APPENDIX A

Supplemental Affected Environment Details and Deepwater Horizon Oil Spill: *Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement* Impact Determination Definitions

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This appendix contains supplemental information for several resources described in Section 4.2 Affected Environment in the *Louisiana Trustee Implementation Group Draft Restoration Plan and Environmental Assessment #4: Nutrient Reduction (Nonpoint Source) and Recreational Use* (RP/EA). The resources described here are listed in the same order as they are presented in Section 4.2.

A-1 PHYSICAL ENVIRONMENT

A-1.1 Geology and Substrates

The following is provides detailed descriptions of geomorphic groups and soil units that occur within analysis area.

A-1.1.1 Backswamps and Marshes

This geomorphic group includes soil map units and components associated with both fresh and brackish fluid marshes (NRCS 2017, 2018). These areas are on low Gulf Coastal fresh or brackish water marshes at elevations of 1 foot or less. Slopes range from 0% to 0.1%. The soils formed in moderately thick herbaceous organic materials overlying fluid clayey or silty sediments. The thickness of organic material ranges from 10 to 74 inches to the contact with fluid clays or silty clays. The unconsolidated brackish mineral and organic sediments are soft and not trafficable (NRCS 2018). These areas flood very frequently with saltwater during high tides, and remain ponded for a very long duration. The water salinity generally ranges from 5 to 15 parts per trillion but are much higher during storm tides or completely fresh during flooding.

The herbaceous surface material is mainly sapric material, but hemic and fibric materials as well as woody peat or wood fragments occur as thin strata (NRCS 2018). These soils flood frequently with fresh water during high water level events from local rivers and during severe storms by sea water from the Gulf of Mexico, and remain ponded for a very long duration.

A-1.1.2 Beach Ridges

This geomorphic group includes soil map units and components associated with saline sandy ridges and sandy chenier ridges (NRCS 2017, 2018). These areas are on low ridges adjacent to Gulf Coastal beaches that generally parallel the Gulf Coast marsh mainly at elevations of 5 feet or less. The soils in this group formed in sandy coastal beach deposits of shell and sand (NRCS 2018). Slopes range from 0% to 3%. Brief flooding occurs rarely. The soils are loamy throughout in low-lying areas of the inland side of the geologic beach ridges along the Gulf of Mexico. Small shell fragments on and in the surface range from 0% to 40%. Shell fragments in the underlying material range from 5% to 90%.

A-1.1.3 Coastal Plains, Delta Plains, and Floodplains

This geomorphic group includes soil map units and components associated with both fresh and brackish firm mineral marshes (NRCS 2017, 2018). These areas are on low Gulf Coastal brackish marshes and freshwater marshes at elevations of 3 feet or less. Slopes range from 0.1% to 0.5%. The soils formed in unconsolidated fluid clayey coastal sediments or thin accumulations of herbaceous plant remains and semi-fluid clayey alluvium over consolidated clayey deposits or submerged soils formed in prairie-aged loess-like deposits (NRCS 2018). The unconsolidated sediments are firm enough and trafficable. These areas flood frequently with freshwater inflow or brackish water during high tides, and remain ponded for a very long duration.

The soils formed in unconsolidated fluid clayey coastal and/or consolidated deltaic sediments or thin accumulations of herbaceous plant remains and semi-fluid clayey alluvium over consolidated clayey deposits or submerged soils formed in prairie aged loess-like deposits (NRCS 2018). The thickness of organic material ranges from 0 to 10 inches to the contact with fluid clays or silty clays. The herbaceous surface material is mainly hemic and sapric material, but fibric materials as well as woody peat or wood fragments occur as thin strata (NRCS 2018). These soils flood frequently with freshwater and brackish water during high tides.

A-1.1.4 Salt Marshes

This geomorphic group includes soil map units and components associated with salt marshes (NRCS 2017, 2018). These areas are on low Gulf Coastal saline marshes at elevations of 1 foot or less. Slopes range from 0% to 0.2%. The soils formed in moderately thick herbaceous organic materials overlying fluid clayey sediments or in thick herbaceous, highly decomposed organic material. The unconsolidated saline clayey and organic sediments are soft and not trafficable (NRCS 2018). These areas flood very frequently and frequently with salt water during high tides. This plant community is dominated by smooth cordgrass, which is specifically adapted to this site. Average depth of water at high tide ranges from 2 to 12 inches, and water salinity varies from 12 to 50 ppt, but may become fresher during periods of high rainfall.

These soils formed in moderately thick herbaceous organic materials overlying fluid clayey sediments or in thick herbaceous, highly decomposed organic material (NRCS 2018). The thickness of organic material ranges from 6 to 100 inches to the contact with fluid clays or silty clays. The herbaceous surface material is mainly sapric material, but hemic and fibric materials as well as woody peat or wood fragments occur as thin strata (NRCS 2018). These soils flood frequently and very frequently with saltwater during high tides.

A-1.1.5 Southwestern Prairies

This geomorphic group includes soil map units and components associated with southwestern loess terrace prairie (NRCS 2017, 2018). Nearly level, gently sloping to depressional areas on uplands or terraces, formed from loess or loess-like material with low sand content. Soils are typically saturated in winter, and often very dry to droughty in late spring and fall. Historically, trees were confined to the better-drained stream sides or ridges, forming “gallery forests,” and acted to divide the coastal prairie into many subunits or “coves” (NRCS 2018). The intrinsic soil conditions and frequent burning from lightning strikes prevented invasion by woody trees and shrubs and maintained the prairie vegetation. Soils in this group are very deep, poorly drained to somewhat poorly drained, and slow to moderately permeable, with very acidic to neutral soil reaction (NRCS 2018).

A-1.1.6 Terraces and Natural Levees

This geomorphic group includes soil map units and components associated with the southern loess Baton Rouge Terrace (NRCS 2017, 2018). Stream terraces and natural levees above the floodplain are somewhat poorly drained to well drained. These areas will flood during heavy rainfall events but are not flooded regularly. Flooding frequency would be none to frequent depending on the location within the soil map unit, which could be up to 50 times in 100 years (NRCS 2018). The soil map unit has no ponding frequency. Slopes range from 0% to 8% but are generally approximately 2%.

Soils are somewhat poorly to well drained, frequently to rarely flooded, Glossaquic Hapludalfs and Ultic Hapludalfs (NRCS 2018). These soils formed in water-reworked loess alluvium derived from streams that drain the loess-mantled uplands of the Southern Mississippi Valley Loess. Slopes range from 0% to 3%.

These deep and very deep, moderately to slowly permeable soils are found in narrow to broad floodplains (NRCS 2018). The water table is at or within 1 to 2 feet of the surface during winter and spring months in normal years. These soils are subject to none to frequent flooding of very brief to long duration, and can be subject to frequent ponding of long duration.

A-1.1.7 Natural Resources Conservation Service (NRCS) Web Soil Survey Data

The following map unit descriptions are derived directly from the Natural Resources Conservation Service (NRCS) Web Soil Survey, updated in 2017 and available at: https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm.

Table A-1 and Table A-2 provide the primary soil types for each alternative.

Calcasieu Parish, Louisiana (LA019)
[Minor map unit components are excluded from this report]

Map unit: AR - Arat mucky silt loam
Component: Arat (85%)

The Arat component makes up 85 percent of the map unit. Slopes are 0 to 1 percent. This component is on fresh water marshes on low coastal plains. The parent material consists of semifluid loamy backswamp deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is very high. Shrink-swell potential is low. This soil is frequently flooded. It is frequently ponded. A seasonal zone of water saturation is at 0 inches during January, February, March, April, May, June, July, August, September, October, November, and December. Organic matter content in the surface horizon is about 23 percent. Nonirrigated land capability classification is 8w. This soil meets hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Map unit: BB - Basile and Brule, 0 to 3 percent slopes, frequently flooded
Component: Basile (70%)

The Basile component makes up 70 percent of the map unit. Slopes are 0 to 1 percent. This component is on flood plains on flat coastal plains. The parent material consists of loamy alluvium derived from igneous, metamorphic and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at 9 inches during January, February, March, April, May, and December. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 5w. This soil meets hydric criteria. There are no saline horizons within 30 inches of the soil surface. The soil has a maximum sodium adsorption ratio of 10 within 30 inches of the soil surface.
Component: Brule (20%)

The Brule component makes up 20 percent of the map unit. Slopes are 0 to 3 percent. This component is on bars on flood plains on flat coastal plains. The parent material consists of Holocene age silty alluvium derived from igneous, metamorphic and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a

depth of 60 inches (or restricted depth) is high. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at 36 inches during January, February, March, April, and December. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 5w. This soil meets hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Map Unit: Bh - Bienville loamy fine sand, 1 to 3 percent slopes
Component: Bienville (90%)

The Bienville component makes up 90 percent of the map unit. Slopes are 1 to 3 percent. This component is on terraces on river valleys on coastal plains. The parent material consists of sandy alluvium of Late Pleistocene age. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 60 inches during January, February, March, April, and December. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 2s. This soil does not meet hydric criteria.

Map unit: Ge - Glenmora silt loam, 1 to 3 percent slopes
Component: Glenmora (90%)

The Glenmora component makes up 90 percent of the map unit. Slopes are 1 to 3 percent. This component is on 3 terraces on 1 coastal plains. The parent material consists of loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 30 inches during January, February, March, April, and December. Organic matter content in the surface horizon is about 1 percent. This component is in the F152BY005TX Seasonally Wet Loamy Upland ecological site. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria.

Map unit: Gg - Gore silt loam, 1 to 5 percent slopes
Component: Gore (90%)

The Gore component makes up 90 percent of the map unit. Slopes are 1 to 5 percent. This component is on 3 terraces, 1 coastal plains, 2 river valleys. The parent material consists of clayey alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria. The soil has a maximum sodium adsorption ratio of 3 within 30 inches of the soil surface.

Map unit: Go - Guyton silt loam, 0 to 1 percent slopes, occasionally flooded
Component: Guyton (85%)

The Guyton component makes up 85 percent of the map unit. Slopes are 0 to 1 percent. This component is on flood plains on coastal plains. The parent material consists of loamy alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly

drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is very high. Shrink-swell potential is low. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 9 inches during January, February, March, April, May, and December. Organic matter content in the surface horizon is about 2 percent. This component is in the F152BY013TX Poorly Drained Loamy Bottomland ecological site. Nonirrigated land capability classification is 4w. This soil meets hydric criteria.

Map unit: GU - Guyton and Bienville soils frequently flooded
Component: Guyton (55%)

The Guyton component makes up 55 percent of the map unit. Slopes are 0 to 1 percent. This component is on depressions on coastal plains. The parent material consists of loamy alluvium of Holocene age. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is very high. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at 9 inches during January, February, March, April, May, and December. Organic matter content in the surface horizon is about 2 percent. This component is in the F133BY017TX Loamy Bottomland ecological site. Nonirrigated land capability classification is 5w. This soil meets hydric criteria.

Component: Bienville (25%)

The Bienville component makes up 25 percent of the map unit. Slopes are 1 to 3 percent. This component is on terraces on river valleys on coastal plains. The parent material consists of sandy alluvium of Late Pleistocene age. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at 60 inches during January, February, March, April, and December. Organic matter content in the surface horizon is about 1 percent. This component is in the F133BY011TX Deep Sandy Terrace ecological site. Nonirrigated land capability classification is 5w. This soil does not meet hydric criteria.

Map unit: Gy - Guyton-Messer complex, 0 to 1 percent slopes, rarely flooded
Component: Guyton (55%)

The Guyton component makes up 55 percent of the map unit. Slopes are 0 to 1 percent. This component is on flood plains on coastal plains. The parent material consists of loamy alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is very high. Shrink-swell potential is low. This soil is rarely flooded. It is not ponded. A seasonal zone of water saturation is at 9 inches during January, February, March, April, May, and December. Organic matter content in the surface horizon is about 2 percent. This component is in the F152BY013TX Poorly Drained Loamy Bottomland ecological site. Nonirrigated land capability classification is 4w. This soil meets hydric criteria. There are no saline horizons within 30 inches of the soil surface. The soil has a maximum sodium adsorption ratio of 5 within 30 inches of the soil surface.

Component: Messer (35%)

The Messer component makes up 35 percent of the map unit. Slopes are 1 to 5 percent. This component is on pimple mounds on flats on coastal plains. The parent material consists of loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is very high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 22 inches during January, February, March, April, and December. Organic matter content in the surface horizon is about 3 percent. This component is in the F152BY005TX Seasonally Wet Loamy Upland ecological site. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Map unit: Kd - Kinder-Gist complex, 0 to 1 percent slopes
Component: Kinder (60%)

The Kinder component makes up 60 percent of the map unit. Slopes are 0 to 1 percent. This component is on flats on flat coastal plains. The parent material consists of late Pleistocene age loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 12 inches during January, February, March, April, and December. Organic matter content in the surface horizon is about 3 percent. This component is in the F152BY007TX Poorly Drained Loamy Upland ecological site. Nonirrigated land capability classification is 3w. This soil meets hydric criteria. There are no saline horizons within 30 inches of the soil surface. The soil has a maximum sodium adsorption ratio of 2 within 30 inches of the soil surface.

Component: Gist (30%)

The Gist component makes up 30 percent of the map unit. Slopes are 1 to 5 percent. This component is on pimple mounds on flats on coastal plains. The parent material consists of loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 58 inches during January, February, and March. Organic matter content in the surface horizon is about 1 percent. This component is in the F152BY006TX Well Drained Loamy Upland ecological site. Nonirrigated land capability classification is 2w. This soil does not meet hydric criteria.

Cameron Parish, Louisiana (LA023)
[Minor map unit components are excluded from this report]

Map unit: SC - Scatlake mucky clay, 0 to 0.2 percent slopes, tidal
Component: Scatlake, tidal (80%)

The Scatlake, very frequently flooded, tidal component makes up 80 percent of the map unit. Slopes are 0 to 0 percent. This component is on intermediate to brackish marshes on low coastal plains. The parent material consists of fluid clayey backswamp deposits. Depth to a root

restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is very high. This soil is very frequently flooded. It is frequently ponded. A seasonal zone of water saturation is at 0 inches during January, February, March, April, May, June, July, August, September, October, November, and December. Organic matter content in the surface horizon is about 25 percent. Nonirrigated land capability classification is 8w. This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent. The soil has a slightly saline horizon within 30 inches of the soil surface. The soil has a maximum sodium adsorption ratio of 10 within 30 inches of the soil surface.

