



Appendix G – Essential Fish Habitat Assessment





Essential Fish Habitat Assessment

May 31, 2022

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SC Highway 41 Corridor Improvements Project

Charleston and Berkeley Counties, South Carolina

May 31, 2022

Prepared for
US Army Corps of Engineers, Charleston District
and Charleston County

Prepared by



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Acronyms and Abbreviations

°F	degrees Fahrenheit
bmp	best management practice
cm	centimeter
DO	dissolved oxygen
EFH	Essential Fish Habitat
EA	Environmental Assessment
FL	fork length
HAPC	habitat areas of particular concern
LOI	Letter of Intent
m	meter
mg/L	Milligrams per liter
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
ppt	parts per thousand
Project	South Carolina Highway 41 Corridor Improvement Project
SAMHC	South Atlantic Fishery Management Council
SC 41	South Carolina Highway 41
US 17	US Highway 17
USACE	U.S. Army Corps of Engineers
YOY	young-of-year

1.0 Introduction

Charleston County proposes to reduce traffic congestion within the South Carolina Highway 41 (SC 41) corridor (Project) to accommodate future traffic projections. In conformance with the Magnuson-Stevens Fishery Conservation and Management Act of 1976 (as amended 1996) this assessment was conducted to describe potential adverse effects on essential fish habitat (EFH). EFH is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (16 USC 1802, 50 CFR 600.10). The National Oceanic and Atmospheric Administration (NOAA) – National Marine Fisheries Service (NMFS) works closely with the South Atlantic Fishery Management Council (SAFMC) to minimize adverse impacts to EFH in the southeast. Adverse effects are those that reduce the quality and/or quantity of EFH, including direct, indirect, site specific, or habitat wide impacts, including individual, cumulative, or synergistic consequences of actions.

This assessment describes the proposed Project including potential effects to EFH, measures to minimize harm to EFH, and conclusions regarding impacts. This assessment is being submitted by Charleston County.

Charleston County is preparing an Environmental Assessment (EA) for the proposed Project in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended. The U.S. Army Corps of Engineers (USACE) Charleston District is the lead federal agency for the EA. This EFH evaluation will be attached as an appendix to the EA.

2.0 Proposed Action

The primary purpose of the proposed Project is to reduce traffic congestion within the SC 41 corridor to accommodate future traffic projections. The secondary purposes of the proposed Project are to enhance safety throughout the corridor, improve transportation system and community connections, and provide bicycle and pedestrian accommodations, while minimizing community and environmental impacts. Charleston County proposes to improve SC 41 for a total of approximately 5.6 miles from US Highway 17 (US 17) across the Wando River Bridge to Clements Ferry Road, located in Berkeley and Charleston Counties, South Carolina (Appendix A). The proposed Project also includes improvements to the intersection of SC 41 and US 17, a new tie-in road between SC 41 and Winnowing Way, and 1.3-mile new location roadway, Laurel Hill Parkway, between SC 41 and Park West Boulevard.

Along SC 41, the proposed typical section would include four travel lanes, curb-and-gutter with a planted median between US 17 and Joe Rouse Road, and from Dunes West Boulevard to Clements Ferry Road, with a 5-foot sidewalk on the west side and a 10-foot multi-use path on the east side. On SC 41 between Joe Rouse Road and Dunes West Boulevard, the proposed typical section would include a three-lane curb-and-gutter section with one travel lane in each direction, a center two-way left turn lane, and 5-foot sidewalk on both sides. The proposed typical section along Laurel Hill Parkway would include two lanes with curb-and-gutter and a 10-foot multi-use path on the east side.

The study corridor includes crossings of Horlbeck and Mill Creeks and the Wando River. This section of SC 41 serves as a minor arterial that has experienced an increase in traffic due to regional growth, and currently sustains operations that exceed capacity and are projected to worsen over time. The existing

two-lane roadway would be widened to four lanes, with a center median and multi-use pathway. No construction work would occur within the Wando River, as the recently replaced SC 41 Bridge over the Wando River would accommodate the proposed improvements (i.e., lane widening).

3.0 Desktop Review and Field Verification

HDR conducted a review of the NMFS EFH Mapper (NOAA 2021a) prior to field reconnaissance surveys. A list of EFH types, habitat areas of particular concern (HAPC), and species of interest was developed based on the South Atlantic Region. Those species and habitat types within the Project area were included in this assessment.

4.0 Essential Fish Habitats

The SAFMC is tasked with conserving and managing fish stocks for a portion of the Atlantic coast. Habitat types that are designated as EFH by the SAFMC are present within the Project survey area. A Letter of Intent (LOI) was distributed on July 13, 2017, to stakeholder agencies to notify them of the commencement of the proposed Project. The LOI provided general project information and requested comments on potential environmental issues and concerns within the Project study area. NOAA-NMFS provided a response letter on August 18, 2017 (Appendix B) that stated the study area includes high-quality tidal salt marsh with tidal creeks and oyster reef/shell, and that tidal freshwater wetlands may be present.

The SAFMC designates these habitats as EFH within the fishery management plans for penaeid shrimp and the snapper-grouper complex, which also includes oyster/shell habitat as a HAPC. The waters of the Wando River, Mill Creek, Horlbeck Creek, the tidal creeks connected to them, and the surrounding coastal marsh also serve as a nursery and forage habitat for other species, such as red drum (*Sciaenops ocellatus*), black drum (*Pogonias cromis*), Atlantic menhaden (*Brevoortia tyrannus*), and blue crab (*Callinectes sapidus*). Many of these species are prey for fish managed under the Magnuson-Stevens Act, such as mackerels, snappers, groupers, billfish, and sharks. NOAA-NMFS recommended the Project's environmental documentation address these species as well as those managed under the Magnuson-Stevens Act.

The Project study area is approximately 688 acres, primarily consisting of the existing Highway 41 corridor in Mt. Pleasant, SC, and a study corridor near Bessemer Road and Dunes West Boulevard. Using ESRI ArcGIS software and recently aerial imagery, EFH habitats were delineated in the study area. Field reconnaissance visits on May 9, 2018 and August 22, 2019 verified (and revised, as necessary) the desktop evaluation.

Approximately 55 acres representing five high-quality types of EFH were identified within the Project area during field surveys, including estuarine marsh habitat, intertidal non-vegetated flats, estuarine tidal creeks, oyster beds, and unconsolidated bottom (Table 4-1; Appendix A). Two freshwater wetlands were also identified within the study area. Freshwater wetlands are not considered a type of EFH and therefore

are not addressed further. A brief description of each EFH type is provided in the following sections and representative photographs are provided in Appendix C.

Table 4-1. SC 41 Corridor Improvement Project Habitat Types

Habitat Type	Area (Acres)	Percent of Total EFH
Essential Fish Habitat		
Estuarine Marsh Habitat	38.3	69.6
Intertidal Non-Vegetated Flat	1.36	2.5
Tidal Creek	2.84	0.0
Oyster Habitat	0.01	5.2
Unconsolidated Bottom	12.6	22.8
Total	55.06	100.0
Freshwater Wetlands		
Palustrine Emergent	0.07	--
Palustrine Forested	0.04	--
Total	0.11	--

4.1 Estuarine Marsh Habitat

Estuarine marshes (i.e., intertidal emergent wetlands) are characterized by erect, rooted, herbaceous hydrophytes that are present for most of the growing season in most years (FGDC 2013). They most commonly occur in areas with relatively stable climatic conditions, as wide fluctuations can cause estuarine marshes to revert to open water. Estuarine systems are “part of a river or stream or other body of water having unimpaired connection with the open sea, where the sea-water is measurably diluted with freshwater derived from land drainage” (Coastal Zone Management Act of 1972, as cited by FGDC 2013).

