4.3.12.2 Additional Potential Mitigation Measures

No additional mitigation measures are proposed for Water Quality by the Corps. Additional avoidance, minimization, and mitigation may be considered by the Corps in its decision-making process. Final mitigation measures may be adopted as conditions of the DA permit and documented in the Record of Decision (ROD).

4.4 VEGETATION AND WILDLIFE

This section describes the potential impacts of Alternative 1 (Proposed Project) and all the alternatives on terrestrial vegetation and wildlife resources in the Vegetation and Wildlife study area. Impacts on terrestrial vegetation include clearing and removal of natural and previously disturbed land cover types and direct and indirect impacts on wildlife and/or their habitat during construction and operation of the Navy Base ICTF.

4.4.1 Methods and Impact Definitions

Impacts to vegetation and wildlife were evaluated through GIS analyses of land cover types and species richness that were verified during the field surveys. The impact evaluation considers both construction and operation activities for the Navy Base ICTF within the Vegetation and Wildlife study area, and evaluates potential impacts related to habitat loss; alteration, and/or fragmentation; displacement and/or mortality of wildlife species; and the introduction of invasive, noxious weeds, and non-native species. The type and severity of impacts on terrestrial resources depend on the characteristics of the disturbance (type, timing, and duration), where the disturbance occurs (the habitat type present and existing site characteristics), the species present, their sensitivity, habituation, and resilience to disturbance (Table 4.4-1).

Anticipated changes in the existing conditions for terrestrial resources in the Vegetation and Wildlife study area under each alternative were identified and assessed quantitatively for resources for which quantitative data were available, including land cover types, wildlife habitat, and raptor nests. For terrestrial resources where no quantitative data were available, impacts are described qualitatively.

Table 4.4-1
Impact Definitions, Vegetation and Wildlife

	Negligible	Minor	Major
Vegetation	No impacts to vegetation or plant communities	Alteration in vegetation or plant communities (habitat) that sustain animal populations; fragmentation of habitat that impairs existing plant communities; localized occurrences of invasive, noxious weeds.	Loss of vegetation or plant communities (habitat) that degrade the stability of animal populations; fragmentation of habitat that results in the loss of plant communities; widespread occurrences of invasive, noxious weeds.
Wildlife	No impacts to wildlife	Short-term displacement of wildlife species; mortality of individuals of common wildlife species; fragmentation of populations of distinct wildlife species; short-term impairment to animal migratory paths; localized occurrences of non-native wildlife species.	Permanent impairment to animal migratory paths; mortality of a distinct population of common wildlife species; destruction of wildlife breeding grounds/nesting areas (e.g., rookeries); introduction and uncontrollable spread of non-native wildlife species.

4.4.2 No-Action Alternative

Under the No-Action Alternative, the Corps would not issue a DA permit, and construction and operation of the Navy Base ICTF would not occur. For the purposes of this EIS, the Corps assumes that the Project site and the River Center project site would continue to include mixed use (residential and commercial) and industrial land uses. In light of Palmetto Railways' ownership of the properties, there would be the potential for redevelopment of these areas to include rail-served warehousing and distribution. While future land uses and human activities may occur adjacent to and/or within the vegetation cover types and wildlife habitat within the study area, it would be speculative to attempt to estimate the acreage of impacts to vegetation at this time.

Under the No-Action Alternative, the existing habitat conditions for terrestrial wildlife in the study area generally would be expected to continue (Figure 3.4-1). The existing habitats in the study area are fragmented due to the CNC and adjacent mixed residential and commercial land uses within portions of both the City of North Charleston and the City of Charleston. Habitat fragmentation refers to the division of large, contiguous blocks of habitat into smaller, more isolated parcels that are less suitable for wildlife.

Upland areas within the study area generally are fragmented and disturbed, and are inhabited by plant and animal species that are adapted to these conditions. Additional upland fragmentation is

likely to continue as a result of additional growth and re-development of existing fallow areas over time. Routine maintenance (mowing and cutting) throughout the study area results in a lack of regeneration of vegetation. Without any comprehensive development plans, the No-Action Alternative would assume these areas to be unchanged.

While there are numerous wildlife species that may inhabit the terrestrial and aquatic habitats within the study area (invertebrates, insects, reptiles, amphibians, birds, fishes, marine mammals, and mammals), existing and future land uses proposed under the No-Action Alternative are not expected to directly (or indirectly) result in the displacement and/or mortality of these species and/or their associated habitats. As a result, there would be no major adverse impacts to wildlife species under the No-Action Alternative.

4.4.3 Alternative 1: Applicant's Proposed Project (South via Milford / North via Hospital District)

4.4.3.1 Construction Impacts

Construction of Alternative 1 (Proposed Project) would permanently disturb approximately 233.71 acres of vegetation (vegetative land cover classes as described in Section 3.4) within the limits of construction of the Vegetation and Wildlife study area due to clearing and grading activities. Approximately 95.5 percent of the total area to be disturbed (223.19 acres) would affect previously disturbed communities. Developed areas lack any significant natural vegetation communities. Approximately 4.5 percent (10.52 acres of the total area to be disturbed) would affect natural communities, including marsh and marine water. As shown in Figure 4.4-1, Alternative 1 (Proposed Project) would permanently alter approximately 223.19 acres of upland terrestrial habitat and 10.52 acres of aquatic habitat (Table 4.4-2).

Table 4.4-2
Land Cover Impacts for Alternative 1: Proposed Project

Impact Location		Impacts on Land Cover (acres)					
	Impact Type	Marsh	Marine Water	Urban Development (high intensity)	Urban Development (low intensity)	Total	% of Total
Cosgrove/McMillan Overpass	Shading	–	–	4.75	–	4.75	2.03
Cosgrove/McMillan/ Hobson Realignment	Fill	–	–	18.69	3.65	22.35	9.56
Drayage Road	Fill	0.32	–	4.37	–	4.69	2.01
Drayage Road Bridges	Shading	3.36	–	0.84	–	4.20	1.80
Hobson/Bainbridge Realignment	Fill	0.63	–	10.87	–	11.50	4.92
ICTF	Fill	3.28	–	117.24	11.59	132.11	56.53

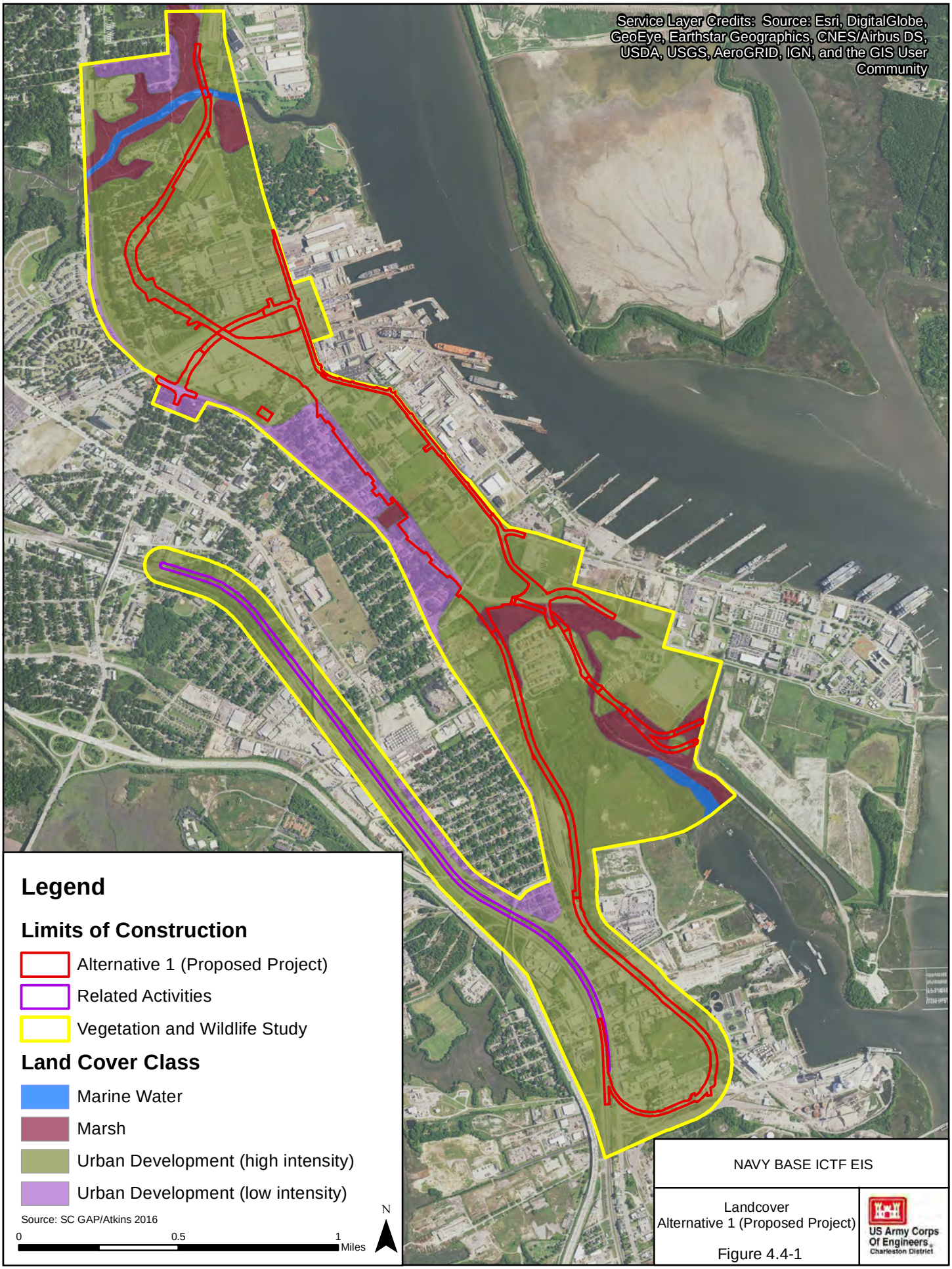
Impact Location	Impact Type	Impacts on Land Cover (acres)					
		Marsh	Marine Water	Urban Development (high intensity)	Urban Development (low intensity)	Total	% of Total
Northern Connection	Fill	0.28	0.01	18.00	0.00	18.29	7.83
Noisette Bridge	Shading	–	0.16	0.03	–	0.19	0.08
Southern Connection	Fill	2.48	–	33.15	–	35.63	15.25
Total*		**10.35**	**0.17**	**207.95**	**15.24**	**233.71**	**100.00**