Iberia Parish, Louisiana (LA045)
[Minor map unit components are excluded from this report]

Map unit: Az - Aquents, dredged, 1 to 5 percent slopes, occasionally flooded
Component: Aquents (85%)

The Aquents component makes up 85 percent of the map unit. Slopes are 1 to 5 percent. This component is on marshes on delta plains. The parent material consists of alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is occasionally flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. This soil meets hydric criteria.

Jefferson Parish, Louisiana (LA051)
[Minor map unit components are excluded from this report]

Map unit: AR - Allemands muck, 0 to 0.2 percent slopes, very frequently flooded
Component: Allemands, very frequently flooded (85%)

The Allemands, very frequently flooded component makes up 85 percent of the map unit. Slopes are 0 to percent. This component is on coastal freshwater marshes, coastal plains. The parent material consists of and/or clayey herbaceous organic material and/or backswamp deposits derived from interbedded sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is very high. Shrink-swell potential is low. This soil is very frequently flooded. It is frequently ponded. A seasonal zone of water saturation is at 0 inches during January, February, March, April, May, June, July, August, September, October, November, and December. Organic matter content in the surface horizon is about 58 percent. This component is in the R151XY008LA Fresh Fluid Mineral Marsh 60-64" Pz ecological site. Nonirrigated land capability classification is 8w. This soil meets hydric criteria. There are no saline horizons within 30 inches of the soil surface. The soil has a none to slightly sodic horizon within 30 inches of the soil surface.

Map unit: BB - Barbary muck, 0 to 1 percent slopes, frequently flooded
Component: Barbary, frequently flooded (85%)

The Barbary, frequently flooded component makes up 85 percent of the map unit. Slopes are 0 to 1 percent. This component is on back swamp flood plains, delta plains. The parent material consists of fluid clayey alluvium derived from sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is very high.

Shrink-swell potential is very high. This soil is frequently flooded. It is frequently ponded. A seasonal zone of water saturation is at 0 inches during January, February, March, April, May, June, July, August, September, October, November, and December. Organic matter content in the surface horizon is about 50 percent. Nonirrigated land capability classification is 8w. This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent. There are no saline horizons within 30 inches of the soil surface.

Map unit: Cm - Cancienne silt loam, 0 to 1 percent slopes
Component: Cancienne (90%)

The Cancienne component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is on Lower natural levees on alluvial plains. The parent material consists of silty alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 33 inches during January, February, March, April, and December. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 2w. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 2 percent. There are no saline horizons within 30 inches of the soil surface.

Map unit: Co - Cancienne silty clay loam, 0 to 1 percent slopes
Component: Cancienne, Silty Clay Loam (85%)

The Cancienne, silty clay loam component makes up 85 percent of the map unit. Slopes are 0 to 1 percent. This component is on natural levees on alluvial plains. The parent material consists of silty alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 43 inches during January, February, March, April, November, and December. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 2w. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent.

Map unit: FA - Felicity loamy fine sand, occasionally flooded
Component: Felicity (95%)

The Felicity component makes up 95 percent of the map unit. Slopes are 0 to 3 percent. This component is on Gulf Coast shore beach ridges on delta plains. The parent material consists of sandy eolian deposits and/or storm washover sediments. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is very high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 30 inches during January, February, March, April, May, June, July, August, September, October, November, and December. Organic matter content in the surface horizon is about 0 percent. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 20 percent. The soil has a moderately saline horizon within 30 inches of the soil surface.

Map unit: Ha - Harahan clay, 0 to 1 percent slopes
Component: Harahan (90%)

The Harahan component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is on artificially drained backswamps on delta plains. The parent material consists of nonfluid over fluid clayey alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is very high. This soil is rarely flooded. It is not ponded. A seasonal zone of water saturation is at 12 inches during January, February, March, April, May, June, July, August, September, October, November, and December. Organic matter content in the surface horizon is about 14 percent. Nonirrigated land capability classification is 3w. This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

Map unit: KE - Kenner muck, 0 to 1 percent slopes, very frequently flooded
Component: Kenner, very frequently flooded (85%)

The Kenner, very frequently flooded component makes up 85 percent of the map unit. Slopes are 0 to 1 percent. This component is on marshes on coastal plains. The parent material consists of mucky clayey herbaceous organic material over fluid clayey alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches is very high. Shrink-swell potential is very high. This soil is very frequently flooded. It is frequently ponded. A seasonal zone of water saturation is at 0 inches during January, February, March, April, May, June, July, August, September, October, November, and December. Organic matter content in the surface horizon is about 40 percent. Nonirrigated land capability classification is 8w. This soil meets hydric criteria. The soil has a slightly saline horizon within 30 inches of the soil surface. The soil has a none to slightly sodic horizon within 30 inches of the soil surface.

Map unit: LR - Larose muck, 0 to 0.5 percent slopes, tidal
Component: Larose, tidal (80%)

The Larose, very frequently flooded component makes up 80 percent of the map unit. Slopes are 0 to 1 percent. This component is on coastal freshwater marshes, coastal plains. The parent material consists of thin herbaceous organic material over fluid clayey alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is very high. This soil is frequently flooded. It is frequently ponded. A seasonal zone of water saturation is at 0 inches during January, February, March, April, May, June, July, August, September, October, November, and December. Organic matter content in the surface horizon is about 52 percent. Nonirrigated land capability classification is 8w. This soil meets hydric criteria. The soil has a moderately saline horizon within 30 inches of the soil surface. The soil has a maximum sodium adsorption ratio of 15 within 30 inches of the soil surface.

Map unit: SC - Scatlake muck, 0 to 0.2 percent slopes, tidal
Component: Scatlake, tidal (80%)

The Scatlake, very frequently flooded, tidal component makes up 80 percent of the map unit. Slopes are 0 to 0 percent. This component is on intermediate to brackish marshes on low coastal plains. The parent material consists of fluid clay backswamp deposits over fluid clayey alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly

drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is very high. This soil is very frequently flooded. It is frequently ponded. A seasonal zone of water saturation is at 0 inches during January, February, March, April, May, June, July, August, September, October, November, and December. Organic matter content in the surface horizon is about 50 percent. Nonirrigated land capability classification is 8w. This soil meets hydric criteria. The soil has a moderately saline horizon within 30 inches of the soil surface. The soil has a maximum sodium adsorption ratio of 10 within 30 inches of the soil surface.

Map unit: Sk - Schriever clay, 0 to 1 percent slopes
Component: Schriever (95%)

The Schriever component makes up 95 percent of the map unit. Slopes are 0 to 1 percent. This component is on backswamps on Mississippi River delta plains. The parent material consists of clayey alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is very high. This soil is rarely flooded. It is not ponded. A seasonal zone of water saturation is at 0 inches during January, February, March, April, and December. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3w. This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent.

Map unit: Va - Vacherie silt loam, 0 to 3 percent slopes
Component: Vacherie, gently undulating (90%)

The Vacherie, gently undulating component makes up 90 percent of the map unit. Slopes are 0 to 3 percent. This component is on natural levees on Mississippi River delta plains. The parent material consists of silty alluvium over clayey alluvium. Depth to a root restrictive layer, strongly contrasting textural stratification, is 9 to 28 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during January, February, March, April, November, and December. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 2w. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent.

Lafourche Parish, Louisiana (LA057)
[Minor map unit components are excluded from this report]

Map unit: LA - Lafitte-Clovelly association, 0 to 0.2 percent slopes, very frequently flooded
Component: Lafitte, very frequently flooded (68%)

The Lafitte, very frequently flooded component makes up 68 percent of the map unit. Slopes are 0 to 0 percent. This component is on brackish marshes on delta plains. The parent material consists of herbaceous organic material over clayey alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches (or restricted depth) is very high. Shrink-swell potential is low. This soil is very frequently flooded. It is frequently ponded. A seasonal zone of water saturation is at 0 inches during January, February, March, April, May, June, July, August, September, October, November, and December. Organic matter content in the surface horizon is about 50 percent. Nonirrigated land capability classification is 8w. This soil

meets hydric criteria. The soil has a slightly saline horizon within 30 inches of the soil surface. The soil has a maximum sodium adsorption ratio of 8 within 30 inches of the soil surface.

Component: Clovelly, very frequently flooded (32%)

The Clovelly, very frequently flooded component makes up 32 percent of the map unit. Slopes are 0 to 0 percent. This component is on intermediate to brackish marshes on low coastal plains. The parent material consists of moderately thick herbaceous organic material over very fluid clayey alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is very high. Shrink-swell potential is very high. This soil is very frequently flooded. It is frequently ponded. A seasonal zone of water saturation is at 0 inches during January, February, March, April, May, June, July, August, September, October, November, and December. Organic matter content in the surface horizon is about 46 percent. This component is in the R151XY003LA Brackish Organic Marsh ecological site. Nonirrigated land capability classification is 8w. This soil meets hydric criteria. The soil has a slightly saline horizon within 30 inches

Orleans Parish, Louisiana (LA071)
[Minor map unit components are excluded from this report]

Map unit: Cm - Cancienne silt loam, 0 to 1 percent slopes
Component: Cancienne (90%)

The Cancienne component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is on Lower natural levees on alluvial plains. The parent material consists of silty alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 33 inches during January, February, March, April, and December. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 2w. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 2 percent. There are no saline horizons within 30 inches of the soil surface.

Plaquemines Parish, Louisiana (LA075)
[Minor map unit components are excluded from this report]

Map unit: AT - Aquents, dredged, frequently flooded
Component: Aquents (90%)

The Aquents component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is on marshes. The parent material consists of alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. This soil meets hydric criteria.

Map unit: BA - Balize and Larose soils
Component: Balize (50%)

The Balize component makes up 50 percent of the map unit. Slopes are 0 to 1 percent. This component is on fresh water marshes on low coastal plains. The parent material consists of fluid loamy backswamp deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is frequently flooded. It is frequently ponded. A seasonal zone of water saturation is at 0 inches during January, February, March, April, May, June, July, August, September, October, November, and December. Organic matter content in the surface horizon is about 15 percent. Nonirrigated land capability classification is 8w. This soil meets hydric criteria. The soil has a very slightly saline horizon within 30 inches of the soil surface. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Component: Larose (30%)

The Larose component makes up 30 percent of the map unit. Slopes are 0 to 1 percent. This component is on freshwater marshes on delta plains. The parent material consists of thin herbaceous organic material over fluid clayey alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is frequently flooded. It is frequently ponded. A seasonal zone of water saturation is at 0 inches during January, February, March, April, May, June, July, August, September, October, November, and December. Organic matter content in the surface horizon is about 58 percent. Nonirrigated land capability classification is 8w. This soil meets hydric criteria. There are no saline horizons within 30 inches of the soil surface. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Map unit: Ra - Rita mucky clay
Component: Rita (90%)

The Rita component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is on fresh water marshes on low coastal plains. The parent material consists of nonfluid over fluid clayey alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is rarely flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during January, February, March, April, May, June, July, August, September, October, November, and December. Organic matter content in the surface horizon is about 14 percent. Nonirrigated land capability classification is 3w. This soil meets hydric criteria. There are no saline horizons within 30 inches of the soil surface.

St. Bernard Parish, Louisiana (LA087)
[Minor map unit components are excluded from this report]

Map unit: AD - Aquents, dredged, frequently flooded
Component: Aquents (90%)

The Aquents component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is on marshes. The parent material consists of alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Available water

to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. This soil meets hydric criteria.

Map unit: CE - Clovelly muck, 0 to 0.2 percent slopes, very frequently flooded
Component: Clovelly, very frequently flooded (85%)

The Clovelly, very frequently flooded component makes up 85 percent of the map unit. Slopes are 0 to 0 percent. This component is on intermediate to brackish marshes on low coastal plains. The parent material consists of moderately thick herbaceous organic material over very fluid clayey alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is very high. Shrink-swell potential is very high. This soil is very frequently flooded. It is frequently ponded. A seasonal zone of water saturation is at 0 inches during January, February, March, April, May, June, July, August, September, October, November, and December. Organic matter content in the surface horizon is about 46 percent. Nonirrigated land capability classification is 8w. This soil meets hydric criteria. The soil has a slightly saline horizon within 30 inches of the soil surface. The soil has a maximum sodium adsorption ratio of 10 within 30 inches of the soil surface.

Map unit: Cm - Cancienne silt loam, 0 to 1 percent slopes
Component: Cancienne (90%)

The Cancienne component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is on Lower natural levees on alluvial plains. The parent material consists of silty alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 33 inches during January, February, March, April, and December. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 2w. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 2 percent. There are no saline horizons within 30 inches of the soil surface.

Map unit: CS - Cancienne and Schriever soils, frequently flooded
Component: Cancienne (50%)

The Cancienne component makes up 50 percent of the map unit. Slopes are 0 to 1 percent. This component is on natural levees on delta plains. The parent material consists of alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very high. Shrink-swell potential is moderate. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at 33 inches during January, February, March, April, and December. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 5w. This soil meets hydric criteria.

Component: Schriever (30%)

The Schriever component makes up 30 percent of the map unit. Slopes are 0 to 1 percent. This component is on backswamps on Mississippi River delta plains. The parent material consists of alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is very low. Available water to a

depth of 60 inches is moderate. Shrink-swell potential is very high. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at 12 inches during January, February, March, April, and December. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 5w. This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

Map unit: Sk - Schriever clay, 0 to 1 percent slopes
Component: Schriever (95%)

The Schriever component makes up 95 percent of the map unit. Slopes are 0 to 1 percent. This component is on backswamps on Mississippi River delta plains. The parent material consists of clayey alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is very high. This soil is rarely flooded. It is not ponded. A seasonal zone of water saturation is at 0 inches during January, February, March, April, and December. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3w. This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent.

Map unit: Va - Vacherie silt loam, 0 to 3 percent slopes
Component: Vacherie, gently undulating (90%)

The Vacherie, gently undulating component makes up 90 percent of the map unit. Slopes are 0 to 3 percent. This component is on natural levees on Mississippi River delta plains. The parent material consists of silty alluvium over clayey alluvium. Depth to a root restrictive layer, strongly contrasting textural stratification, is 9 to 28 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during January, February, March, April, November, and December. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 2w. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent.