Estuarine marshes are one of the most productive ecosystems in the world, owing largely to high primary productivity driven by the transfer of detritus through the estuary and providing a base of the food chain that supports many marine organisms. This marsh habitat also contains numerous microhabitats due to variations in elevation, tidal height, and salinity (S.C. Sea Grant Consortium 2020); however, the marsh platform is the primary microhabitat within the emergent wetland system. This microhabitat accumulates sediment brought by tides, which provides a stable surface for vegetation growth. Tidal creeks and rivulets are often found flowing sinuously through the marsh platform. This area of the emergent wetland provides resources to a plethora of terrestrial and aquatic organisms, such as raccoons (*Procyon lotor*), mink (*Mustela vison*), otters (*Lontra canadensis*), numerous types of birds, blue crabs, red drum, and spot (*Leiostomus xanthurus*) (SCDNR 2014). Estuarine marshes also provide a wealth of ecosystem services, from providing habitat to economically valuable species (i.e., blue crab and red drum), to functioning as a

pollutant filter, and shoreline stabilization.

Estuarine marshes are the dominant type of EFH found within the Project area (69.6 percent), comprising 38.3 acres, interspersed between the intertidal flats and upland areas throughout the Project area (Appendix A). The estuarine marshes are extensions of Horlbeck Creek, Mill Creek, and the Wando River. The estuarine marsh throughout the surveyed Project area is a mosaic of high marsh, dominated by sea oxeye (*Borrichia frutescens*) and black needlerush (*Juncus roemerianus*), and fully inundated or low marsh, dominated by smooth cordgrass (*Sporobolus alterniflora*).

4.2 Intertidal Non-vegetated Flat

Intertidal non-vegetated flats are tidally influenced estuarine subsystems that exist between the high and low tide lines (SAFMC 2021). They serve as a buffer between dry land or shorelines that experiences minimal tidal exposure, and deeper water. Intertidal flats are often on a gently slope characterized by sediment deposition with little to no vascular plants, although macroalgae may be present. Characteristic of the intertidal zone, this habitat experiences regular changes in salinity, water and air temperature, and air and wind exposure which corresponds with the tidal phase. This dynamic system allows for a variety of physiological stressors and ecological functions, and the expansiveness of an intertidal zone is determined by the tidal range in an area. Rising tides facilitate mobile predators and prey that must move to deeper waters as the tide falls. Low tide provides resident organisms with refuge from predation; however, this community is now susceptible to desiccation, temperature, and other threats of exposure.

Intertidal flats are ecologically important in estuarine ecosystems of the South Atlantic (SAFMC 2021). They are highly productive environments that are home to many resident and transient species, which provide trophic support beyond the intertidal zone. Intertidal flats also provide refuge from predation as well as nursery habitat for early life stages of fish and invertebrates.

Approximately 1.4 acres of intertidal non-vegetated flat EFH were identified within the Project area (Appendix A). Intertidal non-vegetated flats were identified at three sections of the Project, including two along the Wando River and one along Horlbeck Creek.

4.3 Estuarine Tidal Creeks

Tidal systems extend from the upstream limit of tidal fluctuations to the upper boundary of estuarine systems where concentration of ocean-derived salts reaches 0.5 parts per thousand (ppt) during the period of average annual low flow (FGDC 2013). The gradient of tidal systems is low, and velocity fluctuates under the influence of tides. Stream bottoms are usually muddy with occasional patches of sand. The floodplain is typically well developed.

Estuarine tidal creeks provide ecosystem services, principally by functioning as the primary link between stormwater runoff from upland areas, and estuaries (SC Sea Grant Consortium 2006). This connection allows pollutants from nonpoint sources to be filtered through tidal creeks and associated emergent marshes. These creeks also provide refuge and food for juvenile fish, shrimp, and crab, including economically valuable species such as red drum, spotted seatrout (*Cynoscion nebulosus*), spot, Atlantic croaker (*Micropogonias undulatus*), and white or brown shrimp (*Penaeus* spp.).

Approximately 2.8 acres of tidal creeks were identified in the Project area (Appendix A). Tidal creeks within the Project study area include Horlbeck Creek and Mill Creek, as well as several unnamed tidal

creeks.

4.4 Oyster Bed Habitat

The eastern oyster (*Crassostrea virginica*) is ecologically and economically important in the state of South Carolina, not only for their harvest but also for the ecosystem services they provide (NOAA 2021b). Oysters function as ecosystem engineers by building reefs, beds, or banks throughout intertidal habitats. These areas provide habitat for other fish and benthic organisms, foraging grounds for various shorebirds, substrate for additional oyster colonization, and facilitate shoreline stabilization and marsh creation. Oysters also enhance local water quality through filtration.

In South Carolina, oysters primarily settle and develop in intertidal habitats creating reefs or beds. These reefs contain live oysters as well as cultch from previous generations. No oyster reefs were identified within the Project study area; however, small oyster assemblages (less than 0.01 acre total) were identified in two locations associated with culverts (Appendix A).

4.5 Unconsolidated Bottom

Unconsolidated bottom is defined as all wetland and deepwater habitat with at least 25 percent cover of particles smaller than stone and less than 30 percent vegetative cover less due to a lack of large, stable surfaces for plants or animals to attach (Cowardin et al. 1979). These environments can be subtidal; permanently, intermittently, or semi-permanently flooded; or permanent or semi-permanently flooded-tidal fresh (FGDC 2013). Unconsolidated bottoms in marine and estuarine systems are relatively stable as compared to riverine systems, where substrates are determined by flow velocity.

Approximately 12.6 acres of unconsolidated bottom within the Project area was identified within the Wando River, a tidal river originating in the I'on swamp in the Francis Marion National Forest (Appendix A). In riverine systems like the Wando River, the substrate comprising unconsolidated bottom is largely determined by current velocity (Cowardin et al. 1979). Therefore, the plants and animals inhabiting these areas are both morphologically and behaviorally adapted for flowing water. Estuarine rivers over unconsolidated bottom may frequently see many larger macrofauna, often migrating from offshore or marine waters, such as sharks, sea turtles, and marine mammals like dolphins or manatee. The diversity of species in an unconsolidated bottom ecosystem is often correlated with the complexity of the substrate type, which lends to more complex trophic systems.

5.0 Managed Fisheries and Habitats

5.1 Habitat Areas of Particular Concern

Habitat areas of particular concern are discreet subsets of EFH that are considered high priority areas for conservation, management, and/or research. These designations are assigned for habitats that are rare, sensitive, stressed, or critical for overall ecosystem functioning (SAFMC 2016a). HAPC for a managed fishery can include intertidal, estuarine, or deep-water habitats that are used for migration, spawning, or development of early life stages.

In the letter dated August 18, 2017 (Appendix B), NOAA-NMFS stated that the SAFMC fishery management plans most applicable to the Project include those for penaeid shrimp and the snapper-grouper complex, and that oyster bed habitat is a HAPC for the snapper-grouper complex. A review of the

NOAA EFH (December 2021) mapper verified the Project area as a HAPC for penaeid shrimp with designated EFH or the snapper-group management unit and several highly migratory species (discussed in Section 5.2).

5.1.1 Penaeid Shrimp

Areas of HAPC defined for penaeid shrimp include all coastal inlets, state-designated nursery habitats, and state-identified overwintering areas (SAFMC 2016b). The Project is located in a coastal inlet and therefore the PSA is considered to fall within the HAPC for penaeid shrimp.

5.2 Federally Managed Fisheries

Federally managed fisheries were evaluated from the NOAA EFH Mapper (NOAA 2021a), and those with habitat in Wando River and within the Project area are detailed below

5.2.1 Blacktip Shark

The NOAA EFH mapper identified EFH for adult/juvenile and neonate blacktip shark (*Carcharhinus limbatus*) within the Project area. Blacktip shark ranges from Virginia to Florida and the Gulf of Mexico, inhabiting shallow coastal waters and offshore surface waters of the continental shelves (NOAA 2017). They are often observed in schools for feeding purposes, which includes predating on a variety of fishes and smaller sharks.

