

**Appendix O:
Conceptual Compensation Plan for Impacts to Wetlands and Waters**

[This page intentionally left blank]

Table of Contents

	<u>Page</u>
Appendix O Conceptual Compensation Plan for Impacts to Wetlands and Waters	O-1
O.1 COMPENSATORY WETLAND MITIGATION REQUIREMENTS	O-1
O.2 DOE COMPENSATION FOR WETLANDS AND WATERS IMPACTS	O-1
O.3 PRELIMINARY REVIEW OF POTENTIAL COMPENSATION SITES	O-2
O.3.1 Bruinsburg	O-3
O.3.1.1 Bruinsburg Compensation Site 1	O-3
O.3.1.2 Bruinsburg Compensation Site 2	O-5
O.3.1.3 Bruinsburg Compensation Site 3	O-5
O.3.1.4 Summary of Bruinsburg Compensation Sites	O-6
O.3.2 Chacahoula.....	O-6
O.3.2.1 Chacahoula Compensation Site 1	O-6
O.3.2.2 Chacahoula Compensation Site 2	O-9
O.3.2.3 Chacahoula Compensation Site 3	O-9
O.3.2.4 Chacahoula Compensation Site 4	O-11
O.3.2.5 Chacahoula Compensation Site 5	O-11
O.3.2.6 Compensation Activities in the Proposed Utility ROW	O-11
O.3.2.7 Summary of Chacahoula Compensation Sites	O-14
O.3.3 Richton.....	O-14
O.3.3.1 Richton Compensation Site 1.....	O-14
O.3.3.2 Richton Compensation Site 2.....	O-16
O.3.3.3 Richton Compensation Site 3.....	O-16
O.3.3.4 Richton Compensation Site 4.....	O-17
O.3.3.5 Richton Compensation Site 5.....	O-17
O.3.3.6 Richton Compensation Site 6.....	O-18
O.3.3.7 Richton Compensation Site 7: Old Fort Bayou Mitigation Bank	O-18
O.3.3.8 Summary of Richton Compensation Sites	O-18
O.3.4 Stratton Ridge	O-18
O.3.4.1 Stratton Ridge Compensation Site 1	O-19
O.3.4.2 Stratton Ridge Compensation Site 2: Katy-Cypress Mitigation Bank	O-19
O.3.4.3 Summary of Potential Compensation Sites for Stratton Ridge	O-22
O.3.5 Bayou Choctaw.....	O-22
O.3.5.1 Bayou Choctaw Compensation Site 1.....	O-22
O.3.5.2 Bayou Choctaw Compensation Site 2.....	O-24
O.3.5.3 Summary of Potential Compensation Sites for Bayou Choctaw	O-24
O.3.6 Big Hill	O-24
O.3.6.1 Big Hill Compensation Site 1	O-25
O.3.6.2 Big Hill Compensation Site 2: Neches River Swamp Reserve Mitigation Bank	O-25
O.3.6.3 Summary of Potential Compensation Sites for Big Hill	O-25
O.3.7 West Hackberry	O-28
REFERENCES	O-28

LIST OF TABLES

	<u>Page</u>
Table O.3.1-1: Summary of Potential Compensation Sites for Bruinsburg	O-6
Table O.3.2-1: Summary of Potential Compensation Sites for Chacahoula.....	O-14
Table O.3.3-1: Summary of Potential Compensation Sites for Richton	O-19
Table O.3.4-1: Summary of Potential Compensation Sites for Stratton Ridge.....	O-22
Table O.3.5-1: Summary of Potential Compensation Sites for Bayou Choctaw	O-24
Table O.3.6-1: Summary of Potential Compensation Sites for Big Hill.....	O-25

LIST OF FIGURES

	<u>Page</u>
Figure O.3.1-1: Location of the Bruinsburg Storage Site and Potential Compensation Sites	O-4
Figure O.3.2-1: Location of the Chacahoula Storage Site and Potential Compensation Sites	O-7
Figure O.3.2.1-1: Chacahoula Compensation Site 1	O-8
Figure O.3.2.2-1: Chacahoula Compensation Site 2	O-10
Figure O.3.2.4-1: Chacahoula Compensation Site 4	O-12
Figure O.3.2.5-1: Chacahoula Compensation Site 5	O-13
Figure O.3.3-1: Location of the Richton Storage Site, the Pascagoula Terminal, and Two Potential Compensation Sites	O-15
Figure O.3.4-1: Location of the Stratton Ridge Storage Site and Potential Compensation Sites.....	O-20
Figure O.3.4.1-1: Stratton Ridge Compensation Site 1	O-21
Figure O.3.5-1: Location of the Bayou Choctaw Storage Site and Potential Compensation Sites.....	O-23
Figure O.3.6-1: Location of the Big Hill Storage Site and Potential Compensation Sites	O-26
Figure O.3.6.1-1: Big Hill Compensation Site 1	O-27

Appendix O

Conceptual Compensation Plan for Impacts to Wetlands and Waters

O.1 COMPENSATORY WETLAND MITIGATION REQUIREMENTS

The Department of Energy (DOE) is evaluating the expansion of the Strategic Petroleum Reserve (SPR) by developing a new site and expanding two or three existing sites to increase the overall SPR capacity. For each alternative, other than the no-action alternative, DOE would construct a storage facility, associated facilities on the storage site, raw water intake (RWI) structures, pipelines, brine disposal pipelines or brine injection wells, pipeline and utility rights-of-way (ROWs), and for some alternatives, marine terminals. As discussed in section 3.7 and appendix B, such development would result in impacts to wetlands and waters of the United States including streams.

Clean Water Act section 404(b)(1) Guidelines (40 CFR Part 230) require compensatory mitigation to offset aquatic resource impacts after all appropriate and practicable steps have been taken to avoid and minimize aquatic resource impacts. These guidelines are implemented through the Clean Water Act Section 404 permit program, which is administered by the U.S. Army Corps of Engineers (USACE). State regulations, including the Section 401 Water Quality Certification, and guidelines also require compensatory mitigation to offset aquatic losses. In addition, compensatory mitigation to offset adverse impacts of Essential Fish Habitat (EFH) is required by National Oceanographic and Atmospheric Administration (NOAA) Fisheries as part of the consultation process required by the Magnuson-Stevens Fishery Conservation and Management Act of 1976.

A brief summary of minimization and avoidance efforts, impacts to waters of the United States and wetlands, and future mitigation, avoidance, and compensation plans is provided in section 3.7, appendix B, and appendix E of the EIS. After an alternative is selected in the record of decision (ROD), DOE would continue to refine the design of the selected alternative while developing measures to avoid impacts to wetlands and other aquatic resources to the maximum extent practical.

Unavoidable impacts would be compensated through the Section 404/401 permitting process. Detailed compensation plans would be developed after wetland and surface water delineations have been conducted as part of the Section 404/401 permitting process. During the permitting process, DOE would develop a better understanding of the extent of wetlands and stream impacts, the type of wetlands, and the functions and values that would be affected. Thus, compensation plans that properly address impacts to wetlands must be created after wetlands have been delineated and functional assessments completed.

Appendix O provides a preliminary review of potential compensation sites for the alternatives. This review is not intended to be exhaustive. For some alternatives, additional compensation sites may need to be identified to develop the compensation plan. In addition, some of the compensation sites identified in this appendix may not be practicable, available, or appropriate when the compensation plan is developed during the Section 404/401 permitting process.

O.2 DOE COMPENSATION FOR WETLANDS AND WATERS IMPACTS

DOE would compensate for unavoidable impacts to wetlands and waters of the United States associated with the SPR storage site and its associated infrastructure by one of the following options:

- Creating, restoring, enhancing, and preserving wetlands and waters of the United States;
- Purchasing mitigation bank credits from an approved commercial or private mitigation bank; or

- Making cash payments for mitigation credits established through an in-lieu-of fee program.

Consultation meetings and discussions with natural resource agencies during the comment period, and written comments submitted by natural resource agencies, indicate that wetland restoration is generally the preferred compensation option. DOE would continue to consult with and seek recommendations from the coordinating natural resource agencies such as USACE, Environmental Protection Agency (EPA), NOAA Fisheries, U.S. Fish and Wildlife Service (USFWS), state resource agencies, and other applicable agencies when the compensation plan is being developed. In some circumstances a combination of two or more types of mitigation may provide the most ecologically sound compensation for wetland functions.

DOE has established the following goals for the compensatory mitigation plan:

- Replace in-kind wetland and aquatic resource functions and values to the extent practicable;
- Focus on wetland and stream restoration, although a combination of restoration, enhancement, creation, and preservation and mitigation banking may be used;
- Preserve upland buffers surrounding the wetlands, preserve or establish riparian buffers, and enhance fish and wildlife habitat to the extent practicable;
- Select mitigation sites in the same watershed or approved hydrologic unit code as the impact areas; and,
- Seek mitigation opportunities that parallel or support other natural resource conservation efforts such as protection of habitat for special status species, National or state wildlife refuges, National or state parks, or restoration projects being implemented such as the Coastal Restoration Planning, Protection and Restoration Act.

DOE would develop and submit the detailed compensation plan as part of the Section 404/401 permitting process and use compensation ratios dictated by the regulatory agencies using a functional assessment for the affected wetlands. The Vicksburg, Mobile, and New Orleans districts of the USACE have indicated that the use of the USACE Charleston district methodology for determining the wetland compensation ratio may be appropriate (USACE Charleston District, 2002).

DOE would follow the USACE Vicksburg, Galveston, Mobile, or New Orleans district's compensatory mitigation guidelines to establish an appropriate mitigation plan as part of the Section 404 permit required by the Clean Water Act. DOE would also follow the requirements and guidelines described in the Regulatory Guidance Letter (RGL) 02-2, Federal Guidance for the Establishment, Use, and Operation of Mitigation Banks, the Federal Guidance on the Use of In-Lieu-of Fee Arrangements for Compensatory Mitigation under Section 404 of the Clean Water Act, and the 1990 Corps/EPA Mitigation Memorandum of Agreement. Coordination of the compensation plan would be conducted with USACE, EPA, NOAA Fisheries, USFWS, state resource agencies, and other applicable agencies.

O.3 PRELIMINARY REVIEW OF POTENTIAL COMPENSATION SITES

DOE identified potential compensation sites through discussions with natural resource agencies, conservation groups, and use of aerial photography and wetland databases. DOE consulted with the Natural Resources Conservation Service (NRCS); USFWS; USACE; The Nature Conservancy; the Mississippi, Louisiana, and Texas Wetland Reserve Programs; Louisiana Department of Environmental Quality (DEQ); and Louisiana Department of Natural Resources (DNR) for recommendations on possible sites. DOE used aerial photography of the sites, NRCS soil surveys, and National Wetland Inventory (NWI) information to identify potential mitigation opportunities. The wetland mitigation sites identified

through this process are a combination of privately owned properties that are currently on the market or appear to offer suitable mitigation opportunities.

In addition to the sites identified from aerial photography, NRCS soil surveys, and NWI information, DOE reviewed approved mitigation banks as potential mitigation sites for some of the SPR alternatives.

A preliminary site survey and GIS analysis was conducted for each proposed new SPR storage site. Because the wetlands potentially affected by the project have not been delineated and the functional assessment has not yet been completed at each proposed storage and expansion site, the compensation ratios have not been established; therefore, the acreage or credits of required compensation are not available. Thus, depending on the selected alternative and the results of the wetland delineations, additional compensation sites may need to be identified. In addition, multiple mitigation sites may need to be developed to satisfy the project's compensatory mitigation requirements.

Detailed analysis such as soil or hydrological assessment of the mitigation sites has not been conducted. Such analyses, along with a feasibility study to further evaluate and design the compensation sites, would be conducted during the design and Section 404/401 permitting phases of the selected alternative to ascertain which of the mitigation sites or combinations of sites best satisfies the compensation requirements. The compensation sites described in appendix O should be considered examples of potential compensation sites.