*The sum of individual items may not equal totals due to rounding.
Source: Atkins 2018.

Where feasible, all road and rail improvements would be made in upland habitat to avoid and minimize impacts to aquatic plant communities. Access bridges and approaches would result in some fill, pile driving, and shading impacts to open marine waters and marshes (Figure 4.4-1). The drayage road for Alternative 1 (Proposed Project) would result in direct loss of aquatic habitat where the roadway corridor traverses marshes. All other impacts are to disturbed/maintained uplands. In most instances, bridges and roadways would be elevated to avoid impacts to aquatic habitat and other natural resources. Where the road and rail bridges are at low elevations relative to the existing ground, direct impacts due to shading and loss of aquatic resource functions would occur. Additional truck and rail traffic could result in the potential for minor and/or major indirect impacts to aquatic plant communities from accidental pollutant spills. However, there are BMPs, mandated requirements, and regulations that cover spills (Section 4.15.3.2); therefore, impacts to aquatic plant communities from accidental spills would be minor and localized.

Construction of the Proposed Project would require placement of fill and structures in tidal and non-tidal wetlands and direct impacts to terrestrial habitat. By locating the ICTF at a previously disturbed area, impacts to undeveloped land are reduced. The same approach is applied to redeveloping roadways and railways within fallow areas previously used in development that are no longer in service. The construction of this alternative would impact mostly urban developed areas (industrial areas and existing road and rail ROW) (Figure 4.4-1).

Potential exists for direct and indirect short-term species displacement during construction; common species are relatively abundant and adapted to living in close association with human activity and infrastructure and would therefore be minor adverse. Specific activities associated with Alternative 1 (Proposed Project) could result in short-term displacement of individuals and/or permanent alterations to habitat including the construction of the drayage road and arrival/departure tracks in nearby marshes of Shipyard and Noisette creeks (permanent physical alterations to habitat and fragmentation), bridge improvements in Noisette Creek (short-term shading, noise, and sedimentation), and bridge construction in Shipyard Creek (permanent shading, short-term noise and sedimentation).


Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Legend
Limits of Construction
Alternative 1 (Proposed Project)
Related Activities
Vegetation and Wildlife Study
Land Cover Class
Marine Water
Marsh
Urban Development (high intensity)
Urban Development (low intensity)
Source: SC GAP/Atkins 2016
0
0.5
1
Miles
N
NAVY BASE ICTF EIS
Landcover
Alternative 1 (Proposed Project)
Figure 4.4-1
US Army Corps Of Engineers
Charleston District

The removal of vegetation can cause increased erosion of soil on areas without the vegetative material to intercept rainfall, reduce runoff and stabilize soil, as addressed in Section 4.1 – Geology and Soils. Areas without well-established vegetation would be susceptible to an indirect impact of invasion by weeds, including invasive or noxious species, because these species are typically adapted to primary succession on bare soil.

Construction and operation of Alternative 1 (Proposed Project) would generate dust that could be dispersed beyond the areas cleared of vegetation. Dust settling on vegetation close to dust-generating activities (e.g., roads) may reduce cover and productivity of the vegetation through disruption of photosynthesis and reproduction processes; however, this potential impact would be a temporary impact and would be reduced through the use of dust suppression BMPs as proposed by Palmetto Railways (see Section 4.13 – Air Quality, for additional information on dust generation and dispersion).

Habitat fragmentation would result from removal of vegetation and loss of habitat during construction of the ICTF facilities and from human disturbance during operation of the Navy Base ICTF. Because the existing habitat in the study area is already fragmented, additional fragmentation during construction of Alternative 1 (Proposed Project) would cause a minor short-term impact on wildlife.

Vegetation clearing would result in direct minor impacts on avian habitat by eliminating existing vegetation, including habitat for birds protected under the Migratory Bird Treaty Act (MBTA). Of all habitats surveyed, the highest number of bird species was observed in the previously disturbed habitat type, which was dominated by American crow, Carolina wren, and laughing gull. These species also were dominant in all other habitats surveyed in the Vegetation and Wildlife study area. Similar-quality habitat will redevelop within temporary disturbance footprints at the completion of the construction of the Project. Raptors, such as red-shouldered hawks and turkey vultures, were observed hunting in the Vegetation and Wildlife study area. The presence of adjacent suitable habitats will likely mean Alternative 1 (Proposed Project) will have minimal impact to these raptors. Given the lack of suitable nesting and foraging habitat throughout the Vegetation and Wildlife study area, and no observations of raptors or their nests during the field surveys, potential impacts on raptors and other large birds would be short-term and minor.

Indirect impacts on birds may include disturbance from human activities such as noise. Birds are expected to avoid construction areas and are highly mobile, able to move quickly away from disturbance. The distance avoided would depend on many factors, including the type, timing, season, and duration of human activity; the type of habitat adjacent to the activity; and the sensitivity and tolerance of the birds affected. The majority of bird species currently present (American crow, northern cardinal, northern mockingbird, mourning dove, blue jay, Carolina wren, buntings, and sparrows) commonly inhabit previously disturbed habitats. These common species are relatively abundant, and are adapted to living in close association with human activity and infrastructure. As such, indirect impacts on birds from human disturbance are expected to be short-term and minor.

Vegetation clearing would result in direct minor impacts on wildlife habitat by eliminating existing vegetation. The species currently present are those that have adapted to using previously disturbed habitats, as demonstrated by their presence in these areas. Because most mammals observed (white-tailed deer, beaver, raccoon, opossum, eastern gray squirrel, and eastern cottontail rabbit) during surveys in the Vegetation and Wildlife study area were found in the previously disturbed vegetation types, the impact would be minor, given the relative abundance of suitable habitat in the surrounding area compared to the availability of such habitat in the study area.

Indirect impacts on mammals may include disturbance from human activities such as noise. Most of the species present in the Vegetation and Wildlife study area occupy previously disturbed habitats, are relatively abundant common species, and are adapted to living in close association with human activity and infrastructure. As such, indirect impacts on wildlife from human disturbance are expected to be short-term and minor.

Aquatic species known to occur in the Vegetation and Wildlife study area include sea worms, small crustaceans, snails, shellfish, shrimp, squid, blue crab, finfish, reptiles, and amphibians. Short-term impacts on these species from construction of Alternative 1 (Proposed Project) include turbidity, sedimentation, and potential chemical contamination from spills or mobilization due to disturbance of sediments. Potential long-term impacts include the permanent loss of open marine waters and associated marshes that provide nesting and foraging habitat. Existing reptiles and amphibians expected to inhabit the Vegetation and Wildlife study area are abundant and common species, so any decrease in their abundance due to reduction of habitat from construction of Alternative 1 (Proposed Project) would not threaten the general population of these species or their predators.

