5.0 CUMULATIVE IMPACTS

5.1 INTRODUCTION

Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time, when adding the incremental impact of a Proposed Project to other past, present, and reasonably foreseeable future actions (Future Actions), regardless of what agency (federal or nonfederal) or person undertakes such actions (40 C.F.R. 1508.7). Chapter 3, Affected Environment, presents information about past and present environmental conditions, including past trends that are expected to continue into the future. Chapter 4, Environmental Consequences, presents the environmental and socioeconomic consequences of implementing Alternative 1 (Proposed Project) and the alternatives. This chapter addresses the cumulative impacts of the Navy Base ICTF when combined with other past, present, and Future Actions.

The cumulative impact assessment provides a broader assessment of potential impacts associated with implementing Alternative 1 (Proposed Project) and the alternatives by considering a wide array of other activities, new and ongoing projects, and programs in the study area. The potential interactions between the Navy Base ICTF and Future Actions and programs are identified in order to assess potential adverse or beneficial cumulative impacts. Each of the resource areas evaluated in this EIS was screened to determine the potential for cumulative impacts, as described below. Those resources with the potential for cumulative impacts were carried forward for further analysis.

The key to a cumulative impact analysis is the identification of Future Actions within a clearly defined geographic and temporal scope. These elements are defined below:

- **Geographic Scope** – The geographic area over which past, present, and Future Actions are identified and evaluated. The geographic scope is related to specific environmental resources. For example, the geographic area over which impacts on air resources (related to the airshed) are considered is different than the area considered for transportation (the county road system). The geographic scope of a cumulative impacts analysis is influenced by both direct and indirect impacts.
- **Temporal Scope** – The time span over which past, present, and Future Actions are identified and cumulative impacts are evaluated. The time span for this analysis is through 2038.

- **Reasonably Foreseeable Future Actions** – Potential federal or nonfederal actions identified within the geographic and temporal scopes of the Proposed Project and alternatives. The predicted impacts of the Future Actions are combined with the potential direct and indirect impacts of the Proposed Project to determine potential future cumulative impacts on a given resource. The term "reasonably foreseeable" is not defined in the regulations. For this analysis, Future Actions are those for which information available suggests that they are likely to occur.

The identification of past, present, and Future Actions and trends involves some uncertainty, as does the assessment of the magnitude of impacts now and in the future. The cumulative impacts analysis is designed to explore the range of potential cumulative impacts while recognizing that uncertainty. Cumulative effects are identified to allow decision makers to be informed that changes may be necessary in existing programs or that future regulatory initiatives may be required.

5.2 GEOGRAPHIC AND TEMPORAL SCOPE

A cumulative impacts analysis requires expanding the geographic area of the study beyond that of the Proposed Project and expanding the temporal limits to consider past, present, and future actions that may affect the resources of concern. Individual geographic boundaries (study areas) were established in Chapter 3 for each resource area evaluated in this EIS. These study areas were used in the cumulative impacts analysis.

The Navy Base ICTF would have impacts during construction and operation. At project inception the Navy Base ICTF was expected to have a construction period that would last approximately five years, with an opening year of 2018; however, the actual opening year has not been determined at this time. The time frame for the cumulative impacts assessment extends to the year 2038, which includes the construction period and approximately 20 years of operation, and is consistent with the time frame for other impact analyses presented in this EIS. This period extends beyond the practical limits of predictability for some topics, such as air quality and water quality issues, but is a reasonable time period for which to assess potential cumulative impacts. The timeframe used for historical examination of cumulative impacts for specific resources varies depending upon the availability and applicability of information.