The following discussion identifies potential compensation sites for the new site associated with each of the alternatives (e.g., Bruinsburg, Chacahoula, Richton, and Stratton Ridge) as well as for the expansion sites that are a part of each alternative (e.g., Bayou Choctaw, Big Hill, and West Hackberry). NRCS soil surveys and NWI information were not available for all potential compensation sites. If NWI information was available, a NWI map of the compensation site is included. NWI maps were not created for mitigation banks because the mitigation banks discussed below are approved mitigation banks.

O.3.1 Bruinsburg

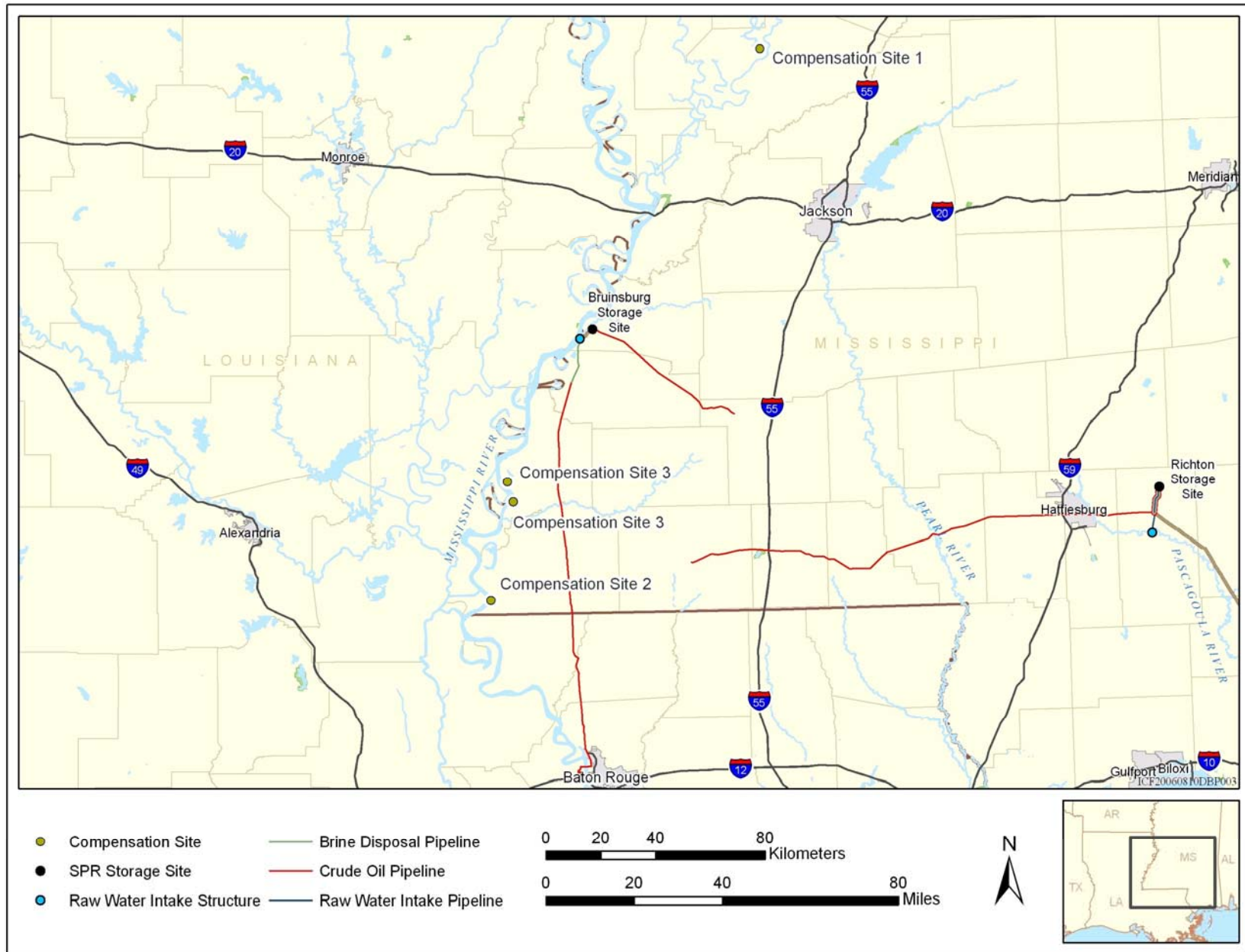
The Bruinsburg storage site would be located about 10 miles (16 kilometers) east of Port Gibson, MS, and 40 miles (64 kilometers) southwest of Vicksburg in Claiborne County, MS. This proposed new site would consist of 16 new caverns and associated infrastructure on the storage site, a RWI structure, four pipeline ROWs, five power line ROWs, and two new terminals, which would affect approximately 480 acres (194 hectares) of wetlands. Impacts potentially would occur to palustrine-forested, palustrine scrub-shrub, palustrine unconsolidated bottom, and riverine wetlands. Appendix B, section B.6.1, provides a more detailed analysis of the potential wetland impacts associated with this site.

DOE identified three potential compensation sites for Bruinsburg, which contain more than 8,565 acres (3,466 hectares). Figure O.3.1-1 shows the location of these sites in relation to the Bruinsburg storage site. Additional information regarding each potential compensation site is provided in the following sections.

O.3.1.1 Bruinsburg Compensation Site 1

Bruinsburg compensation site 1 is located approximately 70 miles (113 kilometers) northeast of the Bruinsburg storage site, and approximately 3 miles (5 kilometers) west of Yahoo City, MS, in Yahoo County (see figure O.3.1-1). Bruinsburg compensation site 1 is approximately 2,745 acres (1,111 hectares). This site would offer a combination of wetland creation, restoration, preservation, and stream/riparian restoration and enhancement opportunities, as discussed here:

Figure O.3.1-1. Location of the Bruinsburg Storage Site and Potential Compensation Sites



- Bruinsburg compensation site 1 offers opportunities for establishment of wetlands and riparian habitat. For example, wetlands could be created and preserved along 5 miles (8 kilometers) of frontage on Broad Lake, the Yazoo River, and Tokeba Bayou.
- NRCS soil surveys indicate that more than 1,000 acres (405 hectares) of compensation site 1 have hydric soils (Forestdale and Sharkey soil series). This type of soil may offer suitable conditions to establish wetlands.
- More than 2,000 acres (809 hectares) of the property are currently cropland; this area may provide opportunities to create or restore wetlands.

O.3.1.2 Bruinsburg Compensation Site 2

Bruinsburg compensation site 2 is located approximately 70 miles (113 kilometers) south of the Bruinsburg storage site, and approximately 45 miles (72 kilometers) northwest of Baton Rouge, LA, in Wilkinson County, MS (see figure O.3.1-1). The property is approximately 2,320 acres (939 hectares). Bruinsburg compensation site 2 would offer a combination of wetland restoration, enhancement, and preservation and stream/riparian restoration and enhancement opportunities, as discussed here:

- The property is located adjacent to the Mississippi River and has about 3 miles (5 kilometers) of river frontage, which could provide opportunities for stream restoration, riparian buffers, and wildlife habitat enhancement.
- Portions of the property have been timbered and offer wetland restoration or enhancement opportunities.

O.3.1.3 Bruinsburg Compensation Site 3

Bruinsburg compensation site 3 is located approximately 40 miles (64 kilometers) southwest of the Bruinsburg storage site and approximately 7 miles (11 kilometers) south of Natchez, MS, in Adams County (see figure O.3.1-1). Compensation site 2 consists of two parcels of land adjacent to St. Catherine Creek National Wildlife Refuge. The St. Catherine Creek National Wildlife Refuge was established in 1990 and is managed by USFWS. The refuge is approximately 24,442 acres (9,890 hectares) and provides habitat for migratory waterfowl within the Mississippi River flyway and for the threatened bald eagle (*Haliaeetus leucocephalus*).

USFWS recommended in its written comments on the draft EIS that DOE consider mitigation sites around the St. Catherine Creek National Wildlife Refuge if the Bruinsburg alternative were selected (see appendix N). Two parcels of land adjacent to the refuge appear to offer mitigation opportunities. These potential compensation sites may offer restoration, preservation, habitat enhancement, and stream/riparian restoration and enhancement opportunities, as discussed here:

- Potential wetland restoration and preservation opportunities may exist along the Mississippi River in areas adjacent to the St. Catherine Creek National Wildlife Refuge.
- One 500 acre (202 hectare) parcel and one 3,000 acre (1,214 hectare) parcel located adjacent to the Mississippi River and the refuge could provide opportunities for riparian and wildlife habitat enhancement.
- After the restoration activities have been completed, parcels could be transferred to the refuge, providing additional wildlife habitat for migratory waterfowl and the bald eagle.

O.3.1.4 Summary of Bruinsburg Compensation Sites

Table O.3.1-1 shows a summary of the restoration, enhancement, preservation, and creation opportunities at each of the potential compensation sites for Bruinsburg. The total number of acres available at each compensation site is also noted. For many compensation sites, the number of acres is an estimate, which would be refined if the alternative is selected and the compensation site is included in the mitigation plan.

Table O.3.1-1. Summary of Potential Compensation Sites for Bruinsburg

	Site 1	Site 2	Site 3
Wetland Restoration	✓	✓	✓
Wetland Enhancement		✓	✓
Wetland Creation	✓		
Wetland Preservation	✓	✓	✓
Stream/Riparian Restoration/Enhancement	✓	✓	✓
Number of Acres at Site	2,745 acres (1,111 hectares)	2,320 acres (939 hectares)	3,500+ acres (1,416 hectares)

O.3.2 Chacahoula

The Chacahoula storage site would be located in Lafourche Parish, southwest of Thibodaux, LA. This proposed new site would consist of 16 new caverns and associated infrastructure on the storage site, access roads, a RWI structure, four pipeline ROWs, and three power line ROWs, which would affect approximately 2,274 acres (920 hectares) of wetlands. Estuarine, lacustrine, marine-aquatic bed, palustrine emergent, palustrine forested, palustrine scrub-shrub, palustrine unconsolidated bottom, and riverine wetlands would be affected. Appendix B, section B.6.2, provides a more detailed analysis of the potential wetland impacts associated with this site.

DOE identified five potential compensation sites for Chacahoula, which contain more than 11,610 acres (4,698 hectares). Figure O.3.2-1 shows the location of these sites in relation to the Chacahoula storage site. Additional information regarding each potential compensation site follows.

O.3.2.1 Chacahoula Compensation Site 1

Chacahoula compensation site 1 is located approximately 8 miles (13 kilometers) south of Houma, LA, in Terrebonne Parish about 30 miles (48 kilometers) to the southeast of the Chacahoula storage site (see figure O.3.2-1). The property is approximately 1,020 acres (414 hectares), as shown in figure O.3.2.1-1. Chacahoula compensation site 1 may offer a combination of wetland creation, restoration, and preservation and stream/riparian restoration and enrichment opportunities, as discussed here:

- Previous studies have noted the potential for bottomland hardwood restoration on about 130 acres (53 hectares; See www.capitalag.com).
- Opportunities for wetland restoration may be available in 150 acres (61 hectares) where fill was placed during the construction of the Houma navigational canal.
- Opportunities for wetland creation may be available in 500 acres (202 hectares) along a portion of the property that is designated uplands.