Blacktip shark EFH for juveniles and adults includes Atlantic coastal areas from Florida to the Maryland/Virginia border and also includes South Carolina inlets, estuaries, and nearshore waters over shell, sand, and rocky habitats (NOAA 2017). EFH is associated with water temperatures ranging from 66.2 to 91.4°F, salinities from 13 to 37 ppt, water depths from 2.4 to 12.8 meters (m), and dissolved oxygen (DO) concentrations ranging from 4.3 to 6.1 milligrams per liter (mg/L). Neonate and young-of-year (YOY) blacktip shark EFH includes the seaward side of coastal islands in North and South Carolina, from depths of 2 to 4 m, and therefore are not expected to utilize habitat within the Project area. Based on these habitat descriptions, the presence of adult/juvenile and neonate blacktip shark in the Project area is likely.

5.2.2 Spinner Shark

The NOAA EFH Mapper identified EFH for neonate spinner shark (*Carcharhinus brevipinna*) within the Project area. Spinner shark is a coastal-pelagic shark found in warm-temperature and tropical waters of the continental and insular shelves (NOAA 2017). Spinner sharks range from Virginia to Florida and the Gulf of Mexico. They are common inshore in water less than 30 m deep, and juveniles typically inhabit waters inshore of the 20-m bathymetric line. Adults are found both inshore and offshore waters to the 90-m bathymetric line but have been observed at depths of at least 150 m. Adults primarily remain in coastal waters and are typically not found in inland bays or bayous. Adult and juvenile (greater than 57 centimeters [cm] fork length [FL]) EFH includes coastal areas between North Carolina and Florida. Juvenile EFH extends from the shoreline to depths of 20 m and is associated with water temperatures between 71.4 and 86.2°F, salinities of 21 to 36 ppt, and DO between 3.5 and 5.0 mg/L. Adult EFH extends from the shore to 90 m in depth. Based on their preference for coastal waters, adult and juvenile spinner sharks are not expected to occur within the vicinity of the Project area.

Spinner sharks are a schooling and migratory species, although the migration patterns have not been described (NOAA 2017). Pupping grounds are also not clearly defined, but nursery habitat has been observed in coastal waters including beaches and bays. Neonate/YOY (less than 57 cm FL) EFH includes coastal areas between Cape Hatteras and the Florida Keys. Nursery habitats in the Carolinas

consist of shallow coastal waters. Therefore, the potential exists for neonate and YOY spinner sharks to be found in the vicinity of the Project area.

5.2.3 Tiger Shark

The NOAA EFH Mapper identified EFH for adult/juvenile Tiger Shark (*Galeocerdo cuvier*) within the Project area. Tiger sharks are found in both deep oceanic and shallow coastal regions, including river mouths and shallow bays (NOAA 2017; FWC 2019). Adult (greater than 266 cm TL) and juvenile (102 to 266 cm TL) EFH extends from offshore pelagic habitats in the Atlantic Ocean associated with the continental shelf break at the seaward extent of the U.S. Exclusive Economic Zone boundary (NOAA 2017). Based on their preference for pelagic environments, it is possible yet unlikely that adult/juvenile spinner shark would be present in the Project area.

Neonate/YOY (less than 101 cm FL) EFH includes coastal areas from the North Carolina-Virginia border to the Florida Keys (NOAA 2017). Tiger shark nurseries, although not well described, are thought to be in offshore areas and some populations appear to not use specific areas as nurseries. Given the inshore location of the Project area, it is unlikely that tiger sharks would use the waters of the Wando River within the Project area as nursery habitat.

5.2.4 Snapper-Grouper Management Unit

The snapper-grouper management unit is managed by the SAFMC and consists of 59 species across ten families, including sea basses and groupers (Serranidae), wreckfish (Polyprionidae), snappers (Lutjanidae), porgies (Sparidae), grunts (Haemulidae), jacks (Carangidae), tilefishes (Malacanthidae), triggerfishes (Balistidae), wrasses (Labridae), and spadefishes (Ephippidae) (SAFMC 2016b). These species spawn offshore over areas of hard substrate and larvae are transported to estuaries which survey as nursery grounds until maturity. Estuarine nursery habitat is essential for providing refuge from predation as well as food sources, which typically consists of small fish and invertebrates. Many species of adult snapper-grouper also frequent estuaries and even tidal freshwaters for feeding.

EFH for snapper-grouper species includes coral reefs, live/hard substrates, submerged aquatic vegetation, artificial reef habitat, and medium to high profile outcroppings on and around the continental shelf break zone ranging from shore to at least 600 feet (SAFMC 2016b). Spawning EFH includes the water column above adult habitat and the pelagic environment, including floating *Sargassum* which is essential for larval transport, survival, and growth. Snapper-grouper nearshore EFH (inshore of the 100-foot contour) for all life stages includes estuarine marshes, riverine and estuarine tidal creeks, oyster reefs and shell banks, unconsolidated bottom, and coastal inlets; all of which are included within or in the vicinity of the Project area. The fishery management plan for the snapper-grouper complex also includes oyster habitat as a HAPC.

5.2.5 Other Fishes

The waters of the Wando River, Charleston Harbor, and the surrounding nearshore coastal areas contain EFH for several other species of migratory fishes and sharks, including bonnethead shark (*Sphyrna tiburo*), finetooth shark (*Carcharhinus isodon*), lemon shark (*Negaprion brevirostris*), sand tiger shark (*Carcharias taurus*), and sandbar shark (*Carcharhinus plumbeus*). Although EFH for these species does not fall within the Project area, it is plausible that these species could occasionally enter the Wando River and the estuarine marshes adjacent to the Project area for foraging purposes. Each of these species have unique Fishery Management Plans for the South Atlantic Region that define their EFH and HAPC (NOAA 2017; SAFMC 2016b). Many commercially important species such as black and red drum, Atlantic Menhaden, and blue crab may also use the waters of the Wando River and nearby areas for nursery and

foraging habitat.

6.0 Potential Effects to Essential Fish Habitat

The proposed Project has the potential to result in permanent or temporary effects to EFH due to direct or indirect causes through the construction process. Permanent effects would be the result of permanent destruction or modification of EFH. Temporary effects would be expected to remain for the duration of the Project or Project-phase for which the effect is associated (e.g., vegetation clearing). Essential fish habitat experiencing temporary effects are expected to return to the existing (current) condition following completion of the Project. The potential temporary and permanent impacts to EFH within the Project area are summarized in Table 6-1. This analysis is based on the 30% design plans of the Compromise Alternative.

Table 6-1. Estimated Potential Impacts (acres) to EFH for the SC 41 Corridor Improvement Project

Impact Type	Effect Type	Estuarine Marsh Habitat	Intertidal Non-vegetated Tidal Flats	Estuarine Tidal Creek	Oyster Bed Habitat	Unconsolidated Bottom	Total ¹
Permanent Impacts (acres)							
Cut and Fill	Direct	3.02	0.11	0.12	0.004	--	3.25
Shade (Bridge Span)	Indirect	0.72	--	0.16	0.003	2.99²	0.88
Total		3.74	0.11	0.28	0.007	--	4.14
Temporary Impacts (acres)							
BMPs³	Direct	1.89	0.14	0.19	0.002	--	2.22
Total		1.89	0.14	0.19	0.002	--	2.22

-- Not applicable

¹ Total may vary from summation due to rounding.

² Existing span of bridge within the study area. Impacts in this area have already been accounted for in prior (separate) project planning, permitting, and mitigation.

³ BMPs (best management practices) include sediment and erosion control measures such as silt fencing, which may require vegetation removal in wetland areas.

6.1 Permanent Impacts

The proposed Project would result in permanent direct impacts due to cut and fill at several locations, including EFH, as the road is widened. It is anticipated that the proposed Project will result in approximately 3.25 acres of cut and fill material, including 3.02 acres in estuarine marsh habitat, 0.11 acre of fill in intertidal non-vegetated flats, 0.12 acre of fill in of tidal creek, and 0.004 acre of fill in oyster

habitat. Following construction of the Project, oyster colonization may occur on the bridge structures, particularly in areas where oysters are currently present or nearby.

