost of value of home.	
117 Shirmac Drive	Christine Owen. Flooding from Katrina	
39266 Mayfair Drive	Flooded for the first time in Katrina. 9 feet of water in house. Second time Isaac 24 inches	
2104 1st Street Slidell	Rick F. House raised and flooded 2 1/2 inches.	
Marina Drive- Eden Isles	If flood second time will not be able to get flood insurance.	
226 Lakeview Drive	Jim Burns. Close all pass into Lake	
Eden Isles	Flooded once. Lived in house since 1980. 6 feet of water.	
1158 Clipper Drive	Flooding Katrina	
I-10 Interstate	Floods from Lake to reach?	
Lake Harbor Middle School	Slow drainage	
Grande Maison Blvd.	Entrance Road floods	
Mandeville Lakefront	Flooding	
Monroe Street	Silver Jackets	
Tintella Road Off Hwy 1077	just gave location (no comment)	
Boston Street	Gauge broke all time record by 3.0 feet in 2016.	
Downtown Covington	Flooded for 3 blocks along the Bogue Falaya River in 2016 flood.	
1077 West of Parish	In 2016 house flooded for the first time. Built in 1978	
No Location	Study of inducements because of ring levees	
CC Road	Flooded in Katrina	
Lacombe	Too much development happening too quickly in wetland areas.	
Rigolets	just gave location (no comment)	
No Location	Rock Jetties	
207 W. Camellia Drive	No comment Glenn T.	

I-10/ Lakeview Drive	Dump concrete along I-10 bridge. Cheapest way. Good for fishing. No levee on Lakeview Drive	
Frenchmen's Estates	3 FEMA Lots. 1 other residence still floods	
Hwy 11/ Eden Isles	Hwy 11 closing only 1 way out of Eden Isles	
Lakeview dr	lost 2 homes parents and own. nothing remained permits to rebuild.	
pontchartrain dr	floods	
clipper estates	2005 Katrina flooded	
river oaks	house flooded in Katrina; yard stays flooded	
i10 s 190	update comprehensive study of SE STP	
hwy 90	flood barrier here	
coin de lestin	Katrina 19 ft? (very shaky writing, pink note)	
114 Moonraker dr	flooded 4 ft of water (Edwin peynocx)	
?	dpeyrouxa@bellsouth.net; $10,800	
French branch	house flood Katrina	
Shirmac	house flooded from Katrina (sid tibier)	
Moonraker dr	Katrina (4' water in house)	
Jacqueline dr	flooded 3' under the house	
lowey lane	water levels rising	
Bayou liberty (bayou oaks)	we flood when it rains hard or wind blows hard. They are digging our ditches for nothing because it doesn't drain	
?	wind drives high tide for days	
Reilly road floods	blocking access in or out water has been rising obviously since Katrina no wetlands	
Oakridge	flooded 5 times since 1995	
248 clara	12' Katrina	
bayou liberty oak ridge sub	flood continuously which did not originally occur	
?	stop any high water coming into the lake at the Rigolets	
Meadowlawn Street	Flooding from Bayou Vincent and Bayou Bonfouca	
401 Carr Drive	(504) 450-0978 Landrieu	
Moonraker Drive	Water rising	
Chamale Neighborhood	Flooding	
Eden Isles	Need flood protection	
Old River Road Neighborhood	When we get heavy rain it floods. There is only one entrance in/out of the entire neighborhood. The entrance is the first to flood and traps everyone in.	

3 Harbor Cove in the Inlets Subdivision	Contact- Tim Gaudet. Recently they have raised Oak Harbor Blvd. at Hwy. 11 and at the Interstate 10 South that we are now more vulnerable and basically in a bowl to flood. South of Oak Harbor Blvd.	
Pontchartrain Drive Eden Isles	Katrina 20 feet flood surge? Lost house	

St. Tammany Parish, Louisiana

Draft Integrated Feasibility Report with Draft Integrated Environmental Impact Statement

FINAL SCOPING REPORT

3 August 2020

Table of Contents

Appendices

1.0 Introduction

The National Environmental Policy Act (NEPA) of 1969 (42 U.S. Code [U.S.C.] 4321 et seq. 1969) and the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 CFR 1500-1508), require federal agencies to use all practicable means to ensure that high quality environmental information is available to public officials and citizens before decisions are made and before actions are taken. NEPA and CEQ regulations require the preparation of a detailed written environmental impact statement (EIS) for proposed actions which constitute a major federal action. “Major federal action” includes actions with effects that may be major, and which are potentially subject to federal control and responsibility. See: CEQ Regulations, Part 1502, Section 1502.4 and Part 1508, Sections 1508.11 and 1508.18.

The National Environmental Policy Act (NEPA) of 1969 established a nationwide policy to include a detailed statement of the environmental impact in every recommendation or report on proposals for major Federal actions significantly affecting the environment. This detailed statement is the environmental impact statement (EIS). This Scoping Report presents and summarizes the scoping comments received at the public scoping meetings and throughout the 45-day comment period.

USACE is the lead Federal agency for the preparation of the DEIS. Other federal and/or state agencies participated as cooperating and/or commenting agencies throughout the NEPA process. Participating cooperating agencies include the US Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), the city of Slidell, the city of Mandeville, and the Louisiana State Historic Preservation Office (SHPO). The Choctaw Nation of Oklahoma has asked to be included as a consulting agency. All entities’ input has been sought throughout the planning process in developing alternatives and at Project Delivery Team meetings with USACE staff.

The U.S. Fish and Wildlife Service assisted in documenting existing conditions and assessing effects of project alternatives through the Fish and Wildlife Start Coordination Act consultation procedures. Other environmental review and consultation requirements for the proposed project include the need for Louisiana Department of Environmental Quality Clean Water Act Section 401 water quality. In addition, because the proposed project may affect federally listed species, the USACE consults with USFWS and the National Marine Fisheries Service (NMFS) in accordance with Endangered Species Act, Section 7. The NMFS was consulted regarding the effects of this proposed project on Essential Fish Habitat per the Magnuson– Stevens Act. The USACE consulted with the State Historic Preservation Officer under Section 106 of the National Historic Preservation Act concerning properties listed, or potentially eligible for listing. The USACE coordinates with the Louisiana Department of Natural Resources for Coastal Zone Management Consistency per the Coastal Zone Management Act.

2.0 Study Authority

This study is authorized by Subtitle B, Section 1201 (14) of the Water Resources Development Act of 2016, as included in the Water Infrastructure Improvements for the Nation Act (P.L. 114-322), and in accordance with the annual reports submitted to the Congress in 2015 and 2016, pursuant to Section 7001 of the Water Resources Reform and Development Act of 2014 (33 U.S.C. 2282d).

The study was funded by the Bipartisan Budget Act of 2018 (P.L. 115-123), Division B, Subdivision 1, Title IV, (BBA 2018) which appropriated supplemental funds in the Supplemental Investigations Funds for Long Term Disaster Recovery Investment Plans (LDRIPs) related to the completion, or initiation and completion, of authorized flood and storm damage risk reduction studies, including shore protection.

Notwithstanding Section 105(a) of the WRDA of 1986 (33 U.S.C. 22 I 5(a)), which specifies the cost-sharing requirements generally applicable to feasibility studies, BBA 2018 authorizes the Government to conduct the study at full Federal expense to the extent that appropriations provided under the Investigations heading of the BBA 2018 are available and used for such purpose. On 26 November 2019, CEMVN submitted a Request for Review and Approval to Execute the Model Feasibility Cost Share Agreement (FCSA) between the Department of the Army and the State of Louisiana, acting by and through, the Coastal Protection and Restoration Authority Board of Louisiana for the study. On 6 January 2020, the MVD Commander approved the draft FCSA and on 14 January 2020, the FCSA was fully executed by all parties.

In the event that there are insufficient BBA 2018 funds to complete the Study, such completion shall be subject to cost-sharing otherwise applicable to the Study and amendment of the FCSA. The Government will conduct the Study consistent with the approved Project Management Plan, which specifies the scope, cost, and schedule for Study activities. This Study has been undertaken in accordance with Sections 1001 and 1002 of the Water Resources Reform Development Act of 2014, applicable existing USACE Civil Work regulations, policies and guidance, and has incorporated SMART Planning principles. See MEMORANDUM FOR COMMANDING GENERAL, U.S. ARMY CORPS OF ENGINEERS, SUBJECT: Revised Implementation Guidance for Section 1001 of the Water Resources Reform and Development Act of 2014, Vertical Integration and Acceleration of Studies as amended by Section 1330(b) of the Water Resources Development Act of 2018, dated March 25, 2019.

3.0 Proposed Action

The purpose of the study is to determine the feasibility of flood risk management and coastal storm surge risk reduction in St. Tammany Parish, Louisiana. The report will document the existing conditions of environmental resources in and around areas considered for construction, and potential impacts on those resources as a result of implementing the alternatives.

The proposed action includes the construction (and operation) of a total of approximately 16.3 miles of a hurricane and storm damage risk reduction levee and floodwall from west Slidell to south Slidell, five pump stations, 5 floodgates, ramps, channel improvements to Bayou Patassat in Slidell, channel improvements to Mile Branch in Covington, and nonstructural home elevations and floodproofing for eligible structures in the Parish.

The USACE focused analysis on the following resources as applicable: Aesthetics and visual resources, water quality, aquatic resources/wetlands, fish and wildlife resources, threatened and endangered species and other protected species of concern, cultural and historic resources and tribal trust resources, floodplains, hazardous, toxic and radioactive waste, land use, navigation and public infrastructure, socio-economics, environmental justice and soils.

The USACE evaluated a range of alternatives for the proposed action including structural and nonstructural measures. For the reasonable and practicable alternatives, the USACE will fully evaluate them, including the no action alternative. Alternatives may result in avoidance and minimization, and mitigation measures of impacts to reduce or offset any impacts.