Figure O.3.2-1: Location of the Chacahoula Storage Site and Potential Compensation Sites

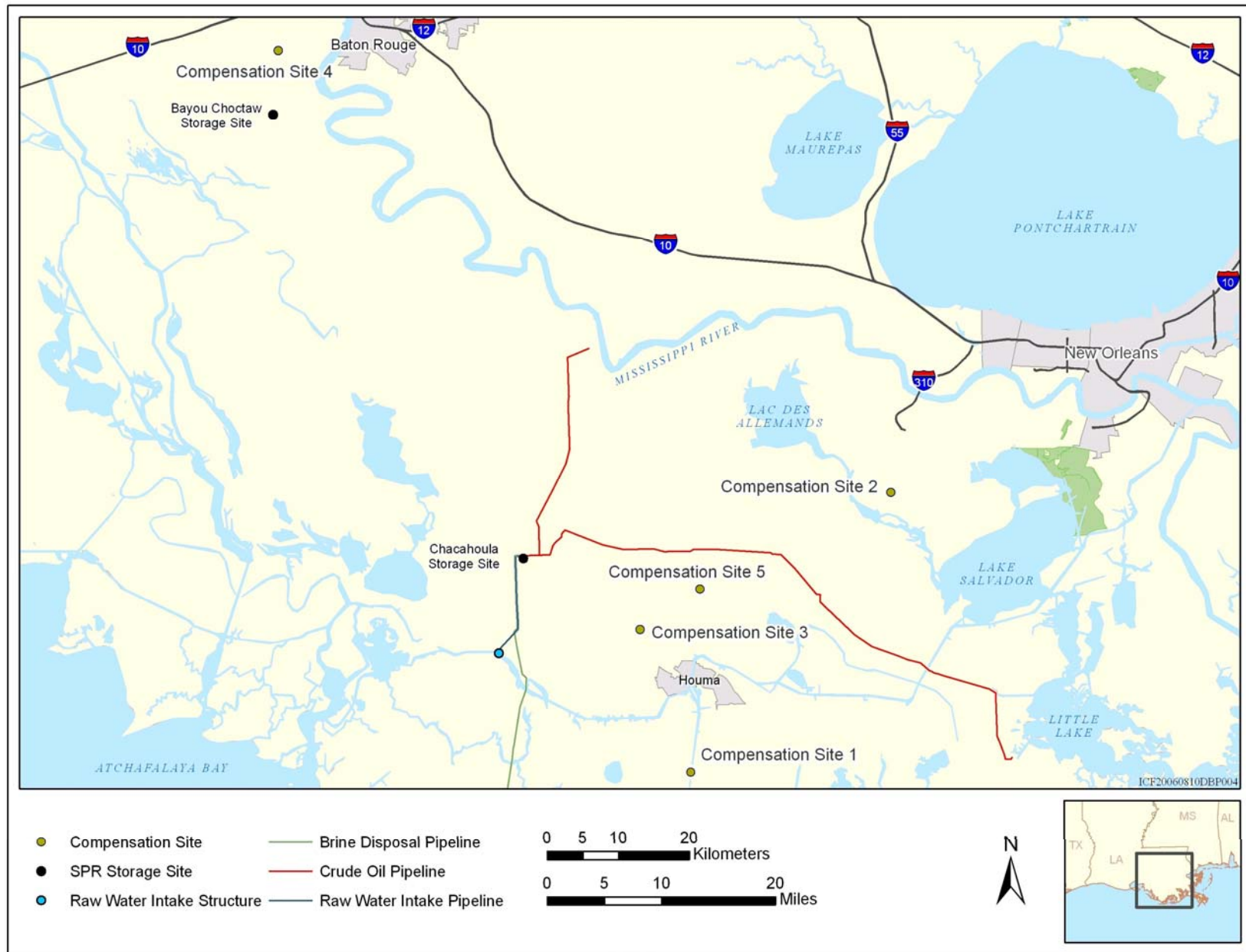
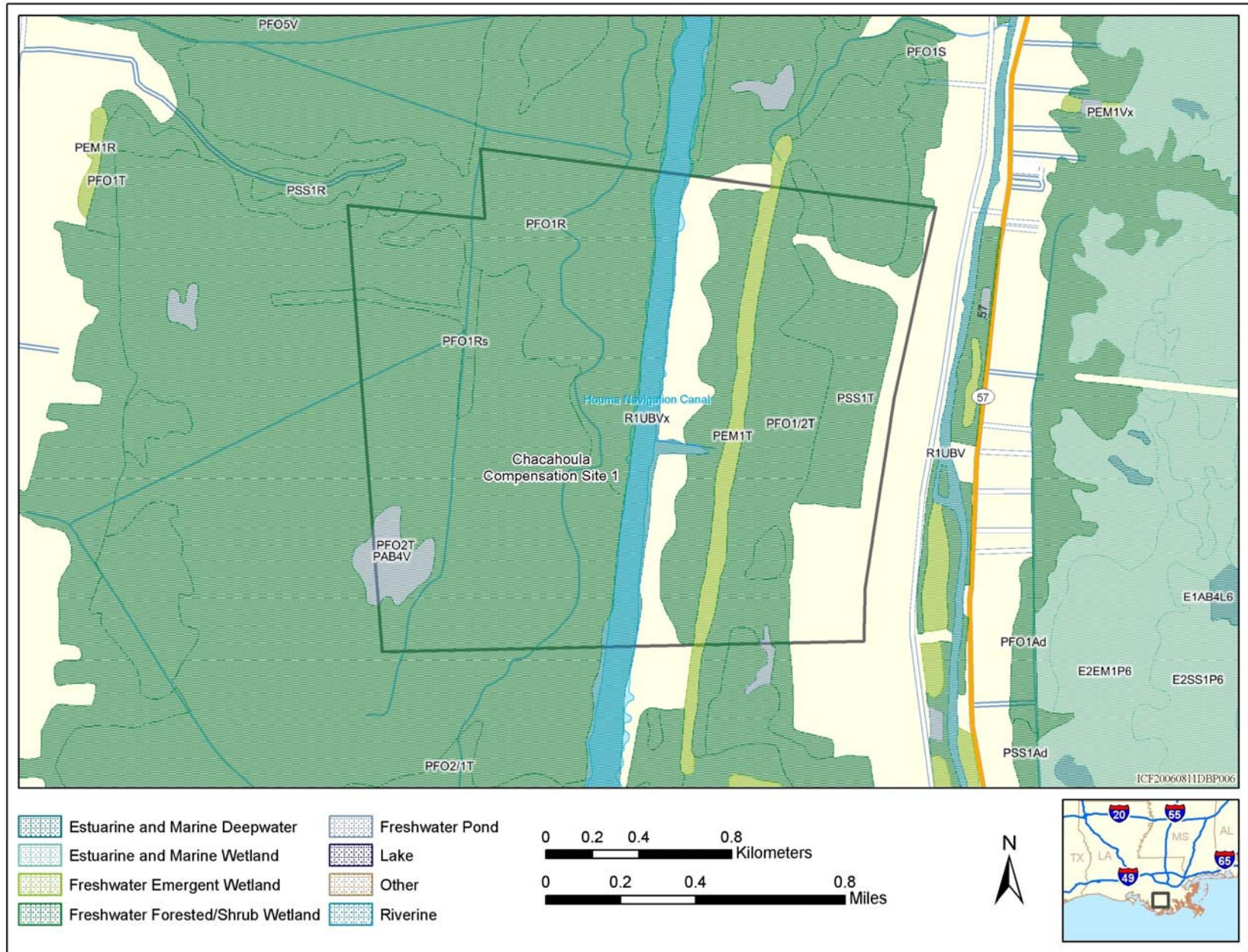


Figure O.3.2.1-1: Chacahoula Compensation Site 1



- The property also contains 250 acres (101 hectares) of forested and emergent wetlands that could be preserved.
- About 12,000 feet (3,658 meters) of stream channels are located on the property offering potential for stream/riparian enhancement and restoration.

O.3.2.2 Chacahoula Compensation Site 2

Chacahoula compensation site 2 is located approximately 15 miles (24 kilometers) to the southwest of New Orleans, LA, in St. Charles Parish (see figure O.3.2-1). This site is approximately 30 miles (48 kilometers) to the east of the Chacahoula storage site (see figure O.3.2-1). The property is approximately 440 acres (178 hectares), as shown in figure O.3.2.2-1. Chacahoula compensation site 2 may offer a combination of wetland creation, restoration, and preservation opportunities, as discussed here:

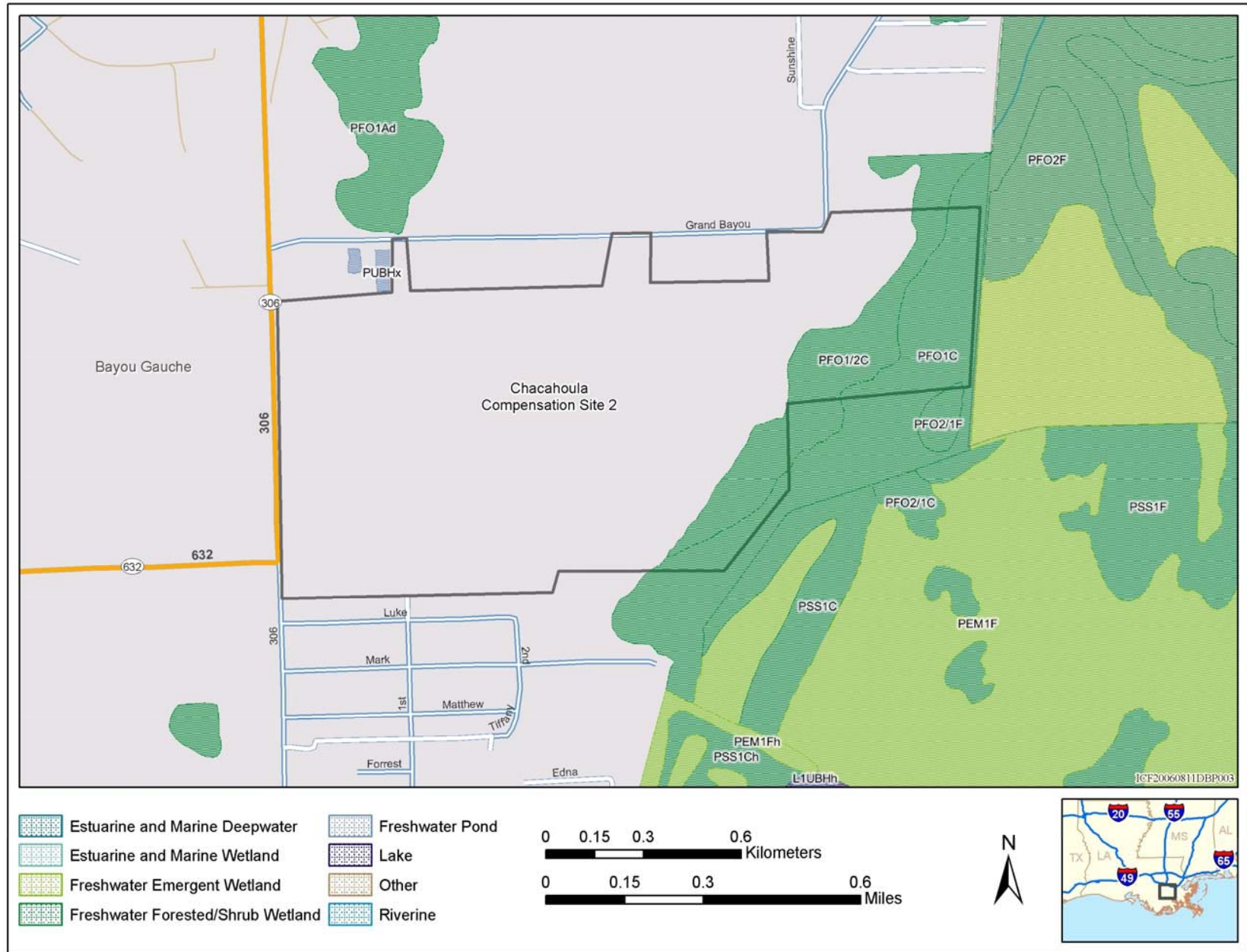
- The majority of Chacahoula compensation site 2 appears to be pastureland or agricultural fields that have been ditched, and which may be suitable for wetland restoration.
- NRCS soil surveys indicate that 270 acres (109 hectares) of compensation site 2 has hydric soils (Harahan clay soil series). This type of soil may offer suitable hydrological conditions to restore wetlands.
- Preservation opportunities may be available for 100 acres (41 hectares) of existing forested wetlands along the Paradise Canal to the east of the site.
- Compensation site 2 is located adjacent to the 7,100 acre (2,873 hectares) Paradise Mitigation Bank, one of the Nation's largest wetland mitigation banks. Preserving and restoring wetlands in this area may provide additional habitat for the wildlife in Paradise Mitigation Bank and the surrounding region.
- The site has at least two canals that may provide some opportunity for riparian habitat enhancement.