Permanent, indirect impacts to EFH also potentially include the loss of estuarine marsh habitat due to bridge shading, which could result in patches of sparse vegetation growth or die-offs, which in turn could result in localized ecosystem shifts impacting both aquatic and terrestrial communities that may be dependent on these plants for food, habitat, or recruitment. Currently, the existing bridge span over the Wando River results in shading over approximately 2.99 acres of unconsolidated bottom habitat. Most, if not all organisms using unconsolidated bottom habitat in this area of the Wando River are likely transient; furthermore, by definition, unconsolidated bottom habitat supports little (if any) vegetation, and therefore shading of this area results in little impact. Additionally, this area is part of the existing condition for this Project, impacts of which have been accounted for in previous permitting and mitigation activities.

The proposed Project would result in an additional 0.88 acres of shading over EFH, including emergent marsh habitat (0.72 acre), tidal creeks (0.16 acre), and oyster habitat (0.004). It is assumed that shading effects only vegetated habitat types, although the shading would also cover small areas of tidal creek and oyster habitat. Alternatively, shading also has the potential to result in positive benefits to EFH, such as oysters beds, by reducing desiccation potential and biofouling. Shadows cast by structures vary in length and direction throughout the day as well as seasonally and it is likely that the EFH within the shaded area would still experience some ambient light throughout the day.

6.2 Temporary Impacts

Construction access and erosion and sediment control measures would be located in upland areas to the maximum extent practicable, however areas that are unavoidable may result in temporary impacts for the duration of the Project. Vegetation removal and temporary fill materials may be necessary to install erosion and sediment control devices, such as double-row silt fencing to prevent sediment runoff from upland work areas. This will result in temporary impacts to approximately 2.22 acres of temporary impacts consisting of estuarine marsh habitat (1.98 acres), intertidal non-vegetated flats (0.14 acres), estuarine tidal creeks (0.19 acres), and oyster bed habitat (0.002 acres).

Temporary siltation may indirectly impact thermal loading in the environment as well as temporarily increasing turbidity. Alterations in light attenuation in the water column can cause decreased visibility for organisms, affecting feeding, movement, and predator avoidance. Redistribution of sediments can alter nutrient distribution, dissolved oxygen levels, and primary productivity locally and throughout the estuarine waters. When suspended sediments begin to settle on the floor of the estuary, this can cause indirect impacts to benthic communities by smothering and burying organisms (Berry et al. 2003). Since turbidity is a natural condition along South Carolina's coast, impacts from the proposed Project are expected to be relatively minor. Impacts should be minimal and would be limited to the immediate area of the construction. After construction, the impacted habitats will return to their prior functions.

7.0 Avoidance and Minimization Measures

Charleston County analyzed several alternatives in the planning process to avoid and minimize impacts to the environment. Charleston County is considering a No-Build alternative as well as the Compromise Alternative. Bridges across Horlbeck Creek would be used to avoid and minimize impacts to marsh habitat. In addition, construction methods will use best management practices to minimize or avoid smothering marsh vegetation.

In addition to the iterative process by which the design has been established, the following avoidance and minimization measures will also be implemented:

- Bridge construction access will be from upland areas to the maximum extent practicable;
- Standard sediment and erosion control practices will be applied, including the following:
 - Avoidance and minimization of temporary impacts to waters and wetland vegetation for BMP control structures installation;
 - No permanent bank erosion or decreased stabilization;
 - To the maximum extent practicable, the Project will be implemented in stages of development so that only areas that are in active construction are exposed. All other areas should have good cover of either temporary or permanent vegetation (using native seed mixtures), or bioengineering material;
 - Grading will be completed as soon as possible after it was commenced;
 - Runoff velocities will be kept as low as possible and retained on-site using sediment and erosion control BMPs; and
 - Appropriate sediment and erosion controls will be used and maintained in effective operating condition throughout the duration of the Project;
- Raw or live concrete may not come into contact with wetlands or open water until cured;
- Siltation barriers will be made of material in which aquatic life cannot become entangled; barriers will be properly secured and regularly monitored to avoid protected species entrapment; and
- All steps would be taken to prevent pollutants from entering waterways or wetlands; and
- No mechanized equipment would operate in wetlands or waters of the U.S. unless clearly identified and authorized in the approved plans.

8.0 Conclusions

Impacts to EFH have been avoided and minimized to the maximum extent practicable for this Project. Permanent impacts resulting from cut, fill, and shading are anticipated to impact approximately 4.14 acres of EFH while temporary, direct impacts from BMPs are anticipated to impact up to 2.22 acres of EFH. Appropriate erosion and sediment control measures are required to minimize effects from construction activities.

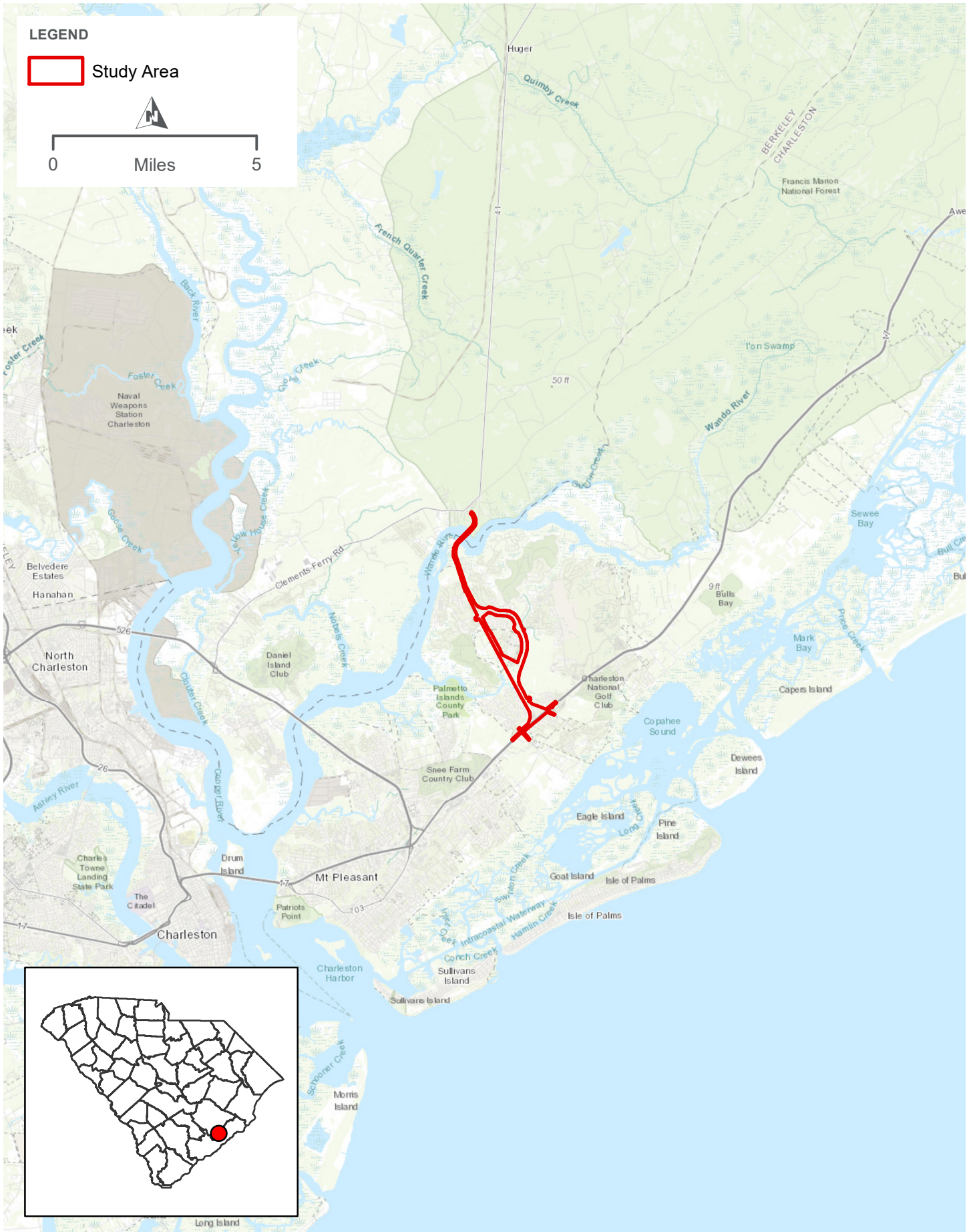
It is anticipated that there will be no impacts to the managed species that have the potential to use EFH within or in the vicinity of the Project area. Since there would be impacts to EFH, the contractor may develop an EFH Mitigation Plan and further consultation with NOAA-NMFS will occur as the Project is finalized. The EFH Mitigation Plan may include mitigation measures such as purchasing mitigation credits from an approved mitigation bank or Permittee Responsible Mitigation (PRM) methods such as causeway removal, living shorelines, oyster bed restoration, or other methods of mitigating for EFH impacts. Charleston County will develop the mitigation plan in coordination with the appropriate resource agencies.