Finfish have high mobility and are capable of avoiding direct construction impacts (excavation and filling). Elevated suspended sediment levels could potentially indirectly impact foraging during construction. Most non-schooling fish are attracted to structures for cover/shelter, as well as substrate from which to forage for invertebrates, algae, etc. Therefore, some fish species would likely be positively impacted by the installation of pilings and structures as part of Alternative 1 (Proposed Project) and the associated sessile epifauna that will be attracted to them.

Injury or mortality of mammals, birds, and other small animals could occur through direct contact with construction equipment, traffic, and toxic materials. Wildlife would likely move away from the limits of construction in the presence of human activity, which would decrease the potential for direct contact with construction equipment and traffic. In addition, large equipment would move slowly through the area, which would reduce the potential for collisions with wildlife. Direct impacts would occur only in the areas directly affected by construction activities. Although individuals could be affected, entire populations would not, resulting in minor temporary impacts on wildlife from contact with construction equipment.

Due to the potential impacts to nesting and foraging habitat for fishes, marine reptiles, and marine mammals, adverse impacts resulting from construction of Alternative 1 (Proposed Project) could be minimized by adhering to environmental work windows that are established by the Corps, which restrict construction to periods when wildlife are least abundant or least likely to be affected by filling and pile installation activities. The environmental work windows for in-water construction have targeted winter months, because wildlife abundance is dramatically reduced during colder water temperatures. Potential impacts to federal- and state-listed threatened and endangered species and mitigation are discussed in Sections 4.6 and 4.7.

4.4.3.2 Operation and Maintenance Impacts

Long-term impacts associated with Alternative 1 (Proposed Project) include maintenance of vegetation that would be removed during construction and long-term increases in road and rail traffic. Alternative 1 (Proposed Project) would increase future rail traffic, thereby increasing the chance of an indirect impact from an accidental introduction of exotic species into the environment. Impacts to the Project site are anticipated to be minimal due to the existing upland habitats at the site supporting many introduced invasive plant and animal species, including Japanese privet, Japanese honeysuckle, kudzu, red fire ants, and the Asian long-horned beetle.

4.4.4 Alternative 2: Proposed Project Site (South via Milford / North via S-line)

Alternative 2 is a variation of Alternative 1 (Proposed Project) where the northern rail connection would be relocated along Spruill Avenue within existing CSX ROW to the S-line, and turn east along Aragon Avenue to the existing NCTC rail line. Road and rail improvements would be adjusted accordingly to facilitate rail and road traffic as a result of the northern rail connection alignment. Alternative 2 would require a bridge crossing of Noisette Creek adjacent to Spruill Avenue, rather than near Noisette Boulevard (Figure 4.4-2).

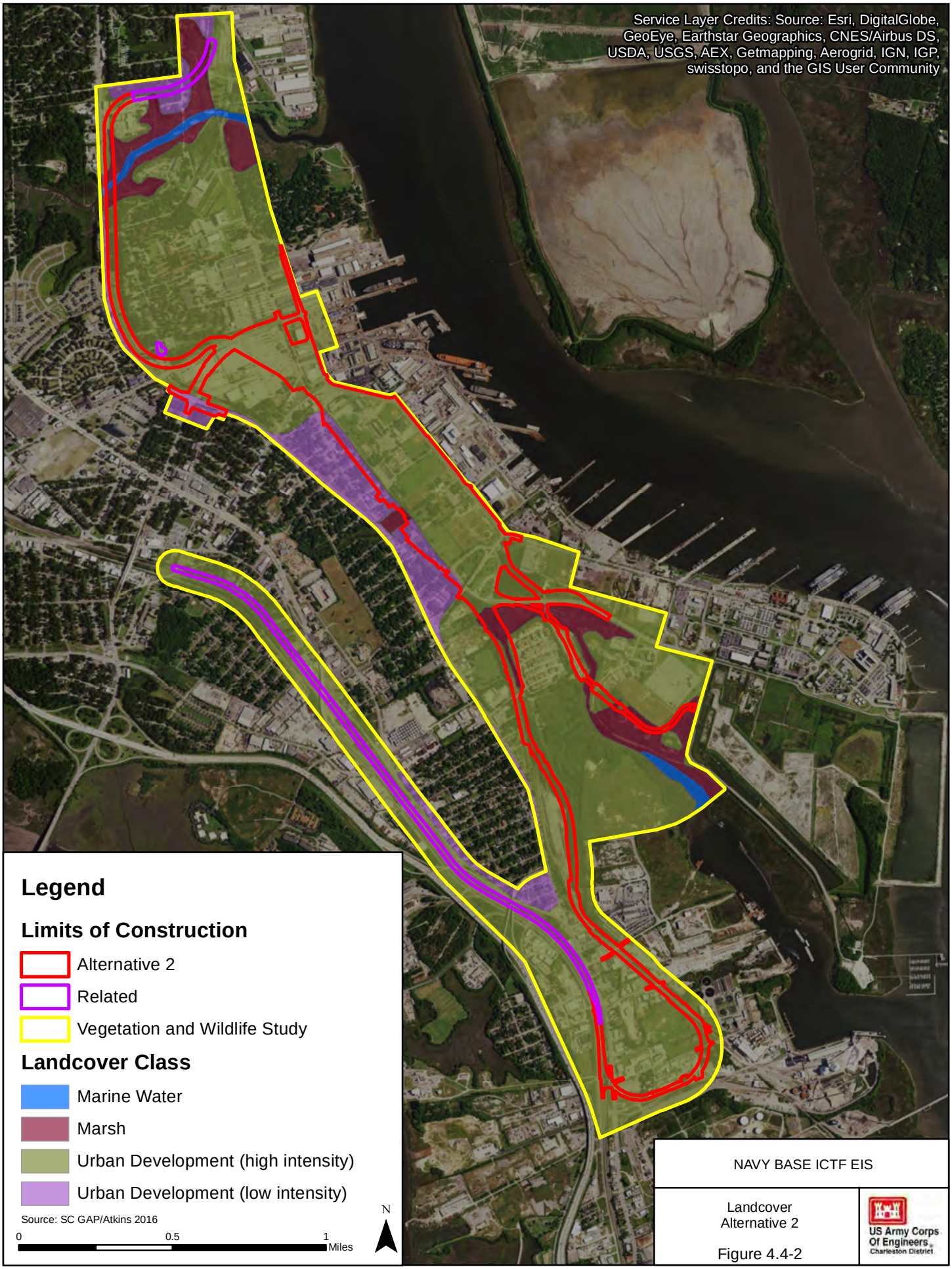
Habitat alteration, habitat fragmentation, introduction of invasive/noxious species, species displacement, and species mortality impacts to vegetation and wildlife under Alternative 2 are expected to be minor which is similar to those discussed under Alternative 1 (Proposed Project); however, the exception would be additional fill, pile driving, and shading impacts to aquatic species and marine and tidal salt marsh habitat associated with the construction of the rail bridge crossing Noisette Creek along Spruill Avenue. Construction of Alternative 2 would permanently disturb approximately 236.83 acres of vegetation within the limits of construction of the Vegetation and Wildlife study area. As shown in Figure 4.4-2, Alternative 2 would permanently alter approximately 223.54 acres of upland terrestrial habitat and 13.28 acres of tidal aquatic habitat (Table 4.4-3).

Table 4.4-3
Land Cover Impacts for Alternative 2

Impact Location		Impacts on Land Cover (acres)					
	Impact Type	Marsh	Marine Water	Urban Development (high intensity)	Urban Development (low intensity)	Total	% of Total
Cosgrove/McMillan Overpass	Shading	–	–	4.75	–	4.75	2.01
Cosgrove/McMillan/ Hobson Realignment	Fill	–	–	18.69	3.65	22.35	9.44
Drayage Road	Fill	0.32	–	4.37	–	4.69	1.98
Drayage Road Bridges	Shading	3.36	–	0.84	–	4.20	1.77
Hobson/Bainbridge Realignment	Fill	0.63	–	10.87	–	11.50	4.85
ICTF	Fill	3.28	–	117.24	11.59	132.11	55.78
Northern Connection	Fill	2.59	–	17.63	0.24	20.47	8.64
Noisette Bridge	Shading	0.27	0.35	–	–	0.62	0.26
Southern Connection	Fill	2.48	–	33.15	–	35.63	15.05
St. Johns cul-de-sac	Fill	–	–	0.51	–	0.51	0.22
Total*		**12.93**	**0.36**	**208.06**	**15.48**	**236.83**	**100.00**

*The sum of individual items may not equal totals due to rounding.