4.0 Scoping Process

NEPA regulations require an early and open process for determining the scope of issues to be addressed in an EIS and for identifying the significant issues related to a proposed action. This process is referred to as scoping (40 CFR 1501.7). As part of the NEPA scoping process, the lead agency may hold an early scoping meeting or meetings. In addition, as part of the scoping process, the lead agency shall:

- invite the participation of affected federal, state, and local agencies, any affected tribal nations, and other stakeholders;
- determine the scope and the significant issues to be analyzed in depth in the EIS; and
- identify and eliminate from detailed study the issues that are not significant or that have been covered by prior environmental review.

NEPA affords all persons, organizations, and government agencies the right to review and comment on proposed major Federal actions that are evaluated by a NEPA document. Known as the scoping process, this is the initial step in the preparation of the EIS and helps identify: (1) the range of actions (project and procedural changes), (2) alternatives (both those to be explored rigorously and evaluated, and those that may be eliminated), and (3) the range of environmental resources considered in the evaluation of environmental impacts.

On 19 June 2020, a notice of intent (NOI) to prepare a Draft Integrated Feasibility Report and Environmental Impact Statement (DIFR–EIS) for the St. Tammany Parish, Louisiana feasibility study was published in the Federal Registry (Vol. 85, No. 119) by the U.S. Army Corps of Engineers, New Orleans District (USACE) that included a 45-day public comment period. The purpose of the NOI was to announce the U.S. Army Corps of Engineers' (USACE) intention to prepare a draft EIS for the study. The formal 45-day public scoping comment period for the EIS.

On 16 July 2020, the CEMVN sent out letters to tribal, Federal, state, and local government entities inviting them to become a cooperating agency with USACE in preparation of the environmental compliance documentation. The U.S. Fish and Wildlife Service (USFWS); National Marine Fisheries Service (NMFS); Louisiana State Historic Preservation Office (LA SHPO); Louisiana Department of Wildlife and Fisheries (LDWF); City of Mandeville, LA; City of Slidell, LA; and the Choctaw Nation of Oklahoma (CNO) responded that they would like to be cooperating agencies and were invited to participate in the PDT meetings.

A. Public Notification

The public was notified of both public meetings using social media, local newspaper ads, and the project website:
https:// www.mvn.usace.army.mil/About/Projects/BBA-2018/studies/

B. Public Information Meetings and Public Scoping Meetings

Public information meetings were held on 11 February 2020 and 12 February, 2020 in Mandeville and Slidell, respectively. Scoping meetings were held virtually due to the coronavirus pandemic on 14 July 2020 and 15 July 2020, broadcast from the New Orleans District over social media. Scoping meeting announcements were advertised in the local newspapers, social media, and U.S. Army Corps of Engineers, New Orleans District websites leading up to the scoping meetings. Two public information meetings were held:

Tuesday, 11 February 2020	Wednesday, 12 February 2020
Mandeville Community Center	Slidell Civic Auditorium
3090 E Causeway Approach	2056 2nd St
Mandeville, LA 70448	Slidell, LA 70458
6 to 8 p.m.	6 to 8 p.m.

The public information meetings provided attendees with an opportunity to listen to a presentation from USACE staff on the Project Delivery Team about the authority, goals, and information needed for the feasibility study. After the presentation, the public could inspect poster stations staffed by project team members and subject matter experts to ask questions and provide input. For both public information meetings, the general public also had the opportunity to view a live-stream video on the USACE Facebook page. Both meetings were advertised to the public through social media and direct communication with state and local officials.

The CEMVN held two public scoping meetings on 14 July 2020 and 15 July 2020. Input received from public meetings assisted the PDT in refining the study's problems and opportunities, goals, objectives, potential measures, and alternative plans. Two scoping meetings were broadcast over Facebook from the New Orleans District:

Tuesday, 14 July 2020	Wednesday, 15 July 2020
USACE New Orleans	USACE New Orleans
1 to 2 p.m.	6 to 7 p.m.

The live broadcasts were recorded to provide those who were unable to watch and available to be watched on social media and the study website. Project Delivery Team members answered questions live from the public after providing a presentation on the project and the array of alternatives were developed. The public was notified of the meetings through social media, local newspaper advertisements, and direct communication with stakeholders. Recordings of the public scoping meetings were also played over the St. Tammany Parish public television channel 70 times in coordination with our partners.

This Scoping Report presents and summarizes the public comments expressed at the meetings beginning 11 February 2020 through the closing of the official comment period on 3 August 2020. This Scoping Report indicates where in the draft EIS individual comments will be addressed. The report will be provided to all scoping participants who provided their address, and will be published on project website: https://www.mvn.usace.army.mil/About/Projects/BBA-2018/studies/.

5.0 Scoping Participants

Roughly 200 stakeholders attended the two public information meetings in February, including members of the public, and state and local officials. The Facebook live broadcast of the meeting had approximately 50 stakeholders viewing in real-time, while the videos of the meetings have been viewed over 1,500 times and reached over 5,000 people according to Facebook analytics. At the end of all the public information and scoping meetings.

6.0 Scoping Meeting Comments

This section provides a general summary of the comments received during the public scoping process. All public comments in their entirety have been made a part of the Administrative Record and are provided in Appendix C, organized in alphabetical order by last name for ease of reference. Comments that were submitted by agencies or organizations (identified by those comments submitted with formal signatures or letterheads) are named by the agency or organization rather than an individual's name.

Scoping comments document the public's concerns about the scope of the proposed action, as well as identify significant resources and suggested alternatives. Scoping comments will be considered during the study process and preparation of the draft report.

A. Scoping Comment Categorization by Theme

A total of 85 comments were collected through email, Facebook comments, and information sent to the Project Delivery Team. These comments were categorized by concern or issue identified by the commenters. A total of three recurring themes were identified as follows:

- Flooding. The first theme is "Flooding concerns," and this involves issues surrounding floodwater impacts, including localized and regional impacts, especially those affecting property owners. Many individuals submitted information about the flooding in their local area for the Project Delivery Team to consider. When assessing local flooding concerns, the team used the agency guideline of 800 cfs when determining whether or not the amount of flooding was local drainage that was not meant to be addressed by the USACE feasibility study. Those above the threshold of 800 cfs were examined by the Project Delivery Team and used to help develop alternatives, including levee alignments and the placement of pump stations.

- Levees. The second theme "Levee concerns" pertains to levee alignments. Included in this theme are the multiple comments received from the public about potential inducement of flooding in Eden Isles from levees elsewhere around the greater Lake Pontchartrain ecosystem, including the Westshore Lake Pontchartrain Project in Laplace, Louisiana. These comments were assessed by leadership and Project Delivery Team members as falling outside the area of this feasibility study. Other stakeholders like USFWS, NMFS, and LDWF had refinements to proposed levee alignments and pump station placements that were used to determine the final designs of each alternative. Project Delivery Team members for Cultural Resources and Environmental Justice also provided input for final designs of each alternative based on their impacts.

- Ecosystem-wide flood and storm risk reduction. The third theme "Ecosystem-wide flood and storm risk reduction" involves requests for investigating habitat restoration throughout the study area and considering impacts to wildlife and species of conservation need. Multiple stakeholders discussed the building of large coastal wetlands for wave attenuation to reduce the energy of waves during tropical storm events. Working with partners at USFWS, NMFS, and LDWF, it was determined that the cost-benefit ratio of building marshes did not allow nature-based alternatives to move forward within the feasibility study. There is still the potential for extensive mitigation projects associated with this feasibility study that will accomplish the same goal however to offset the impacts of the final chosen alternative. Finally, included in this theme are potential impacts for wildlife from this feasibility study, particularly protected species, and those concerns are analyzed throughout the DEIS in their own dedicated section in coordination with the pertinent resource agencies.

All submitted comments will be listed in an appendix in the Final Environmental Impact Statement.

7.0 Opportunities for Public Input

The official deadline for receipt of comments for scoping was 3 August 2020. USACE New Orleans District has received comments on this project as the alternatives. Additionally, the draft EIS document will be available for a 45-day public review and comment beginning 13 March 2021.

8.0 Resource Agency Input

An initial interagency stakeholder meeting was 15 January 2020, including both state and Federal agencies, at the USACE New Orleans District. Further concerns emerged for addressing the study with nature-based solutions, community concerns about local flooding, and the size of the study area. Representatives from the interested and affected resource agencies have participated in biweekly Project Delivery Team meetings and provided constant feedback throughout the development of alternatives from the initial interagency stakeholder meeting. A Planning Aid Letter was received from USFWS on 3 February 2020 that specified species of concern to the agency that were directly incorporated into the DEIS.

9.0 Website

The following project website (https://www.mvn.usace.army.mil/About/Projects/BBA-2018/studies/) will be updated with new information as needed, including a copy of this final scoping report.

From: NPS_Environ_Rev@nps.gov
To: Sttammanyfs
Cc: Steven_M_Wright@nps.gov; lani_pettebone@nps.gov; susan_king@ios.doi.gov
Subject: [Non-DoD Source] No NPS Comments, ER-20/0270: NOI by USACE for the Coastal Storm Risk Management and Flood Risk Management - St.Tammany Parish, Louisiana
Date: Tuesday, July 14, 2020 5:37:21 PM

Dear Sir/Madam,

The NPS has no comments on ER-20/0270, the NOI by USACE for the Coastal Storm Risk Management and Flood Risk Management - St.Tammany Parish, Louisiana.

If you have questions, please contact Steven Wright at Steven_M_Wright@nps.gov.

From: Roe, R Matthew (Matt) CIV USARMY CEMVN (US)
To: BAKER, EVERARD CIV USARMY CEMVN (USA); Dixon, Amy A CIV (USA); MEYERS, MICHELLE L
Cc: Davis, Sarah E CIV (USA); Mobley, Jamie L CIV USARMY CEMVD (USA)
Subject: Comment to the google voice
Date: Tuesday, July 28, 2020 9:28:59 AM

All,

We received the below comment to our google voice number.

Text comment from [redacted]

I watched your broadcast Wednesday evening and was extremely dismayed regarding feasibility study, I live in western st Tammany..we are tired of being shit on!!
Every area around the lake surrounding us is increasing flood protection, thus increasing our risk, my house has never flooded but my flood ins has tripled. So screw you assholes! I'm moving

You are the same bought and paid for people that have opened the BC spillway for 3-5 years running, instead of diverting some through morganza. Screw you and your bullshit studies!