9.0 References

- Berry, W. N. Rubenstein, B. Melzian, and B. Hill. 2003. The Biological Effects of Suspended and Bedded Sediment (SABS) in Aquatic Systems: A Review. US Environmental Protection Agency, National Health and Environmental Health Effects Laboratory, Rhode Island, p. 58.
- Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetland and Deepwater Habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service. Washington, DC.
- Federal Geographic Data Committee (FGDC). 2013. Classification of Wetlands and Deepwater Habitats of the United States. FGDC-STD-004-2013. Second Edition. Wetlands Subcommittee, Federal Geographic Data Committee and U.S. Fish and Wildlife Service, Washington, DC.
- Florida Fish and Wildlife Conservation Commission (FWC). 2019. Tiger Shark *Galeocerdo cuvier*. Accessed 12/21/2021. [URL]: <https://myfwc.com/wildlifehabitats/profiles/saltwater/sharks/tiger-shark/>.
- National Oceanic and Atmospheric Administration (NOAA). 2017. Final Amendment 10 to the 2006 Consolidated Atlantic Highly Migratory Species Fishery Management Plan: Essential Fish Habitat and Environmental Assessment. Office of Sustainable Fisheries Atlantic Highly Migratory Species Management Division.
- _____. 2021a. Essential Fish Habitat Mapper. National Marine Fisheries Service. Accessed 12/21/2021. [URL]: <https://www.habitat.noaa.gov/protection/efh/efhmapper/index.html>.
- _____. 2021b. Oyster Reef Habitat. Habitat Conservation. Accessed 12/21/2021. [URL]: <https://www.fisheries.noaa.gov/national/habitat-conservation/oyster-reef-habitat#the-value-of-oyster-reef-habitat>.
- South Atlantic Fishery Management Council (SAFMC). 2016a. Users Guide to Essential Fish Habitat Designations by the South Atlantic Fishery Management Council. Accessed 12/21/2021. [URL]: https://safmc.net/wp-content/uploads/2016/06/Attach5_SAFMCEFHUsersGuideNov11RP.pdf.
- _____. 2016b. Essential Fish Habitat – Habitat Areas of Particular Concern (EFH-HAPC) and Coral Habitat Areas of Particular Concern (C-HAPC). Accessed 12/12/2021. [URL]: <https://safmc.net/wp-content/uploads/2016/06/EFH-HAPC20Table.pdf>.
- _____. 2021. Intertidal Flats Habitat. Accessed 12/21/2021. [URL]: <https://safmc.net/uncategorized/intertidal-flats-habitat/>
- South Carolina Department of Natural Resources (SCDNR). 2014. Sea Science: Dynamics of the Salt Marsh. Accessed May 2022. [URL]: <https://www.dnr.sc.gov/marine/pub/seascience/dynamic.html#:~:text=Salt%20marshes%20occur%20along%20much,any%20other%20Atlantic%20coast%20state.>
- South Carolina Sea Grant Consortium (S.C. Sea Grant Consortium). 2006. Tidal Creek Habitats Sentinels of Coastal Health. Publication sponsored by National Oceanic and Atmospheric Administration MOA-2006-025/7182. Accessed 12/21/2021. [URL]: <https://www.scseagrant.org/wp-content/uploads/Tidal-Creek-Habitats-Booklet.pdf>.