5.3 IDENTIFICATION OF PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE ACTIONS

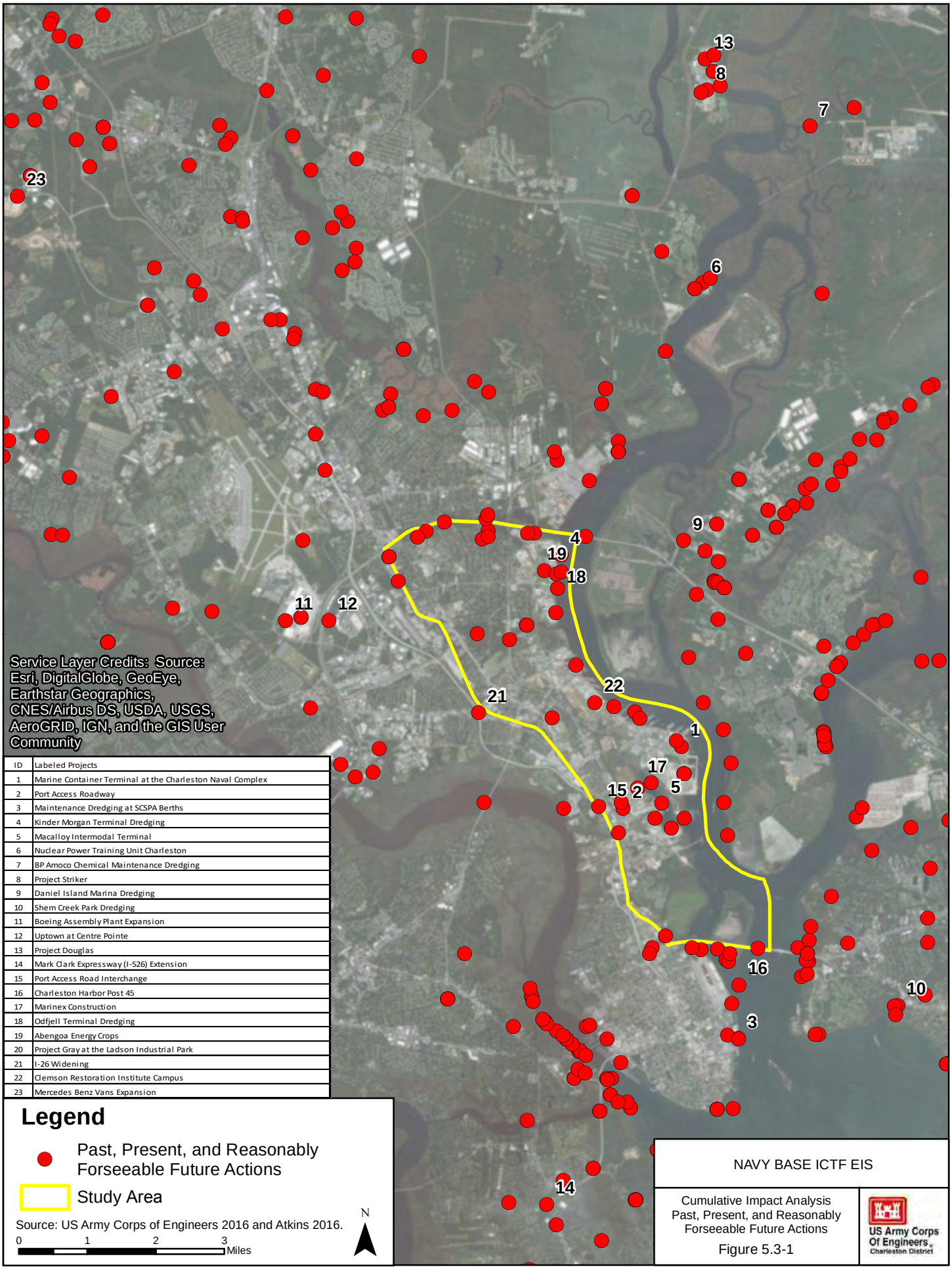
Relevant projects, plans, and programs that could interact with Alternative 1 (Proposed Project) or the alternatives were identified during the environmental analysis for the specific resource areas. To identify Future Actions, a general literature search was conducted. The following entities were consulted:

- Berkeley Charleston Dorchester Council of Governments
- Charleston Metro Chamber of Commerce
- South Carolina Department of Commerce
- ICTF Scoping Report
- South Carolina Statewide Transportation Improvement Program
- South Carolina State Rail Plan
- Corps Permit Records and Public Notices

A review of actions noted in these sources indicates that cumulative impacts would result primarily from port and navigational projects, urban and industrial development, and surface transportation projects. Figure 5.3-1 illustrates the locations of the past, present, and Future Actions in relation to the Navy Base ICTF. Types of actions and specific projects are noted in the following subsections. Appendix M contains detailed descriptions of the projects that have been identified.

5.3.1 Port and Navigational Projects

The Port and industry linked with Charleston's maritime transportation are major components of the greater metro Charleston economy. The widening of the Panama Canal, expected to be complete in 2016, will allow larger vessels to travel directly from Asia and the Indian sub-continent to East Coast ports. A number of projects have been undertaken or are planned in the Port of Charleston area to accommodate these larger vessels and/or to accommodate projected growth in container cargo. Such projects include the deepening of the Charleston Harbor to 52 feet mean low water (MLW) (Charleston Harbor Post 45), construction of the Hugh K. Leatherman Sr. Terminal (HLT) (formerly the Navy Base Marine Container Terminal at CNC), and expansion of commercial, institutional, and industrial facilities. Many of these projects include development of manufacturing, warehousing, and upland transportation facilities in addition to maritime improvements. There are also numerous community dock facilities planned and under construction to support residential developments throughout the area.