St. Charles Parish, Louisiana (LA089)
[Minor map unit components are excluded from this report]

Map unit: Ha - Harahan clay, 0 to 1 percent slopes
Component: Harahan (90%)

The Harahan component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is on artificially drained backswamps on delta plains. The parent material consists of nonfluid over fluid clayey alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is very high. This soil is rarely flooded. It is not ponded. A seasonal zone of water saturation is at 12 inches during January, February, March, April, May, June, July, August, September, October, November, and December. Organic matter content in the surface horizon is about 14 percent. Nonirrigated land capability classification is 3w. This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

St. Mary Parish, Louisiana (LA101)
[Minor map unit components are excluded from this report]

Map unit: ATA - Aquents, dredged
Component: Aquents (85%)

The Aquents component makes up 85 percent of the map unit. Slopes are 0 to 1 percent. This component is on natural levees on delta plains. The parent material consists of alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is rarely flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. This soil meets hydric criteria.

Map unit: ATB - Aquents, dredged, 1 to 5 percent slopes, occasionally flooded
Component: Aquents (85%)

The Aquents component makes up 85 percent of the map unit. Slopes are 1 to 5 percent. This component is on marshes on delta plains. The parent material consists of alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is occasionally flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. This soil meets hydric criteria.

Map unit: BdA - Baldwin silty clay loam, 0 to 1 percent slopes
Component: Baldwin (90%)

The Baldwin component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is on natural levees, delta plains. The parent material consists of clayey alluvium and/or sandy alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is high. This soil is rarely flooded. It is not ponded. A seasonal zone of water saturation is at 11 inches during January, February, March, April, May, June, July, August, September, October, November, and December. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3w. This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent.

Map unit: BNA - Bancker muck, tidal
Component: Bancker (85%)

The Bancker component makes up 85 percent of the map unit. Slopes are 0 to 0 percent. This component is on brackish areas along bayous in the marshes on delta plains. The parent material consists of fluid clayey alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is very frequently flooded. It is frequently ponded. A seasonal zone of water saturation is at 0 inches during January, February, March, April, May, June, July, August, September, October, November, and December. Organic matter content in the surface horizon is about 50 percent. This component is in the R151XY004LA Brackish Fluid Mineral Marsh 60-64" Pz ecological site. Nonirrigated land capability classification is 8w. This soil meets hydric criteria. The soil has a slightly saline horizon within 30 inches of the soil surface. The soil has a moderately sodic horizon within 30 inches of the soil surface.

Map unit: CYA - Clovelly muck, 0 to 0.2 percent slopes, very frequently flooded
Component: Clovelly, very frequently flooded (85%)

The Clovelly, very frequently flooded component makes up 85 percent of the map unit. Slopes are 0 to 0 percent. This component is on intermediate to brackish marshes on low coastal plains. The parent material consists of moderately thick herbaceous organic material over very fluid clayey alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is very high. Shrink-swell potential is very high. This soil is very frequently flooded. It is frequently ponded. A seasonal zone of water saturation is at 0 inches during January, February, March, April, May, June, July, August, September, October, November, and December. Organic matter content in the surface horizon is about 46 percent. Nonirrigated land capability classification is 8w. This soil meets hydric criteria. The soil has a slightly saline horizon within 30 inches of the soil surface. The soil has a maximum sodium adsorption ratio of 10 within 30 inches of the soil surface.

Map unit: DsA - Dupuy silt loam, 0 to 1 percent slopes, occasionally flooded
Component: Dupuy (85%)

The Dupuy component makes up 85 percent of the map unit. Slopes are 0 to 1 percent. This component is on unprotected areas on natural levees on Teche delta plains. The parent material consists of loamy alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 30 inches during January, February, March, and April. Organic matter content in the surface horizon is about 78 percent. Nonirrigated land capability classification is 3w. This soil does not meet hydric criteria.

Map unit: GxA - Uderts and Glenwild soils, 0 to 3 percent slopes, smoothed
Component: Uderts (50%)

The Uderts component makes up 50 percent of the map unit. Slopes are 0 to 1 percent. This component is on natural levees on Teche delta plains. The parent material consists of clayey alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is high. Shrink-swell potential is very high. This soil is rarely flooded. It is not ponded. A seasonal zone of water saturation is at 9 inches during January, February, March, April, and December. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 3w. This soil does not meet hydric criteria.

Component: Glenwild (40%)

The Glenwild component makes up 40 percent of the map unit. Slopes are 0 to 3 percent. This component is on natural levees on Red River delta plains. The parent material consists of loamy alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 30 inches during January, February, and March. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

Map unit: UD - Udorthents, 1 to 20 percent slopes
Component: Udorthents (85%)

The Udorthents component makes up 85 percent of the map unit. Slopes are 1 to 20 percent. This component is on marshes on delta plains. The parent material consists of loamy and/or clayey alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. This soil does not meet hydric criteria.

St. Tammany Parish, Louisiana (LA103)
[Minor map unit components are excluded from this report]

Map unit: Ag - Aquents, dredged
Component: Aquents (100%)

The Aquents component makes up 100 percent of the map unit. Slopes are 0 to 1 percent. This component is on marshes. The parent material consists of clayey dredge spoils and/or loamy dredge spoils. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is rarely flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. This soil meets hydric criteria.

Vermilion Parish, Louisiana (LA113)
[Minor map unit components are excluded from this report]

Map unit: BB - Barbary muck, 0 to 1 percent slopes, frequently flooded
Component: Barbary, frequently flooded (85%)

The Barbary, frequently flooded component makes up 85 percent of the map unit. Slopes are 0 to 1 percent. This component is on back swamp flood plains, delta plains. The parent material consists of fluid clayey alluvium derived from sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is very high. Shrink-swell potential is very high. This soil is frequently flooded. It is frequently ponded. A seasonal zone of water saturation is at 0 inches during January, February, March, April, May, June, July, August, September, October, November, and December. Organic matter content in the surface horizon is about 50 percent. Nonirrigated land capability classification is 8w. This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent. There are no saline horizons within 30 inches of the soil surface.

Map unit: Co - Coteau-Patoutville-Frost silt loams, gently undulating
Component: Coteau (35%)

The Coteau component makes up 35 percent of the map unit. Slopes are 1 to 3 percent. This component is on terraces on uplands. The parent material consists of loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 27 inches during January, February, March, April, and December. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria.

Component: Patoutville (35%)

The Patoutville component makes up 35 percent of the map unit. Slopes are 1 to 3 percent. This component is on terraces on uplands. The parent material consists of loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is very high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 21 inches during January, February, March, April, May, and December. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria.

Component: Frost (25%)

The Frost component makes up 25 percent of the map unit. Slopes are 0 to 1 percent. This component is on swales on loess uplands. The parent material consists of water reworked loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is very high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 9 inches during January, February, March, April, and December. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3w. This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

Map unit: FA - Fausse clay, 0 to 1 percent slopes, frequently flooded
Component: Fausse, frequently flooded (85%)

The Fausse, frequently flooded component makes up 85 percent of the map unit. Slopes are 0 to 1 percent. This component is on backswamp flood plains on alluvial plains. The parent material consists of clayey alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is high. Shrink-swell potential is very high. This soil is frequently flooded. It is frequently ponded. A seasonal zone of water saturation is at 0 inches during January, February, March, April, November, and December. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7w. This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 2 percent.

Map unit: Pa - Patoutville silt loam, 0 to 1 percent slopes
Component: Patoutville (90%)

The Patoutville component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is on abandoned meander scrolls, flat coastal plains. The parent material consists of silty loess over silty and clayey non-calcareous loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is very high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 21 inches during January, February, March, April, May, and December. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 2w. This soil does not meet hydric criteria. The soil has a maximum sodium adsorption ratio of 2 within 30 inches of the soil surface.

Table A-1. Soil Map Units and Attributes for Recreational Use Alternatives

Recreational Use Alternative	NRCS Survey	Map Unit Symbol	Map Unit Name	Geomorphic Class	Drainage Class	Erodibility	Runoff	Hydrologic Group	Corrosion, Concrete	Corrosion, Steel	Taxonomic Order	Taxonomic Particle Size	Total Subsidence
Recreational Use Improvements at Barataria Preserve in Jefferson Parish, Jean Lafitte National Historical Park and Preserve, Barataria Preserve Unit	LA051	AR	Allemands muck, 0 to 0.2 percent slopes, very frequently flooded	Coastal plains, marshes	Very poorly drained	Slight	Negligible	A/D	High	High	Histosols	clayey	46
Recreational Use Improvements at Barataria Preserve in Jefferson Parish, Jean Lafitte National Historical Park and Preserve, Barataria Preserve Unit	LA051	BB	Barbary muck, 0 to 1% slope, frequently flooded	Delta plains, flood plains	Very poorly drained	Slight	Negligible	D	Moderate	High	Entisols	very-fine	27
Recreational Use Improvements at Barataria Preserve in Jefferson Parish, Jean Lafitte National Historical Park and Preserve, Barataria Preserve Unit	LA051	Co	Cancienne silty clay loam, 0 to 1 percent slopes	Natural levees on alluvial plains	Somewhat poorly drained	Slight	Low	C	Moderate	High	Inceptisols	fine-silty	
Recreational Use Improvements at Barataria Preserve in Jefferson Parish, Jean Lafitte National Historical Park and Preserve, Barataria Preserve Unit	LA051	Sk	Schriever clay, 0 to 1 percent slopes	Backswamps on delta plains	Poorly drained	Slight	High	D	Low	High	Vertisols	very-fine	
Recreational Use Improvements at Barataria Preserve in Jefferson Parish, Jean Lafitte National Historical Park and Preserve, Barataria Preserve Unit	LA051	Sk	Schriever clay, 0 to 1 percent slopes	Backswamps on delta plains	Poorly drained	Slight	High	D	Low	High	Vertisols	very-fine	
Bayou Segnette State Park Improvements	LA051	AR	Allemands muck, 0 to 0.2 percent slopes, very frequently flooded	Coastal plains, marshes	Very poorly drained	Slight	Negligible	A/D	High	High	Histosols	clayey	46
Bayou Segnette State Park Improvements	LA051	BB	Barbary muck, 0 to 1% slope, frequently flooded	Delta plains, flood plains	Very poorly drained	Slight	Negligible	D	Moderate	High	Entisols	very-fine	27
Bayou Segnette State Park Improvements	LA051	Cm	Cancienne silt loam, 0 to 1 percent slopes	Natural levees on alluvial plains	Somewhat poorly drained	Slight	Low	C	Moderate	High	Inceptisols	fine-silty	
Bayou Segnette State Park Improvements	LA051	Ha	Harahan clay	Backswamps on delta plains	Poorly drained	Slight		D	Moderate	High	Inceptisols	very-fine	18
Bayou Segnette State Park Improvements	LA051	KE	Kenner muck, 0 to 1 percent slopes, very frequently flooded	Marshes on coastal plains	Very poorly drained	Slight	Negligible	D	Moderate	High	Histosols	not used	130
Bayou Segnette State Park Improvements	LA051	LR	Larose muck	Marshes on delta plains	Very poorly drained	Slight		D	Moderate	High	Entisols	very-fine	26
Bayou Segnette State Park Improvements	LA051	Va	Vacherie silt loam, gently undulating	Natural levees on delta plains	Somewhat poorly drained	Slight		C	Low	High	Entisols	coarse-silty over clayey	
Belle Chasse	LA075	Ra	Rita mucky clay	Marshes on coastal plains	Poorly drained	Slight		D	Moderate	High	Inceptisols	very-fine	18
Caminada Pass Bridge Fishing Pier Restoration, Jefferson Parish, Region 2, Barataria Basin	LA051	FA	Felicity loamy fine sand, occasionally flooded	Beach ridges on delta plains	Somewhat poorly drained	Slight		A	Moderate	High	Entisols	not used	
Chitimacha Boat Launch	LA101	BdA	Baldwin silty clay loam, 0 to 1 percent slopes	Natural levees on delta plains	Poorly drained	Slight	Very high	D	Moderate	High	Alfisols	fine	
Chitimacha Boat Launch	LA101	GxA	Uderts and Glenwild soils, 0 to 3 percent slopes, smoothed	Natural levees on delta plains	Somewhat poorly drained	Slight	Very high	D	Low	High	Vertisols		
Cypremort Point State Park Improvements	LA101	ATB	Aquents, dredged, 1 to 5 percent slopes, occasionally flooded	Backswamps on delta plains, marshes on delta plains	Very poorly drained	Not rated		D			Entisols		
Cypremort Point State Park Improvements	LA045	Az	Aquents, dredged, 1 to 5 percent slopes, occasionally flooded	Backswamps on delta plains, marshes on delta plains	Very poorly drained	Not rated		D			Entisols		
Cypremort Point State Park Improvements	LA101	BNA	Bancker muck, tidal	Marshes on delta plains	Very poorly drained	Slight	High	D	Moderate	High	Entisols	very-fine	26
Cypremort Point State Park Improvements	LA101	CYA	Clovelly muck, very frequently flooded	Marshes on coastal plains	Very poorly drained	Slight	High	D	Low	High	Histosols	clayey	86
Cypremort Point State Park Improvements	LA101	DsA	Dupuy silt loam, 0 to 1 percent slopes, occasionally flooded	Natural levees on delta plains	Somewhat poorly drained	Slight	Medium	C	Moderate	High	Alfisols	fine-silty	
Des Allemands Boat Launch	LA089	Ha	Harahan clay	Backswamps on delta plains	Poorly drained	Slight	–	D	Moderate	High	Inceptisols	Very-fine	18
Improvements to Grand Avoille Boat Launch	LA101	ATA	Aquents, dredged	Natural levees on delta plains	Very poorly drained	Not rated	–	D	–	–	Entisols	–	–
Improvements to Grand Avoille Boat Launch	LA101	UD	Udorthents, 1 to 20 percent slopes	Backswamps on delta plains, marshes on delta plains	Poorly drained	Not rated	–	D	–	–	Entisols	–	–
Grand Isle State Park Improvements	LA051	FA	Felicity loamy fine sand, occasionally flooded	Beach ridges on delta plains	Somewhat poorly drained	Slight	–	A	Moderate	High	Entisols	Not used	–
Grand Isle State Park Improvements	LA051	SC	Scatlake muck	Salt marshes on coastal plains	Very poorly drained	Slight	–	D	Moderate	High	Entisols	Very-fine	23