Appendix A

Figures



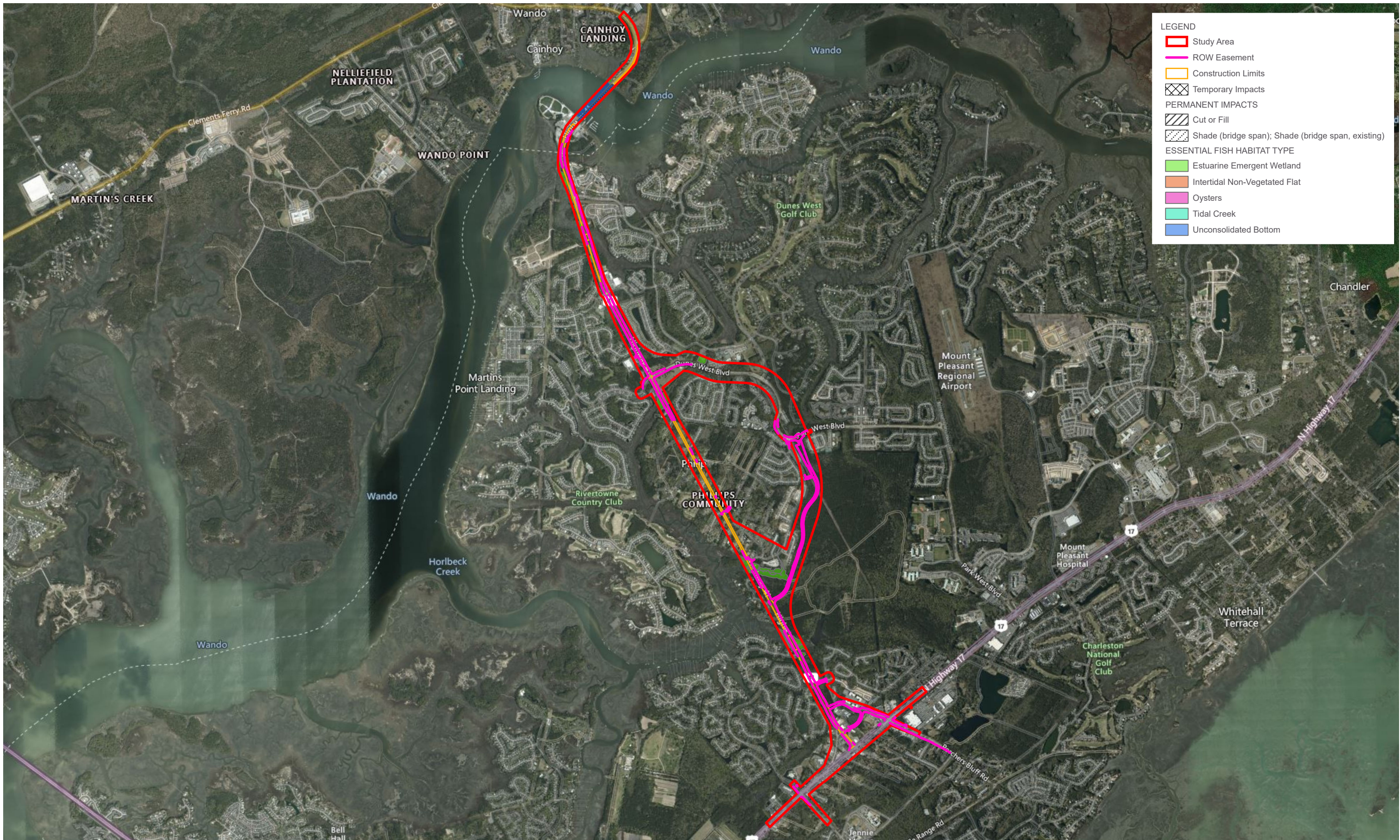


Charleston County
Transportation Development



ESSENTIAL FISH HABITAT ASSESSMENT

SITE MAP



LEGEND

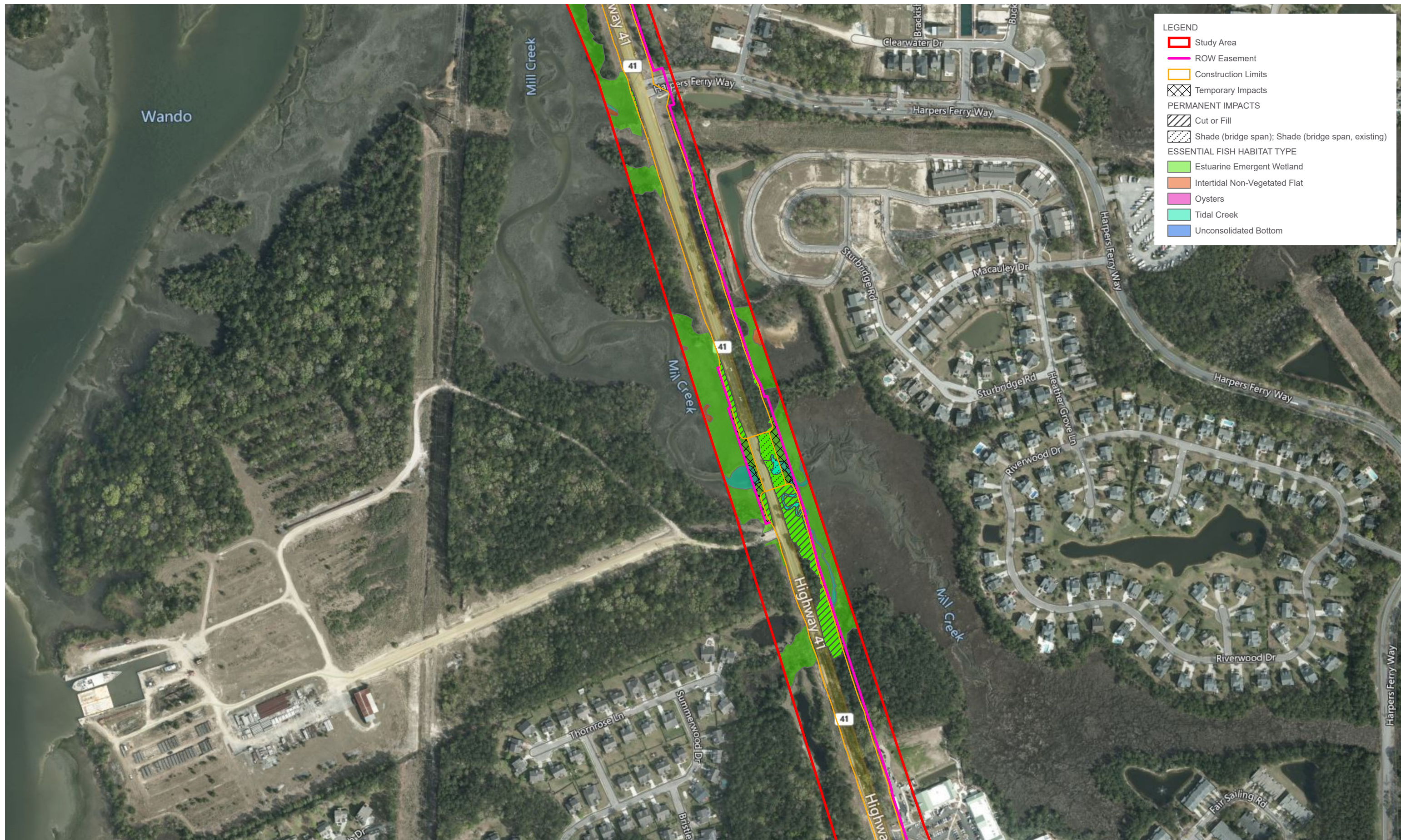
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- ROW Easement
- Construction Limits
- Temporary Impacts
- PERMANENT IMPACTS
- Cut or Fill
- Shade (bridge span); Shade (bridge span, existing)
- ESSENTIAL FISH HABITAT TYPE
- Estuarine Emergent Wetland
- Intertidal Non-Vegetated Flat
- Oysters
- Tidal Creek
- Unconsolidated Bottom

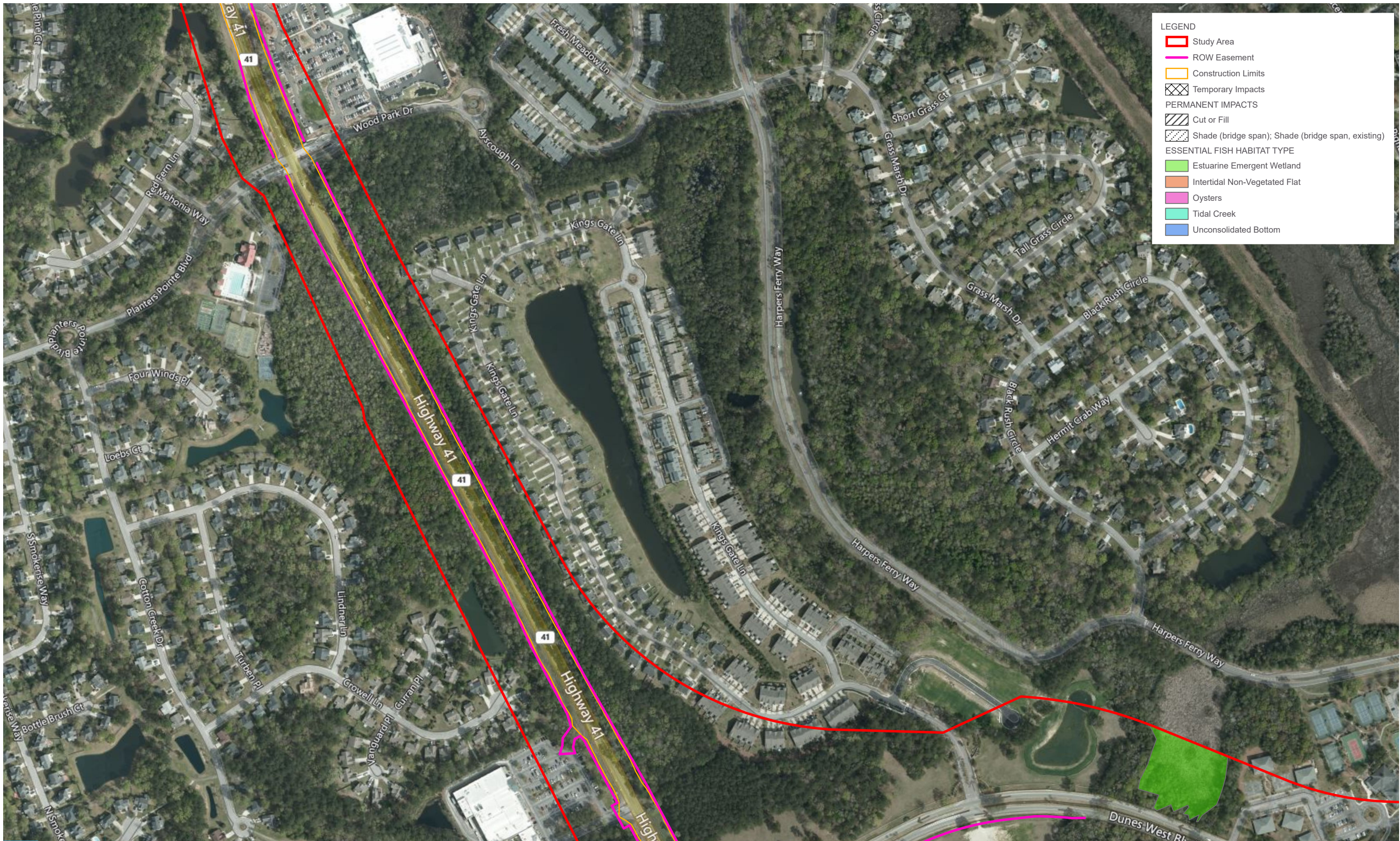




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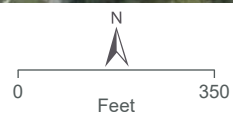