O.3.2.3 Chacahoula Compensation Site 3

Chacahoula compensation site 3 is located approximately 2 miles (3 kilometers) to the northwest of Houma, LA, in Terrebonne Parish. This site is about 15 miles (24 kilometers) to the southeast of the Chacahoula storage site (see figure O.3.2-1). The property is approximately 3,850 acres (1,558 hectares). Chacahoula compensation site 3 may offer a combination of forested wetland restoration and preservation opportunities, as discussed here:

- Opportunities to preserve wetlands may be available within 3,050 acres (1,234 hectares) of existing forested and emergent wetland.
- NRCS soil surveys indicate that the entire compensation site has hydric soils (Allemands muck, Larose muck, and Barbary muck soil series). This type of soil may offer suitable hydrological conditions to establish wetlands. Much of the site is crisscrossed with ditches.
- Opportunities to restore or enhance wetlands may be available within 800 acres (324 hectares) of previously cleared and ditched wetlands.

Figure O.3.2.2-1: Chacahoula Compensation Site 2



O.3.2.4 Chacahoula Compensation Site 4

Chacahoula compensation site 4 is located approximately 10 miles (16 kilometers) to the southwest of Baton Rouge, LA, in West Baton Rouge Parish. This site is approximately 45 miles (72 kilometers) to the northwest of the Chacahoula storage site (see figure O.3.2-1). The property is approximately 600 acres (243 hectares), as shown in figure O.3.2.4-1. Compensation site 4 may offer a combination of forested wetland restoration and preservation opportunities, as discussed here:

- Opportunities to preserve wetlands may be available within 150 acres (61 hectares) of existing forested wetland.
- Opportunities to create and restore wetlands may be available within 100 acres (41 hectares) of existing agricultural fields. Many ditches traverse the farmed portion of the site.
- NRCS soil surveys indicate that the entire compensation site has hydric soils (Commerce silt loam, Convert Silt, Sharkey clay, and Tunica clay soil series). This type of soil may offer suitable hydrological conditions to establish wetlands.

O.3.2.5 Chacahoula Compensation Site 5

Chacahoula compensation site 5 is located approximately 5 miles (8 kilometers) to the northeast of Houma, LA, in Terrebonne Parish, and approximately 17 miles (27 kilometers) to the southeast of the Chacahoula storage site (see figure O.3.2-1). The property is approximately 5,700 acres (2,307 hectares), as shown in figure O.3.2.5-1. Compensation site 5 may offer a combination of wetland restoration, enhancement, and preservation and stream/riparian enhancement opportunities, as discussed here:

- Opportunities to create and restore forested and emergent wetlands may be available within 1,700 acres (688 hectares) of existing agricultural field.
- Opportunities to preserve or enhance forested, emergent, and scrub-shrub wetlands may be available within 4,000 acres (1,619 hectares) of currently existing wetlands.
- The site includes more than 13,000 feet (3,962 meters) of stream channels (Grand Bayou), which may offer riparian and stream channel restoration and enhancement opportunities.

O.3.2.6 Compensation Activities in the Proposed Utility ROW

Mitigation activities could occur in the vicinity of the proposed utility line ROW running south from the storage site to the Gulf of Mexico. The habitat in the proposed ROW, which includes palustrine forested wetlands dominated by cypress and tupelo trees, is similar to the habitat at the Chacahoula storage site. In addition, the area closer to the coast includes estuarine emergent and scrub-shrub wetlands. The proposed ROW for the Chacahoula site is about 146 miles (235 kilometers) long, of which about 77 miles (124 kilometers) follows existing ROWs. Compensation activities in the proposed utility ROW may offer a combination of wetland enhancement, restoration, and preservation, as discussed here:

- The proposed utility ROW may offer opportunities for enhancement and restoration in areas where construction or other disturbances have affected wetlands.
- DOE would coordinate the proposed compensation with USACE, USFWS, and other state and local resource agencies to identify the most sensitive areas in need of preservation and enhancement. For example, areas with known nesting sites for the threatened bald eagle could be priority sites for preservation and restoration. The proposed ROW is near eight bald eagle nests and potential brown pelican nesting areas.

Figure O.3.2.4-1. Chacahoula Compensation Site 4

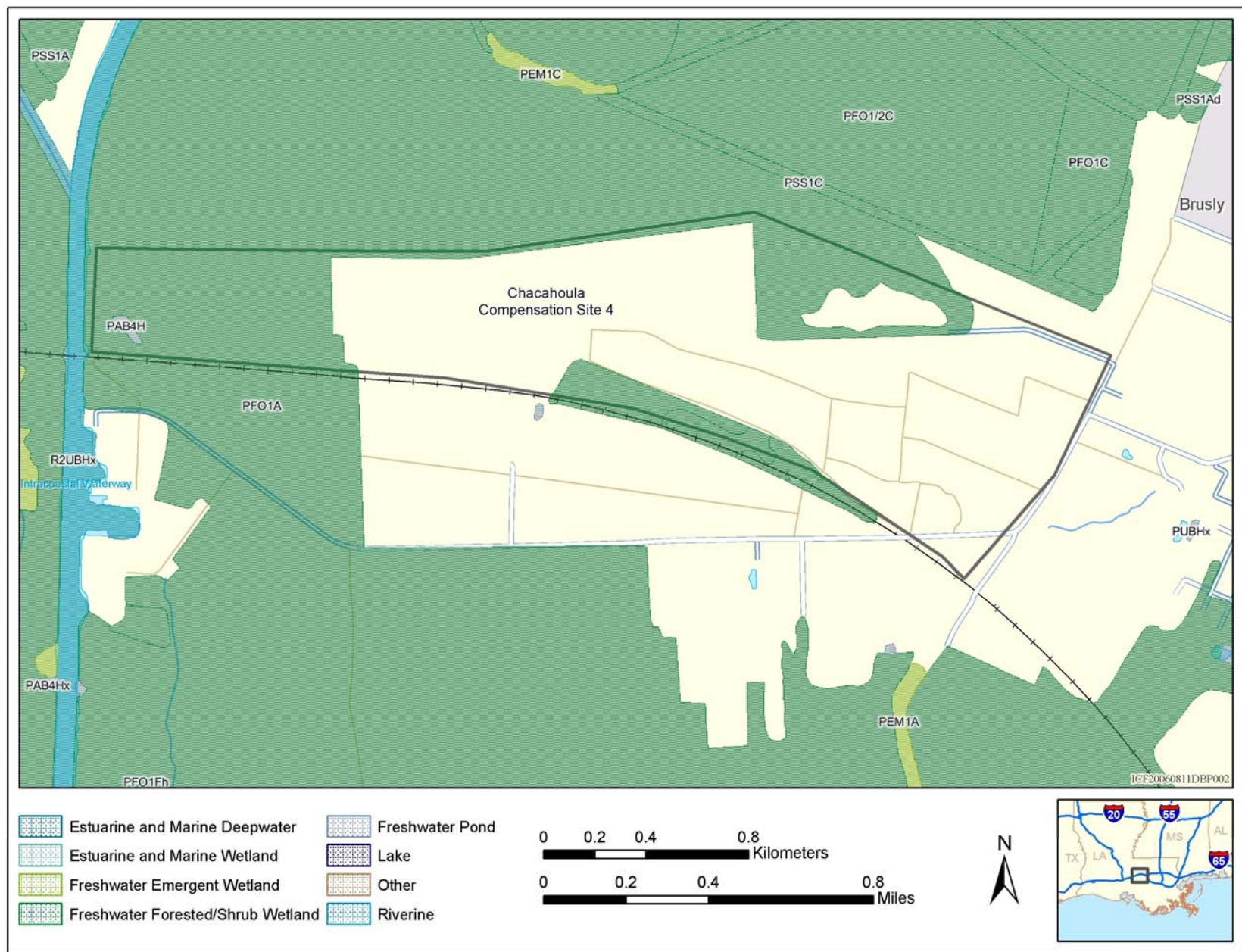
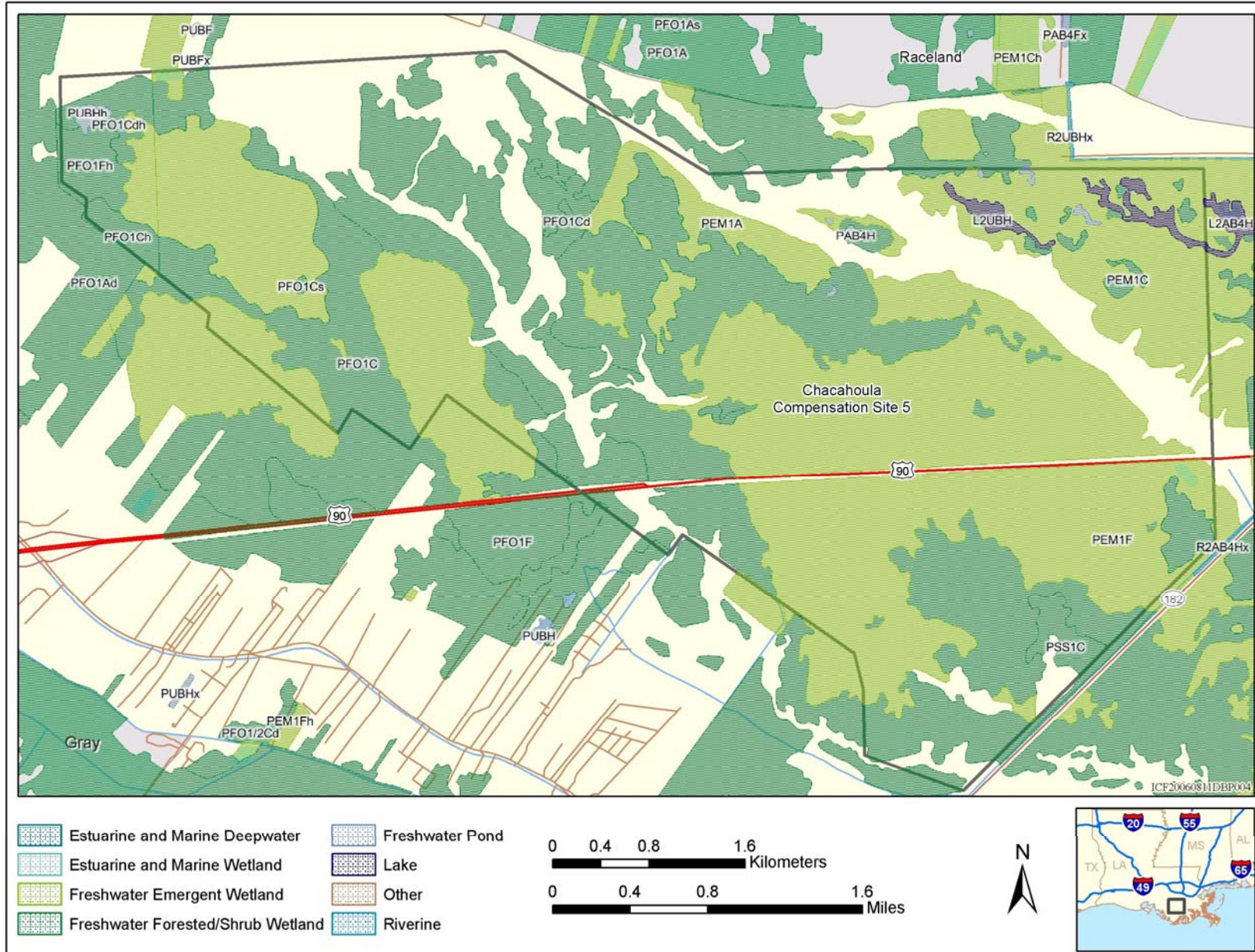


Figure O.3.2.5-1. Chacahoula Compensation Site 5



O.3.2.7 Summary of Chacahoula Compensation Sites

Table O.3.2-1 shows a summary of the restoration, enhancement, preservation, and creation opportunities at each of the potential compensation sites for Chacahoula. The total number of acres available at each compensation site is also noted. For many compensation sites, the number of acres is an estimate, which would be refined if the alternative is selected and the compensation site is included in the mitigation plan.