Recreational Use Alternative	NRCS Survey	Map Unit Symbol	Map Unit Name	Geomorphic Class	Drainage Class	Erodibility	Runoff	Hydrologic Group	Corrosion, Concrete	Corrosion, Steel	Taxonomic Order	Taxonomic Particle Size	Total Subsidence
Louisiana Swamp Exhibit at Audubon Zoo	LA071	Cm	Cancienne silt loam, 0 to 1 percent slopes	Natural levees on alluvial plains	Somewhat poorly drained	Slight	Low	C	Moderate	High	Inceptisols	Fine-silty	–
Middle Pearl	LA103	Ag	Aquents, dredged	Marshes	Very poorly drained	Not rated	–	D	–	–	Entisols	–	–
Pointe-aux-Chenes Wildlife Management Area Recreational Use Enhancement	LA057	LA	Lafitte-Clovelly association	Marshes on delta plains	Very poorly drained	Slight	–	D	Moderate	High	Histosols	Not used	109
Pass-a-Loutre Wildlife Management Area Campgrounds	LA075	AT	Aquents, dredged, frequently flooded	Marshes	Very poorly drained	Not rated	–	D			Entisols		–
Pass-a-Loutre Wildlife Management Area Access	LA075	BA	Balize and Larose soils	Marshes on coastal plains	Very poorly drained	Slight	–	D	Moderate	High	Entisols	Fine-silty	27
Palmetto Island State Park Improvements	LA113	BB	Barbary muck, 0 to 1% slope, frequently flooded	Delta plains, flood plains	Very poorly drained	Slight	Negligible	D	Moderate	High	Entisols	Very-fine	27
Palmetto Island State Park Improvements	LA113	Co	Coteau-Patoutville-Frost silt loams, gently undulating	Terraces on uplands	Somewhat poorly drained	Slight	–	C	Moderate	High	Alfisols	Fine-silty	–
Palmetto Island State Park Improvements	LA113	FA	Fausse clay, 0 to 1 percent slopes, frequently flooded	Flood plains on alluvial plains	Very poorly drained	Slight	Negligible	D	Low	Moderate	Inceptisols	Very-fine	27
Palmetto Island State Park Improvements	LA113	Pa	Patoutville silt loam, 0 to 1 percent slopes	Terraces on uplands	Somewhat poorly drained	Slight	–	C	Moderate	High	Alfisols	Fine-silty	–
Rockefeller Piers and Rockefeller Signage	LA023	SC	Scatlake mucky clay	Salt marshes	Very poorly drained	Slight	–	D	Moderate	High	Entisols	Very-fine	23
St. Bernard State Park Improvements	LA087	AD	Aquents, dredged, frequently flooded	Marshes	Very poorly drained	Not rated	–	D	–	–	Entisols	–	–
St. Bernard State Park Improvements	LA075	AT	Aquents, dredged, frequently flooded	Marshes	Very poorly drained	Not rated	–	D	–	–	Entisols	–	–
St. Bernard State Park Improvements	LA087	CE	Clovelly muck	Marshes on coastal plains	Very poorly drained	Slight	–	D	Low	High	Histosols	Clayey	86
St. Bernard State Park Improvements	LA087	Cm	Cancienne silt loam, 0 to 1 percent slopes	Natural levees on alluvial plains	Somewhat poorly drained	Slight	Low	C	Moderate	High	Inceptisols	Fine-silty	–
St. Bernard State Park Improvements	LA087	CS	Cancienne and Schriever soils, frequently flooded	Natural levees on delta plains	Somewhat poorly drained	Slight	–	C	Low	High	Inceptisols	Fine-silty	–
St. Bernard State Park Improvements	LA075	CV	Carville, Cancienne, and Schriever soils, frequently flooded	Natural levees on delta plains	Somewhat poorly drained	Slight	–	C	Low	High	Inceptisols	Coarse-silty	–
St. Bernard State Park Improvements	LA087	Sk	Schriever clay, 0 to 1 percent slopes	Backswamps on delta plains	Poorly drained	Slight	High	D	Low	High	Vertisols	Very-fine	–
St. Bernard State Park Improvements	LA087	Va	Vacherie silt loam, gently undulating	Natural levees on delta plains	Somewhat poorly drained	Slight	–	C	Low	High	Entisols	Coarse-silty over clayey	–
St. Bernard State Park Improvements	LA075	Ww	Westwego clay	Backswamps on delta plains	Poorly drained	Slight	–	D	Moderate	High	Entisols	Very-fine	33
Sam Houston Jones State Park Improvements	LA019	AR	Arat mucky silt loam	Marshes on coastal plains	Very poorly drained	Slight	–	D	Moderate	High	Entisols	Fine-silty	27
Sam Houston Jones State Park Improvements	LA019	BB	Basile and Brule, 0 to 3 percent slopes, frequently flooded	Flood plains on coastal plains	Poorly drained	Slight	Low	C/D	High	High	Alfisols	Fine-silty	27
Sam Houston Jones State Park Improvements	LA019	Bh	Bienville loamy fine sand, 1 to 3 percent slopes	Terraces on river valleys on coastal plains	Somewhat excessively drained	Slight	–	A	High	Low	Alfisols	–	–
Sam Houston Jones State Park Improvements	LA019	Ge	Glenmora silt loam, 1 to 3 percent slopes	Coastal plains, river valleys, terraces	Moderately well drained	Slight	–	C	Moderate	High	Alfisols	Fine-silty	–
Sam Houston Jones State Park Improvements	LA019	Gg	Gore silt loam, 1 to 5 percent slopes	Coastal plains, river valleys, terraces	Moderately well drained	Moderate	–	D	Low	High	Alfisols	Fine	–
Sam Houston Jones State Park Improvements	LA019	Go	Guyton silt loam, occasionally flooded	Flood plains on coastal plains	Poorly drained	Slight	–	D	High	High	Alfisols	Fine-silty	–
Sam Houston Jones State Park Improvements	LA019	GU	Guyton and Bienville soils frequently flooded	Depressions on coastal plains	Poorly drained	Slight	–	D	High	High	Alfisols	Fine-silty	–
Sam Houston Jones State Park Improvements	LA019	Gy	Guyton-Messer silt loams	Terraces on coastal plains	Poorly drained	Slight	–	D	High	High	Alfisols	Fine-silty	–
Sam Houston Jones State Park Improvements	LA019	Kd	Kinder-Messer silt loams	Flats on coastal plains	Poorly drained	Slight	–	C	Moderate	High	Alfisols	Fine-silty	–
The Wetlands Center	LA051	BB	Barbary muck, 0 to 1% slope, frequently flooded	Delta plains, flood plains	Very poorly drained	Slight	Negligible	D	Moderate	High	Entisols	Very-fine	27
WHARF Phase 1	LA051	BB	Barbary muck, 0 to 1% slope, frequently flooded	Delta plains, flood plains	Very poorly drained	Slight	Negligible	D	Moderate	High	Entisols	Very-fine	27
WHARF Phase 1	LA051	Sk	Schriever clay, 0 to 1 percent slopes	Backswamps on delta plains	Poorly drained	Slight	High	D	Low	High	Vertisols	Very-fine	–
Atchafalaya Delta Wildlife Management Area Access	–	–	Open water	Lower deltaic plains	–	–	–	–	–	–	–	–	–

Table A-2. Potentially Affected Soil Map Unit Attributes for the Parishes where Nutrient Reduction Alternatives could be located. The five predominant soil types in each parish are listed.

Parish	NRCS Survey	% of Survey Area	Map Unit Symbol	Map Unit Name	Geomorphic Class	Drainage Class	Erodibility	Surface Runoff	Hydrologic Group	Corrosion, Concrete	Corrosion, Steel	Taxonomic Order	Taxonomic Particle Size	Total Subsidence	Prime Farmland
Calcasieu	LA019	47	Cr	Crowley-Vidrine silt loams	Meander scrolls on coastal plains	Somewhat poorly drained	Slight	–	D	Moderate	High	Alfisols	–	–	All areas are prime farmland
Calcasieu	LA019	20	Mr	Edgerly loam, 0 to 1 percent slopes	Flats on coastal plains	Poorly drained	Slight	Low	D	Low	High	Mollisols	Not used	–	All areas are prime farmland
Calcasieu	LA019	13	AR	Arat mucky silt loam	Marshes on coastal plains	Very poorly drained	Slight	–	D	Moderate	High	Entisols	–	27	Not prime farmland
Calcasieu	LA019	12	Mn	Midland silty clay loam	Open depressions on terraces on river valleys on coastal plains	Poorly drained	Slight	–	D	Moderate	High	Alfisols	–	–	All areas are prime farmland
Calcasieu	LA019	3	Mt	Mowata-Vidrine silt loams	Flats on coastal plains, flats on coastal plains	Poorly drained	Slight	–	D	Low	High	Alfisols	–	–	All areas are prime farmland
Cameron	LA023	22	AE	Allemands muck, 0 to 0.2 percent slopes, very frequently flooded	Coastal plains, marshes	Very poorly drained	Slight	Negligible	A/D	High	High	Histosols	Not used	46	Not prime farmland
Cameron	LA023	14	SC	Scatlake mucky clay	Salt marshes	Very poorly drained	Slight	–	D	Moderate	High	Entisols	–	23	Not prime farmland
Cameron	LA023	7	LE	Larose muck	Marshes on delta plains	Very poorly drained	Slight	–	D	Moderate	High	Entisols	–	26	Not prime farmland
Cameron	LA023	7	Cr	Creole mucky clay	Marshes	Very poorly drained	Slight	–	D	Moderate	High	Entisols	–	13	Not prime farmland
Cameron	LA023	6	GB	Ged mucky clay	Marshes	Very poorly drained	Slight	–	D	Moderate	High	Alfisols	–	–	Not prime farmland
Catahoula	LA025	10	Ag	Alligator clay, occasionally flooded	backswamps on delta plains	Poorly drained	Slight	–	D	Moderate	High	Vertisols	–	–	Not prime farmland
Catahoula	LA025	8	Sk	Sharkey clay, 0 to 1 percent slopes, occasionally flooded	backswamps on alluvial plains, flats on alluvial plains	Poorly drained	Slight	High	D	Low	High	Vertisols	Not used	–	Not prime farmland
Catahoula	LA025	6	SW	Sweatman-Smithdale association, 5 to 40 percent slopes	hillslopes on coastal plains	Well drained	Severe	–	C	High	High	Ultisols	–	–	Not prime farmland
Catahoula	LA025	6	SP	Smithdale-Oula-Providence association, 5 to 40 percent slopes	hillslopes on uplands	Well drained	Severe	–	B	Moderate	Low	Ultisols	–	–	Not prime farmland
Catahoula	LA025	6	Gy	Guyton silt loam, frequently flooded	flood plains on coastal plains	Poorly drained	Slight	–	D	High	High	Alfisols	–	–	Not prime farmland
Catahoula	LA025	6	OP	Oula-Providence association, 5 to 25 percent slopes	interfluves on coastal plains	Well drained	Severe	–	D	High	High	Alfisols	–	–	Not prime farmland
Catahoula	LA025	5	MS	Memphis-Smithdale association, 5 to 40 percent slopes	terraces on uplands	Well drained	Severe	–	B	Moderate	Moderate	Alfisols	–	–	Not prime farmland
Catahoula	LA025	4	Sh	Sharkey clay, 0 to 1 percent slopes, rarely flooded, south	backswamps on alluvial plains, natural levees on alluvial plains	Poorly drained	Slight	High	D	Moderate	High	Vertisols	Not used	–	All areas are prime farmland
Concordia	LA029	19	So	Sharkey clay, 0 to 1 percent slopes, frequently flooded	alluvial plains, backswamps, flood plains	Poorly drained	Slight	Negligible	D	Moderate	Moderate	Vertisols	Not used	–	Not prime farmland
Concordia	LA029	12	Sk	Sharkey clay, 0 to 1 percent slopes, occasionally flooded	backswamps on alluvial plains, flats on alluvial plains	Poorly drained	Slight	High	D	Low	High	Vertisols	Not used	–	Not prime farmland
Concordia	LA029	8	Sh	Sharkey clay, 0 to 1 percent slopes, rarely flooded, south	backswamps on alluvial plains, natural levees on alluvial plains	Poorly drained	Slight	High	D	Moderate	High	Vertisols	Not used	–	All areas are prime farmland
Concordia	LA029	7	Ab	Alligator clay, occasionally flooded	flood plains on delta plains	Poorly drained	Slight		D	Moderate	High	Vertisols	–	–	Not prime farmland
Concordia	LA029	5	To	Tensas-Alligator complex, undulating	natural levees on delta plains	Somewhat poorly drained	Moderate	–	D	Moderate	High	Alfisols		–	All areas are prime farmland
Jefferson	LA053	25	MdA	Midland silt loam	Open depressions on terraces on river valleys on coastal plains	Poorly drained	Slight	–	D	Moderate	High	Alfisols		–	All areas are prime farmland
Jefferson	LA053	18	CrA	Crowley-Vidrine silt loams, 0 to 1 percent slopes	Meander scrolls on coastal plains	Somewhat poorly drained	Slight	–	D	Moderate	High	Alfisols	–	–	All areas are prime farmland
Jefferson	LA053	15	KpA	Kaplan silt loam, 0 to 1 percent slopes	Meander scrolls on coastal plains	Somewhat poorly drained	Slight	–	D	Low	High	Alfisols	–	–	All areas are prime farmland
Jefferson	LA053	11	MoA	Edgerly loam, 0 to 1 percent slopes	Flats on coastal plains	Poorly drained	Slight	Low	D	Low	High	Mollisols	Not used	–	All areas are prime farmland