Thanks,

Matt

From: Ray
To: Sttammanyfs
Subject: [Non-DoD Source] Flood Control
Date: Monday, August 3, 2020 9:58:14 AM

Is there someone I can talk to about a flood control pond built by the Corp approximately 30 years ago? My name is Ray Sissell and my number is [redacted]

Thank you,
--

Ray Sissell

From: John McDonald
To: Sttammanyfs
Subject: [Non-DoD Source]
Date: Monday, August 3, 2020 3:40:29 PM

Ladies and Gentlemen:

I have attended, via the internet, your last two virtual presentations concerning the above project. In response to your request for comment, I offer the following:

My wife and I reside at the eastern end of Herwig Bluff Road (the eastern most extension of Gause Boulevard east of Slidell, Louisiana). Our property borders on Devil's Elbow, which waterway connects with the West Pearl River, just below I-10.

Since Hurricane Katrina, we have lost the use of a sizeable portion of our property due to the continuous high level of the West Pearl River and Devil's Elbow. This section of our property was almost always dry. Now, it is almost always under water. I am sure there are other landowners downstream with the same problem. I can only assume that the problem is due to silting or obstructions in the West Pearl River which have not been remedied since Hurricane Katrina.

I believe this problem is worthy of consideration and remediation in your study.

Thanking you for your attention, I remain

Very Truly Yours,

John F. McDonald, III

[redacted]

[redacted]

JOHN BEL EDWARDS
GOVERNOR

JACK MONTOUCET
SECRETARY

PO BOX 98000 | BATON ROUGE LA | 70898

August 3, 2020

Ms. Amy Dixon, Project Manager
United States Army Corps of Engineers
CEMVN-PMR-C
7400 Leake Avenue
New Orleans, LA 70118

RE: St. Tammany Feasibility Study – public meeting information

Dear Ms. Dixon:

The Louisiana Department of Wildlife and Fisheries (LDWF) has only very recently become involved in the St. Tammany Feasibility Study, and staff were so far, unable to participate fully in the gathering of information and selection of alternatives and ideas. Nonetheless, we offer the following information and comments in response to the ongoing public comment period associated with the St. Tammany Feasibility Study Public Meetings and information presented. Staff look forward to participating in future Project Development Team (PDT) meetings and other project related discussions.

Scenic Rivers

From what staff can determine, many of the alternatives within the current array impact the Louisiana Scenic Rivers System. A number of the remaining, proposed measures may be detrimental to system streams. Other measures may conflict with related policy constraints. Based on our review of the current array of proposed alternatives, Alternative 4 may impact Cane Bayou, Bayou LaCombe, and Bayou Liberty; Alternative 5 may impact Bayou Liberty and Bayou LaCombe; Alternative 7 may impact the West Pearl River and Morgan River; and Alternative 8 may impact Simpson Creek and Mile Branch. All aforementioned waterways are Louisiana designated Natural and Scenic Rivers (LASR). Several of the proposed measures impacting these waterways are prohibited by the Scenic Rivers Act (LA R.S. 56:1840-1856), while others may require LDWF authorization. For information on prohibitions and permitting requirements, Scenic Rivers Coordinator, Chris Davis can be contacted at (225)765-2642. The Scenic Rivers Act, Scenic Rivers Rules and Regulations (Title 76, Part IX) and other related information can be found at https://www.wlf.louisiana.gov/page/scenic-rivers.

Staff have noted that Environmental Planning has thus far considered the effect alternatives may have on recreation and views from the Lakefront and the St. Tammany Trace. LDWF recommends that these considerations (and others) be extended to LASRs as well.

Additional Alternatives

LDWF has noted that modeling of similar river systems (e.g., Amite River and Vermillion River) have shown that channel improvements and other strategies intended to increase drainage efficiency are often ineffective, counterproductive, or otherwise unviable options for addressing riverine flooding associated with lower gradient reaches, especially those subject to unfavorable tailwater conditions (e.g., high tides and wind driven water). Due to these findings in similar systems, staff believe USACE should instead consider riverine flood risk reduction strategies that restore natural functions and allow for stormwater and/or floodwater to be retained or detained in the upper watershed, thereby reducing flood peaks and overall flood risk within downstream problem areas. LDWF has noted that many small headwater streams and other smaller tributaries have been and/or are being dredged or otherwise disconnected from their floodplains. Additionally, large scale landscape changes that promote rapid drainage of forested wetlands and other natural storage areas have occurred. We believe that these types of landscape impacts and other features may increase the potential for the siting of meaningful nature based solutions (NBS). Restoration of important natural functions related to flood risk reduction and other NBS strategies may provide significant flood risk reduction in downstream areas. However, for these NBS strategies to be considered fully, staff believe that the study area should be expanded to include the entire eight digit hydrologic unit (HUC 8) for each, larger study area river known to pose significant flood risk to the community. Currently the study area is limited to parish boundaries; however, the catchments of the larger parish rivers extend well beyond that political boundary.

If alternatives and measures are able to address increased flood risk related to development, staff believe that the PDT should investigate impacts of development, the effectiveness of current mitigative measures, and consider modifications to existing stormwater infrastructure that may reduce flood risk. For instance, staff understand that some associated retention/detention ponds may have overly efficient connection to receiving waters and/or may offer very short detention times/volumes, which can create deleterious discharges that lead to extremely flashy receiving waterways and may ultimately contribute to downstream flood risk. Could existing, ponds and outfall devices that are found to be problematic be modified to increase freeboard and detention time, mimicking natural hydrology that existed prior to construction (not merely preconstruction hydrology)? If this project type were found to be cost effective, the measure could easily be reproduced throughout the watershed to have a greater, cumulativeeffect.

LDWF noted that several alternatives in the current array involve ring levees and large linear levees which potentially impact extensive areas of wetlands and other sensitive habitats (e.g., LASRs). Many of the residential structures that would be afforded protection by some of these alignments are currently constructed on pier and beam. Home elevation costs for these particular structures may be much lower when compared to lifting slab on grade homes. We suggest that direct comparisons of levee alternatives and the less environmentally damaging non-structural alternatives (home elevations) be made for these specific areas. When environmental impacts are accounted for, the PDT may find that the cost-benefit for the non-structural options is favorable in certain areas and that some version of the non-structural alternative is preferred.

LDWF submits these recommendations to the U.S. Army Corps of Engineers in accordance with provisions of the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.). Please do not hesitate to contact Habitat Section biologist Matthew Weigel at (985)543-4931 should you need further assistance.

Sincerely,

/S/ Randell S. Myers

Randell S. Myers
Assistant Secretary, Wildlife Division

mw

c: EPA, Marine & Wetlands Section
USFWS Ecological Services

healthy gulf
935 Gravier St, STE 700
New Orleans, LA 70112

August 3rd, 2020

Mrs. Amy Dixon,
U.S. Army Corps of Engineers, New Orleans District
CEMVN-PMR-C
7400 Leake Avenue
New Orleans, La 70118

By email:StTammanyFS@usace.army.mil

Dear Mrs. Dixon:

I am writing comments on behalf of Healthy Gulf, an organization with members in St. Tammany Parish. In our 25 years, we have focused much of our attention and advocacy on the Clean Water Act's regulation of wetlands and water quality. The comments below address "degradation of wetland systems within the Parish" as called for in the scoping language.

The current scoping process for the St. Tammany Parish Louisiana Feasibility Study offers alternatives to reduce flood damage in the Parish through structural and non-structural projects. In 2019, our organization presented the results of a survey of 5 years (2014-2018) of CWA 404 wetland fill permit applications in the Northshore Parishes along the Interstate 12 corridor. We found three hotspots of 404 permit activity: Western St. Tammany Parish, The Amite River corridor in Livingston and E. Baton Rouge Parishes, and in Ascension Parish in the Prairieville/Gonzales vicinity south of Baton Rouge.

Address and emphasize the need for non-structural solutions

One of these hotspot areas –St. Tammany - was within a nonstructural project area identified in the 2017 Louisiana CPRA Coastal Master Plan. This Master Plan nonstructural project STT.01N identified $1.6 billion in elevation and floodproofing costs/needs in 2017. There were, at that time, 5500 residences and 375 non-residential structures in need of this investment in elevation, floodproofing or through buyouts of repetitively flooded properties. There were St. Tammany Parish areas north of I-12 in the Tchefuncte River floodplain identified for this CPRA project, and the Parish's entire coastal zone, south of I-12 fell into this same non-structural project area. This need is not funded by the state as part of the active Master Plan projects, but provides context to the water management and flooding problem that the Parish must face as more and more wetland filling permits are applied for in each passing year.

The nonstructural areas mapped and identified in Alternative 2 in this St. Tammany Parish La, Feasibility Study fall in the same area as CPRA's Master Plan 2017 STT.01N project.

We strongly encourage the Corps to carry Alternative 2 through its final array, as the need to address elevations in existing homes, businesses and other structures is clear and will only become larger in the face of continued development. This study is a chance to underscore the existing large need for non-structural flood control measures in St. Tammany Parish. Please don't let this opportunity pass. Repetition of this message about non-structural flood control projects (that CPRA has already identified) is badly needed and can inform, and may help change the minds of residents, planners and elected officials in St. Tammany.

Help the Parish to use local 404 permit application data for planning

Elected officials and community residents St. Tammany Parish and the other Parishes we surveyed for our project on Northshore wetland fill permits applied for 2014-2018 were surprised at the amount of wetland filling that goes on where they live, and were at a loss to figure out why this data had not been summarized and presented before. I explained to St. Tammany and Tangipahoa elected officials that all of the permit information is public and can be accessed on the Army Corps websites. The Parishes are not taking the time to look at cumulative wetland losses within their boundaries, and the ACOE is not compiling this data for them either. We believe that this information is too valuable and tells too important a story to not be summarized and put to use.

Wetland loss is a moving target for all the Northshore Parishes. If they cannot keep a periodic tally of the wetlands they are losing to filling for new (and old) development, they can't use this data to modify and update their flood control plans in the face of continued development, which often involves even more applications for wetland filling.