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

ID	Labeled Projects
1	Marine Container Terminal at the Charleston Naval Complex
2	Port Access Roadway
3	Maintenance Dredging at SCSPA Berths
4	Kinder Morgan Terminal Dredging
5	Macalloy Intermodal Terminal
6	Nuclear Power Training Unit Charleston
7	BP Amoco Chemical Maintenance Dredging
8	Project Striker
9	Daniel Island Marina Dredging
10	Shem Creek Park Dredging
11	Boeing Assembly Plant Expansion
12	Uptown at Centre Pointe
13	Project Douglas
14	Mark Clark Expressway (I-526) Extension
15	Port Access Road Interchange
16	Charleston Harbor Post 45
17	Marinex Construction
18	Odfjell Terminal Dredging
19	Abengoa Energy Crops
20	Project Gray at the Ladson Industrial Park
21	I-26 Widening
22	Clemson Restoration Institute Campus
23	Mercedes Benz Vans Expansion

Legend

Past, Present, and Reasonably Forseeable Future Actions

Study Area

Source: US Army Corps of Engineers 2016 and Atkins 2016.

0 1 2 3 Miles

N

NAVY BASE ICTF EIS

Cumulative Impact Analysis
Past, Present, and Reasonably Forseeable Future Actions

Figure 5.3-1

US Army Corps Of Engineers Charleston District

Port and navigational projects that have the potential to contribute to cumulative impacts include:

- Hugh K. Leatherman Sr. Terminal (HLT) (formerly the Navy Base Marine Container Terminal at the Charleston Naval Complex)
- Charleston Harbor Post 45
- Maintenance Dredging at SCPA Berths
- Kinder Morgan Terminal Maintenance Dredging
- Kinder Morgan at Shipyard Creek
- Shipyard Creek Associates, LLC
- Odfjell Terminal Dredging
- Nuclear Power Training Unit Charleston
- BP Amoco Chemical Maintenance Dredging
- Marinex Construction
- Project Douglas
- Daniel Island Marina Dredging
- Shem Creek Park Dredging
- Abengoa Energy Crops

5.3.2 Other Urban and Industrial Development

Urban and industrial development that may contribute to cumulative impacts include industrial or manufacturing facilities, commercial and residential development/redevelopment, institutional development, and public works projects. Industrial and manufacturing facilities that also have a port component are included in the previous section. Urban and industrial development projects include:

- Boeing Assembly Plant Expansion
- Uptown at Centre Pointe
- Clemson Restoration Institute Campus

5.3.3 Surface Transportation

Surface transportation projects that may contribute to cumulative impacts include improvements to roadways as well as the rail system. The existing transportation system is discussed in Section 3.8. The South Carolina Statewide Transportation Improvement Program (STIP) covers all federally-funded improvements that are expected to occur within a 6-year period (currently through 2019). The STIP is updated every 3 years and is revised on a continual basis to reflect the latest program and project information (SCDOT 2013). Surface transportation projects include:

- I-26 Port Access Road Interchange
- I-26 widening from Exit 196 to Exit 221 (completed)
- Mark Clark Expressway (I-526) Extension

The following rail projects have been recently completed or are proposed by Palmetto Railways:

- Charleston Yard Expansion Project
- Navy Base North End Yard
- Cosgrove Yard Operations (FRA recently awarded a $650,000 grant to the Applicant to upgrade crossing equipment at the Virginia Avenue grade crossing at this location)

5.4 METHODS

The analysis of cumulative impacts related to Alternative 1 (Proposed Project) and alternatives followed the four steps described below.

Step 1: Project-related impacts identified in Chapter 4 were reviewed to determine which environmental resources would likely be affected both by Alternative 1 (Proposed Project) and by other past, present, and Future Actions. The environmental resources not likely to be affected by the Proposed Project and therefore not likely to be affected by cumulative impacts associated with the Proposed Project were screened and then excluded from further consideration (Table 5.5-1). Environmental resources that could be affected by cumulative impacts were analyzed further. The criteria used to assess and identify cumulatively affected resources followed the methodology presented in the CEQ's Considering Cumulative Effects (1997).