Source: Atkins 2018.


Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
Legend
Limits of Construction
Alternative 2
Related
Vegetation and Wildlife Study
Landcover Class
Marine Water
Marsh
Urban Development (high intensity)
Urban Development (low intensity)
Source: SC GAP/Atkins 2016
0
0.5
1
Miles
N
NAVY BASE ICTF EIS
Landcover
Alternative 2
Figure 4.4-2
US Army Corps Of Engineers
Charleston District

4.4.5 Alternative 3: Proposed Project Site (South via Kingsworth / North via Hospital District)

Alternative 3 is a variation of Alternative 1 (Proposed Project) where the southern rail connection would connect to an existing CSX rail line near Kingsworth Avenue. Road and rail improvements would be adjusted accordingly to facilitate rail and road traffic as a result of the southern rail connection alignments (Figure 4.4-3).

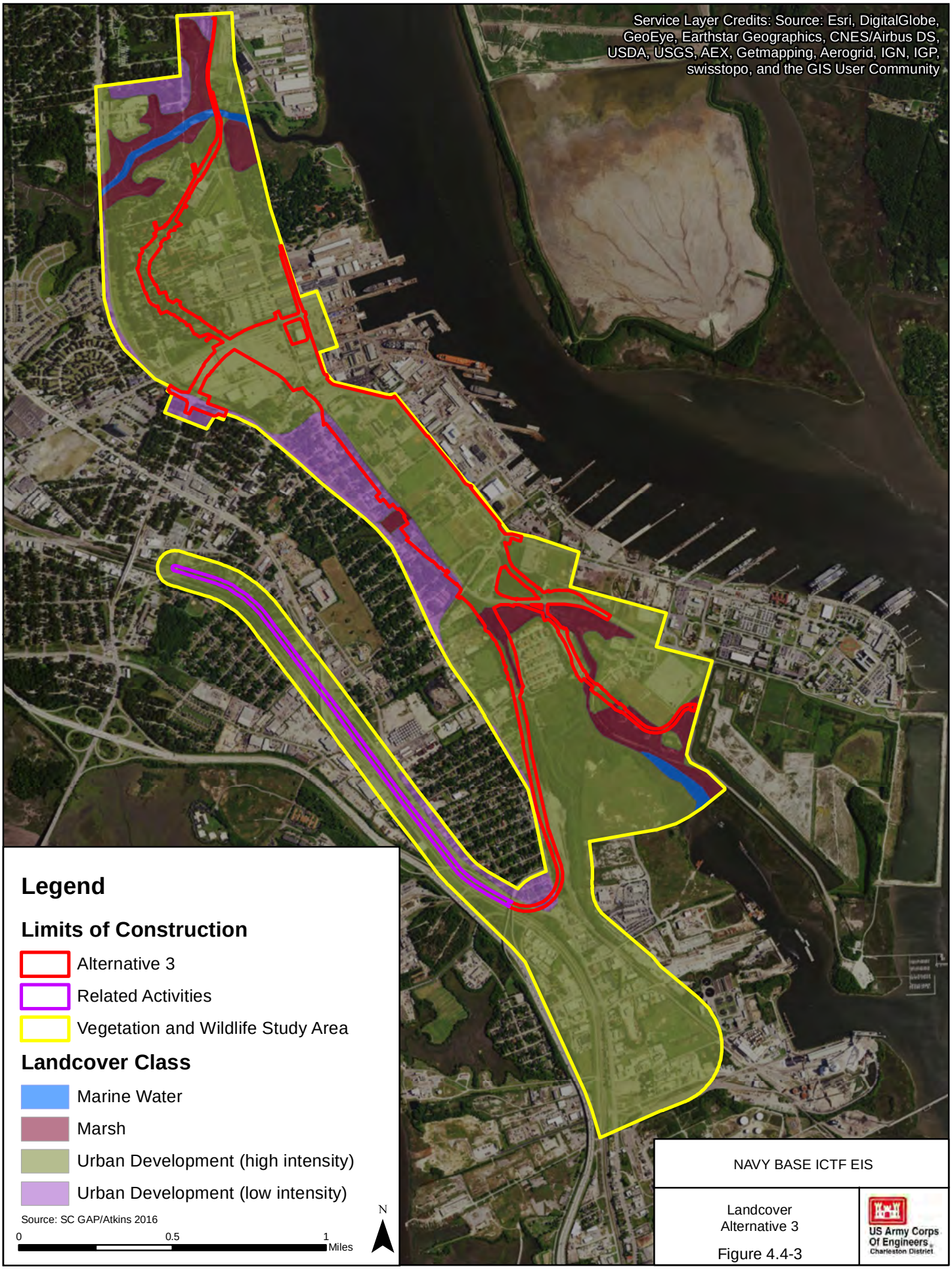
Habitat alteration, habitat fragmentation, introduction of invasive/noxious species, species displacement, and species mortality impacts to vegetation and wildlife under Alternative 3 are expected to be minor which is similar to those discussed under Alternative 1 (Proposed Project); however, the exception would be small additional fill impacts to aquatic species and marsh habitat associated with the Kingsworth Avenue southern rail connection. Construction of Alternative 3 would permanently disturb approximately 214.27 acres of vegetation within the limits of construction of the Vegetation and Wildlife study area. As shown in Figure 4.4-3, Alternative 3 would permanently alter approximately 203.75 acres of upland terrestrial habitat and 10.52 acres of tidal aquatic habitat (Table 4.4-4).

Table 4.4-4
Land Cover Impacts Alternative 3

Impact Location		Impacts on Land Cover (acres)					
	Impact Type	Marsh	Marine Water	Urban Development (high intensity)	Urban Development (low intensity)	Total	% of Total
Cosgrove/McMillan Overpass	Shading	–	–	4.75	–	4.75	2.22
Cosgrove/McMillan/ Hobson Realignment	Fill	–	–	18.69	3.65	22.35	10.43
Drayage Road	Fill	0.32	–	4.37	–	4.69	2.19
Drayage Road Bridges	Shading	3.36	–	0.84	–	4.20	1.96
Hobson/Bainbridge Realignment	Fill	0.63	–	10.87	–	11.50	5.37
ICTF	Fill	3.28	–	117.24	11.59	132.11	61.66
Northern Connection	Fill	0.28	0.01	18.00	–	18.29	8.54
Noisette Bridge	Shading	–	0.16	0.03	–	0.19	0.09
Southern Connection	Fill	2.48	–	12.85	0.86	16.19	7.56
Total*		**10.35**	**0.17**	**187.64**	**16.10**	**214.27**	**100.00**

*The sum of individual items may not equal totals due to rounding.

Source: Atkins 2018.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Legend
Limits of Construction
Alternative 3
Related Activities
Vegetation and Wildlife Study Area
Landcover Class
Marine Water
Marsh
Urban Development (high intensity)
Urban Development (low intensity)
Source: SC GAP/Atkins 2016
0
0.5
1
Miles
N
NAVY BASE ICTF EIS
Landcover
Alternative 3
Figure 4.4-3
US Army Corps Of Engineers
Charleston District

4.4.6 Alternative 4: Proposed Project Site (South via Milford)

Alternative 4 is a variation of Alternative 1 (Proposed Project) where trains would enter and exit the Navy Base ICTF from a southern rail connection. Proposed rail for the northern rail connection through the Hospital District would stop short of Noisette Creek (Figure 4.4-4).