Wetland (habitat) mitigation as required under CWA Sec. 404 by ACOE often happens in mitigation banks in remote parts of these Parishes or in adjoining Parishes, sometimes in different watersheds from the permitted wetland filling (and loss), and does almost nothing to help store water and address flooding where it would do the most good. One acre of wetlands can store one million gallons of water. That local deficit in water storage is not adequately mitigated by purchase of wetland mitigation credits on land many miles away, and the ability of engineered stormwater handling systems in newly developed areas is often overwhelmed after development and build-out. We have all witnessed this with increasing frequency during large rainfall events, like the 2016 floods in many river basins in the Florida Parishes along the I-12 corridor.

Since the Corps maintains the records of 404 permit applications, this information needs to be made available in an easily usable form to planners and floodplain managers in the various Parishes so they can use it to their advantage. Please consider this both as a scoping request and deliverable item for your final study for St. Tammany Parish.

<u>Alternatives that address headwater flooding including Pearl River flooding should be carried through the final array.</u>

Both the Pearl River Basin and the relatively small watersheds upstream of parts of St.Tammany Parish contribute to headwater flooding affecting the middle and lower parts of the Parish. With the largest (and most expensive) structural projects in this array being focused in the Coastal Zone, the contribution of headwaters to the Parish's flooding should not be obscured or treated lightly in the study.

The Pearl River is a regulated river and the water management actions of the Pearl River Valley Water Supply District at the Ross Barnett Reservoir dam affect St. Tammany Parish after a lag time of about a week. Some mention of this problem – Ross Barnett Reservoir authority's dumping water ahead of large rainfall events – and its effect on riverine flooding in Eastern St. Tammany should go into the Study for the sake of completeness and to inform more St. Tammany residents of this source of flooding. Anything that the Corps can include in its Feasibility Study that will document that the Parish is at the mercy of water management decisions in another state would be helpful. (This cannot be emphasized enough as the Pearl faces the possibility of a new, destructive and misguided lake development project in Jackson, Ms. when other less disruptive alternatives are available. Better and different water management protocols by the Reservoir Authority should be adopted to ensure the Lower Pearl has fewer flooding problems) This dumping of impounded water into the river upstream often coincides with storm surge during tropical weather system passage along the Mississippi and SE Louisiana coasts and compounds flooding during hurricanes and tropical storms.

The contribution of landscape conditions and land management and use patterns in upper St. Tammany, Tangipahoa and Washington Parishes to the timing and volume of headwater flooding should be a feature of the Feasibility Study. This factor should not lose emphasis even though a majority of the work of the study will feature levees, ring levees, floodwalls and other structures in the Coastal Zone management area and middle and lower St. Tammany Parish.

Where there are defunct inactive or relict sand and gravel mines in the floodplains of headwater streams affecting St Tammany Parish, the restoration of these mines and a return of the floodplain to a better function can be considered. In Tangipahoa and Livingston Parishes, there are many more of these old mines that can be restored and the river channels stabilized as a result. Where this is appropriate in St. Tammany Parish and in the headwater areas affecting it, such restoration should be discussed and even included in the alternatives so far presented for scoping.

Healthy Gulf appreciates the opportunity to provide these comments. If the ACOE is interested in seeing the 404 permit application maps and tables in our 2014-2018 analysis of Northshore Parishes permit activity, we will share them and discuss them with agency staff.

Sincerely,

Andrew Whitehurst
Water Program Director, Healthy Gulf

From: bert fontcuberta
To: Sttammanyfs
Subject: Re: [Non-DoD Source] St. Tammany Flooding - Input from Citizens
Date: Wednesday, March 18, 2020 9:48:28 AM

Hey Amy,
hope all is well, I do contract wetlands mapping for Mike Henry at Hydrik, I created my basemaps in the early 90's and have been working on the consistently trying to stay up with developments. I probably have more data than the parish as they were mostly concerned about Parish maintained waterways. Do you have any map that I can interface with which identifies the scenic waterways (maybe thru LA Wildlife & Fish.) or are you concerned about them at this point. For instance the Tchefuncte River is scenic, its tributaries: Soap & Tallow Branch and Timber Branch are considered scenic because they touch Tchef. They are in desperate need of de-snagging / widening.
Thanks,
Bert

On Wed, Mar 18, 2020 at 4:29 AM Sttammanyfs <sttammanyfs@usace.army.mil <mailto:sttammanyfs@usace.army.mil> > wrote:

Good Morning Bert,

We would appreciate as much speed as you are able to give, although I understand being tied up with what you are working on right now. Please see below for my phone number, but I am always available at this email.

Thank you,

Amy Dixon
Project Manager
U.S. Army Corps of Engineers
New Orleans District
Work: 504-862-1193

-----Original Message-----
From: bert fontcuberta [mailto:bertfontcuberta@gmail.com <mailto:bertfontcuberta@gmail.com>]
Sent: Monday, March 16, 2020 11:39 AM
To: Sttammanyfs <sttammanyfs@usace.army.mil <mailto:sttammanyfs@usace.army.mil> >
Subject: Re: [Non-DoD Source] St. Tammany Flooding - Input from Citizens

Yes, I will be tied up next couple of weeks on Medical mapping, we can regroup after, forward your contact info

On Wed, Mar 11, 2020 at 10:21 AM Sttammanyfs <sttammanyfs@usace.army.mil <mailto:sttammanyfs@usace.army.mil> <mailto:sttammanyfs@usace.army.mil > > > wrote:

Good Morning Bert,

After sharing with the team, we would like to know if you could share your map. Let me know if this is possible.

Thanks,

The St. Tammany Team

-----Original Message-----
From: bert font[redacted]
Sent: Wednesday, March 11, 2020 9:45 AM
To: Sttammanyfs <sttammanyfs@usace.army.mil <mailto:sttammanyfs@usace.army.mil>
<mailto:sttammanyfs@usace.army.mil > > >
[redacted]
Subject: [Non-DoD Source] St. Tammany Flooding - Input from Citizens

Greetings Corps of Engineers,

The Parish stated that ya'll are open to comments on the flooding in St. Tammany Parish. My thoughts are to widen all non-scenic waterways thereby creating larger detention areas within the existing tributaries. I have them all mapped if you would like to sit down & discuss further, Much Thanks, Bert Fontcuberta New Orleans Map Company

[redacted]

p.s. the new La Hwy No. 21 Bridge over the Tchefuncte River creates a choke point for flood waters, the top bank crowns and bridge span should have been widened to accommodate flood waters, *unless it was the plan all along to flood residents upstream from that point, I have the videos to support this.

From: Bob Hodges
To: Sttammanyfs
Subject: [Non-DoD Source] Public comments submitted for the St. Tammany Feasibility Study
Date: Thursday, July 9, 2020 3:12:00 PM

As solicited in the Public Meeting notice printed in a recent edition of The Advocate, I am submitting my comments for the above referenced Feasibility Study. I will not be able to participate in either of the two Facebook Live sessions and I would request these comments be considered to be included in those live sessions.

I have been a resident of the area in near proximity to this study (Flower Estates North) since September 1999. I have witnessed in that time three (3) major flood events that affected my neighbors in the area of the study. My primary concern about the format of the live meetings is the refusal of the USACE to allow any discussion of the impact of future development in the area of the study. Specifically I am referring to the colossal MEDLINE development being proposed by a southshore developer that prompted a spot zoning change by the St. Tammany Parish Council that is now being challenged in the courts as unconstitutional. Anyone with an understanding of the water dynamics of this area knows that this development will only further increase the current flooding risk to the local community. The refusal of the Parish Council to consider these concerns in public hearings has left our community with the hope that only “adults left in the room”, i.e. the USACE would act responsibly and include future development in the feasibility study. I believe it is accurate to say that all in our community who are aware of this study will have the same reaction to the USACE taking its current position.

After the disaster in New Orleans with Hurricane Katrina and the damage that event caused to the confidence the public had in the USACE, it is my hope the USACE will re-consider and include the full scope of present and future development and the impact on flooding risk in the scope of thestudy.

Respectfully,

Bob Hodges

[redacted]

[redacted]

From: Brian Bourgeois
To: Sttammanyfs
Subject: [Non-DoD Source] 20200212 St. Tammany Study Mtg in Slidell
Date: Wednesday, February 12, 2020 7:17:25 PM

Brian Bourgeois
[redacted]
(French Branch Neighborhood) Elevation 11ft.

Home flooded during Katrina. About 1ft of water.
Flooding came from surge up the 'Old' Pearl River via the Doubloon Branch and then the French Branch.

Good evening:

Thank you for the meeting, your people did a great job! Very concise presentation.

I am especially happy to have a website I can go to for status of the effort. It's been very difficult to find out what is going on from the State/Parish.

Concerns:

* Future hurricane events causing a repeat of Katrina flooding which inundated about 2/3 of Slidell.

* Higher risk of flood events due to climate change, sea level rise

Without plans for flood protection structures, I am very concerned about my ability to sell this property in the future, and intend to leave the area sooner than later.

An additional concern that I have not seen addressed:

Most of Slidell's potable water is from wells. Flood protection would be grand, but has anyone looked at salt water intrusion into the ground water with rising sea levels?

Thank you,

Dr. Brian Bourgeois, PE
CAPT USN (Ret)

From: Cliff Lloyd
To: Sttammanyfs
Subject: [Non-DoD Source] Flowers Bayou
Date: Monday, July 20, 2020 11:14:10 PM

Not sure who monitors flowers bayou but a lot of mudd has been filling the bayou and if something isn't done the bayou will not be navigable and affect flooding even more due to the amount of mudd and fill that has flowed over from all the development on the other side of Hwy 21.

Thank you.