Table O.3.2-1; Summary of Potential Compensation Sites for Chacahoula

	Site 1	Site 2	Site 3	Site 4	Site 5
Wetland Restoration	✓	✓	✓	✓	✓
Wetland Enhancement					✓
Wetland Creation	✓				
Wetland Preservation	✓	✓	✓	✓	✓
Stream/Riparian Restoration/Enhancement	✓			✓	✓
Number of Acres at Site	1,020 acres (413 hectares)	440 acres (178 hectares)	3,850 acres (1,558 hectares)	600 acres (242 hectares)	5,700 acres (2,307 hectares)

O.3.3 Richton

The Richton storage site would be located in Perry County, MS, 18 miles (29 kilometers) east of Hattiesburg and 3 miles (4.8 kilometers) northwest of the town of Richton. This proposed new site would consist of 16 new caverns and associated facilities on the storage site, 2 RWI structures and access road, 5 ROWs, and 2 new terminals, which would affect approximately 1,328 acres (538 hectares) of wetlands. Estuarine, estuarine scrub-shrub, lacustrine, palustrine aquatic bed, palustrine emergent, palustrine forested, palustrine scrub-shrub, palustrine open-water, palustrine unconsolidated bottom, and riverine wetlands would be affected. Appendix B, section B.6.3, provides a more detailed analysis of the potential wetland impacts associated with this site.

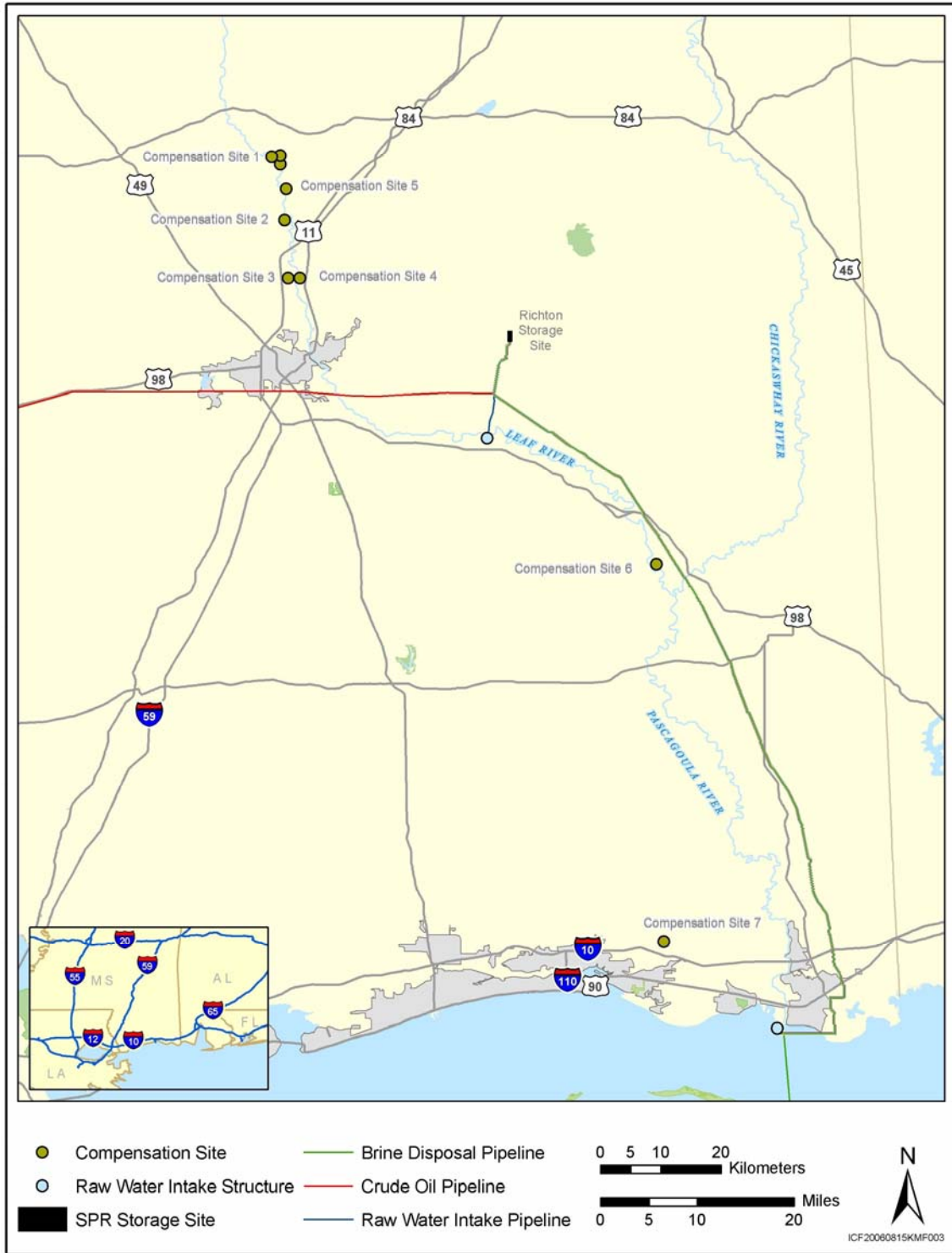
DOE identified seven potential compensation sites for Richton. Six sites contain over 2,695 acres (1,091 hectares) and one site is a mitigation bank with available credits. Figure O.3.3-1 shows the location of these sites in relation to the Richton storage site. Additional information regarding each potential compensation site is provided in the following sections.

O.3.3.1 Richton Compensation Site 1

Richton compensation site 1 is located approximately 7 miles (11 kilometers) west of Ellisville, MS, in Jones County, and approximately 30 miles (48 kilometers) to the northwest of the Richton storage site (see figure O.3.3-1). The property is approximately 500 acres (202 hectares) and consists of three parcels. Compensation site 1 may offer a combination of wetland enhancement and preservation and stream/riparian restoration opportunities, as discussed here:

- Existing forested wetlands and forested uplands along the Leaf River could be preserved. These areas may be a conservation priority since the pearl darter (*Percina aurora*), a Federal candidate species, and the Federally threatened Gulf sturgeon (*Acipenser oxyrhynchus desotoi*) inhabit the Pascagoula River drainage system. This site includes a portion of the designated critical habitat for the Gulf sturgeon in the Leaf River.

Figure O.3.3-1: Location of the Richton Storage Site, the Pascagoula Terminal, and Seven Potential Compensation Sites



- This site includes approximately 5,000 linear feet (1,524 meters) of the Leaf River channel. Most of the riparian corridor is intact, but it could be preserved under this option. In addition, about 100 acres (40 hectares) of the site is currently farmed. Therefore, opportunities may exist for riparian habitat enhancement.

O.3.3.2 Richton Compensation Site 2

Richton compensation site 2 is located approximately 13 miles (21 kilometers) north of Hattiesburg, MS, in Jones County, and approximately 21 miles (34 kilometers) to the northwest of the Richton storage site (see figure O.3.3-1). The property is approximately 530 acres (215 hectares) and consists of multiple parcels. Richton compensation site 2 may offer a combination of wetland creation, restoration, preservation, and enhancement. In addition the site may offer stream/riparian restoration opportunities, as discussed here:

- Existing forested wetlands and forested uplands located along the Leaf River and two tributaries to the Leaf River could be preserved. These forested areas are approximately 192 acres (78 hectares) in size and may be a conservation priority since the pearl darter and Gulf sturgeon inhabit the Pascagoula River drainage system. This site includes a portion of the designated critical habitat for the Gulf sturgeon in the Leaf River.
- This site includes approximately 1.8 miles (3 kilometers) of the Leaf River channel. Portions of the riparian corridor appear to be used for agricultural purposes and could be restored. In addition, approximately 200 acres (40 hectares) of the site is currently used for agricultural purposes. Therefore, opportunities may exist for riparian habitat enhancement and wetland creation and restoration.
- This site includes approximately 6,800 feet (2,073 meters) of two tributaries to the Leaf River. Most of the riparian corridors along these tributaries are intact, but they could be preserved if one of the Richton alternatives is selected and site 2 is chosen as a compensation site.
- This site also includes approximately 135 acres (55 hectares) of agricultural ponds or reservoirs, which could be used to create and restore wetlands located adjacent to the Leaf River.

O.3.3.3 Richton Compensation Site 3

Richton compensation site 3 is located approximately 9 miles (15 kilometers) north of Hattiesburg, MS, in Jones County, and approximately 18 miles (29 kilometers) to the northwest of the Richton storage site (see figure O.3.3-1). The property is approximately 520 acres (210 hectares) and consists of multiple parcels. Richton compensation site 3 may offer a combination of wetland creation, restoration, and enhancement. In addition the site may offer stream/riparian enhancement and preservation opportunities, as discussed here:

- Existing forested wetlands and forested uplands located along the Leaf River could be enhanced and preserved. The forested riparian buffer is approximately 58 acres (24 hectares) in size and may be a conservation priority since the pearl darter and Gulf sturgeon inhabit the Pascagoula River drainage system. This site also includes a portion of the designated critical habitat for the Gulf sturgeon in the Leaf River.
- This site includes approximately 3,300 feet (1,006 meters) of the Leaf River channel. Portions of the riparian corridor appear to be used for agricultural purposes and could be restored. In addition, about

200 acres (40 hectares) of the site is currently used for agricultural purposes. Therefore, opportunities may exist for riparian habitat enhancement and wetland creation and restoration.

O.3.3.4 Richton Compensation Site 4

Richton compensation site 4 is located approximately 9 miles (15 kilometers) north of Hattiesburg, MS, in Jones County, and approximately 17.5 miles (28 kilometers) to the northwest of the Richton storage site (see figure O.3.3-1). The property is approximately 360 acres (146 hectares) and is located across the Leaf River from compensation site 3. Compensation site 4 may offer a combination of wetland creation, restoration, and enhancement. In addition the site may offer stream/riparian enhancement and preservation opportunities, as discussed here:

- Existing forested wetlands and forested uplands located along the Leaf River could be enhanced and preserved. The forested riparian buffer could be widened and may be a conservation priority since the pearl darter and Gulf sturgeon inhabit the Pascagoula River drainage system. This site also includes a portion of the designated critical habitat for the Gulf sturgeon in the Leaf River.
- This site includes approximately 3,000 feet (914 meters) of the Leaf River channel. Portions of the riparian corridor appear to be used for agricultural purposes and could be restored. In addition, the majority of the site is cleared and appears to be used for agricultural purposes. Therefore, opportunities may exist for riparian habitat enhancement and wetland creation and restoration.
- This site is located directly across the Leaf River from compensation site 3. Selecting both of these two compensation sites could provide riparian buffer restoration and preservation opportunities on both sides of the Leaf River channel.