Parish	NRCS Survey	% of Survey Area	Map Unit Symbol	Map Unit Name	Geomorphic Class	Drainage Class	Erodibility	Surface Runoff	Hydrologic Group	Corrosion, Concrete	Corrosion, Steel	Taxonomic Order	Taxonomic Particle Size	Total Subsidence	Prime Farmland
Jefferson	LA053	9	JdA	Judice silty clay	Meandering channels on coastal plains	Poorly drained	Slight	–	D	Low	High	Vertisols		–	All areas are prime farmland
Lafourche	LA057	13	Cm	Cancienne silt loam, 0 to 1 percent slopes	Natural levees on alluvial plains	Somewhat poorly drained	Slight	Low	C	Moderate	High	Inceptisols	Fine-silty	–	All areas are prime farmland
Lafourche	LA057	12	AN	Aquents, frequently flooded	Filled marshlands	Very poorly drained	Not rated	–	D	–		Entisols	–	–	Not prime farmland
Lafourche	LA057	12	BB	Barbary muck, 0 to 1% slope, frequently flooded	Delta plains, flood plains	Very poorly drained	Slight	Negligible	D	Moderate	High	Entisols	Very-fine	27	Not prime farmland
Lafourche	LA057	10	Sk	Schriever clay, 0 to 1 percent slopes	Backswamps on delta plains	Poorly drained	Slight	High	D	Low	High	Vertisols	Very-fine	–	All areas are prime farmland
Lafourche	LA057	10	AE	Allemands muck, 0 to 0.2 percent slopes, very frequently flooded	Coastal plains, marshes	Very poorly drained	Slight	Negligible	A/D	High	High	Histosols	Not used	46	Not prime farmland
St. Helena	LA091	47	RS	Ruston-Smithdale association, rolling	Hillslopes on uplands	Well drained	Severe	–	B	Moderate	Moderate	Ultisols	–	–	Not prime farmland
St. Helena	LA091	30	Ta	Tangi silt loam, 1 to 3 percent slopes	Ridges on uplands	Moderately well drained	Slight	–	C	Moderate	Moderate	Ultisols	–	–	All areas are prime farmland
St. Helena	LA091	14	OG	Ouachita, Ochlockonee, and Guyton soils, frequently flooded	Ridges on flood plains	Well drained	Slight	–	C	Moderate	Moderate	Inceptisols	–	–	Not prime farmland
St. Helena	LA091	3	Rn	Ruston fine sandy loam, 1 t0 3 percent slopes	Hillslopes on uplands	Well drained	Slight	–	B	Moderate	Moderate	Ultisols	–	–	All areas are prime farmland
St. Helena	LA091	1	Tg	Tangi silt loam, 3 to 8 percent slopes	Ridges on uplands	Moderately well drained	Moderate	–	C	Moderate	Moderate	Ultisols	–	–	Not prime farmland
Tangipahoa	LA105	38	Ta	Tangi silt loam, 1 to 3 percent slopes	Ridges on uplands	Moderately well drained	Slight	–	C	Moderate	Moderate	Ultisols	–	–	All areas are prime farmland
Tangipahoa	LA105	30	RS	Ruston-Smithdale association, rolling	Hillslopes on uplands	Well drained	Severe	–	B	Moderate	Moderate	Ultisols	–	–	Not prime farmland
Tangipahoa	LA105	12	OG	Ouachita, Ochlockonee, and Guyton soils, frequently flooded	Natural levees on river valleys	Well drained	Slight	–	C	Moderate	Moderate	Inceptisols	–	–	Not prime farmland
Tangipahoa	LA105	10	Tg	Tangi silt loam, 3 to 8 percent slopes	Ridges on uplands	Moderately well drained	Moderate	–	C	Moderate	Moderate	Ultisols	–	–	Not prime farmland
Tangipahoa	LA105	3	Ma	Malbis fine sandy loam, 3 to 8 percent slopes	Broad interstream divides on uplands	Moderately well drained	Moderate	–	B	Moderate	Moderate	Ultisols	–	–	Not prime farmland
Tensas	LA107	30	ShA	Sharkey clay, 0 to 1 percent slopes, rarely flooded, south	backswamps on alluvial plains, natural levees on alluvial plains	Poorly drained	Slight	High	D	Moderate	High	Vertisols	Not used	–	All areas are prime farmland
Tensas	LA107	27	TeB	Tensas-Sharkey clays, gently undulating	natural levees on delta plains	Somewhat poorly drained	Slight	Very high	D	Moderate	High	Alfisols	–	–	All areas are prime farmland
Tensas	LA107	9	SkA	Sharkey clay, 0 to 1 percent slopes, occasionally flooded	backswamps on alluvial plains, flats on alluvial plains	Poorly drained	Slight	High	D	Low	High	Vertisols	Not used	–	Prime farmland*
Tensas	LA107	6	LE	Levees-Borrow pits complex, nearly level to strongly sloping	artificial levees on river valleys		Not rated	High	C	Moderate	Moderate	Entisols	Not used	–	Not prime farmland
Tensas	LA107	4	TkB	Tensas-Sharkey-Dundee complex, gently undulating	natural levees on delta plains	Somewhat poorly drained	Slight	Very high	D	Moderate	High	Alfisols	–	–	All areas are prime farmland
Terrebonne	LA109	20	ShA	Schriever clay, 0 to 1 percent slopes	Backswamps on delta plains	Poorly drained	Slight	High	D	Low	High	Vertisols	Very-fine	–	All areas are prime farmland
Terrebonne	LA109	15	SrA	Schriever clay, occasionally flooded	Backswamps on delta plains	Poorly drained	Slight	Very high	D	Moderate	High	Vertisols	Very-fine	–	Not prime farmland
Terrebonne	LA109	12	CdA	Cancienne silty clay loam, 0 to 1 percent slopes	Natural levees on alluvial plains	Somewhat poorly drained	Slight	Low	C	Moderate	High	Inceptisols	Fine-silty	–	All areas are prime farmland
Terrebonne	LA109	9	LRA	Larose muck, very frequently flooded	Marshes on delta plains	Very poorly drained	Slight	High	D	Moderate	High	Entisols	Very-fine	26	Not prime farmland
Terrebonne	LA109	7	FAA	Fausse clay, 0 to 1 percent slopes, frequently flooded	Flood plains on alluvial plains	Very poorly drained	Slight	Negligible	D	Low	Moderate	Inceptisols	Very-fine	27	Not prime farmland
Vermilion	LA113	18	AE	Allemands muck, 0 to 0.2 percent slopes, very frequently flooded	Coastal plains, marshes	Very poorly drained	Slight	Negligible	A/D	High	High	Histosols	Not used	46	Not prime farmland
Vermilion	LA113	18	Gy	Gueydan muck	Marshes	Poorly drained	Slight	–	D	Moderate	High	Entisols	–	18	Not prime farmland
Vermilion	LA113	8	Mn	Midland silty clay loam	Open depressions on terraces on river valleys on coastal plains	Poorly drained	Slight	–	D	Moderate	High	Alfisols	–	–	All areas are prime farmland

Parish	NRCS Survey	% of Survey Area	Map Unit Symbol	Map Unit Name	Geomorphic Class	Drainage Class	Erodibility	Surface Runoff	Hydrologic Group	Corrosion, Concrete	Corrosion, Steel	Taxonomic Order	Taxonomic Particle Size	Total Subsidence	Prime Farmland
Vermilion	LA113	6	Cw	Crowley silt loam, 0 to 1 percent slopes	Meander scrolls on coastal plains	Somewhat poorly drained	Slight	–	D	Moderate	High	Alfisols	–	–	All areas are prime farmland
Vermilion	LA113	5	BA	Bancker muck	Marshes	Very poorly drained	Slight	–	D	Moderate	High	Entisols	–	26	Not prime farmland
Washington	LA117	19	Sa	Savannah fine sandy loam, 1 to 3 percent slopes	Fluviomarine terraces on coastal plains	Moderately well drained	Slight	–	C	High	Moderate	Ultisols	–	–	All areas are prime farmland
Washington	LA117	18	Rt	Ruston fine sandy loam, 3 to 8 percent slopes	Hillslopes on uplands	Well drained	Moderate	–	B	Moderate	Moderate	Ultisols	–	–	All areas are prime farmland
Washington	LA117	15	OB	Ouachita, Bibb, and Jena soils, frequently flooded	Natural levees on river valleys	Well drained	Slight	–	C	Moderate	Moderate	Inceptisols	–	–	Not prime farmland
Washington	LA117	11	SM	Smithdale fine sandy loam, 8 to 12 percent slopes	Hillslopes on uplands	Well drained	Severe	–	B	Moderate	Low	Ultisols	–	–	Not prime farmland
Washington	LA117	8	RS	Ruston fine sandy loam, 1 to 3 percent slopes	Hillslopes on uplands	Well drained	Slight	–	B	Moderate	Moderate	Ultisols	–	–	All areas are prime farmland

*Prime farmland if protected from flooding or not frequently flooded during the growing season

The Percent of Survey Area column indicates the top soils that accounted for 50% or greater of the survey area. This method was employed to reduce the overall number of soil map units to five to 10 soil map units within the soil survey for conciseness.

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A-1.2 Hydrology and Water Quality

The 11 major hydrologic basins where the alternatives are located are summarized in Table A-3.

Table A-3. Descriptions of Hydrologic Basins Associated with the Alternatives

Basin Name	Description
Atchafalaya River Basin	This river basin is located in south central Louisiana. It is distributary of the Red, Black, and Mississippi Rivers, presently carrying 30% of the Mississippi's flow. The basin is well defined by a system of levees, which surround it on the north, east, and west. The entire basin serves as a major floodway for the Mississippi River floodwaters. It encompasses approximately 1,806 square miles and is predominately wooded lowland and cypress-tupelo swamp with some fresh water marshes in the lower distributary area. It constitutes the largest contiguous fresh water swamp in the United states.
Barataria Basin	This river basin lies in the eastern coastal region of the state. It is bounded on the north and east by the lower Mississippi River, on the west by Bayou Lafourche, and on the south by the Gulf of Mexico. The major receiving water body in this basin is Barataria Bay. The Barataria Basin consists largely of wooded lowlands and fresh to brackish marshes, having some saline marsh on the fringes of Barataria Bay. Elevations in this basin range from minus 2 feet to 4 feet above sea level.
Calcasieu River Basin	This river basin is located in southwestern Louisiana and is positioned in a north-south direction. The drainage area of the river basin comprises approximately 3,910 square miles. The headwaters of the river basin are located in the hills west of Alexandria and the river flows south for about 160 miles to the Gulf of Mexico. The mouth of the river is about 30 miles east of the Texas-Louisiana state line. The landscape in the basin varies from pine-forested hills in the upper end to brackish and salt marshes in the lower reach around Calcasieu Lake.
Lake Pontchartrain Basin	This basin, located in southeastern Louisiana, consists of the tributaries and distributaries of Lake Pontchartrain, a large estuarine lake. The basin is bound on the north by the Mississippi state line, on the west and south by the east bank Mississippi River levee, on the east by the Pearl River Basin, and on the southeast by Breton and Chandeleur Sounds. This basin includes Lake Borgne, Breton Sound, Chandeleur Sound, and the Chandeleur Islands. The northern part of the basin consists of wooded uplands, both pine and hardwoods forests. The southern portions of the basin consist of cypress-tupelo swamps, lowlands, and both brackish and saline marshes. The marshes of the southeastern part of the basin constitute the most rapidly eroding area along the Louisiana coast. Elevations in this basin range from minus five feet at New Orleans to over 200 feet near the Mississippi border.
Mermentau River Basin	This river basin is located in southwestern Louisiana and encompasses the prairie region of the state and a section of the coastal zone. The river basin is bounded on the north and east by the Vermilion-Teche Basin, on the west by the Calcasieu River Basin, and on the south by the Gulf of Mexico.
Mississippi River Basin	The upper Mississippi River, which flows south, forms the boundary between Louisiana and Mississippi. The lower Mississippi River flows southeasterly through the southeast section of Louisiana. The upper stretch of the Mississippi River does not receive any tributary flow from the Louisiana side, which is leveed. Tributaries do enter from Mississippi, including the Yazoo River, the Black River, the Homochitto River, the Buffalo River, and Bayou Pierre. The stretch of the Mississippi River between the Old River Control Structure and Baton Rouge does receive tributary flow from Thompson's Creek, Bayou Sara, Tunica Bayou, and Monte Sano Bayou. The river is leveed on both the east and west banks from Baton Rouge below Monte Sano Bayou to Venice. This stretch of river is also heavily industrialized, receiving numerous industrial discharges from Baton Rouge to New Orleans. The birdfoot delta of the Mississippi, where it flows into the Gulf, consists of fresh and intermediate marshes.
Ouachita River Basin	The Ouachita River source is found in the Ouachita Mountains of west central Arkansas near the Oklahoma border. The Ouachita River flows south through northeastern Louisianan and joins with the Tensas River to form the Black River, which empties into the Red River. The Ouachita Basin covers over 10,000 square miles of drainage area. Most of the basin consists of rich, alluvial plains cultivated in cotton and soybeans. The northwest corner of the basin is forested in pine, which is commercially harvested.

Basin Name	Description
Pearl River Basin	This river basin lies along southeastern Louisiana – southwestern Mississippi border. This basin is bordered on the north by the Mississippi state line and on the west and south by the Lake Pontchartrain Basin. Elevations in this basin range from 350 feet above mean sea level in the northwest portions to sea level at the south end. Correspondingly, the vegetation varies from pine forests to brackish marsh.
Red River Basin	The Red River has its origin in eastern New Mexico and flows across portions of Texas, Oklahoma, and Arkansas before entering northwestern Louisiana. The river flows south to Shreveport, where it turns southeast and flows for approximately 160 miles to its junction with the Atchafalaya River. From the Arkansas state line to Alexandria, the Red River is contained within high banks, which range from 20 to 35 feet above low water level. Below Alexandria, the river flows through a flat alluvial plain, which is subject to backwater flooding during periods of high water. The Red River drains approximately 7,760 square miles within Louisiana.
Terrebonne Basin	This river basin covers an area extending approximately 120 miles from the Mississippi River on the north to the Gulf of Mexico on the south. It varies in width from 18 to 70 miles. This basin is bounded on the west by the Atchafalaya River Basin and on the east by the Mississippi River and Bayou Lafourche. The topography of the entire basin is lowland, and all the land is subject to flooding except the natural levees along major waterways. The coastal portion of the basin is prone to tidal flooding and consists of marches ranging from fresh to saline.
Vermilion-Teche Basin	This river basin lies in south central Louisiana. The upper end of the basin lies in the central part of the state near Alexandria, and the basin extends southward to the Gulf of Mexico. The basin is bordered on the north and the northeast by a low escarpment and the lower end of the Red River Basin. The Atchafalaya River Basin is to the east, and the Mermentau River Basin is to the west.