Cliff Lloyd

From: Curt Coppock
To: Sttammanyfs
Subject: [Non-DoD Source] St. Tammany Drainage and Flooding Problems
Date: Sunday, July 12, 2020 7:07:24 PM

To Whom it May Concern,

Actually, this concerns everyone who lives in St. Tammany Parish! As our parish continues to grow in both population and infrastructure, it is vitally important to protect our property from the ever increasing chances of flooding. Drainage issues are impacting neighborhoods that have never been at risk of flooding before. I have lived in my Covington home for 26 years. I bought my property and built my home in Flower Estates for many reasons but one of the main reasons was to have water-front property for my boat and boathouse. I was happy that I could come home from a long week of working on the road and take my boat and my family out on Flower Bayou, the Tchefuncte River and Lake Pontchartrain on the weekends. For most of the 26 years that I have lived here, we have never had problems navigating the bayou. The depth of the bayou was always adequate to accommodate my shallow-draft deck boat. All of that changed a few years ago and it is obvious why.

As development occurred along Hwy. 21 between I-12 and St. Tammany Parish Hospital several things happened. First, land was cleared for the development of the Winn Dixie, and all of the other businesses in that shopping center such as Cafe-du-Monde, 5 Guys Burgers, and all the rest of the businesses that occupy the Hwy. 21 corridor. Ochsner Clinic and the Stone Creek Health Club also contributed to the problem. As land was cleared and all of the trees and under-brush were removed, any rainstorm washed dirt and sediment into Flower Bayou. Also, there was no vegetation to absorb the water. The result is the fact that the bayou quickly silted up, it is now extremely shallow and it is often only navigable by canoe, pirogue, or kayak. This has been exacerbated by the fact that there are now so many square feet of concrete in the form of building foundations and parking lots that the ground is no longer available to absorb the rainwater as it was designed to do. All of the rain flows directly into the increasingly shallow bayou and because the bayou is now so shallow due to the sediment deposited there during the development, the bayou can no longer handle the increased water volume, the bayou over-flows its banks and homes and properties flood where they never did just a few years ago. This results in property damage, increased insurance costs for homeowners and businesses and decreased property values for everyone.

The problems along Flower Bayou and all of other natural drainage systems in the parish will only get worse as the parish's population and infrastructure continue to expand. That will inevitably happen unless the parish, the state of Louisiana and the Army Corps of Engineers immediately address this problem. One of the things that should be done as soon as possible is that the Corps of Engineers should dredge Flower Bayou and all of the other natural drainage systems and bayous that have always drained this parish. If not, even your property could be at risk of flooding during the next rain storm. As proof of this problem I submit to you the attached pictures of the bayou today. If it was as deep as it was just a few years ago it could drain more water volume at a faster rate and there would be less flooding and water damage during our rainstorms and hurricanes. Please let your voices and concerns be heard.

Curt Coppock

--

Best Regards,

Curt Coppock
[redacted]

From: Curt Coppock
To: Sttammanyfs
Subject: [Non-DoD Source] St. Tammany Parish Drainage Problems
Date: Sunday, July 12, 2020 11:11:03 PM

Here are the pictures that I had intended to attach to my previous email. It is obvious that this vital drainage system has been compromised by the run-off and silt that has been deposited In this waterway due to the development along Hwy. 21 It has gotten progressively worse over the last several years and it will continue to get worse in the future unless the parish and the Corps of Engineers immediately address this problem by dredging this bayou to increase its depth, volume and flow capacity. Property and homes in Flower Estates and other Covington neighborhoods will be at an increased risk of flooding if this and other problem areas are not addressed in the immediate future.

Best Regards,

Curt Coppock
[redacted]
Sent from Yahoo Mail for iPad

From: DANIEL A IV MCGOVERN
To: Sttammanyfs
Subject: [Non-DoD Source] Needed Flood Protection for Eden isle and Clipper
Date: Wednesday, July 8, 2020 7:51:28 AM

Mrs Amy Dixon:

My name is Dan Mc Govern IV and I am presently on the St Tammany Levee, Drainage and Conservation District. I have been on since its inception but only recently have I seen any efforts to protect our area.

Katrina put over 13 inches of water in my home at [redacted]. I built at an elevation of 13 plus feet and still got flooded.

Neel Schaffer estimated the cost to elevate our homes at about 4,605 residences to be around $806,300,000(Neel Schaffer 2017 Master Plan Structural Risk Reduction.
But under their plan under Case 2 to place a Hwy 11 T wall, lakefront T wall, and Barge Gate and I 10 Levee the cost estimate was $305,000,000.

The Ring Levee built around us also adds to our flooding problem for it was built without any study into risk reduction. It will indeed channel more water from surge upon us.

My flood insurance went from around $600.00 per year to $1300.00. I ask that you help us by devoting the skills and talents of the USACE to help our residents on this problem.

I am retired and see that in the future I may not be able to resume living in this beautiful waterfront community.

I ask that your agency consider one of the proposed conceptual plans outlined on Page 35 of the St Tammany Parish Proposed Flood Protection Conceptual Evaluation of June 2019 by Neel Schaffer.
Sincerely,

Commissioner Daniel A. Mc Govern iv, J.D.

From: Deborah Faust
To: Sttammanyfs
Subject: [Non-DoD Source] Covington is being destroyed
Date: Tuesday, July 7, 2020 8:03:32 AM

Greedy developers are cementing over our wetlands causing flooding.
PLEASE HELP US STOP IT!!

Deborah L. Faust
[redacted]
[redacted]
[redacted] <mailto:f[redacted]>
Cell [redacted]

From: Gene Billingsley
To: Sttammanyfs
Subject: [Non-DoD Source] FW: Website Inquiry St. Tammany/Flower Estates
Date: Sunday, July 12, 2020 12:08:08 PM

Regarding the upcoming public meetings on Flooding in St Tammany Parish, I am attaching an earlier inquiry specifically regarding Flowers Bayou and flooding in Flowers Estates. As a new homeowner and resident of Flowers Estates
we are very concerned with this issue. Look forward to the upcoming events.

Regards,
Gene/Sharon Billingsley
[redacted]

-----Original Message-----
From: HQ-PUBLIC AFFAIRS <HQ-PUBLICAFFAIRS@usace.army.mil>
Sent: Monday, June 1, 2020 12:35 PM
To: Gene Billingsley [redacted]
Subject: RE: Website Inquiry

Your message has been forwarded to our New Orleans District for assistance.

USACE Public Affairs Office

-----Original Message-----
From: Gene Billingsley[[redacted]
Sent: Monday, June 1, 2020 10:50 AM
To: HQ-PUBLIC AFFAIRS <HQ-PUBLICAFFAIRS@usace.army.mil>
Subject: [Non-DoD Source] Website Inquiry

Inquiry as to any plans in process for further dredging the Tchefuncte

River where it empties into Lake Pontchartrain. As a resident of Covington, La. and a member of Flower Estates Civic Association,

We are very concerned about the continual flooding which occurs in this area. Just a couple of weeks ago we experienced flooding as a result of the river backing up from the entrance into Lake Pontchartrain. This has been a regular occurrence, and a costly experience for many residents whose properties have gone under these floods. Thanks in advance as to any information in this regard.

Regards,

Gene Billingsley Sr.

[redacted]

[redacted]

Sentfrom Mail<BlockedBlockedhttps://go.microsoft.com/fwlink/?LinkId=550986> for Windows 10

From: Greyfellas Ruffino
To: Sttammanyfs
Subject: [Non-DoD Source] St Tammany Parish
Date: Thursday, July 16, 2020 10:56:47 AM

Trees are critical for healthy and vibrant communities. Planting trees helps make cities clean and green, but protecting the trees we already have may be even more important: large mature trees provide many more benefits than smaller young trees. Research shows that mature trees capture more carbon, filter more particulate matter to reduce air pollution, capture more storm water, create shade and reduce energy use, and many other environmental and health benefits.

Some benefits trees provide:
- Prevent flooding. Rain flows down the trunk into the earth;
- Prevents soil erosion;
- Shield children from ultra-violet rays;
- Increase property value;
- Provides oxygen;
- Cleans the air as they absorb pollutant gases.

The unfortunate reality is that the vast majority of trees are not being preserved and cut down. In many cases, trees could have been preserved but were cut down. This causes a massive negative environmental impact. Also, deforestation also destroys much needed habitat for animals, plants and other species. Deforestation has been a tragic disaster for the earth and everyone living on it.

The local level is where deforestation has the most immediate effect. When forest cover is lost, runoff rapidly flows into streams, elevating river levels and subjecting downstream cities, and agricultural fields to flooding, especially during the rainy season. With forest loss, the local community loses the system that performed valuable but often under-appreciated services like ensuring the regular flow of clean water and protecting the community from flood and drought. The forest acts as a sort of sponge, soaking up rainfall brought by tropical storms while anchoring soils and releasing water at regular intervals. This regulating feature of tropical rainforests can help moderate destructive flood and drought cycles that can occur when forests are cleared.

Scores of office buildings sit empty across the parish. Please encourage property owners to renovate vacant buildings or sell them for other uses. I simply ask that you review buildings on a case-by-case basis and discuss where zoning changes make sense and which new uses might work best in a given location.

In regards to clearing land/new construction please do something different and better unlike our previous administration. It takes more years to re-grow trees than it does to build around the tree. In addition to hurting this generation by cutting trees down, you’re hurting your children, grandchildren — those you love dearly. PLEASE use your power to make a difference and show other cities, states, countries how to do things better. I am a lifelong resident of Covington and it’s just heartbreaking.

Thank you,
Rebecca W Ruffino
Covington, LA

From: Jeanne Stangle
To: Sttammanyfs; mcooper@stpgov.org; rlheidelberg@stpgov.org; Amy Laborde; Thomas J. Smith; tsmith@stpgov.org; Steve Stefancik; Jerry Binder; Binder Jerry; Lee Domangue; Donna McDonald; Darrell Noveh; Sandra Johnson; Chuck and Roberta Neuman; Michele Duvic; Tommy Lenz; Jeanne Stangle; seanreily
Subject: [Non-DoD Source] Camp Salmen Meet St Tam Parish Pres Mike Cooper, Mar 9, 2020, Agenda & Flood Control
Date: Thursday, February 27, 2020 2:41:37 PM
Attachments: FOCS mike cooper agenda.docx

To St Tammany Parish President Mike Cooper and Staff;

To Dist 14 St Tammany Parish Councilman T J. Smith, Jr, who represents Camp Salmen Nature Park on Bayou Liberty;

To St Tammany Parish Councilmen Stefancik and Binder who also represents portions of Bayou Liberty;

To Lee Domangue, MD, President of Bayou Liberty Assn, and BLA Board Members;

To Darrell Noveh, President of Friends of Camp Salmen Nature Park and Board Members;
To US Army Corps of Engineers Staff from Feb 12, 2020, Slidell meeting:

Please see attached nola.com <Blockedhttp://nola.com> January 24, 2009, summary of federal funding for preservation of forested wetlands along Bayou Liberty, with description by 2009 St Tammany Parish President Kevin Davis: "I began this effort with the acquisition of Camp Salmen eight years ago and continue to make preserving our ecology and habitat a priority...Projects such as this property acquisition in Bayou Liberty help with storm protection, drainage and wildlife habitat".