O.3.3.5 Richton Compensation Site 5

Richton compensation site 5 is located approximately 17 miles (27 kilometers) north of Hattiesburg, MS, in Jones County, and approximately 23 miles (37 kilometers) to the northwest of the Richton storage site (see figure O.3.3-1). The property is approximately 225 acres (91 hectares). Richton compensation site 5 may offer a combination of wetland creation, restoration, and enhancement. In addition the site may offer stream/riparian enhancement and preservation opportunities, as discussed here:

- Existing forested wetlands and forested uplands located along the Leaf River could be enhanced and preserved. Portions of the forested riparian buffer could be widened at this site and may be a conservation priority since the pearl darter and Gulf sturgeon inhabit the Pascagoula River drainage system. This site also includes a portion of the designated critical habitat for the Gulf sturgeon in the Leaf River.
- This site includes approximately 4,500 feet (1,372 meters) of the Leaf River channel. Portions of the riparian corridor are cleared and appear to be used for agricultural purposes and could be restored. In addition, the majority of the site appears to be used for agricultural purposes. Therefore, opportunities may exist for riparian habitat enhancement and wetland creation and restoration.
- This site includes approximately 4,200 feet (1,280 meters) of two tributaries to the Leaf River. Most of the riparian corridors along these tributaries are intact, but they could be enhanced and preserved under this option.

O.3.3.6 Richton Compensation Site 6

Richton compensation site 6 is located approximately 23 miles (37 kilometers) southeast of New Augusta, MS, in Green County, and approximately 27 miles (44 kilometers) to the southeast of the Richton storage site (see figure O.3.3-1). The property is approximately 560 acres (227 hectares). Compensation site 6 may offer a combination of wetland restoration and enhancement. In addition the site may offer stream/riparian enhancement and preservation opportunities, as discussed here:

- Existing forested wetlands and forested uplands located along the Leaf River could be enhanced and preserved. The forested riparian buffer may be a conservation priority since the pearl darter and Gulf sturgeon inhabit the Pascagoula River drainage system. This site also includes a portion of the designated critical habitat for the Gulf sturgeon in the Leaf River. The site is located upstream from the Leaf River's confluence with the Chickasawhay River.
- This site includes approximately 2 miles (3.2 kilometers) of the Leaf River channel upstream from the confluence with the Chickasawhay River. Most of the riparian corridor is intact, but it could be preserved under this option. In addition, about 233 acres (94 hectares) of the site is currently cleared. Therefore, opportunities may exist for riparian habitat and wetland enhancement or restoration.

O.3.3.7 Richton Compensation Site 7: Old Fort Bayou Mitigation Bank

Compensation could also be achieved by purchasing mitigation credits from the approved Old Fort Bayou Mitigation Bank. This mitigation bank was created in November 1996, when the Mississippi Chapter of The Nature Conservancy acquired more than 1,700 acres (688 hectares) in Jackson County, MS. The Old Fort Bayou Mitigation Bank is located approximately 12 miles (19 kilometers) to the northwest of the Pascagoula Terminal (see figure O.3.3-1).

The mitigation bank is located a few miles inland from the Gulf of Mexico. The bank currently has 480 credits available. Mitigation credits are available for pine flatwood-savannah, bay-cypress-tupelo swamp, and emergent wetland habitat. The mitigation bank can provide credits for wetland impacts occurring in portions of Jackson, Harrison, Pearl River, George, Hancock, and Stone Counties, MS. A portion of the impacts from the Richton alternative occur in this geographic area.

O.3.3.8 Summary of Richton Compensation Sites

Table O.3.3-1 shows a summary of the wetland restoration, enhancement, preservation, and creation opportunities at each of the potential compensation sites for Richton, and whether the site would be a mitigation bank. The total number of acres available at each compensation site is also noted. For many compensation sites, the number of acres is an estimate, which would be refined if the alternative is selected and the compensation site is included in the mitigation plan.

O.3.4 Stratton Ridge

The Stratton Ridge site would be located in Brazoria County, TX, 3 miles (4.8 kilometers) east of Clute and Lake Jackson and 6 miles (9.7 kilometers) north of Freeport. This proposed site would consist of 16 new caverns and associated facilities, a RWI structure, four ROWs, and terminal and dock refurbishment, which would affect approximately 613 acres (248 hectares) of wetlands. Estuarine, lacustrine, palustrine emergent, palustrine forested, palustrine scrub-shrub, palustrine unconsolidated bottom, and riverine wetlands would be affected. Appendix B, section B.6.4, provides a more detailed analysis of the potential wetland impacts and the nature of the impacts associated with this site.

Table O.3.3-1: Summary of Potential Compensation Sites for Richton

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7
Wetland Restoration		✓	✓	✓	✓	✓	
Wetland Enhancement	✓	✓	✓	✓	✓	✓	
Wetland Creation		✓	✓	✓	✓		
Wetland Preservation	✓	✓	✓	✓	✓	✓	
Wetland Mitigation Bank							✓
Stream/Riparian Enhancement	✓	✓	✓	✓	✓	✓	
Number of Acres/Number of Available Credits at Site	500 acres	530 acres	520 acres	360 acres	225 acres	560 acres	480 credits

DOE identified two potential compensation sites for Stratton Ridge. One site contains 247 acres (100 hectares) of habitat; one site is a mitigation bank with available credits to be purchased. Figure O.3.4-1 shows the location of these sites in relation to the Stratton Ridge storage site. Additional information regarding each potential compensation site is provided in the following sections.

O.3.4.1 Stratton Ridge Compensation Site 1

Stratton Ridge compensation site 1 is located approximately 6 miles (10 kilometers) west of West Bernard, TX, in Wharton County, and approximately 60 miles (97 kilometers) to the northwest of the Stratton Ridge storage site (see figure O.3.4-1). The property is approximately 247 acres (100 hectares), as shown in figure O.3.4.1-1. Compensation site 1 may offer a combination of wetland creation, restoration, and preservation and stream/riparian restoration and enhancement opportunities, as discussed here:

- The property was previously cleared and used as a rice farm. Wetland restoration and creation opportunities may be available within 150 acres (61 hectares) of fallow agricultural fields. The site includes 120 acres (49 hectares) of hydric soil (Bernand clay), which may offer suitable hydrological conditions for wetland restoration.
- The property borders West Bernard Creek for about 3,000 feet (914 meters) and offers stream/riparian enhancement and restoration opportunities.

O.3.4.2 Stratton Ridge Compensation Site 2: Katy-Cypress Mitigation Bank

The second potential compensation site for the Stratton Ridge alternative is the Katy-Cypress Mitigation Bank. This mitigation bank is located approximately 20 miles (32 kilometers) northwest of Houston, in Harris County, TX (see figure O.3.4-1).

The Katy-Cypress Mitigation Bank is located in the Cypress Creek watershed. Mitigation credits are available for impacts to watersheds associated with Cypress Creek, the Brazos River, the Trinity River, and Buffalo Bayou. The Stratton Ridge storage site is located in the Brazos River watershed. Mitigation credits are available for impacts to the Katy Prairie and similar prairie and forested wetlands. Currently there are 48 credits available in the bank.

Figure O.3.4-1. Location of the Stratton Ridge Storage Site and Potential Compensation Sites

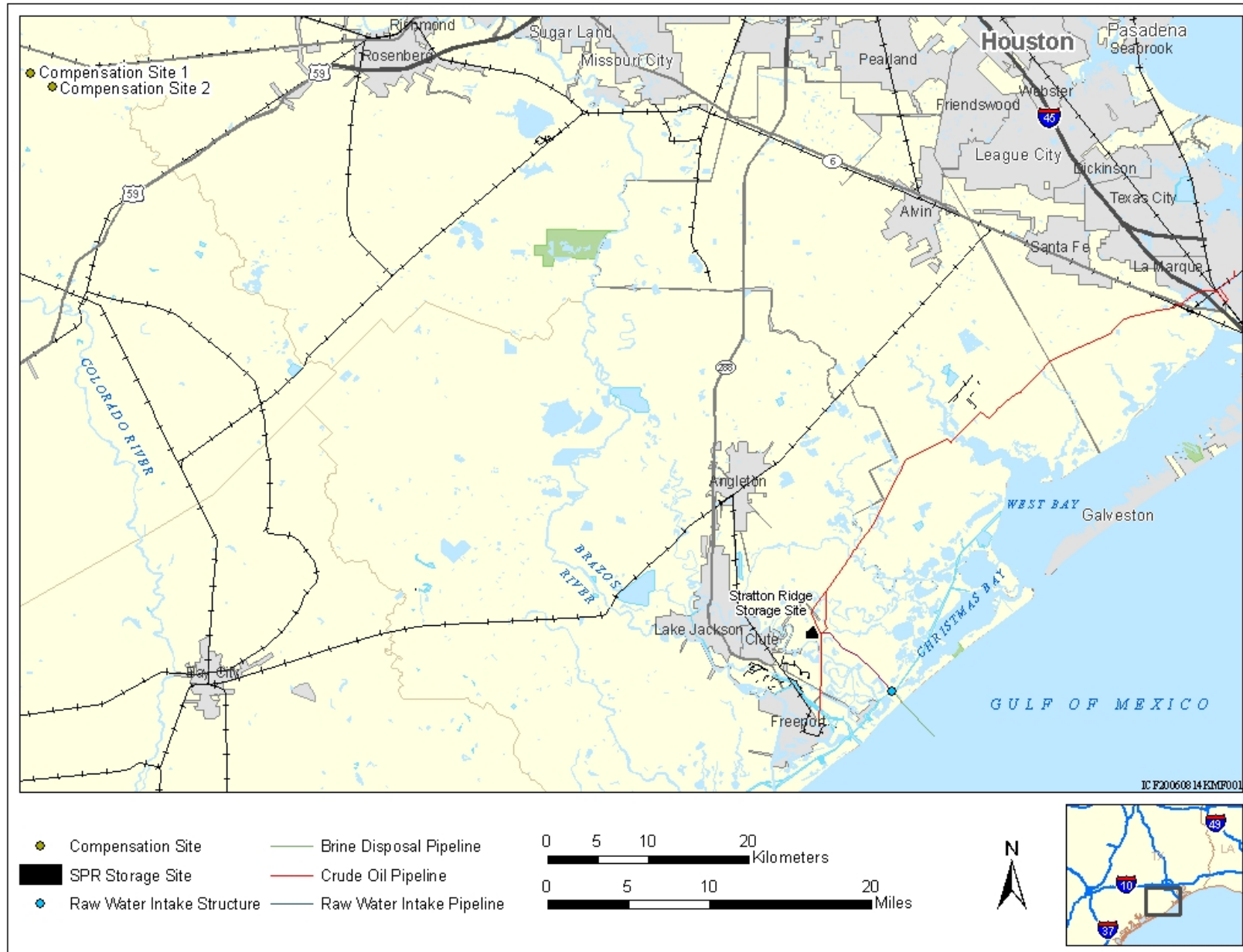
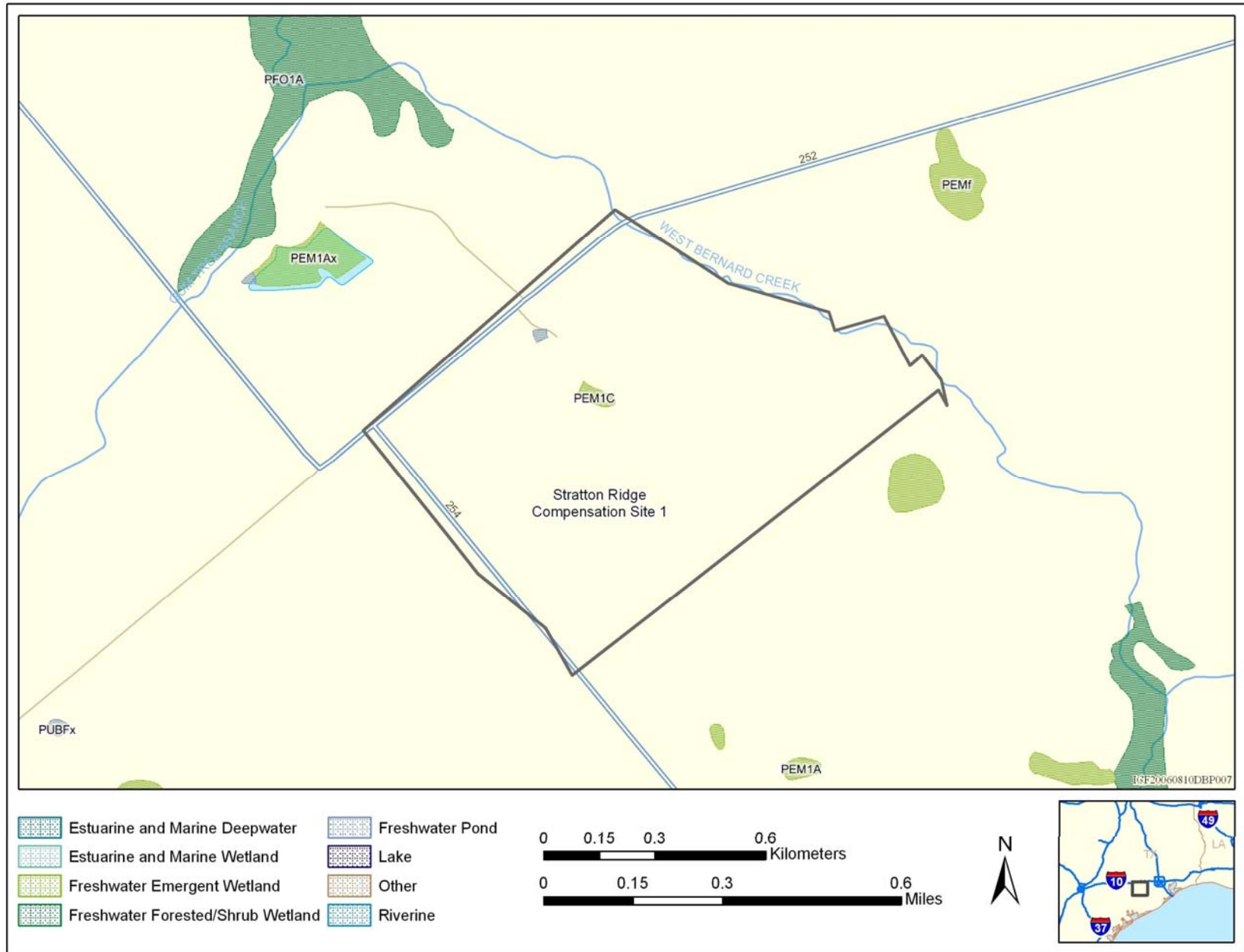