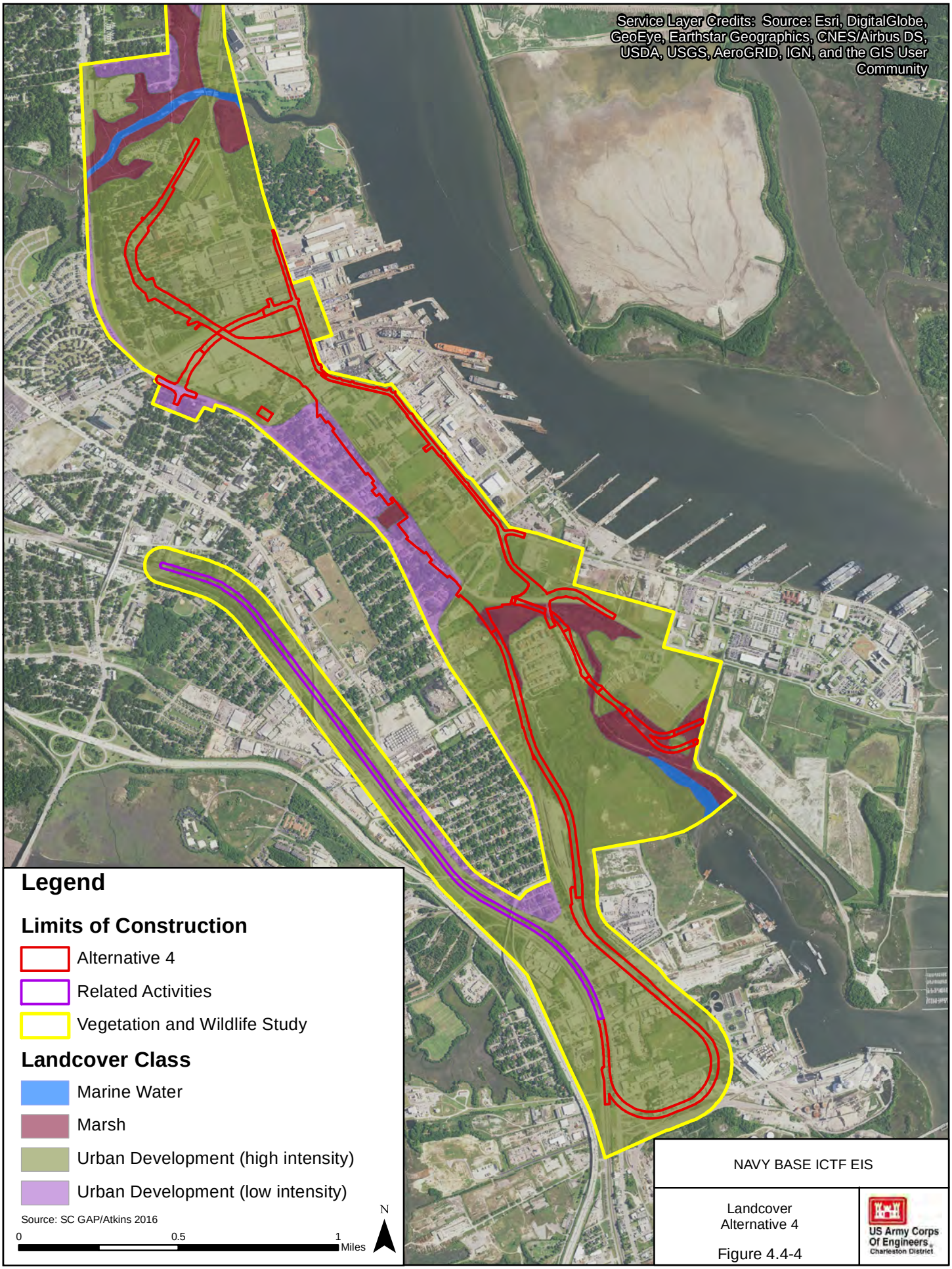
Habitat alteration, habitat fragmentation, introduction of invasive/noxious species, species displacement, and species mortality impacts to vegetation and wildlife under Alternative 4 are expected to be minor which is similar to those discussed under Alternative 1 (Proposed Project); however, there would be no impacts to open marine water habitat and fewer fill and shading impacts to the aquatic species and habitat of Noisette Creek. Construction of Alternative 4 would permanently disturb approximately 235.89 acres of vegetation within the limits of construction of the Vegetation and Wildlife study area. As shown in Figure 4.4-4, Alternative 4 would permanently alter approximately 225.82 acres of upland terrestrial habitat and 10.07 acres of tidal aquatic habitat (Table 4.4-5).

Table 4.4-5
Land Cover Impacts for Alternative 4

Impact Location		Impacts on Land Cover (acres)					
	Impact Type	Marsh	Marine Water	Urban Development (high intensity)	Urban Development (low intensity)	Total	% of Total
Cosgrove/McMillan Overpass	Shading	–	–	4.75	–	4.75	2.01
Cosgrove/McMillan/ Hobson Realignment	Fill	–	–	18.69	3.65	22.34	9.47
Drayage Road	Fill	0.32	–	4.37	–	4.69	1.99
Drayage Road Bridges	Shading	3.36	–	0.84	–	4.20	1.78
Hobson/Bainbridge Realignment	Fill	0.63	–	10.87	–	11.50	4.87
ICTF	Fill	3.28	–	117.24	11.59	132.11	56.00
Northern Track Lead	Fill	–	–	16.11	–	16.11	6.83
Southern Connection	Fill	2.48	–	37.70	–	40.18	17.03
Total*		**10.07**	**0.00**	**210.58**	**15.24**	**235.89**	**100.00**

*The sum of individual items may not equal totals due to rounding.

Source: Atkins 2018.



NAVY BASE ICTF EIS

Landcover
Alternative 4

Figure 4.4-4

US Army Corps Of Engineers
Charleston District

4.4.7 Alternative 5: River Center Site (South via Milford / North via Hospital District)

Alternative 5 is a variation of Alternative 1 (Proposed Project) with the Project site being moved to the River Center project site. Road and rail improvements would be adjusted accordingly to facilitate rail and road traffic at the new site. The northern rail connection is truncated by the River Center project site, but the plans for rehabilitating the rail bridge crossing Noisette Creek at Noisette Boulevard are the same as those under Alternative 1 (Proposed Project). The Cosgrove Road/ McMillan Avenue Overpass in Alternative 1 (Proposed Project) would be replaced with an ICTF Access Road for OTR trucks in the same general vicinity. The Hobson Road/Bainbridge Avenue realignment, Viaduct Road removal, and drayage road construction are the same as described under Alternative 1 (Proposed Project).

Like Alternative 1 (Proposed Project), most of the road and rail improvements under Alternative 5 would be made to upland habitat to avoid and minimize impacts to aquatic habitat, where feasible. Access bridges would result in the direct loss of aquatic habitat due to pile driving activities and shading impacts. All other impacts are to disturbed/maintained upland habitat.