Source: LDEQ (2016)

A-1.2.1 Wetlands and Floodplains

Wetland types potentially affected by the proposed project are summarized by parish and by NWI category in Table A-4.

Table A-4. Acres of Wetland Types by Parish (part 1 of 2)

NWI Wetland Type	Acadia	Calcasieu	Cameron	Catahoula	Concordia	Iberia	Jefferson	Jefferson Davis	Lafourche	Lafayette	Orleans	Plaquemines
Estuarine and Marine Deepwater	0	19,016	218,471	0	0	18,917	128,835	0	104,509	0	113,526	206,373
Estuarine and Marine Wetland	0	20,120	342,311	0	0	100,294	60,589	0	182,059	0	29,223	239,907
Freshwater Emergent Wetland	628	30,635	227,211	4,990	9,618	5,226	14,254	5,013	127,048	519	7,158	45,200
Freshwater Forest/ Shrub Wetland	34,340	74,853	15,606	116,464	197,831	110,145	31,431	23,743	166,543	8,252	7,846	21,267
Freshwater Pond	1,201	2,901	9,724	2,471	5,871	1,346	480	850	1,783	727	967	2,096
Lake	193	5,997	102,199	7,133	13,480	16,525	2,543	3,176	17,419	97	6,105	1,896
Riverine	5,138	9,607	10,066	16,003	24,449	8,573	6,792	6,203	9,267	2,106	3,947	87,934
Total	**41,501**	**163,129**	**925,587**	**147,061**	**251,250**	**261,026**	**244,924**	**38,985**	**608,629**	**11,711**	**168,773**	**604,672**

Source: USFWS (2017)

Table A-4. Acres of Wetland Types by Parish (part 2 of 2)

NWI Wetland Type	St. Bernard	St. Charles	St. Helena	St. Martin	St. Mary	St. Tammany	Tangipahoa	Tensas	Terrebonne	Vermilion	Washington
Estuarine and Marine Deepwater	85,277	64,681	0	0	3,242	165,721	14,725	0	204,574	37,012	0
Estuarine and Marine Wetland	180,732	8,323	0	0	6,614	20,586	4,408	0	292,844	153,412	0
Freshwater Emergent Wetland	5,342	57,490	425	5,537	99,227	13,118	7,587	3,564	174,615	129,264	476
Freshwater Forest/ Shrub Wetland	6,891	67,710	39,162	328,134	165,835	122,200	110,005	152,796	138,716	37,149	73,488
Freshwater Pond	555	1,291	992	3,053	3,461	3,659	2,917	2,521	5,931	4,020	2,620
Lake	155	17,455	181	20,310	21,477	5,184	3,663	9,449	28,671	64,196	717
Riverine	1,709	7,649	2,721	24,637	34,751	24,589	5,360	18,085	21,374	9,366	6,140
Total	**280,662**	**224,600**	**43,482**	**381,672**	**334,606**	**355,056**	**148,666**	**186,415**	**866,726**	**434,419**	**83,441**

A-1.3 Air Quality

The Air Quality Index (AQI) monitoring program was developed from the NAAQS baseline standards. The AQI is an indicator of overall air quality, because it considers all of the criteria air pollutants measured within a geographic area (EPA 2018a). According to EPA, AQIs of under 50 are considered good air quality, and 51 to 100 are considered moderate air quality. As AQIs advance beyond 50, air quality begins to get worse, and AQIs of over 300 are classified as hazardous (EPA 2014). Based on available data, all affected parishes had a median 2017 AQI below 50 (Table A-5). AQI data were unavailable for Cameron, St. Mary, St. Helena, Plaquemines, Vermillion, and Washington Parishes.

Table A-5. Air Quality Status by Parish

Parish	NAAQS Attainment Status	Median Air Quality Index 2017*
Acadia	Attainment	N/A
Calcasieu	Attainment	45
Cameron	Attainment	N/A
Catahoula	Attainment	N/A
Concordia	Attainment	N/A
Iberia	Attainment	N/A
Jefferson	Attainment	39
Jefferson Davis	Attainment	N/A
Lafourche	Attainment	36
Lafayette	Attainment	40
Orleans	Attainment	38
Plaquemines	Attainment	N/A
St. Bernard	Non-attainment for sulfur dioxide	40
St. Charles	Attainment	1
St. Helena	Attainment	N/A
St. Martin	Attainment	37
St. Mary	Attainment	N/A
St. Tammany	Attainment	38
Tangipahoa	Attainment	31.5
Tensas	Attainment	N/A
Terrebonne	Attainment	28
Vermillion	Attainment	N/A
Washington	Attainment	N/A

Source: EPA (2018a)

*N/A: not applicable

A-2 BIOLOGICAL ENVIRONMENT

Several level IV ecoregions are present within the affected parishes. Each of these ecoregions supports a different array of plant and animal species. Ecoregions in which alternatives are located are described below.

A-2.1 Ecoregions

The Arkansas/Ouachita River Holocene Meander Belts ecoregion consists of a flat to nearly flat floodplain characterized by meander scars and oxbow lakes of present and past courses of the Arkansas and Ouachita Rivers, and contains point bars, natural levees, swales, and abandoned channels. This ecoregion also contains Bayou Bartholomew, one of the most species-rich streams in North America. Much of the native forest has been cleared and drained for cropland and pasture, but where it remains, it typically consists of bald-cypress and water tupelo in the modern stream channel, adjacent to strips of wet bottomland hardwood forests dominated by overcup oak (*Quercus lyrata*) and water hickory (*Carya aquatica*).

The Arkansas/Ouachita River Backswamps ecoregion contains the slackwater areas along the Arkansas and Ouachita Rivers, where water collects into swamps, oxbow lakes, ponds, and sloughs. Because of the better-drained nature of the soils in this ecoregion, forests and forest wetlands contain water oak (*Quercus nigra*) and willow oak (*Quercus phellos*). Much of this ecoregion is farmed, but areas of forest still occur.

The Flatwoods ecoregion is largely dominated by longleaf pine (*Pinus palustris*) flatwoods and savannahs, characterized by abundant small hillocks (known as pimple mounds). This ecoregion is lower in elevation, as well as wetter, flatter, and less dissected than adjacent associated upland ecoregions. Streams are low gradient and sluggish.

The Floodplains and Low Terraces ecoregion is characterized by forested wetlands; contains natural levees, swales, oxbow lakes, and meander scars; and is nearly level. Species typical within this ecoregion include water oak, willow oak, sweetgum (*Liquidambar styraciflua*), blackgum (*Nyssa sylvatica*), American elm (*Ulmus americana*), red maple (*Acer rubrum*), and swamp chestnut oak (*Quercus michauxii*), along with bald cypress and water tupelo in semi-permanently flooded areas.

The Inland Swamp ecoregion occurs as a transition from freshwater backswamps to the freshwater, brackish, and saline waters of the deltaic marshes (discussed below), and contains the largest bottomland hardwood forest swamps in North America. Forest communities are dominated by bald cypress and water tupelo. Due to levees on both sides of the Mississippi River, much of the river flow has been diverted and has contributed to the loss of wetland habitat in this ecoregion.

The Lafayette Loess Plains ecoregion was historically dominated by tallgrass prairies (big bluestem [*Andropogon gerardii*], little bluestem [*Schizachyrium scoparium*], yellow Indiangrass [*Sorghastrum nutans*], switchgrass [*Panicum virgatum*] and other herbaceous species) and gallery forests along streams, but was largely replaced by cropland, crayfish aquaculture, and pastures. Substantial urban expansion has also occurred in this ecoregion. Narrow hardwood forests persist along some streams and in lowlands.

The Macon Ridge ecoregion is higher in elevation, better drained, and supports drier plant communities than adjacent ecoregions because of the loessial soils deposited by the Mississippi River. Vegetation is dominated by willow oak, water oak, and swamp chestnut oak in the bottomlands, and white oak (*Quercus alba*), southern red oak (*Quercus falcata*), and post oak (*Quercus stellata*) in upland hardwood forests. Historically, prairies and loblolly pine (*Pinus taeda*) forests may have been present, but the ecoregion now consists of a mosaic of cropland and pasture with some areas of forest.

The Northern Backswamps ecoregion consists of low-lying overflow areas on floodplains where water collects in swamps, lakes, and low-gradient streams. Water levels are seasonally variable, and in the wettest areas, vegetation is dominated by bald cypress-water tupelo forests, better-drained areas are dominated by overcup oak-hickory forest, and best-drained areas contain willow oak or Nuttall oak (*Quercus texana*) forest. This ecoregion contains bottomland forests, cropland, farmed wetlands, and pasturelands.

The Northern Holocene Meander Belts ecoregion consists of a flat to nearly flat floodplain characterized by the meander belts and natural levees of present and past courses of the Mississippi River, and contains point bars, natural levees, swales, and abandoned channels. Vegetation varies, depending on soil texture, but may include oak (*Quercus*), sugarberry (*Celtis*), elm (*Ulmus*), ash (*Fraxinus*), pecan (*Carya*), cottonwood (*Populus*), and sycamore (*Platanus*). The abandoned channel network is more extensive than in the Southern Holocene Meander Belts ecoregion, and cropland expansion resulted in widespread draining of wetlands and removal of bottomwood forests; however, bottomland forest restoration efforts since 1985 have reversed this trend.

The Northern Humid Gulf Coastal Prairies ecoregion was historically dominated by tallgrass grasslands (little bluestem, big bluestem, yellow Indiangrass, brownseed paspalum [*Paspalum plicatulum*], switchgrass, and other herbaceous species), with gallery forests along streams, but nearly all of this ecoregion has been converted to cropland, pastureland, crawfish aquaculture, or other urban land uses. In the north portion of the ecoregion, some loblolly and longleaf pine occur.

The Southeastern Floodplains and Low Terraces ecoregion is characterized by forested riverine habitats. Large rivers and backwaters with ponds, swamps, and oxbow lakes provide important wildlife corridors and habitat. River swamp forests include bald cypress and water tupelo, whereas bottomland forests are dominated by oaks. Some portions of better drained terraces have been converted to pastureland or cropland.

The Southern Backswamps ecoregion is generally warmer with higher rainfall than the Northern Backswamps ecoregion, and is characterized by wetlands and frequent flooding. Bottomland hardwood forests are common, but channelization and flood control systems have modified this ecoregion and impacted many of the wetlands.

The Southern Holocene Meander Belts ecoregion contains point bars, oxbows, natural levees, and abandoned channels. Species such as live oak (*Quercus virginiana*), laurel oak (*Quercus laurifolia*), and Spanish moss (*Tillandsia usneoides*) are present. This ecoregion has been extensively modified for agriculture, flood control, and navigation, and most of the historic bottomland forests have been cleared.

The Southern Pine Plains and Hills ecoregion was historically part of the longleaf pine belt, rolling longleaf woodlands broken by stream bottoms with mixed loblolly pine-hardwood forests. Currently, most of the longleaf pine forests have been replaced by mixed forests and slash pine (*Pinus elliottii*) and loblolly pine plantations.

The Southern Pleistocene Valley Trains ecoregion comprises glacial outwash deposits, similar to the Macon Ridge ecoregion, but is generally warmer with a higher annual rainfall. Cropland and pastureland are common, and dominant tree species are overcup oak, Nuttal oak, honey locust (*Gleditsia triacanthos*), elm, water oak, sweetgum, blackgum, and hickory (*Carya* sp.).

The Southern Tertiary Uplands ecoregion contains most of the state's longleaf pine range west of the Mississippi River, and large parts of this ecoregion are National Forest lands. This ecoregion is largely dominated by longleaf pine-bluestem woodlands, though other forest types are present and include shortleaf pine (*Pinus echinata*)-hardwood; calcareous, mixed hardwood-loblolly pine; and hardwood along streams. Rare plants occur in scattered prairies, on sandstone outcrops, and seeps that support acid bog species.

The Deltaic Coastal Marshes and Barrier Islands ecoregion is dominated by brackish and saline marshes, and contains vegetation tolerant of these conditions such as oyster grass, marshhay cordgrass, black needlerush, and coastal saltgrass. The ecoregion also contains small areas of black mangrove (*Avicennia germinans*) and live oak (along Grand Isle and old natural levees). The wetlands and marshes of this ecoregion act as a buffer during storm events to moderate flooding and tidal inundation.

The Gulf Barrier Islands and Coastal Marshes ecoregion contain tidal freshwater marshes on the delta plains of large rivers, and provides important habitat for waterfowl, shorebird, sea turtle, and fish species, as well as furbearing mammals and alligator. This ecoregion is more associated with the deltaic deposits of the Pearl River than those of the Mississippi River.

The Texas-Louisiana Coastal Marshes ecoregion is characterized by extensive freshwater and saltwater coastal marshes, few bays, and a lack of barrier islands. This ecoregion contains a large number of rivers, lakes, bayous, tidal channels, and canals, and is nearly treeless, being largely dominated by extensive cordgrass marshes. Narrow ridges paralleling the shoreline (cheniers) contain live oak, hackberry (*Celtis* sp.), palmetto (*Sabal* sp.), and prickly pear cactus (*Opuntia* sp.). This ecoregion provides important estuarine and marsh habitat for globally significant populations of waterfowl.

A-3 SOCIOECONOMIC ENVIRONMENT

A-3.1 Cultural Resources

Nine distinct cultural periods have been identified within the region potentially affected by the alternatives. These periods are summarized below.

A-3.1.1 Paleoindian Period (10,000–8000 B.C.)