Figure O.3.4.1-1. Stratton Ridge Compensation Site 1



0.3.4.3 Summary of Potential Compensation Sites for Stratton Ridge

Table O.3.4-1 shows a summary of the restoration, enhancement, preservation, and creation opportunities at each of the potential compensation sites for Stratton Ridge, and whether the site would be a mitigation bank. The total number of acres available at each compensation site is also noted. For many compensation sites, the number of acres is an estimate, which would be refined if the alternative is selected and the compensation site is included in the mitigation plan.

0.3.5 Bayou Choctaw

The Bayou Choctaw expansion site occupies a 360-acre (140-hectare) site in Iberville Parish, LA, located about 12 miles (19 kilometers) southwest of Baton Rouge. The expansion consists of two new 10-million barrel (MMB) caverns and six new offsite brine injection wells. The entire Bayou Choctaw site development, which includes the expansion site, the brine disposal expansion area, and one ROW, would affect approximately 34 acres (14 hectares) of wetlands. Only palustrine forested wetlands would be affected. Appendix B, section B.6.5, provides a more detailed analysis of the potential wetland impacts and the nature of the impacts associated with this site.

Table O.3.4-1: Summary of Potential Compensation Sites for Stratton Ridge

	Site 1	Site 2
Wetland Restoration	✓	
Wetland Enhancement		
Wetland Creation	✓	
Wetland Preservation	✓	
Wetland Mitigation Bank		✓
Stream/Riparian Enhancement/Restoration	✓	
Number of Acres/Number of Available Credits at Site	247 acres (100 hectares)	48 credits available

DOE identified two potential compensation sites for Bayou Choctaw, which contain approximately 790 acres (320 hectares). Figure O.3.5-1 shows the location of these sites in relation to the Bayou Choctaw storage site. Additional information regarding each potential compensation site is provided in the following sections.

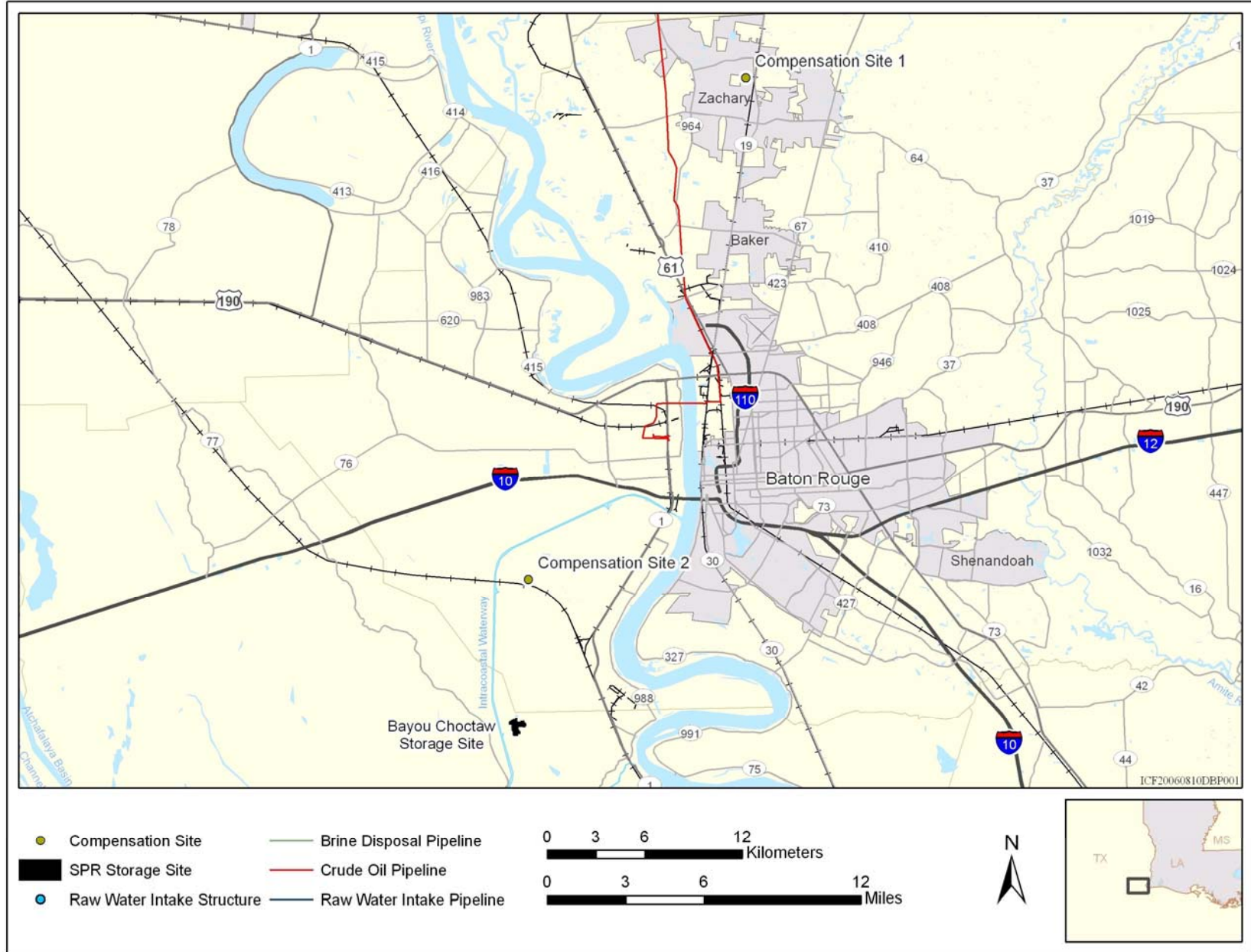
0.3.5.1 Bayou Choctaw Compensation Site 1

Bayou Choctaw compensation site 1 is located approximately 11 miles (18 kilometers) to the north of Baton Rouge, LA, in East Baton Rouge County, and approximately 23 miles (37 kilometers) to the west of the Bayou Choctaw storage site (see figure O.3.5-1). The property is approximately 190 acres (77 hectares). Compensation site 1 may offer a combination of forested wetland restoration and preservation opportunities, as discussed here:

- Opportunities to restore forested wetlands may be available within 20 acres (8 hectares) of previously disturbed land that includes roads, clearings, and timbered area.
- Opportunities to preserve forested, scrub-shrub, and emergent wetlands may be available within about 60 acres (24 hectares) of existing wetlands.

The site includes about 4,500 linear feet (1371 meters) of White Bayou, which may offer stream/riparian enhancement and restoration opportunities.

Figure O.3.5-1: Location of the Bayou Choctaw Storage Site and Potential Compensation Sites



O.3.5.2 Bayou Choctaw Compensation Site 2

Bayou Choctaw compensation site 2 is located approximately 10 miles (16 kilometers) to the southwest of Baton Rouge, LA, in West Baton Rouge Parish, and approximately 5 miles (8 kilometers) to the northeast of the Bayou Choctaw storage site. Bayou Choctaw compensation site 2 is the same site as Chacahoula compensation site 4. See section O.3.2.4 for details.

O.3.5.3 Summary of Potential Compensation Sites for Bayou Choctaw

Table O.3.5-1 shows a summary of the restoration, preservation, and creation opportunities at each of the potential compensation sites for Bayou Choctaw. The total number of acres available at each compensation site is also noted. For many compensation sites, the number of acres is an estimate, which would be refined if the compensation site is included in the mitigation plan.

Table O.3.5-1: Summary of Potential Compensation Sites for Bayou Choctaw

	Site 1	Site 2
Wetland Restoration	✓	✓
Wetland Enhancement		
Wetland Creation		✓
Wetland Preservation	✓	✓
Stream/Riparian Restoration/Enhancement	✓	✓
Number of Acres at Site	190 acres (79 hectares)	600 acres (243 hectares)

O.3.6 Big Hill

The Big Hill storage site is located in Jefferson County, TX, 17 miles (27 kilometers) southwest of Port Arthur and 70 miles (113 kilometers) east of Houston. The expansion consists of up to nine new caverns with a capacity of up to 108 MMB. The entire Big Hill expansion site, which includes the expansion area and two new ROWs, would affect approximately 189 acres (76 hectares). Lacustrine, palustrine emergent, palustrine forested, palustrine scrub-shrub, palustrine unconsolidated bottom, and riverine wetlands would be affected. Appendix B, section B.6.7, provides a more detailed analysis of the potential wetland impacts and the nature of the impacts associated with this site.

DOE identified two potential compensation sites for Big Hill. One site contains 610 acres (247 hectares) and one site is a mitigation bank with 422 available credits to be purchased. Figure O.3.6-1 shows the location of these sites in relation to the Big Hill storage site. Additional information regarding each potential compensation site is provided in the following sections.