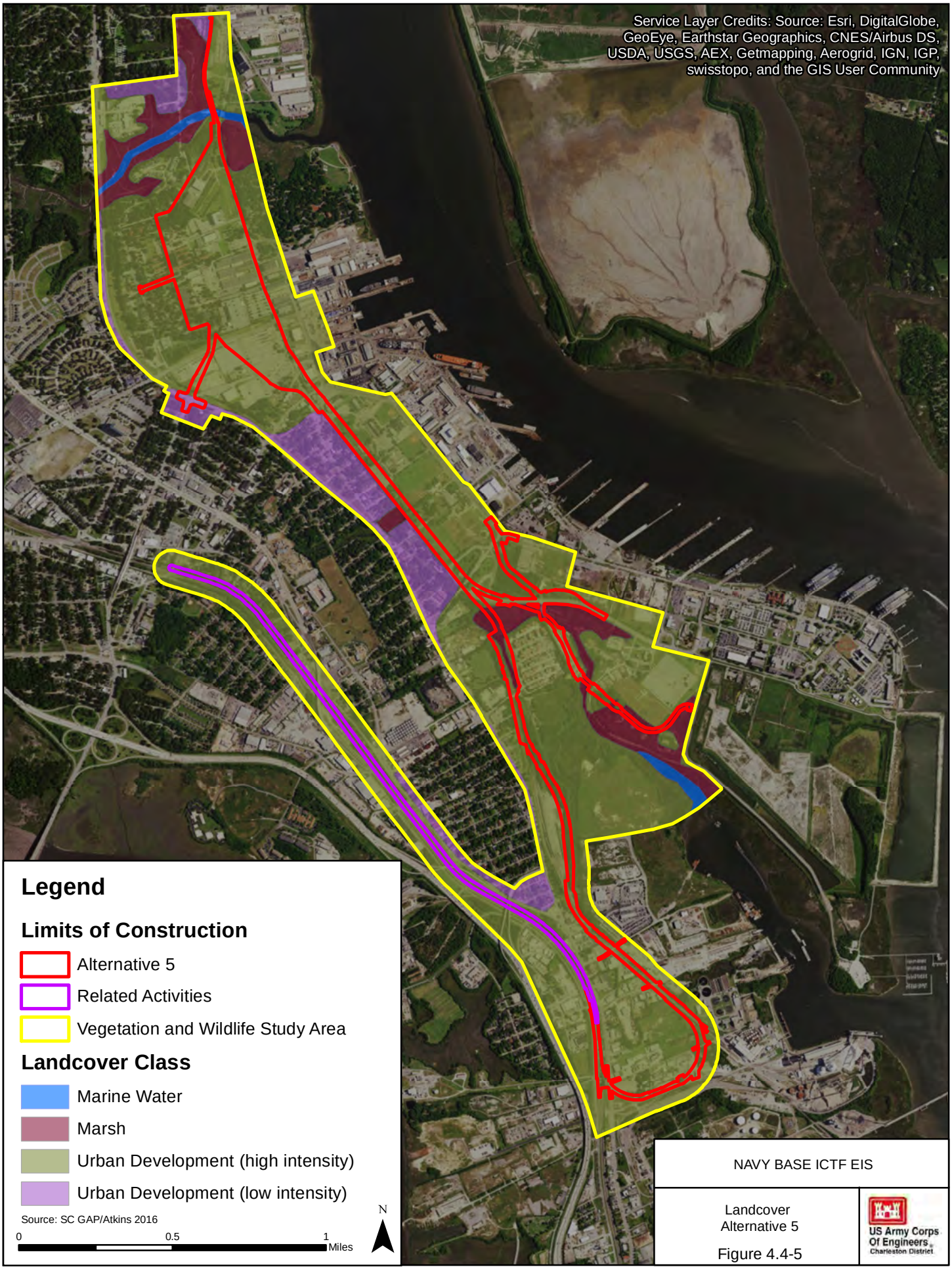
Habitat alteration, habitat fragmentation, introduction of invasive/noxious species, species displacement, and species mortality impacts to vegetation and wildlife under Alternative 5 are expected to be minor which is similar to those discussed under Alternative 1 (Proposed Project); however, under Alternative 5, there would be fewer impacts to upland habitat, because the River Center project site would be smaller in size than Alternative 1 (Proposed Project). Construction of Alternative 5 would permanently disturb approximately 194.32 acres of vegetation within the limits of construction of the study area. As shown in Figure 4.4-5, Alternative 5 would permanently alter approximately 185.86 acres of upland terrestrial habitat and 8.45 acres of tidal aquatic habitat (Table 4.4-6).

Table 4.4-6
Land Cover Impacts for Alternative 5

Impact Location		Impacts on Land Cover (acres)					
	Impact Type	Marsh	Marine Water	Urban Development (high intensity)	Urban Development (low intensity)	Total	% of Total
Drayage Road	Fill	0.32	–	13.39	–	13.71	7.05
Drayage Road Bridges	Shading	3.36	–	0.84	–	4.20	2.16
Hobson/Bainbridge Realignment	Fill	0.63	–	10.87	–	11.50	5.92
ICTF	Fill	–	–	113.08	0.05	113.12	58.22
ICTF Access Roads	Fill	–	–	4.11	1.83	5.94	3.06
Noisette Bridge	Shading	–	0.16	0.03	–	0.19	0.10
Northern Connection	Fill	0.28	0.01	0.60	–	0.90	0.46
Southern Connection	Fill	3.70	–	40.89	0.17	44.75	23.03
Total*		**8.28**	**0.17**	**183.81**	**2.05**	**194.32**	**100.00**

*The sum of individual items may not equal totals due to rounding.

Source: Atkins 2018.


Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
Legend
Limits of Construction
Alternative 5
Related Activities
Vegetation and Wildlife Study Area
Landcover Class
Marine Water
Marsh
Urban Development (high intensity)
Urban Development (low intensity)
Source: SC GAP/Atkins 2016
0
0.5
1
Miles
N
NAVY BASE ICTF EIS
Landcover
Alternative 5
Figure 4.4-5
US Army Corps Of Engineers
Charleston District

4.4.8 Alternative 6: River Center Site (South via Kingsworth / North via Hospital District)

Alternative 6 is a variation of Alternative 1 (Proposed Project) with the Project site being moved to the River Center project site. Under Alternative 6, the southern rail connection would connect to an existing CSX rail line near Kingsworth Avenue, as described in Alternative 3. Road and rail improvements would be adjusted accordingly to facilitate rail and road traffic at the new site. Under Alternative 6, the northern rail connection, ICTF Access Road, River Center project site, Hobson Road/Bainbridge Avenue realignment, Viaduct Road removal, and drayage road are the same as those described under Alternative 5.

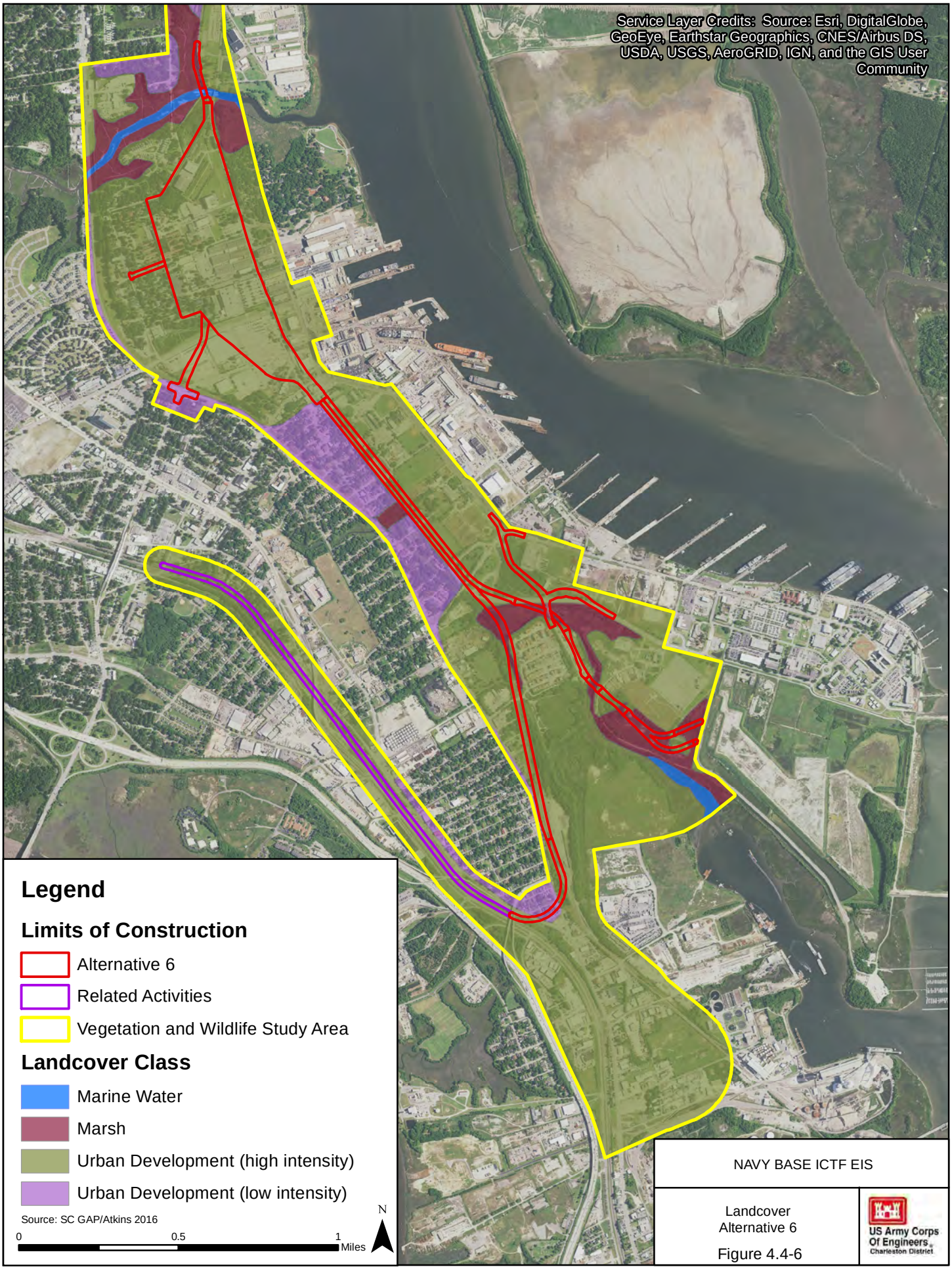
Habitat alteration, habitat fragmentation, introduction of invasive/noxious species, species displacement, and species mortality impacts to vegetation and wildlife under Alternative 6 are expected to be minor, which is similar to those discussed under Alternative 1 (Proposed Project); however, similar to Alternative 5, there would be fewer impacts to upland habitat, because the River Center project site would be smaller than the Project site footprint. Construction of Alternative 6 would permanently disturb approximately 175.15 acres of vegetation within the limits of construction of the Vegetation and Wildlife study area. As shown in Figure 4.4-6, Alternative 6 would permanently alter approximately 166.70 acres of upland terrestrial habitat and 8.45 acres of tidal aquatic habitat (Table 4.4-7).