Please see attached agenda for Introduction of Board of Friends of Camp Salmen Nature Park, Inc, to St Tammany Parish President Mike Cooper,

Monday, March 9, 2020, 10:30 AM to 11:00 AM

Thank you from Jeanne Stangle, Board Member, Friends of Camp Salmen Nature Park, Inc.

From: Jennifer Donewar
To: Sttammanyfs
Subject: [Non-DoD Source] St Tammany Study
Date: Monday, July 6, 2020 1:51:24 PM

There are major concerns with the river beds of west St Tammany. My parents live off of Savannah Branch which is a branch off the Little Tchefuncte River just south of Folsom. My father has lived on this property for 77 years.
With all of the new projects that are being permitted by the council to be built along Highway 1077 from Bennett Bridge to Hwy 190 in Goodbee, their potential for flooding is ever increasing. They flooded in 1983 when the Percy Dam busted along the upper river basin. Since then, their home has flooded twice in 2016. They came within inches of flooding again in December of 2018. Their home is built three feet off the ground.
With all of the fill homes that are being permitted in these large subdivisions along 1077, the chances of them flooding increases with every house. The river no longer has a natural floodplain to spill over into. It is not fair to flood out people who have been on family property all of their lives so there is a bigger economic impact for the parish with each residence that is built. The areas that are being permitted for building are widely known as wetlands. This needs to stop!

When water is spilling over Bennett Bridge Road, like a dam flowing, there is a HUGE problem. Please help stop this madness.

Sent from my iPhone

From: Milazzo, John W (Jack) III CIV USARMY CEMVN (USA)
To: [redacted]
Cc: Sttammanyfs
Subject: FW: [Non-DoD Source] presentation (UNCLASSIFIED)
Date: Tuesday, February 18, 2020 7:04:21 AM
Attachments: Proposal to protect against storm surge Corps and CPRA presentation.pptx

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CLASSIFICATION: UNCLASSIFIED

Mr. Faust,

Thank you for sharing. You mentioned Amy Dixon already has a copy, but I am forwarding to our project team e-mail for the record. If you do have anything else to share, please feel free to send to me or to sttammanyfs@usace.army.mil. We will be updating our site regularly, so please check for updates at https://www.mvn.usace.army.mil/About/Projects/BBA-2018/studies/St-Tammany/

Kind regards,

Jack Milazzo, ASLA, PLA
Landscape Architect
U.S. Army Corps of Engineers, New Orleans District
504.862.1505 office

-----Original Message-----
From: John Faust[mailto[redacted]
Sent: Saturday, February 15, 2020 4:22 PM
To: Milazzo, John W (Jack) III CIV USARMY CEMVN (USA) <John.W.Milazzo@usace.army.mil>
Subject: [Non-DoD Source] presentation

Mr. Milazzo

My name is John Faust, I am Vice-Chairman of the St. Tammany Levee Board. We met at the Corps of Engineers public meeting for the Feasibility Study held in Slidell on February 12th. At the meeting there was a lap top running a presentation of the flooding sustained from Katrina in the Southeastern portion of St. Tammany. You asked me to sent you a copy of the presentation . The attachment below contains the presentation .

The presentation also gives a little history lesson of the progression of flood protection in St. Tammany Parish. If you have any questions please give me a call .

John Faust
[redacted]

CLASSIFICATION: UNCLASSIFIED

Proposal to protect against storm surge in the Southeastern shoreline area of St. Tammany

History of development and flood protection in southeastern St. Tammany Parish

- Both residential and commercial development in southeastern St. Tammany began over 130 years ago.
- The city of Slidell was the center point of early development in the Southeastern region of St. Tammany Parish.
- Over the last 60 years residential and commercial sprawl has taken place beyond the city limits.
- Over the past 45 years rapid residential and commercial development began along the coastal area.
- A short time later, Lacombe and Mandeville saw an increase in residential and commercial development as well.
- Currently, there is more residential and commercial developments occurring outside the area of the city of Slidell than in it.
- The older developments in the coastal area elevated the land or placed structures on piers to reduce flood risk.
- About 25 years ago the parish allowed developers of residential and commercial properties to build ring levees as opposed to elevating structures in the coastal zone.
- These ring levee systems were developed through private commercial enterprise and constructed considerably higher than the previously elevated developments.
- Over the past 6 years the parish has connected these ring levees with parish-built levee systems.
- The ring levees that border the older structurally elevated communities are parallel and perpendicular to the older communities. See figure 1
- The last leg of the ring levee system that borders the older structurally elevated communities is connected to the elevated railroad bed which runs parallel to Hwy. 11 from the lake inland. See fig.1

Development of flood protection in the Southeastern region St. Tammany Parish

- Prior to Hurricane Betsy there was little or no attempt to develop community based governmental flood protection in St. Tammany Parish.
- In the late 1980's the parish created a levee board, however, the parish dissolved it in the mid 1990's.
- In the late 1980's the Corps of engineers produced a reconnaissance report discussing a ring levee system around the city of Slidell.
- From the time the reconnaissance report was finished until hurricane Katrina in 2005, no parish levee projects were in development.
- In the 1990's the parish allowed two developers to build ring levee systems for their PUD.
- The two developments were Lakeshore Estates and Oak Harbor Estates.
- In 2012 the parish received SELA funds and used the funds over the next two years to build a connecting levee system between the privately built Oak Harbor and the Lakeshore levee systems. See figure 1
- The connecting levees, along with the Lakeshore and Oak Harbor levees, were built 15 feet or higher.
- The connected the levees of Oak Harbor and Lakeshore Estates are now part of a flood protection for old Slidell.
- There has been no modeling to study if any additional flood risk is accruing to communities located in front of the connected levee systems. See fig. 1
- The levee systems border the earlier developed communities of Eden Isles, Oak Harbor, Highway 11, and Lakeview.
- As stated, the earlier communities were previously developed by either elevating the land or elevated structures on piling.
- The elevations of these communities were set to government flood risk reduction standards at the time of development.
- However, those communities are lower than the ring levee systems which were built to 15 feet or higher.
- The communities of Eden Isles, Lakeview, Oak Harbor, and Highway 11 are surrounded by the ring levee system with an open end facing the lake. See figure 2

Increased flood risk to Coastal region of Southeastern St. Tammany

- The most affected area in St. Tammany Parish by storm surge flooding is in the southeasternregion.
- The affected areas are part of the coastal zone and extend from Lacombe to Hwy. 90 in St. Tammanyparish.
- The outbound surge in almost all cases is higher in the affected region .
- The outbound surge is driven by easterly directed winds across Lake Pontchartrain as hurricanes moveinland.
- As the surge exits through the 5-mile opening between South point, the eastern end of the HSDRRS, and the shoreline of St. Tammany Parish a convergence occurs.. See figure 3
- The outbound surge was estimated to be 3 feet higher than the inbound surge of hurricane Katrina along the southeastern region of St. Tammany Parish.
- Evidence of this occurring can be seen in the damage to the Interstate bridge and the flood damage along withthe debris field in the Eden Isles, Oak Harbor and other areas. See figures 3,5,6,7,
- The extremely large debris field that collected in the communities of Eden Isles and Oak Harbor came from structures destroyed in other communities located along the shores of Lake Pontchartrain.
- The diagram shows the outbound surge as it flows along the HSDRRS levee until it reaches the it’s end at South Point. See fig. 3
- There are additional factors that also influence the outbound surge such as the elevated roadbed of Hwy. 90 andthe elevated track bed of L&N railroad at Lake Borgne. See figure 3
- These Hwy 90 and the elevated railroad tracks are perpendicular to the outbound surge reducing the flow.

Fig.1) Eden Isles and levees and the elevated railroad tracks surrounding the community.