O.3.6.1 Big Hill Compensation Site 1

Big Hill compensation site 1 is located approximately 7 miles (11 kilometers) to the east of Winnie, TX, in Jefferson County, and approximately 5 miles (8 kilometers) to the north of the Big Hill storage site (see figure O.3.6-1). The property is approximately 610 acres (247 hectares), as shown in figure O.3.6.1-1. Compensation site 1 may offer a combination of wetland creation, restoration, and preservation and stream/riparian enhancement and restoration opportunities, as discussed here:

- Opportunities to create wetlands may be available.
- Opportunities to create forested, scrub-shrub, and emergent wetlands may be available within 60 to 100 acres (16 to 24 hectares) of existing agricultural land that is hydric soil. Some of this appears to have been an irrigation pond that is currently farmed.
- Opportunities to preserve forested, scrub-shrub, and emergent wetlands may be available within 40 acres (16 hectares) of existing wetlands.
- Riparian buffer enhancement and restoration opportunities may be available along about 11,000 linear feet (3,350 meters) of wetlands that border Mayhaw Bayou and along the farm fields adjacent to an unnamed tributary that traverses the site.

O.3.6.2 Big Hill Compensation Site 2: Neches River Swamp Reserve Mitigation Bank

The second potential compensation site for Big Hill is the Neches River Swamp Reserve Mitigation Bank. This mitigation bank is located approximately 30 miles (48 kilometers) northeast of the Big Hill storage site in Beaumont, TX (see figure O.3.6-1). The mitigation bank is about 541 acres (219 hectares).

The Neches River Swamp Reserve Mitigation Bank is located in the Neches River and Sabine River watersheds. The approved service area includes the Big Hill expansion site. Currently there are 422 wetland credits available.

O.3.6.3 Summary of Potential Compensation Sites for Big Hill

Table O.3.6-1 shows a summary of the wetland restoration, preservation, and creation opportunities at each of the potential compensation sites for Big Hill, and whether the site would be a mitigation bank. The total number of acres available at each compensation site is also noted. For many compensation sites, the number of acres is an estimate, which would be refined if the compensation site is included in the mitigation plan.

Table O.3.6-1: Summary of Potential Compensation Sites for Big Hill

	Site 1	Site 2
Wetland Restoration	✓	
Wetland Enhancement		
Wetland Creation	✓	
Wetland Preservation	✓	
Wetland Mitigation Bank		✓
Number of Acres/Number of Available Credits at Site	610 acres (247 hectares)	422 credits available

Figure O.3.6-1 Location of the Big Hill Storage Site and Potential Compensation Sites

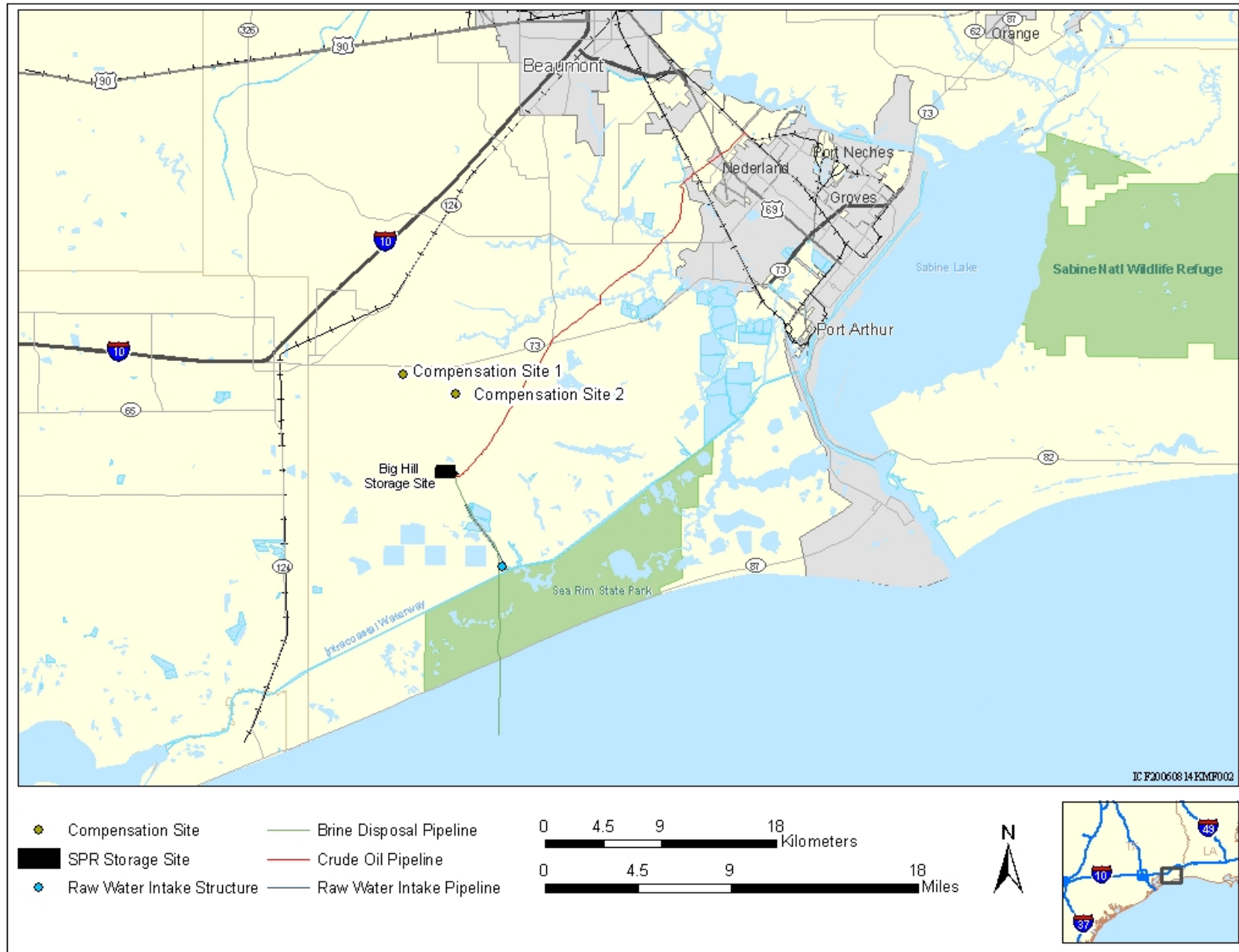
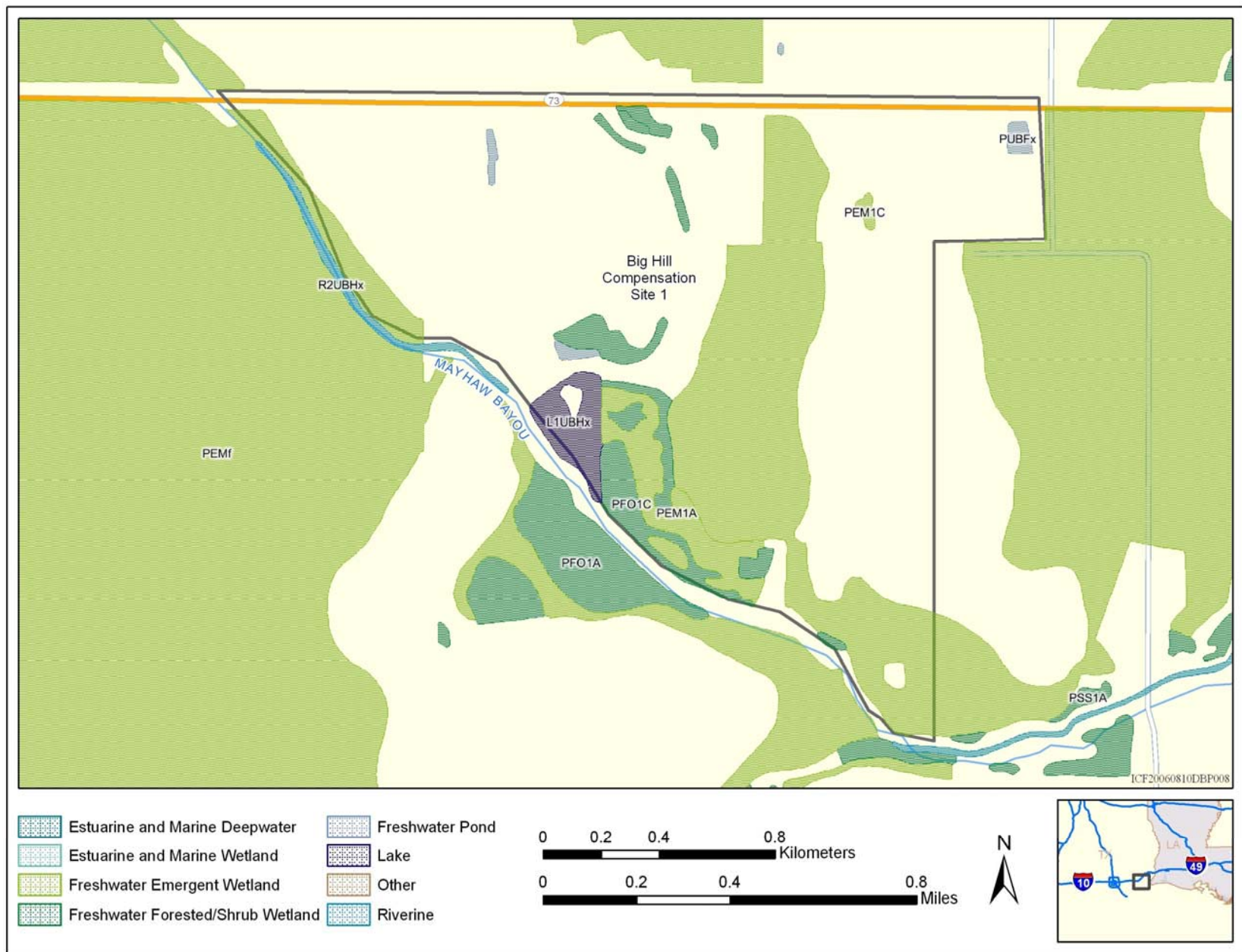


Figure O.3.6.1-1. Big Hill Compensation Site 1



O.3.7 West Hackberry

The West Hackberry expansion site is located in Cameron and Calcasieu Parishes in southwestern LA. The site is approximately 20 miles (32 kilometers) southwest of the City of Lake Charles and 16 miles (26 kilometers) north of the Gulf of Mexico. The expansion consists of the acquisition of three existing caverns with a total of 15 MMB of capacity. The construction of the expansion would convert about 5 acres (2 hectares) of scrub-shrub wetlands to emergent wetlands because of the security buffer.

DOE would consider using preservation of existing emergent scrub-shrub wetlands on the property or the in-lieu-of fee for this expansion because of the minor wetland impacts associated with this site.

REFERENCES

United States Army Corps of Engineers, Vicksburg District, Regulatory Branch, "Compensatory Mitigation Standard Operating Procedures for the States of Mississippi, Arkansas, and Louisiana in the Vicksburg District." Accessed at: <http://www.mvk.usace.army.mil/offices/od/odf/PubNotice/JCB-200400320%20Special%20Public%20Notice.pdf>

United States Army Corps of Engineers, New Orleans District, Regulatory Branch. "Mitigation Guidelines." Accessed at: <http://www.mvn.usace.army.mil/ops/regulatory/guide.htm>

United States Army Corps of Engineers, "Compensatory Mitigation." New Orleans District, Regulatory Branch. Accessed at: <http://www.mvn.usace.army.mil/ops/regulatory/comp.htm>

United States Army Corps of Engineers, Mobile District, Regulatory Branch. "RIBITS: Regional Internet Bank Information Tracking System." Accessed at: <https://samribits.sam.usace.army.mil/ribits/>

United States Army Corps of Engineers, Charleston District, Regulatory Division. "Standard Operating Procedure for Compensatory Mitigation" (RD-SOP-02-01). Accessed at <http://www.sac.usace.army.mil/permits/sop02-01.pdf>

Environmental Protection Agency and the Department of the Army, "Memorandum of Agreement Between the Environmental Protection Agency and the Department of the Army Concerning the Determination of Mitigation Under the Clean Water Act Section 404(b)(1) Guidelines." February 6, 1990. Accessed at: <https://samribits.sam.usace.army.mil/ribits/moafe90.htm>