Step 2: The geographic scope for the cumulative impacts analysis was determined based on the geographic area affected or influenced by the Proposed Project and alternatives. In general, the geographic scope should be consistent with the resources that could reasonably be affected. The temporal scope was established based on the timeframe of the Proposed Project and the Future Actions that were identified and evaluated.

Step 3: Future Actions that fell within both the geographic and temporal scopes were identified and evaluated.

Step 4: Cumulative impacts were evaluated together with the direct impacts of each alternative—including the No-Action Alternative, which serves as a baseline. The range of actions considered in the cumulative impacts analysis included all connected and similar actions that could cumulatively contribute to identified Project-related impacts. Criteria used in identifying cumulatively affected resources included whether (1) the resource is especially vulnerable to incremental impacts; (2) other actions in the same geographic area may result in similar impacts on the resource; (3) impacts have been historically important for the resource; and (4) cumulative impact concerns

have been previously analyzed and identified (EPA 1999b). A review of the Future Actions in combination with the Proposed Project determines whether projects in the resource-specific study areas for cumulative impacts could result in similar impacts on the resource.

5.5 SCREENING FOR CUMULATIVE IMPACTS

Each resource area was researched, reviewed, and evaluated to determine whether Project-related impacts on that resource in concert with other Future Actions would result in the potential for cumulative impacts. This screening revealed that Project-related impacts in several resource categories addressed in Chapter 4 have the potential to contribute in more than a minor way to cumulative impacts. Other resource areas were determined unlikely to be cumulatively affected or would potentially contribute to cumulative impacts in only a minor way. The resource areas determined to have the potential for more than minor cumulative impacts were carried forward for further consideration and analysis. The rationale for these conclusions is presented in Table 5.5-1 with additional detail on impacts included in the corresponding section in Section 4.0 Environmental Consequences. Section 5.6 includes additional analyses of the impacts to any resource areas for which Alternative 1 (Proposed Project) has the potential to contribute to cumulative impacts in more than a minor way. For some resource areas, the Corps determined that, based on the additional analysis, there would be no cumulative impacts.

Table 5.5-1
Screening of Potential Cumulative Impacts by Resource Area

Resource Area	Potential to Contribute to Cumulative Impacts in More Than a Minor Way?	Rationale
Geology and Soils	**No**	Alternative 1 (Proposed Project) is anticipated to result in negligible impacts to geology and potentially minor adverse impacts to soils due to erosion, loss of topsoil, soil compaction, and runoff. Construction of Alternative 1 (Proposed Project) would cause a relatively small demand for fill material in comparison to available resources. Construction of Alternative 1 (Proposed Project) would not impact any soils that comprise sources of potable water. The interaction of Alternative 1 (Proposed Project) with other Future Actions is not anticipated to result in any cumulative impacts to geology and soils.

Resource Area	Potential to Contribute to Cumulative Impacts in More Than a Minor Way?	Rationale
Hydrology	**No**	Construction of Alternative 1 (Proposed Project) would cause a significant increase in impervious surface; however, with mitigation impacts would be minor Alternative 1 (Proposed Project) involve discharge into impaired water bodies; however, implementation of Best Management Practices (BMPs) would be required to reduce pollutant loads and prevent further impairment, resulting in negligible impacts. Alternative 1 (Proposed Project) are located in designated floodplains, however there would be a negligible adverse impact to base floodplains resulting from the placement of fill; negligible impact to flood hazard for other adjacent areas. The interaction of Alternative 1 (Proposed Project) with other Future Actions is not anticipated to result in any cumulative impacts to hydrology.
Water Quality	**No**	Alternative 1 (Proposed Project) has the potential to improve surface water quality over existing conditions due to improved treatment of stormwater runoff through addition of detention ponds, sediment forebays, and implementation of BMPs. All design requirements must be in compliance with the total maximum daily load (TMDL) for dissolved oxygen established for the Charleston Harbor, Cooper, Ashley, and Wando Rivers. Other Future Actions would be subject to similar regulatory standards and are not expected to interact with Alternative 1 (Proposed Project) in a way that would result in cumulative impacts to water quality.
Vegetation and Wildlife	**No**	Impacts to upland vegetation are anticipated to be minor adverse for Alternative 1 (Proposed Project). Impacts to wetland plant communities would be reduced by the avoidance and minimization of construction activities within tidal wetlands. This includes bridging any roadways and railways that are proposed to impact tidal wetlands and creeks. Impacts to mammals, wading birds, migratory birds, raptors, reptiles, fish, crustaceans and mollusks are anticipated to be minor adverse for Alternative 1 (Proposed Project) as a result of potential displacement and/or mortality of individuals during construction activities. The interaction of Alternative 1 (Proposed Project) with other Future Actions is not anticipated to result in any cumulative impacts to vegetation and wildlife.
Waters of the U.S.	**Yes**	Alternative 1 (Proposed Project) would result in fill impacts to 15.84 acres of wetland habitat (includes 6.65 acres of tidal salt marsh, 8.01 acres of freshwater wetlands, 1.14 acres of tidal open waters and 0.04 acres of non-tidal open-water impacts). The interaction of Alternative 1 (Proposed Project) with other Future Actions may result in cumulative impacts to waters of the U.S.
Protected Species	**No**	With the implementation of avoidance and minimization measures during construction activities and additional potential mitigation measures, Alternative 1 (Proposed Project) would have negligible effects on habitat alteration/fragmentation and species displacement of Protected Species. The interaction of Alternative 1 (Proposed Project) with other Future Actions is not anticipated to result in any cumulative impacts to Protected Species.