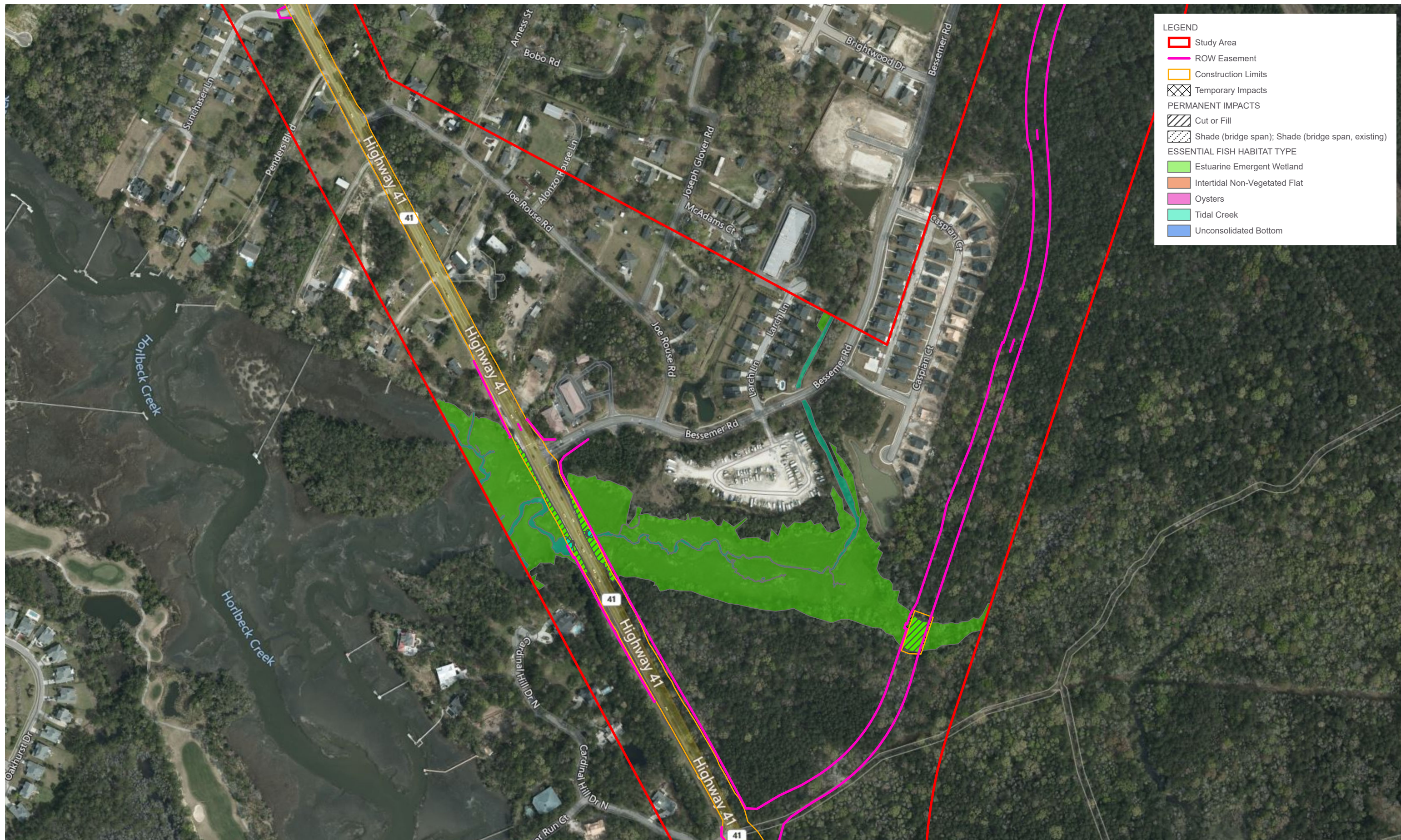


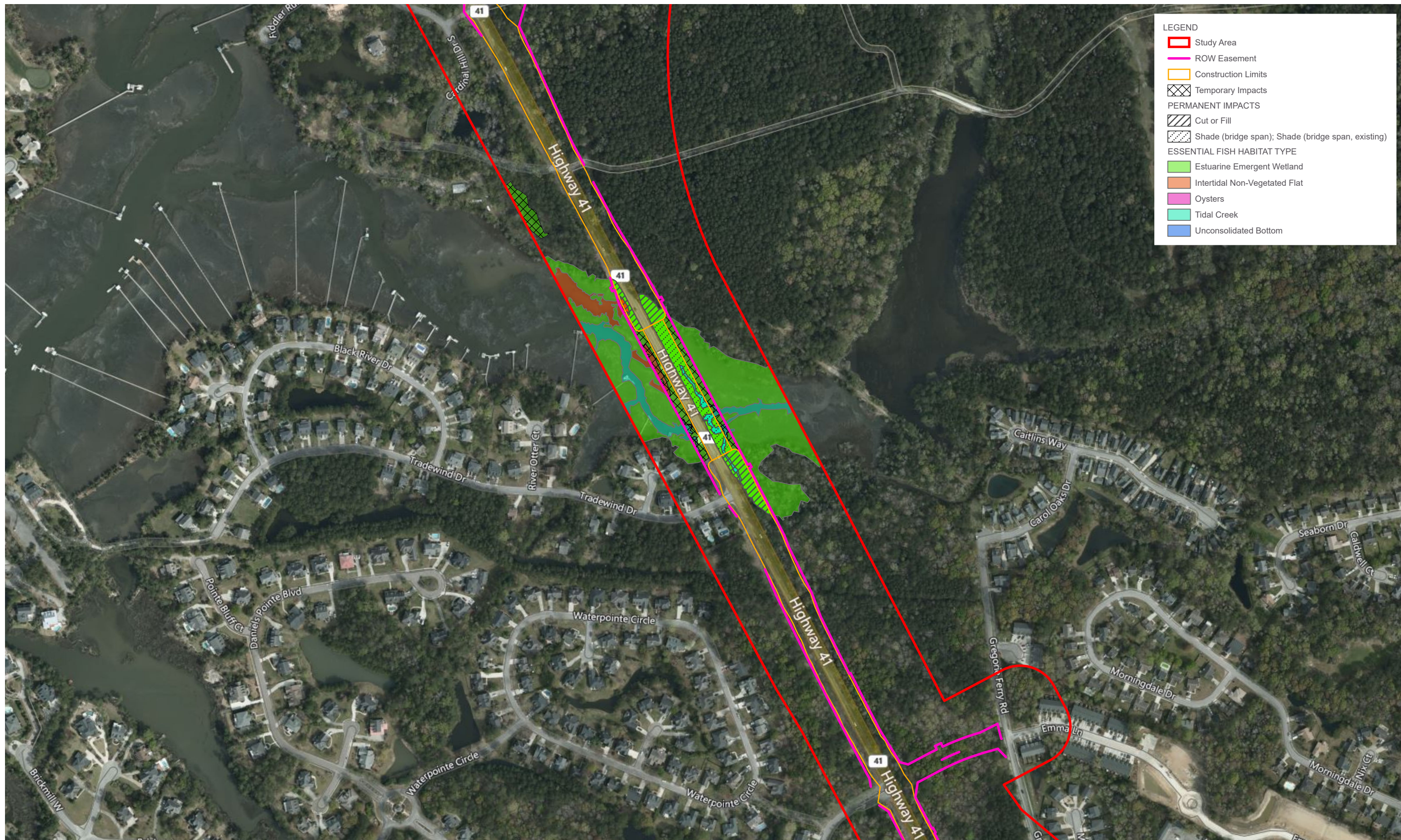




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Appendix B

Agency Coordination



UNITED STATES DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

NATIONAL MARINE FISHERIES SERVICE

Southeast Regional Office

263 13th Avenue South

St. Petersburg, Florida 33701-5505

<http://sero.nmfs.noaa.gov>

August 18, 2017

F/SER47:KH/pw

(Sent via Electronic Mail)

Cal Oyer, P.E.