Table 4.4-7
Land Cover Impacts for Alternative 6

Impact Location		Impacts on Land Cover (acres)					
	Impact Type	Marsh	Marine Water	Urban Development (high intensity)	Urban Development (low intensity)	Total	% of Total
Drayage Road	Fill	0.32	–	13.39	–	13.71	7.83
Drayage Road Bridges	Shading	3.36	–	0.84	–	4.20	2.40
Hobson/Bainbridge Realignment	Fill	0.63	–	10.87	–	11.50	6.56
ICTF	Fill	–	–	113.08	0.05	113.12	64.59
ICTF Access Roads	Fill	–	–	4.11	1.83	5.94	3.39
Noisette Bridge	Shading	–	0.16	0.03	–	0.19	0.11
Northern Connection	Fill	0.28	0.01	0.60	–	0.90	0.51
Southern Connection	Fill	3.70	–	17.65	0.17	25.59	12.28
Total*		**8.28**	**0.17**	**163.79**	**2.91**	**175.15**	**100.00**

*The sum of individual items may not equal totals due to rounding.

Source: Atkins 2018.


Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Legend
Limits of Construction
Alternative 6
Related Activities
Vegetation and Wildlife Study Area
Landcover Class
Marine Water
Marsh
Urban Development (high intensity)
Urban Development (low intensity)
Source: SC GAP/Atkins 2016
0
0.5
1
Miles
N
NAVY BASE ICTF EIS
Landcover
Alternative 6
Figure 4.4-6
US Army Corps Of Engineers
Charleston District

4.4.9 Alternative 7: River Center Site (South via Milford)

Alternative 7 is a variation of Alternative 1 (Proposed Project) with the Project site being moved to the River Center project site. Under Alternative 7, trains would enter and exit the Navy Base ICTF from a southern rail connection as described under Alternative 4. Road and rail improvements would be adjusted accordingly to facilitate rail and road traffic at the new site. Under Alternative 7, the ICTF Access Road, River Center project site, Hobson Road/Bainbridge Avenue realignment, Viaduct Road removal, and drayage road are the same as those described under Alternative 5.

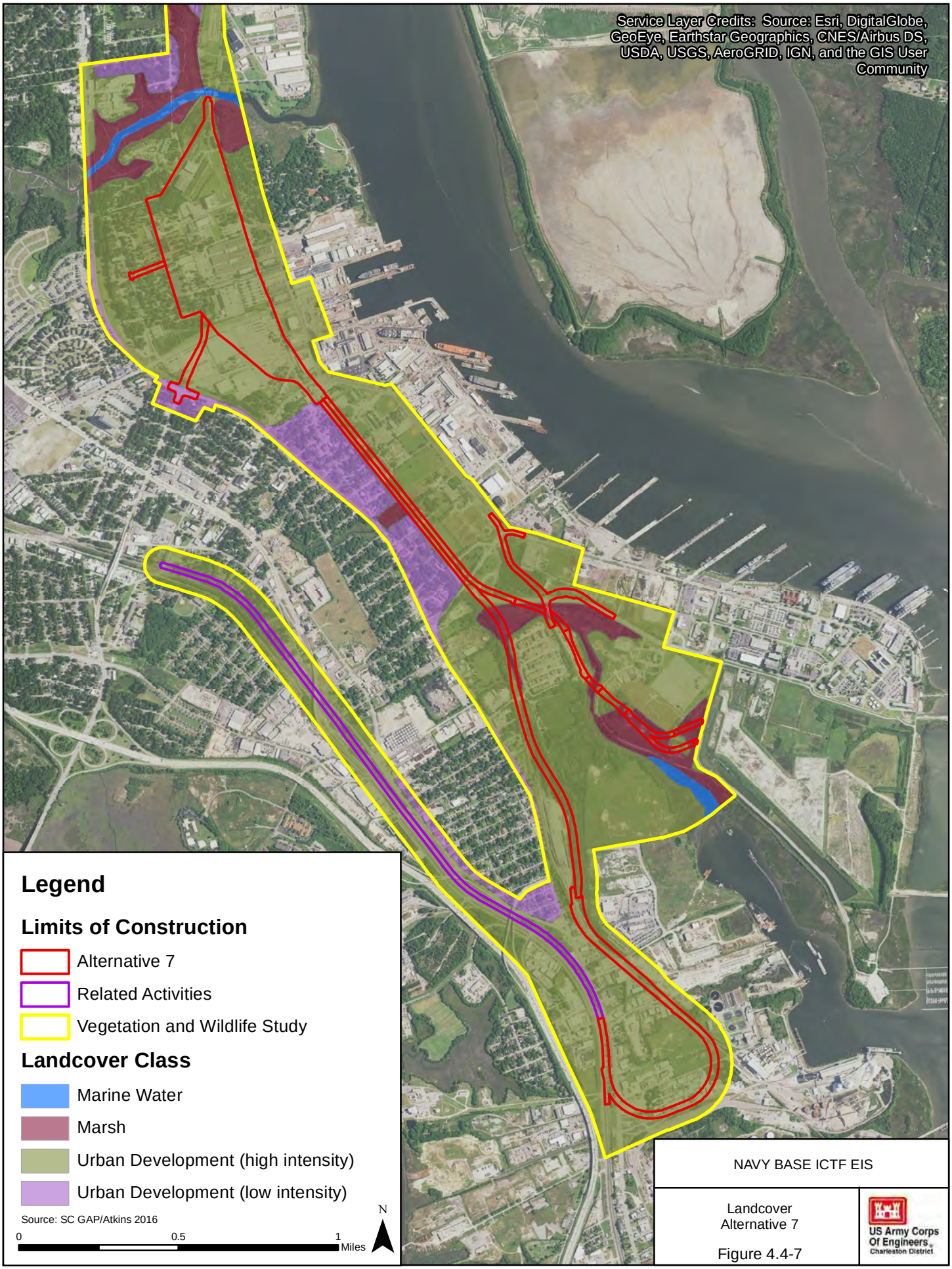
Habitat alteration, habitat fragmentation, introduction of invasive/noxious species, species displacement, and species mortality impacts to vegetation and wildlife under Alternative 7 are expected to be minor, which is similar to those discussed under Alternative 1 (Proposed Project); however, under Alternative 7, there would be no impacts to marine habitat and fewer fill and shading impacts to the aquatic species and habitat of Noisette Creek. There would also be fewer impacts to upland habitat, because the River Center project site footprint would be smaller than the Project site footprint. Construction of Alternative 7 would permanently disturb approximately 197.98 acres of vegetation within the limits of construction of the Vegetation and Wildlife study area. As shown in Figure 4.4-7, Alternative 7 would permanently alter approximately 189.98 acres of upland terrestrial habitat and 8.00 acres of tidal aquatic habitat (Table 4.4-8).

Table 4.4-8
Land Cover Impacts for Alternative 7

Impact Location		Impacts on Land Cover (acres)					
	Impact Type	Marsh	Marine Water	Urban Development (high intensity)	Urban Development (low intensity)	Total	% of Total
Drayage Road	Fill	0.32	–	13.39	–	13.71	6.92
Drayage Road Bridges	Shading	3.36	–	0.84	–	4.20	2.12
Hobson/Bainbridge Realignment	Fill	0.63	–	10.87	–	11.50	5.81
ICTF	Fill	–	–	113.28	0.05	113.33	57.24
ICTF Access Roads	Fill	–	–	4.11	1.83	5.94	3.00
Southern Connection	Fill	3.70	–	45.43	0.17	49.30	24.90
Total*		**8.00**	**0.00**	**187.93**	**2.05**	**197.98**	**100.00**

*The sum of individual items may not equal totals due to rounding.

Source: Atkins 2018.