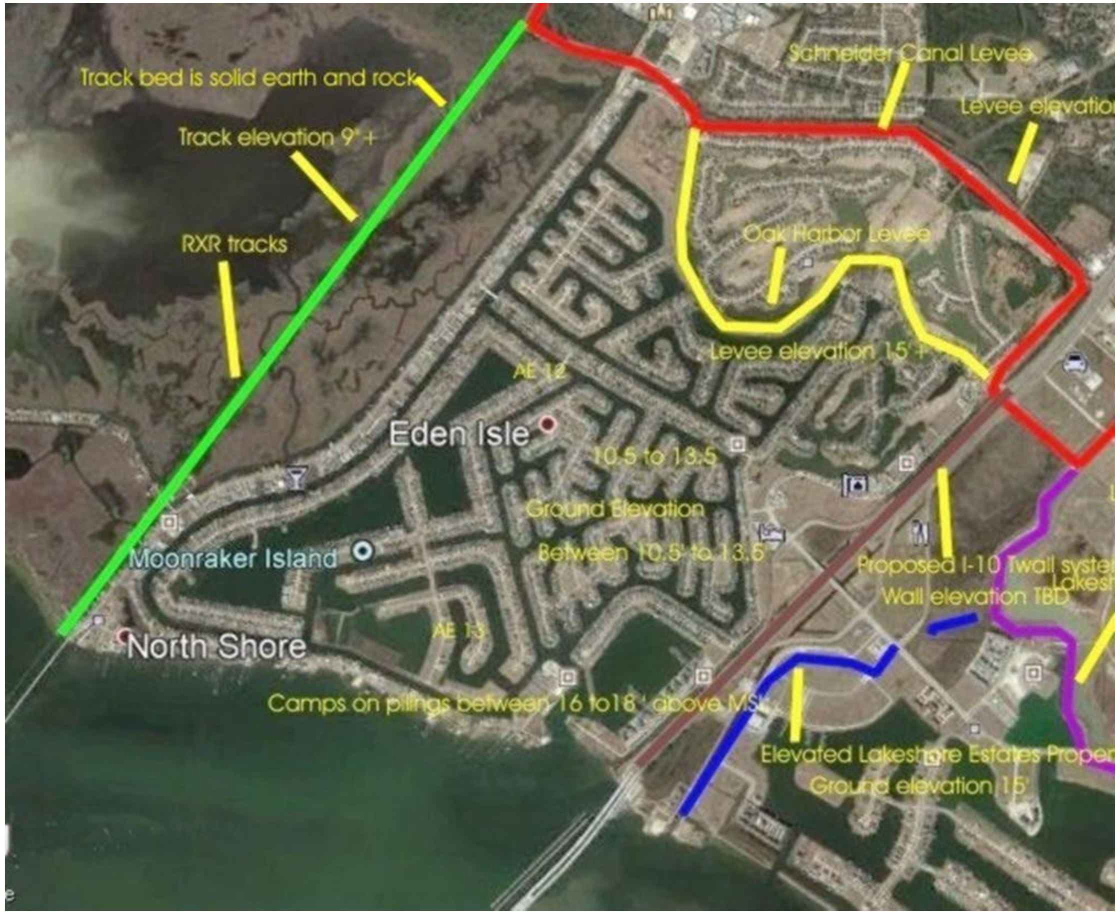


Fig. 2 Surge impact on Eden Isles

Fig 3 Convergence of outbound surge as storm surge is forced out of Lake Pontchartrain as the hurricane moves inland

Katrina storm surge damage to Southeastern St. Tammany

- It has been estimated that St. Tammany Parish sustained over 2 billion dollars in damage to property from Hurricane Katrina.
- It was also estimated that the Southeastern section of St. Tammany parish sustained the greatest amount of damage, with over $ 950,000,000 in property damage.
- The Eden Isles, Oak Harbor, Lakeview, Lakeshores Estates and Car Drive sustained over

  $ 450,000,000.00 in property damage alone.
- These figures do not include Parish government facilities that were damaged in Katrina.
- The debris field was so extensive it took almost a year to be removed. See fig. 5,6,7

Fig. 5 Debris field on eastern St. Tammany shoreline

It should be noted that this debris is not from Eden Isles structures.
It is from other areas along Lake Pontchartrain shorelines that were destroyed by hurricane Katrina.

Fig6 Debris field in Eden Isles subdivision after Katrina

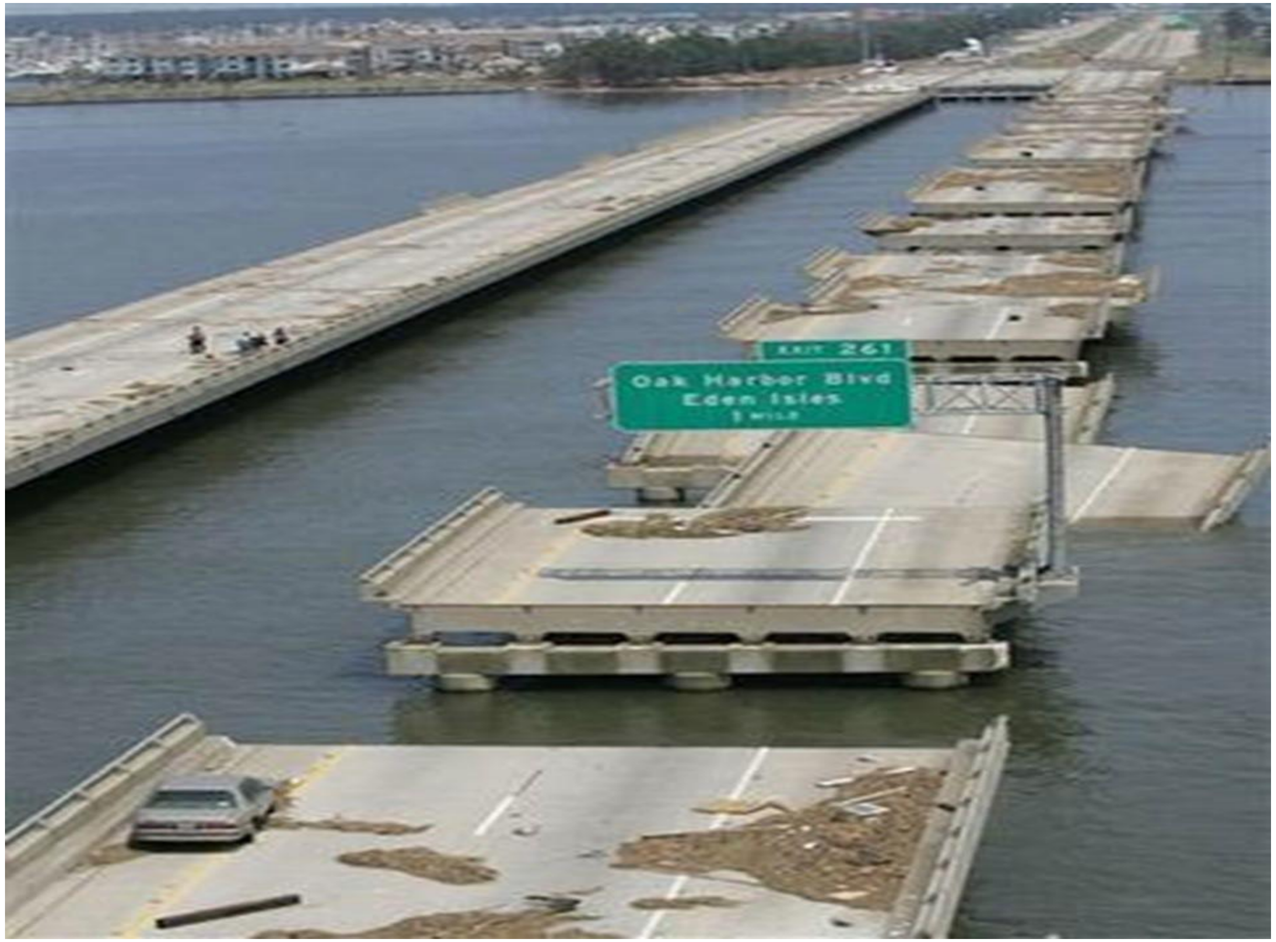
It should be noted that this debris is not from Eden Isles structures.
It is from other areas along Lake Pontchartrain shorelines that were destroyed by hurricane Katrina.

Fig. 7 Debris field on Marina Dr. in Eden Isles subdivision

It should be noted that this debris is not from Eden Isles structures.
It is from other areas along Lake Pontchartrain shorelines that were destroyed by hurricane Katrina.

Damage to I-10 at the shoreline of St. Tammany

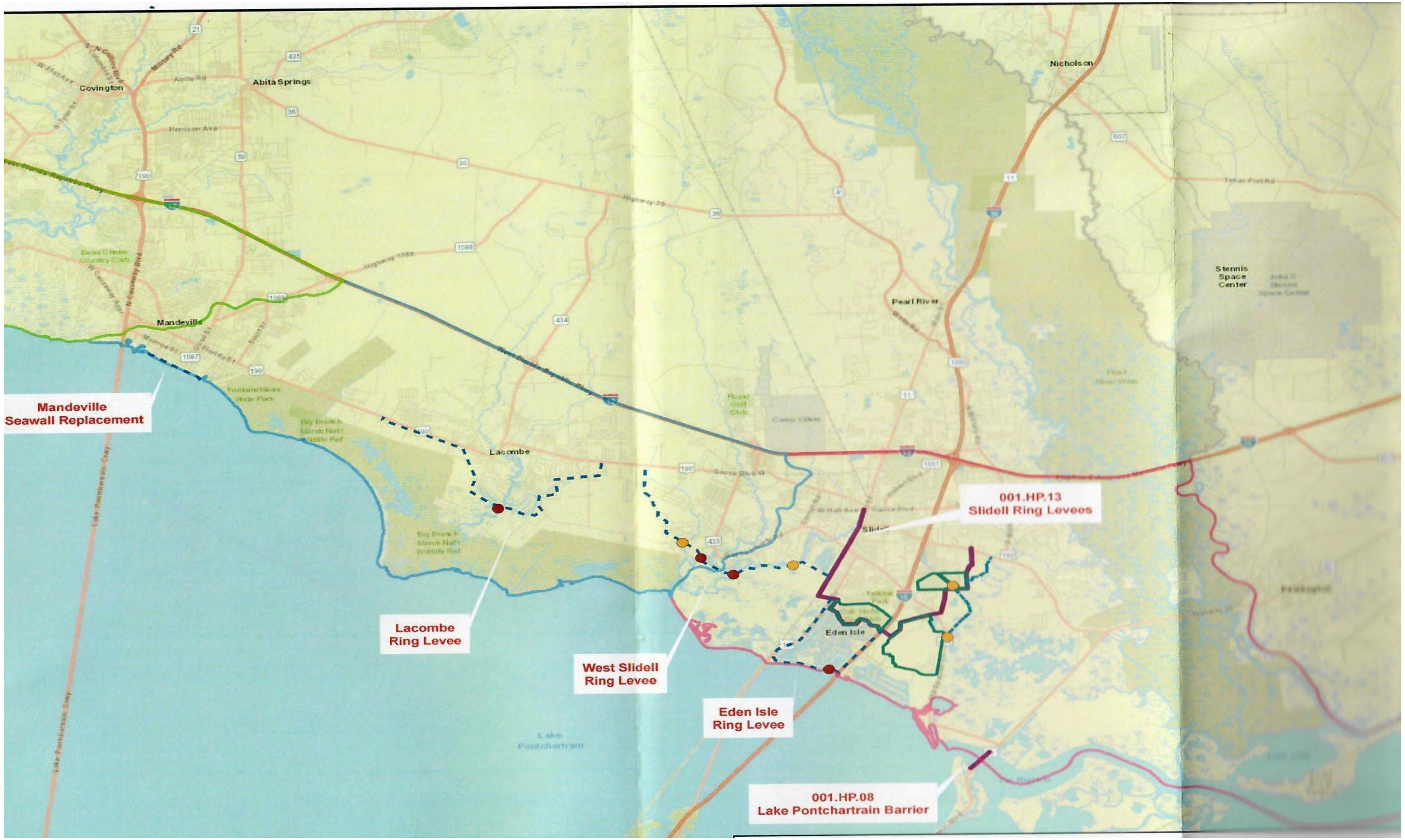
Notice that the bridge sections are shoved off their piers in an outbound direction