Project Manager

Charleston County Transportation Development

4045 Bridge View Drive

North Charleston, SC 29405

Mr. Chad Long

Director of Environmental Services

South Carolina Department of Transportation

P.O. Box 191

Columbia, South Carolina 29201

Attention: Nicole Riddle and Mark Mohr

Dear Mr. Long:

NOAA's National Marine Fisheries Service (NMFS) reviewed the request by Charleston County, dated July 13, 2017, requesting input on the Letter of Intent and Exhibit for the proposed SC Highway 41 Corridor Improvements in Charleston and Berkeley Counties. Charleston County coordinated this request with the South Carolina Department of Transportation (SCDOT) and Federal Highway Administration (FHWA). Charleston County proposes to improve approximately 4.6 miles of SC 41 from US 17 in Mt. Pleasant across the new Wando River Bridge to Clements Ferry Road. While Charleston County, SCDOT, and FHWA have yet to identify all proposed improvements, the project will likely include widening the highway and realigning some intersections. As the nation's federal trustee for the conservation and management of marine, estuarine, and anadromous fishery resources, the NMFS provides the following comments and recommendations pursuant to authorities of the Fish and Wildlife Coordination Act and the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act).

Essential Fish Habitat in the Project Area

The project study area (shown in Exhibit Figure 1) includes high quality tidal salt marsh with tidal creeks and oyster reef/shell. Additionally, tidal freshwater wetlands may be present. The South Atlantic Fishery Management Council (SAFMC) designates these habitats as essential fish habitat (EFH) within the fishery management plans for penaeid shrimp and the snapper-grouper complex. Also, please note the fishery management plan for the snapper-grouper complex includes oyster/shell habitat as a Habitat Area of Particular Concern (HAPC). HAPCs are a subset of EFH that are either rare, particularly susceptible to human-induced degradation, especially important ecologically, or located in an environmentally stressed area. The SAFMC



provides additional information on EFH for federally managed species in Volume IV of the *Fishery Ecosystem Plan of the South Atlantic Region*¹.

The waters of the Wando River, Mill Creek, Horlbeck Creek, the tidal creeks connected to them, and the surrounding coastal marsh also serve as nursery and forage habitat for other species, such as red drum (*Sciaenops ocellatus*), black drum (*Pogonias cromis*), Atlantic menhaden (*Brevoortia tyrannus*), and blue crab (*Callinectes sapidus*). Many of these species are prey for fish managed under the Magnuson-Stevens Act, such as mackerels, snappers, groupers, billfish, and sharks. Red drum is an important state-managed fishery, and estuarine wetlands within the project area provide habitat necessary for development and survival of several life stages of red drum. The NMFS recommends the project's environmental documentation address these species as well as those managed under the Magnuson-Stevens Act.

Comments on Potential Effects to EFH and Federally Managed Fisheries

While the County, SCDOT, and FHWA are at the early planning stages for many project elements, the NMFS anticipates temporary and permanent impacts to EFH from the proposed project based on the information provided. These impacts will result from clearing, grading, filling, and stabilizing the shoreline for roadway widening and bridge construction. Where the highway intersects or is in close proximity to tidally influenced waters or wetlands, the NMFS recommends use of bridges to the maximum extent practicable to avoid and minimize impacts to marsh habitat. On the northern end of the study area near Mill Creek, there are large sections of the roadway where marsh and tidal creek habitat occurs directly adjacent to the existing side slopes. This is also true on the southern side of the study area near Horlbeck Creek, though to a lesser extent. The NMFS recommends the environmental documentation include a detailed alternatives analysis for various bridging and widening options and for the analysis to include detailed information on the type, amount, and site-specific function of wetlands directly and/or indirectly impacted by each alternative.

Generally, the NMFS recommends designing projects to affect the minimum amount of wetlands necessary to accomplish the project purpose. Activities that may adversely affect fishery habitat should be avoided when less environmentally harmful alternatives are available. For example, projects should avoid filling aquatic habitats, avoid temporary fills for construction purposes, and use only clean fill when filling is necessary. In many locations, permanent fill can be avoided or minimized by bridging aquatic areas. The project should also avoid construction practices that smother marsh vegetation. The NMFS has documented the impacts to salt marsh vegetation from barges and barge mats lasting longer than three years at Shem Creek Park and the Folly River Bridge. These and similar projects should be reviewed for adjusting best management practices to improve impact forecasts.

Comments on Potential Compensatory Mitigation

Compensatory mitigation may be necessary for the proposed project. The NMFS prefers onsite, in-kind mitigation for impacts to salt marsh habitat at this location. Should there be unavoidable impacts to oyster reef/shell habitat, mitigation could be coordinated with the South Carolina Department of Natural Resources South Carolina Oyster Restoration and Enhancement or Shellfish Research Section and may be one component of a larger mitigation plan. The NMFS

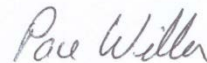
¹ Available at <http://safmc.net/EcosystemLibrary/FEPVolumeIV>

would be happy to assist Charleston County, SCDOT, and FHWA by providing preliminary reviews of any mitigation plan during its development.

The Magnuson-Stevens Act requires federal agencies to consult with NMFS regarding actions that may adversely affect EFH. Based on the information provided, NMFS believes adverse impacts to EFH are likely, and this project will benefit from an EFH assessment. The level of detail in the EFH assessment should be commensurate with the complexity and magnitude of the potential adverse effects of the action. The SCDOT and FHWA may provide the EFH assessment as a stand-alone document or within documents addressing obligation under the National Environmental Policy Act. In either case, the NMFS recommends coordination during development of the EFH assessment to ensure all issues are adequately covered and to avoid unnecessary delays in final evaluations.

The NMFS appreciates the opportunity to provide these comments. Please direct related questions or comments to the attention of Keith M. Hanson at our Charleston Area Office, 219 Fort Johnson Road, Charleston, South Carolina 29412-9110, Keith.Hanson@noaa.gov or by phone at (843)762-8622.

Sincerely,



/ for

Virginia M. Fay
Assistant Regional Administrator
Habitat Conservation Division

cc: SCDOT, LongCC@scdot.org, RiddleNL@scdot.org,
MohrAM@scdot.org
Charleston County, Coyer@charlestoncounty.org
FHWA, Jeffery.Belcher@dot.gov
F/SER47, Keith.Hanson@noaa.gov

Appendix C

Representative Photographs



Photo 1. Emergent marsh habitat within the SC 41 Project area (April 2018).



Photo 2. Tidal creek within emergent marsh habitat within the SC 41 Project area (April 2018).



Photo 3. Oysters on culvert in SC 41 Project area (April 2018).



Photo 4. Intertidal non-vegetated flat adjacent to tidal creek within the SC 41 Project Area (April 2018).



Photo 5. Unconsolidated bottom open water habitat (Wando River) within the SC 41 Project area (April 2018).



Photo 6. Tidal creek within the SC 41 Project Area (April 2018).