The earliest period of human occupation of the Gulf Coast, called the Paleoindian period, is characterized by a lithic tool assemblage that includes lanceolate projectile points that have been found in conjunction with Pleistocene-era megafauna kill sites across the continent. This has led scholars to believe that Paleoindian peoples were mobile hunter-gatherers dedicated to the exploitation of these big game; however, there is a limited amount of information available for this type of site in the southeast (Rees 2010:37). Still, Paleoindian projectile points have been identified in the coastal areas of south Louisiana on salt dome islands or on Pleistocene-era terraces. Based on the location of these sites, it is possible that additional Paleoindian sites may be present on subsided landforms in the Gulf of Mexico (Gagliano 1967). As a result, archaeological sites deposited from this period are subject to shoreline erosion, subsidence, meander belt formation and abandonment, and rising sea levels (Rees 2010).

A-3.1.2 Archaic Period (8000–500 B.C.)

The Archaic period generally dates to the end of the Wisconsin glaciation and the concomitant extinction of Pleistocene megafauna. The period is often distinguished by the development of a broad subsistence base and evidence of a more intensive exploitation of regionally specific plant and animal resources. This change in subsistence is marked by an adaptation in tool production to conform to new hunting techniques, food preparation, and related activities. The Archaic period in the Gulf Coastal Plain is generally defined by pre- or non-horticultural adaptations and pre-ceramic and pre-bow-and-arrow hunting technologies (Story 1990). Although the subsistence strategies of Archaic peoples likely did not vary much from their ancestors, there is evidence that a wider variety of food resources were exploited (Chapman and Shea 1981). The Archaic period represents the earliest periods of development of more-complex cultural patterns. A cultural tradition known as Big Creek, generally oriented around the Saline River Basin in northern Louisiana, is associated with the construction of mound complexes, possibly as early as 3700 B.C. (Arco et al. 2006; Saunders 2010). Later in the Archaic, the Poverty Point culture (1700 to 500 B.C.) flourished in northern Louisiana. Defined by the Poverty Point Site (16CW5), a massive site where hunter-gatherers cooperated to build several large mounds and concentric earthworks enclosing a 35-acre plaza on the bluff overlooking Bayou Macon (Gibson 2010). This period is marked by the production of steatite stone vessels, the trade of exotic materials, and the introduction of ceramic production, which arrives on the Gulf Coastal Plain from points further east in Florida and Georgia (Hays and Weinstein 2010).

A-3.1.3 Woodland Period (500 B.C.–A.D. 1200)

The Woodland period (500 B.C. to A.D. 1200) is marked by the development of agriculture, the greater proliferation and stylistic variability of ceramics, the continuation and proliferation of earthwork construction, and the appearance of the bow and arrow ca. A.D. 800. An increase in inter-societal trade of exotic items such as copper and other burial inclusions was also experienced. This coincides with the intensification of burial mound construction, and inferred increase in social stratification, during this time period (Jackson et. al 2002). Social structure grew in complexity, as evidenced by the first permanent

villages found during this period. The Tchula/Tchefuncte culture, defined by a ceramics composed with soft, chalky pastes that have a laminated appearance in cross-section, flourished in the early part of the Woodland period (500 B.C. to A.D. 100) (Phillips 1970). Site types vary across the landscape, with coastal Tchefuncte sites typically containing large shell middens, while inland Tchula/Tchefuncte sites were small villages with smaller shell middens (Neuman 1984).

Later developments in Avoyelles Parish included the elaboration of conical burial mounds, complex geometric earthworks, and elaborate mortuary practices developed (Kidder 2002). This culture, centered on the Marksville site (16AV1) and dating approximately 100 B.C. to A.D. 400, may have been influenced by the spread of cultural complexes from the Ohio River valley and other points in the southeast (Toth 1988). Marksville was supplanted by the Troyville culture (A.D. 400 to 700) centered on the Troyville Mounds (16CT7) in Catahoula Parish (Neuman 1984). Troyville sites are identified from both inland and coastal contexts, and are often contemporary with both late Marksville sites and early Coles Creek sites. The Coles Creek culture (A.D. 700–1200), which likely emerged from the Troyville culture, represents a change in the complexity of social organization in the southeast, involving increased social stratification evident through larger corporate mound-building projects (Muller 1978). Settlements tended to aggregate around arable portions of river valleys, likely signaling early agricultural intensification, of native starchy plants (Kidder and Fritz 1993; Smith 1992). Coastal Coles Creek sites are more likely to be smaller settlements with shell middens that may or may not contain mounds; sites tend to be larger and more complex as one moves closer to the cultural core up the Mississippi Valley, where increased inter-regional interaction took place.

A-3.1.4 Mississippian Period (A.D. 1200–1542)

The Mississippian period (A.D. 1200–1542) in central and southern Louisiana is synonymous with the Plaquemine culture. The Plaquemine culture is defined by settlement patterns, economic organization, and religious practices that were established during the Troyville-Coles Creek period (Neuman 1984). Although maize has been identified in the archaeological record as early as the Middle Woodland period, during the Early Mississippian period, maize quickly becomes a central part of the diet for most inhabitants in the region, although wild food sources and other starchy plants like sunflower and chenopod continue to be used (Rollingson 2004; Greenlee 1998). Large mound sites were constructed during this time and long-distance trade networks are established, which may reflect an increase in social complexity (Phillips 1970). The period is also marked by the elaboration of shared set of religious iconography across much of the Southeast and Mississippi River Valley (Lankford 2011; Waring and Holder 1945).

A-3.1.5 European Exploration (A.D. 1542–1699)

Although his exact travel path is unknown, many scholars have attributed the first European exploration of southern Louisiana to Hernando DeSoto in 1542. After arriving in Florida in 1539, DeSoto and his army traveled west to explore the coast in the name of Spain (Hudson et al. 1989:78). It is believed that his expedition was the first to encounter the large chiefdom settlements throughout the southeast and the Native American groups of eastern Texas. For the next 150 years, the Mississippi Valley was relatively untouched by large-scale colonization efforts. After the Frenchman Pierre Le Moyne d'Iberville explored the Mississippi River in 1699, French colonization efforts in Louisiana rapidly expanded.

Along the southern Mississippi River, Europeans encountered the Chitimacha and Houma tribes (east and west of the river, respectively (Campisi 2004; Brightman 2004). By the close of the eighteenth century, the Houma would be relegated to the lower reaches of Bayou LaFourche (Campisi 2004). The Chitimacha, who had approximately 3,000 individuals in the middle of the seventeenth century, eventually were forced to abandon their villages along the Mississippi after a failed war with the French.

By the turn of the nineteenth century, only approximately 100 Chitimacha could be counted in two villages along the Bayou Teche (Brightman 2004:650). In Southwestern Louisiana, French and Spanish explorers encountered a number of groups, including the Bidai, Akokisa, and Atakapa, collectively known as Atakapan, most of whom were gone by the early nineteenth century (Newcomb 2004).

A-3.1.6 European Colonization (A.D. 1699–1803)

Soon after the initial exploration period, France began to colonize the Louisiana territory founding Fort St. Jean Baptiste aux Natchitos in the vicinity of Natchitoches, Louisiana in 1714. The Spanish, likely in response, established a mission and fort to Los Adaes, between 1716 and 1721 (Gregory et al. 2004; Perttula 1992). In southern Louisiana, settlement focused on the Mississippi River, where large concessions of land were given to French nobles in an attempt to settle the colony. As a result of the French and Indian War (1754–1763), France relinquished ownership of Louisiana to Spain. Spanish dominion of Louisiana introduced many changes, two of the most notable being the influx of Acadians after their forced expulsion from Nova Scotia by the British in 1755, and the parceling of the Louisiana territory for settlement. In 1800, France regained possession of Louisiana from Spain; however, they would not retain ownership for long. On May 2, 1803, the United States signed the Louisiana Purchase treaty with France.

A-3.1.7 Antebellum Period (A.D. 1803–1861)

The Territory Orleans and (after 1812) State of Louisiana blossomed during the first part of the nineteenth century, due in large part to the exploitation of slave labor at plantations ranging up and down the Mississippi River. The successful introduction of sugar cane and sugar granulation in the late 1700s led to an explosion of sugar cane plantations throughout southern Louisiana. When Louisiana joined the Union in 1812, the population was just 80,000, including 35,000 slaves (Sacher 2011), but by the census of 1860, the state was home to more than 700,000 people, with the city of New Orleans representing a lion's share of that population. Throughout the period, the slave population grew, especially outside New Orleans, where by the time of the Civil War, slaves made up approximately 60% of the population (Sacher 2011).

A-3.1.8 Civil War and Reconstruction (A.D. 1861–1890)

The Civil War had profound effects on Louisiana and its inhabitants. Upon Louisiana's secession, the Union recognized the great importance of New Orleans as the Confederacy's largest port, capturing it early in the war (The Civil War Sites Advisory Commission 2014). Battles raged up and down the Mississippi and Red Rivers, seeking to control the vital flow of goods on these major highways. Economic hardships were prevalent in this region during the War, even for the wealthy planters; from the approximate 1,200 plantations in the region at the start of the war, there were less than 200 remaining at its end (Smith et al. 1983:98). Following the cessation of hostilities in 1865, Louisiana experienced an economic reorganization that left the great majority of its peoples despondent and poor. Nominally freed, in practice many former slaves remained on former plantations under exploitative tenant farming or wage labor systems (Jeter et al. 1989:284). Louisiana remained occupied by Federal troops until 1877, at which time a reactionary Democratic Party-led government was ushered into power, ending federal reconstruction efforts, decreasing infrastructure spending, reducing outlays for education and social services, and reducing taxes on wealthy landowners (Nystrom 2010, 2011). They instituted policies that enshrined the power of whites, such as a system of literacy tests only aimed at black voters (Nystrom 2011).

Modern Period (A.D. 1890–present)

Into the twentieth century, agriculture continued to dominate Louisiana's economy. During this time, many turned to the railroad for reliable transportation (Weinstein et al. 1979:12–13). Modern roads and highways have continued this trend, fostering new settlement in areas previously inaccessible because they did not front waterways or railroads. In modern Louisiana, few industries have altered the landscape and economy as much as the petroleum industry. With the increasing demand for gasoline and lubricating oil, the search for oil was intensified in the early 1900s. The majority of Louisiana oil and gas production occurs in the southern half of the state. Within the region, oil refineries line the shores of the Mississippi River and pipelines crisscross the landscape. This production expanded after World War II and peaked in 1970, although Louisiana still remains in the top five oil producing states in the nation (Kaiser and Yu 2012). Agriculture and the petroleum industry, as well as fishing and tourism, continue to be the backbone of the local economy today.

A-4 FINAL PDARP/PEIS IMPACT DETERMINATION DEFINITIONS

For purposes of the *Louisiana Trustee Implementation Group Draft Restoration Plan and Environmental Assessment #4: Nutrient Reduction (Nonpoint Source) and Recreational Use*, impacts are characterized as minor, moderate or major, and short term or long term. The definition of these characterizations is consistent with that used in the Final PDARP/PEIS (DWH Trustees 2016:Section 6, Table 6.3-2). The following pages are excerpts from the Final PDARP/PEIS.

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Table 6.3-2. Guidelines for NEPA impact determinations in the Final PDARP/PEIS.

Resource	Impact Duration	Impact Intensity Definitions		
		Minor	Moderate	Major
Physical Resources				
Geology and Substrates	Short-term: During construction period. Long-term: Over the life of the project or longer.	Disturbance to geologic features or soils could be detectable, but could be small and localized. There could be no changes to local geologic features or soil characteristics. Erosion and/or compaction could occur in localized areas.	Disturbance could occur over local and immediately adjacent areas. Impacts to geology or soils could be readily apparent and result in changes to the soil character or local geologic characteristics. Erosion and compaction impacts could occur over local and immediately adjacent areas.	Disturbance could occur over a widespread area. Impacts to geology or soils could be readily apparent and could result in changes to the character of the geology or soils over a widespread area. Erosion and compaction could occur over a widespread area. Disruptions to substrates or soils may be permanent.
Hydrology and Water Quality	Short-term: During construction period. Long-term: Over the life of the project or longer.	Hydrology: The effect on hydrology could be measurable, but it could be small and localized. The effect could only temporarily alter the area's hydrology, including surface and ground water flows. Water quality: Impacts could result in a detectable change to water quality, but the change could be expected to be small and localized. Impacts could quickly become undetectable. State water quality standards as required by the Clean Water Act could not be exceeded. Floodplains: Impacts may result in a detectable change to natural and beneficial floodplain values, but the change could be expected to be small, and localized. There could be no appreciable increased risk of flood loss including impacts on human safety, health, and welfare. Wetlands: The effect on wetlands could be measurable but small in terms of area and the nature of the impact. A small impact on the size, integrity, or	Hydrology: The effect on hydrology could be measurable, but small and limited to local and adjacent areas. The effect could permanently alter the area's hydrology, including surface and ground water flows. Water quality: Effects to water quality could be observable over a relatively large area. Impacts could result in a change to water quality that could be readily detectable and limited to local and adjacent areas. Change in water quality could persist; however, it could likely not exceed state water quality standards as required by the Clean Water Act. Floodplains: Impacts could result in a change to natural and beneficial floodplain values and could be readily detectable, but limited to local and adjacent areas. Location of operations in floodplains could increase risk of flood loss, including impacts on human safety, health, and welfare.	Hydrology: The effect on hydrology could be measurable and widespread. The effect could permanently alter hydrologic patterns including surface and ground water flows. Water quality: Impacts could likely result in a change to water quality that could be readily detectable and widespread. Impacts could likely result in exceedance of state water quality standards and/or could impair designated uses of a water body. Floodplains: Impacts could result in a change to natural and beneficial floodplain values that could have substantial consequences over a widespread area. Location of operations could increase risk of flood loss, including impacts on human safety, health, and welfare. Wetlands: The action could cause a permanent loss of wetlands across a widespread area. The character of the wetlands could be changed so that the functions typically provided by the wetland could be permanently lost.