St. Tammany Master Plan and Gap Analysis

- The St. Tammany levee board, in conjunction with St. Tammany parish and the CPRA, are in the process of developing a Master Plan that designs flood protection for the coastal region.
- Neel-Schaffer engineering was hired to create the Master Plan.
- During the process, a gap analysis was developed which outlined areas at risk from stormsurge flooding.
- Areas in Lacombe, the city of Slidell, Eden Isles, and Oak Harbor have suffered with repeated surge issues.
- South and east of Eden Isles, the shoreline communities of Lakeshore Estates, Salt Bayou, Rigolets Estates and Treasure Island have also suffered with surges issues.
- Neel Schaffer has developed several possible levee alignments that would effectively protect communities in the southeastern region of St. Tammany Parish.
- In fig. 4 the communities that would benefit from the construction of flood protection are highlighted.
- The levee alignments are shown as dotted lines on the map. See fig.4
-

Fig. 4 Alterative Levee alignments covering at risk areas



What will be achieved when this flood protection is built

- Considerable risk reduction against surge damage in the Lakeview, Eden Isles, Oak Harbor, Lacombe communities and areas in Slidell but outside of the current planed levee project.
- There would be a decrease in costly payouts by the National flood Insurance program.
- The flood protection system would protect against additional damage caused by the extensive debris field driven into residences and businesses.
- The expense of debris clean-up that communities face following hurricanes like Katrina would be drastically reduced.
- The residents and business owners in these communities will directly benefit from a reduction in Flood insurance premiums.
- Property values will stabilize, allowing the residents and business owners in these areas to have not only peace of mind, but see continued communal growth.

From: Dixon, Amy A CIV (USA)
To: Sttammanyfs
Subject: FW: [Non-DoD Source] Re: FW: St. Tammany Parish Feasibility Study list of alternatives
Date: Monday, April 27, 2020 5:25:01 AM

-----Original Message-----
From: Laurésica [redacted]
Sent: Friday, April 24, 2020 10:08 PM
To: Dixon, Amy A CIV (USA) <Amy.Dixon@usace.army.mil>
Subject: [Non-DoD Source] Re: FW: St. Tammany Parish Feasibility Study list of alternatives

Hi Amy,

I was in on the the meeting this morning. I would like to make clear that the Mandeville Lakefront floods frequently, not just with big storms. In fact, we were under water 2 weeks ago on Easter Sunday. No rain. The water came up quickly because of strong winds. I am attaching photos from this flooding on April 12th. I also have a video if you are interested.

I appreciate the work that you are putting into this.

Lauré Sica

On Thu, Apr 23, 2020 at 3:20 PM Dixon, Amy A CIV (USA) <Amy.Dixon@usace.army.mil <mailto:Amy.Dixon@usace.army.mil> > wrote:

EXTERNAL EMAIL: Please do not click on links or attachments unless you know the content is safe.

-----Original Appointment-----
From: Dixon, Amy A CIV (USA) [mailto:Amy.Dixon@usace.army.mil <mailto:Amy.Dixon@usace.army.mil>]
Sent: Friday, April 17, 2020 6:34 AM
To: Dixon, Amy A CIV (USA); MEYERS, MICHELLE L; Justin Merrifield; Alexis Rixner; BAKER, EVERARD CIV USARMY CEMVN (USA); Dircksen, Matthew S CIV USARMY CEMVN (USA); Kelly, Shannon C CIV USARMY CEMVN (USA); Logan, John B CIV USARMY CEMVN (USA); Manuel, Elizabeth A CIV (USA); Donna S. O'Dell; ofckrieger@aol.com <mailto:ofckrieger@aol.com> ; Laura (Beach) Gatlin; Roy L. Heidelberg III; bidj340retired@gmail.com <mailto:bidj340retired@gmail.com> ; ddegeneres@cityofmandeville.com<mailto:ddegeneres@cityofmandeville.com>; lscott@cityofmandeville.com <mailto:lscott@cityofmandeville.com> ; lspranley@cityofmandeville.com <mailto:lspranley@cityofmandeville.com> ; gjones@cityofmandeville.com <mailto:gjones@cityofmandeville.com>;dcurtis@abitaspringsla.gov<mailto:dcurtis@abitaspringsla.gov>; jdufrene@abitaspringsla.gov <mailto:jdufrene@abitaspringsla.gov> ; alcourouleau@townofmadisonville.com <mailto:alcourouleau@townofmadisonville.com> ; Bradley, Sarah C CIV USARMY CEMVN (USA); attorney.mathison@townofpearlriver.net <mailto:attorney.mathison@townofpearlriver.net> ; bclancy@cityofslidell.org <mailto:bclancy@cityofslidell.org> ; jfrance@cityofslidell.org <mailto:jfrance@cityofslidell.org> ; rherring@cityofslidell.org <mailto:rherring@cityofslidell.org> ; mguilbeau@cityofslidell.org <mailto:mguilbeau@cityofslidell.org> ; cbrown@covla.com

<mailto:cbrown@covla.com> ; jchatellier@townofmadisonville.org <mailto:jchatellier@townofmadisonville.org> ; Jay Watson

Cc: Steven Gunter; John Troutman; Donald Villere; mcooper@stpgov.org <mailto:mcooper@stpgov.org> ; gthayes@stpgov.org <mailto:gthayes@stpgov.org>

Subject: St. Tammany Parish Feasibility Study list of alternatives

When: Friday, April 24, 2020 9:00 AM-11:00 AM (UTC-06:00) Central Time (US & Canada).

Where: Virtual Webex

EXTERNAL EMAIL: Please do not click on links or attachments unless you know the content is safe.

Please note the time change to Friday the 24th at 9 AM.

[redacted]

The agenda for this meeting will be supplied on Monday, however this meeting is to discuss the current list of alternatives moving forward in the St. Tammany Parish Louisiana Feasibility Study. I have attached the draft of our presentation to aid in discussion. Please review before the meeting on Wednesday. In alternative 3, the structural barrier at the Rigolets was screened out; only marsh creation and restoration remains at this location. More updates on what alternatives have been screened out and progress moving forward will be discussed at this meeting. We welcome all comments on our current plan. Thank you for attending and taking the time to review the attached presentation.

If you have any questions before the meeting on Friday, feel free to give me a call,

Thank you,

Amy Dixon

Project Manager

U.S. Army Corps of Engineers

New Orleans District

Work: 504-862-1193

--

Laure Sica

[redacted]

From: Milazzo, John W (Jack) III CIV USARMY CEMVN (USA)
To: Sttammanyfs
Subject: FW: [Non-DoD Source] last one (UNCLASSIFIED)
Date: Thursday, February 13, 2020 2:09:14 PM
Attachments: slough.pdf

CLASSIFICATION: UNCLASSIFIED

Re: Mr Ren Clark at [redacted]

From: Ren Clark [redacted]
Sent: Thursday, February 13, 2020 2:04 PM
To: Milazzo, John W (Jack) III CIV USARMY CEMVN (USA) <John.W.Milazzo@usace.army.mil>
Subject: Re: [Non-DoD Source] last one (UNCLASSIFIED)

re: location, see attached. To me, this case is the poster child for why, when it comes to water management, municipal and parish governments should not be allowed to run with scissors.

On Thursday, February 13, 2020, 12:21:50 PM CST, Milazzo, John W (Jack) III CIV USARMY CEMVN (USA) <john.w.milazzo@usace.army.mil> wrote:

CLASSIFICATION: UNCLASSIFIED

Mr. Clark,

Thank you for sharing this information with us. What is the location or address that this took place? I am forwarding this information and that of 420 Carroll St. to the rest of ourteam.

Kind regards,

Jack Milazzo, ASLA, PLA

Landscape Architect

U.S. Army Corps of Engineers, New Orleans District

504.862.1505 office

-----Original Message-----

From: Ren Clark[[redacted]

Sent: Thursday, February 13, 2020 11:55 AM

To: Milazzo, John W (Jack) III CIV USARMY CEMVN (USA) <John.W.Milazzo@usace.army.mil <mailto:John.W.Milazzo@usace.army.mil> >

Subject: [Non-DoD Source] last one

Jack,

One last piece of amateur science. Please note that this area of tidally influenced, periodically flooded, hydric soils with abundant palmetto and other hydrophytic veg, at an elevation below 3 ft on NAVD88 was filled in by 'development' soon after this event.

Ren Clark

CLASSIFICATION: UNCLASSIFIED

CLASSIFICATION: UNCLASSIFIED

From: Rich Small
To: Sttammanyfs
Subject: [Non-DoD Source] Another Flood Prevention Idea
Date: Friday, February 14, 2020 11:00:52 AM
Attachments: image.png

Good Morning!

While talking with a few of my neighbors yesterday (02/13/2020) the idea of building a “Great Wall” similar to the Great Wall of New Orleans was suggested as another solution.

See site below:

Blockedhttp://www.takepart.com/feature/2015/08/17/katrina-new-orleans-walled-city

If this “New” Wall were to be built as a continuation of the Great Wall extending northeast along the rail lines to the Mississippi State Line; it would protect all St. Tammany residence against a storm surge from the Gulf of Mexico.

Also see attached larger picture.

Again Thank You in advance for taking the time to read this note!

Regards,

Dee and Rich Small

[redacted]