NAVY BASE ICTF EIS

Landcover
Alternative 7

Figure 4.4-7

US Army Corps Of Engineers
Charleston District

4.4.10 Related Activities

If Alternative 1 (Proposed Project) was constructed, a section of unimproved CSX ROW would have to be activated with rail lines that would accept intermodal trains at the proposed new at-grade crossing at Meeting Street in the vicinity of Discher Street and would terminate in the vicinity of Accabee Road. This Related Activity would apply to Alternatives 1, 2, 4, 5, and 7. Under Alternatives 3 and 6, the Related Activity construction would begin at the proposed new at-grade crossing at Meeting Street in the vicinity of Kingsworth Avenue and would terminate in the vicinity of Accabee Road. Under Alternative 2, an additional Related Activity would be required to connect the northern rail from the Project site, crossing a portion of marsh that drains to Noisette Creek, to the existing NCTC track along Virginia Avenue.

The impacts on vegetation associated with construction of the Related Activity for each alternative including Alternative 1 (Proposed Project) are summarized in Table 4.4-9. As described above, construction of the Related Activity associated with Alternative 2 would involve impacts to marsh habitat, otherwise most of the impacts from construction of the Related Activity would be to upland, disturbed habitat.

Table 4.4-9
Land Cover Impacts from Related Activities

Alternative		Impacts on Land Cover (acres)				
	Impact Type	Marsh	Marine Water	Urban Development (high intensity)	Urban Development (low intensity)	Total
Proposed Project	Fill	–	–	21.80		**21.80**
Alternative 2	Fill	2.14	–	22.70	2.62	**27.46**
Alternative 3	Fill	–	–	16.83		**16.83**
Alternative 4	Fill	–	–	21.45		**21.45**
Alternative 5	Fill	–	–	21.80		**21.80**
Alternative 6	Fill	–	–	16.83		**16.83**
Alternative 7	Fill	–	–	21.45		**21.45**

Source: Atkins 2018.

4.4.11 Summary of Impacts Table

Table 4.4-10 summarizes the environmental consequences to Vegetation and Wildlife from Alternative 1 (Proposed Project) and all the alternatives.

Table 4.4-10
Summary of Impacts, Vegetation and Wildlife

Alternative	Habitat	Introduction of Invasive/Noxious Species	Species Displacement	Species Mortality
No-Action	Negligible effect on vegetative land cover classes from habitat alteration and fragmentation due to the continuation of mixed use and industrial land uses.	Minor adverse. Routine maintenance (cutting and mowing) of vegetation could result in the proliferation of invasive/noxious plants present within the study area	Negligible. Existing and future land uses are not expected to directly or indirectly displace the wildlife species inhabiting the study area	Negligible. Existing and future land uses are not expected to result in the mortality of species inhabiting the study area
1: *Proposed Project: South via Milford / North via Hospital District*	Minor adverse. Loss of habitat from removal of vegetation during construction but would not degrade the stability of animal populations; approximately 233.71 acres of vegetation would be removed, of which 95.5 percent would consist of previously disturbed communities and 4.5 percent of natural communities (10.35 acres of marsh and 0.17 acre of marine open water); increase in habitat fragmentation	Minor adverse. Routine maintenance (cutting and mowing) of vegetation could result in the proliferation of invasive/noxious plants present within the study area	Minor adverse. Potential exists for direct and indirect short-term species displacement during construction; common species are relatively abundant and adapted to living in close association with human activity and infrastructure	Minor adverse. Potential exists for mortality of species during construction; wildlife would likely move away in the presence of human activity
2: *South via Milford / North via S-line*	Same as Alternative 1 (Proposed Project) but approximately 236.83 acres of vegetation would be removed, of which 94.4 percent would consist of previously disturbed communities and 5.6 percent of natural communities (12.93 acres of marsh and 0.36 acre of marine open water)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
3: *South via Kingsworth / North via Hospital*	Same as Alternative 1 (Proposed Project), but approximately 214.27 acres of vegetation would be removed, of which 95.1 percent would consist of previously disturbed communities and 4.9 percent of natural communities (10.34 acres of marsh and 0.17 acre of marine open water)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
4: *South via Milford*	Same as Alternative 1 (Proposed Project) but approximately 235.89 acres of vegetation would be removed, of which 95.7 percent would consist of previously disturbed communities and 4.3 percent of natural communities (10.07 acres of marsh); no marine open water would be impacted	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)

Alternative	Habitat	Introduction of Invasive/Noxious Species	Species Displacement	Species Mortality
5: *River Center Site: South via Milford / North via Hospital District*	Minor adverse loss of habitat from removal of vegetation during construction but would not degrade the stability of animal populations; approximately 194.32 acres of vegetation would be removed, of which 95.7 percent would consist of previously disturbed communities and 4.35 percent of natural communities (8.28 acres of marsh and 0.17 acre of marine open water); increase in habitat fragmentation	Minor adverse. Routine maintenance (cutting and mowing) of vegetation could result in the proliferation of invasive/noxious plants present within the study area	Minor adverse. Potential exists for direct and indirect short-term species displacement during construction; common species are relatively abundant and adapted to living in close association with human activity and infrastructure	Minor adverse. Potential exists for mortality of species during construction; wildlife would likely move away in the presence of human activity
6: *River Center Site: South via Kingsworth / North via Hospital*	Same as Alternative 5 but approximately 175.15 acres of vegetation would be removed, of which 95.2 percent would consist of previously disturbed communities and 4.83 percent of natural communities (8.28 acres of marsh and 0.17 acre of marine open water)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
7: *River Center Site: South via Milford*	Same as Alternative 5 but approximately 197.98 acres of vegetation would be removed, of which 96.0 percent would consist of previously disturbed communities and 4.0 percent of natural communities (8.00 acres of marsh); no marine open water would be impacted	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)

Vegetation Impact Definitions

Negligible = No impacts to vegetation or plant communities.

Minor = Alteration in vegetation or plant communities (habitat) that sustain animal populations; fragmentation of habitat that impairs existing plant communities; localized occurrences of invasive, noxious weeds.

Major = Loss of vegetation or plant communities (habitat) that degrade the stability of animal populations; fragmentation of habitat that results in the loss of plant communities; widespread occurrences of invasive, noxious weeds.

Wildlife Impact Definitions

Negligible = No impacts to wildlife.

Minor = Short-term displacement of wildlife species; mortality of individuals of common wildlife species; fragmentation of populations of distinct wildlife species; short-term impairment to animal migratory paths; localized occurrences of non-native wildlife species.

Major = Permanent impairment to animal migratory paths; mortality of a distinct population of common wildlife species; destruction of wildlife breeding grounds/nesting areas (e.g., rookeries); introduction and uncontrollable spread of non-native wildlife species.

In summary, the land cover types and wildlife habitat within the Vegetation and Wildlife study area were divided into four categories: marsh, marine water, urban development (high intensity) and urban development (low intensity). There are no impacts to marine open water from Alternatives 4 and 7. All alternatives, including Alternative 1 (Proposed Project), would impact 95.5 percent of previously disturbed habitat within the limits of proposed construction of the Vegetation and Wildlife study area. Alternatives 5 through 7 would remove and disturb less vegetation and wildlife habitat than Alternative 1 (Proposed Project) due to the smaller River Center project site footprint.

4.4.12 Mitigation

4.4.12.1 Applicant's Proposed Avoidance and Minimization Measures

The Applicant has committed to several measures that avoid and/or minimize potential impacts of Alternative 1 (Proposed Project). These measures are taken from Palmetto Railways Mitigation Plan provided in Appendix N. Some of these measures are required under federal, state, and local permits; others are measures that Palmetto Railways has incorporated into the design and operations of Alternative 1 (Proposed Project). Each mitigation measure is also designated as one that either helps to avoid an impact or one that minimizes an impact.

- Redevelopment of an existing industrial site that minimizes impacts to undeveloped land. (Avoidance and Minimization)
- Plant native vegetation and trees on the earthen berm within a 100-foot buffer along the western property boundary. (Minimization)

These avoidance and minimization measures, except the items noted with an asterisk (*), have been considered in the preceding impact analysis. The complete list of Applicant-proposed avoidance and minimization measures for the Navy Base ICTF is also provided in Chapter 6, Table 6.1.

4.4.12.2 Additional Potential Mitigation Measures

No additional mitigation measures are proposed for vegetation and wildlife by the Corps. Additional avoidance, minimization, and mitigation may be considered by the Corps in its decision-making process. Final mitigation measures may be adopted as conditions of the DA permit and documented in the Record of Decision (ROD).