Resource	Impact Duration	Impact Intensity Definitions		
		Minor	Moderate	Major
		connectivity could occur; however, wetland function could not be affected and natural restoration could occur if left alone.	Wetlands: The action could cause a measurable effect on wetlands indicators (size, integrity, or connectivity) or could result in a permanent loss of wetland acreage across local and adjacent areas. However, wetland functions could only be permanently altered in limited areas.	
Air Quality	Short-term: During construction period. Long-term: Over the life of the project or longer.	The impact on air quality may be measurable, but could be localized and temporary, such that the emissions do not exceed the Environmental Protection Agency's (EPA's) *de minimis* criteria for a general conformity determination under the Clean Air Act (40 CFR § 93.153).	The impact on air quality could be measurable and limited to local and adjacent areas. Emissions of criteria pollutants could be at EPA's *de minimis* criteria levels for general conformity determination.	The impact on air quality could be measurable over a widespread area. Emissions are high, such that they could exceed EPA's *de minimis* criteria for a general conformity determination.
Noise	Short-term: During construction period. Long-term: Over the life of the project.	Increased noise could attract attention, but its contribution to the soundscape would be localized and unlikely to affect current user activities.	Increased noise could attract attention and contribute to the soundscape including in local areas and those adjacent to the action, but could not dominate. User activities could be affected.	Increased noise could attract attention and dominate the soundscape over widespread areas. Noise levels could eliminate or discourage user activities.
Biological Resources				
Habitats	Short-term: Lasting less than two growing seasons. Long-term: Lasting longer than two growing seasons.	Impacts on native vegetation may be detectable, but could not alter natural conditions and could be limited to localized areas. Infrequent disturbance to individual plants could be expected, but would not affect local or range-wide population stability. Infrequent or insignificant one-time disturbance to locally suitable habitat could occur, but sufficient habitat could remain functional at both the local and regional scales to maintain the viability of the species. Opportunity for increased spread of non-native species could be detectable but	Impacts on native vegetation could be measureable but limited to local and adjacent areas. Occasional disturbance to individual plants could be expected. These disturbances could affect local populations negatively but could not be expected to affect regional population stability. Some impacts might occur in key habitats, but sufficient local habitat could retain function to maintain the viability of the species both locally and throughout its range. Opportunity for increased spread of non-native species could be detectable and	Impacts on native vegetation could be measurable and widespread. Frequent disturbances of individual plants could be expected, with negative impacts to both local and regional population levels. These disturbances could negatively affect range-wide population stability. Some impacts might occur in key habitats, and habitat impacts could negatively affect the viability of the species both locally and throughout its range. Actions could result in the widespread increase of non-native species, resulting in broad and permanent changes to native

Resource	Impact Duration	Impact Intensity Definitions		
		Minor	Moderate	Major
		temporary and localized and could not displace native species populations and distributions.	limited to local and adjacent areas, but could only result in temporary changes to native species population and distributions.	species populations and distributions.
Wildlife Species (Including Birds)	Short-term: Lasting up to two breeding seasons, depending on length of breeding season. Long-term: Lasting more than two breeding seasons.	Impacts to native species, their habitats, or the natural processes sustaining them could be detectable, but localized, and could not measurably alter natural conditions. Infrequent responses to disturbance by some individuals could be expected, but without interference to feeding, reproduction, resting, migrating, or other factors affecting population levels. Small changes to local population numbers, population structure, and other demographic factors could occur. Sufficient habitat could remain functional at both the local and range-wide scales to maintain the viability of the species. Opportunity for increased spread of non-native species could be detectable but temporary and localized, and these species could not displace native species populations and distributions.	Impacts on native species, their habitats, or the natural processes sustaining them could be measureable but limited to local and adjacent areas. Occasional responses to disturbance by some individuals could be expected, with some negative impacts to feeding, reproduction, resting, migrating, or other factors affecting local population levels. Some impacts might occur in key habitats. However, sufficient population numbers or habitat could retain function to maintain the viability of the species both locally and throughout its range. Opportunity for increased spread of non-native species could be detectable and limited to local and adjacent areas, but could only result in temporary changes to native species population and distributions.	Impacts on native species, their habitats, or the natural processes sustaining them could be detectable and widespread. Frequent responses to disturbance by some individuals could be expected, with negative impacts to feeding, reproduction, migrating, or other factors resulting in a decrease in both local and range-wide population levels and habitat type. Impacts could occur during critical periods of reproduction or in key habitats and could result in direct mortality or loss of habitat that might affect the viability of a species. Local population numbers, population structure, and other demographic factors might experience large changes or declines. Actions could result in the widespread increase of non-native species resulting in broad and permanent changes to native species populations and distributions.
Marine and Estuarine Fauna (Fish, Shellfish, Benthic Organisms)	Short-term: Lasting up to two spawning seasons, depending on length of season. Long-term: Lasting more than two spawning seasons.	Impacts could be detectable and localized but small. Disturbance of individual species could occur; however, there could be no change in the diversity or local populations of marine and estuarine species. Any disturbance could not interfere with key behaviors such as feeding and spawning. There could be no restriction of movements daily or seasonally. Opportunity for increased spread of non-native species could be detectable but	Impacts could be readily apparent and result in a change in marine and estuarine species populations in local and adjacent areas. Areas being disturbed may display a change in species diversity; however, overall populations could not be altered. Some key behaviors could be affected but not to the extent that species viability is affected. Some movements could be restricted seasonally. Opportunity for increased spread of non-	Impacts could be readily apparent and could substantially change marine and estuarine species populations over a wide-scale area, possibly river-basin-wide. Disturbances could result in a decrease in fish species diversity and populations. The viability of some species could be affected. Species movements could be seasonally constrained or eliminated. Actions could result in the widespread increase of non-native species resulting in broad and permanent changes to native

Resource	Impact Duration	Impact Intensity Definitions		
		Minor	Moderate	Major
		temporary and localized and these species could not displace native species populations and distributions.	native species could be detectable and limited to local and adjacent areas, but could only result in temporary changes to native species population and distributions.	species populations and distributions.
Protected Species	Short-term: Lasting up to one breeding/growing season. Long-term: Lasting more than one breeding/growing season.	Impacts on protected species, their habitats, or the natural processes sustaining them could be detectable, but small and localized, and could not measurably alter natural conditions. Impacts could likely result in a "may affect, not likely to adversely affect" determination for at least one listed species.	Impacts on protected species, their habitats, or the natural processes sustaining them could be detectable and some alteration in the numbers of protected species or occasional responses to disturbance by some individuals could be expected, with some negative impacts to feeding, reproduction, resting, migrating, or other factors affecting local and adjacent population levels. Impacts could occur in key habitats, but sufficient population numbers or habitat could remain functional to maintain the viability of the species both locally and throughout their range. Some disturbance to individuals or impacts to potential or designated critical habitat could occur. Impacts could likely result in a "may affect, likely to adversely affect" determination for at least one listed species. No adverse modification of critical habitat could be expected.	Impacts on protected species, their habitats, or the natural processes sustaining them could be detectable, widespread, and permanent. Substantial impacts to the population numbers of protected species, or interference with their survival, growth, or reproduction could be expected. There could be impacts to key habitat, resulting in substantial reductions in species numbers. Results in an "is likely to jeopardize proposed or listed species/adversely modify proposed or designated critical habitat (impairment)" determination for at least one listed species.

Resource	Impact Duration	Impact Intensity Definitions		
		Minor	Moderate	Major
Socioeconomic Resources				
Socioeconomics and Environmental Justice[a]	Short-term: During construction period. Long-term: Over the life of the project or longer.	A few individuals, groups, businesses, properties, or institutions could be affected. Impacts could be small and localized. These impacts are not expected to substantively alter social and/or economic conditions. Actions could not disproportionately affect minority and low-income populations.	Many individuals, groups, businesses, properties, or institutions could be affected. Impacts could be readily apparent and detectable in local and adjacent areas and could have a noticeable effect on social and/or economic conditions. Actions could disproportionately affect minority and low-income populations. However, the impact could be temporary and localized.	A large number of individuals, groups, businesses, properties, or institutions could be affected. Impacts could be readily detectable and observed, extend over a widespread area, and have a substantial influence on social and/or economic conditions. Actions could disproportionately affect minority and low-income populations, and this impact could be permanent and widespread.
Cultural Resources	Short-term: During construction period. Long-term: Over the life of the project or longer.	The disturbance of a site(s), building, structure, or object could be confined to a small area with little, if any, loss of important cultural information potential.	Disturbance of a site(s), building, structure, or object not expected to result in a substantial loss of important cultural information.	Disturbance of a site(s), building, structure, or object could be substantial and may result in the loss of most or all its potential to yield important cultural information.
Infrastructure	Short-term: During construction period. Long-term: Over the life of the project or longer.	The action could affect public services or utilities but the impact could be localized and within operational capacities. There could be negligible increases in local daily traffic volumes resulting in perceived inconvenience to drivers but no actual disruptions to traffic.	The action could affect public services or utilities in local and adjacent areas and the impact could require the acquisition of additional service providers or capacity. Detectable increase in daily traffic volumes (with slightly reduced speed of travel), resulting in slowed traffic and delays, but no change in level of service (LOS). Short service interruptions (temporary closure for a few hours) to roadway and railroad traffic could occur.	The action could affect public services or utilities over a widespread area resulting in the loss of certain services or necessary utilities. Extensive increase in daily traffic volumes (with reduced speed of travel) resulting in an adverse change in LOS to worsened conditions. Extensive service disruptions (temporary closure of one day or more) to roadways or railroad traffic could occur.
Land and Marine Management	Short-term: During construction period. Long-term: Over the life of the project or longer.	The action could require a variance or zoning change or an amendment to a land use, area comprehensive, or management plan, but could not affect overall use and management beyond the local area.	The action could require a variance or zoning change or an amendment to a land use, area comprehensive, or management plan, and could affect overall land use and management in local and adjacent areas.	The action could cause permanent changes to and conflict with land uses or management plans over a widespread area.

Resource	Impact Duration	Impact Intensity Definitions		
		Minor	Moderate	Major
Tourism and Recreational Use	Short-term: During construction period. Long-term: Over the life of the project or longer.	There could be partial developed recreational site closures to protect public safety. The same site capacity and visitor experience could remain unchanged after construction. The impact could be detectable and/or could only affect some recreationists. Users could likely be aware of the action but changes in use could be slight. There could be partial closures to protect public safety. Impacts could be local. There could be a change in local recreational opportunities; however, it could affect relatively few visitors or could not affect any related recreational activities.	There could be complete site closures to protect public safety. However, the sites could be reopened after activities occur. There could be slightly reduced site capacity. The visitor experience could be slightly changed but still available. The impact could be readily apparent and/or could affect many recreationists locally and in adjacent areas. Users could be aware of the action. There could be complete closures to protect public safety. However, the areas could be reopened after activities occur. Some users could choose to pursue activities in other available local or regional areas.	All developed site capacity could be eliminated because developed facilities could be closed and removed. Visitors could be displaced to facilities over a widespread area and visitor experiences could no longer be available in many locations. The impact could affect most recreationists over a widespread area. Users could be highly aware of the action. Users could choose to pursue activities in other available regional areas.
Fisheries and Aquaculture	Short-term: During construction period. Long-term: Over the life of the project or longer.	A few individuals, groups, businesses, properties, or institutions could be affected. Impacts could be small and localized. These impacts are not expected to substantively alter social and/or economic conditions.	Many individuals, groups, businesses, properties, or institutions could be affected. Impacts could be readily apparent and detectable in local and adjacent areas and could have a noticeable effect on social and/or economic conditions.	A large number of individuals, groups, businesses, properties, or institutions could be affected. Impacts could be readily detectable and observed, extend over a widespread area, and could have a substantial influence on social and/or economic conditions.
Marine Transporta-tion	Short-term: During construction period. Long-term: Over the life of the project or longer.	The action could affect public services or utilities, but the impact could be localized and within operational capacities. There could be negligible increases in local daily marine traffic volumes, resulting in perceived inconvenience to operators but no actual disruptions to transportation.	The action could affect public services or utilities in local and adjacent areas, and the impact could require the acquisition of additional service providers or capacity. Detectable increase in daily marine traffic volumes could occur (with slightly reduced speed of travel), resulting in slowed traffic and delays. Short service interruptions could occur (temporary delays for a few hours).	The action could affect public services utilities over a widespread area resulting in the loss of certain services or necessary utilities. Extensive increase in daily marine traffic volumes could occur (with reduced speed of travel), resulting in extensive service disruptions (temporary closure of one day or more).

Resource	Impact Duration	Impact Intensity Definitions		
		Minor	Moderate	Major
Aesthetics and Visual Resources	Short-term: During construction period. Long-term: Over the life of the project or longer.	There could be a change in the view shed that was readily apparent but could not attract attention, dominate the view, or detract from current user activities or experiences.	There could be a change in the view shed that was readily apparent and attracts attention. Changes could not dominate the viewscape, although they could detract from the current user activities or experiences.	Changes to the characteristic views could dominate and detract from current user activities or experiences.
Public Health and Safety, Including Flood and Shoreline Protection	Short-term: During construction period. Long-term: Over the life of the project or longer.	Actions could not result in 1) soil, ground water, and/or surface water contamination; 2) exposure of contaminated media to construction workers or transmission line operations personnel; and/or 3) mobilization and migration of contaminants currently in the soil, ground water, or surface water at levels that could harm the workers or general public. Increased risk of potential hazards (e.g., increased likelihood of storm surge) to visitors, residents, and workers from decreased shoreline integrity could be temporary and localized.	Project construction and operation could result in 1) exposure, mobilization and/or migration of existing contaminated soil, ground water, or surface water to an extent that requires mitigation; and/or 2) could introduce detectable levels of contaminants to soil, ground water, and/or surface water in localized areas within the project boundaries such that mitigation/remediation is required to restore the affected area to the preconstruction conditions. Increased risk of potential hazards to visitors, residents, and workers from decreased shoreline integrity could be sufficient to cause a permanent change in use patterns and area avoidance in local and adjacent areas.	Actions could result in 1) soil, ground water, and/or surface water contamination at levels exceeding federal, state, or local hazardous waste criteria, including those established by 40 CFR § 261; 2) mobilization of contaminants currently in the soil, ground water, or surface water, resulting in exposure of humans or other sensitive receptors such as plants and wildlife to contaminant levels that could result in health effects; and 3) the presence of contaminated soil, ground water, or surface water within the project area, exposing workers and/or the public to contaminated or hazardous materials at levels exceeding those permitted by the federal Occupational Safety and Health Administration (OSHA) in 29 CFR § 1910. Increased risk of potential hazards to visitors, residents, and workers from decreased shoreline integrity could be substantial and could cause permanent changes in use patterns and area avoidance over a widespread area.

[a] Evaluation of potential environmental justice issues will be fully address in future tiered documents.