Resource Area	Potential to Contribute to Cumulative Impacts in More Than a Minor Way?	Rationale
Essential Fish Habitat	**No**	Alternative 1 (Proposed Project) would result in the loss of 7.79 acres of Essential Fish Habitat (EFH) and a minor impact to federally managed species during construction. Alternative 1 (Proposed Project) would have a negligible impact to oysters with the implementation of water quality BMPs and the potential for future oyster settlement and propagation. The interaction of Alternative 1 (Proposed Project) with other Future Actions is not anticipated to result in cumulative impacts to EFH.
Traffic and Transportation	**Yes**	The transportation study was designed to account for other Future Actions in the study area; therefore, the impacts inherently account for cumulative impacts. The interaction of Alternative 1 (Proposed Project) with other Future Actions is anticipated to result in cumulative impacts to transportation within the study area.
Land Use and Infrastructure	**Land Use – Yes** **Infrastructure – No**	Land Use: Impacts to land use as a result of Alternative 1 (Proposed Project) is anticipated to be major, requiring rezoning as well as an amendment to the City of North Charleston Comprehensive Plan. Alternative 1 (Proposed Project) would require the demolition of approximately 88 structures. Additional off-site roadway and rail improvements would cause the demolition of approximately 23 structures, all of which would be considered a major permanent adverse impact. Infrastructure: Utility services for potable water, sanitary sewer, natural gas, telecommunications, and solid waste are currently in place and have sufficient capacity to serve Alternative 1 (Proposed Project). Peak service demands from the five electric cranes on the Project site would require upgrades to the local electric utility infrastructure. There may be temporary interruptions of utility services during construction as existing infrastructure is relocated and/or upgraded. No cumulative impacts to utilities are anticipated in the region.
Cultural Resources	**Yes**	Impacts to historic properties as a result of Alternative 1 (Proposed Project) are anticipated to be adverse for the CNH historic district and the USMC Barracks. There would be negligible impacts to the remaining historic properties near Alternative 1 (Proposed Project) due to vibration. The potential for archaeological sites to exist within the Proposed Project site is minimal. There is the potential that the interaction of Alternative 1 (Proposed Project) with other Future Actions could result in cumulative impacts to cultural resources.

Resource Area	Potential to Contribute to Cumulative Impacts in More Than a Minor Way?	Rationale
Visual Resources and Aesthetics	**Yes**	Construction and operation of Alternative 1 (Proposed Project) would result in a minor, permanent adverse impact to scenic views. Alternative 1 (Proposed Project) would result in a major, permanent adverse impact to scenic resources (e.g., historic properties). There would be a range of negligible to major, permanent adverse impacts to visual quality and character of the Visual Resource study area (VRSA) from the construction and removal of structures and mature trees, including contributing elements of a historic district(s) under Alternative 1 (Proposed Project). The introduction of high-mast lighting (illuminated from dusk until dawn), as well as train head lamps, would introduce minor, permanent impacts from light and glare. Nighttime head lamps from trains could potentially disturb sleep for residences along curvatures in rail tracks under Alternative 1 (Proposed Project).
Noise and Vibration	**Yes**	For Alternative 1 (Proposed Project), traffic noise impacts would result in a negligible adverse impact overall and a negligible beneficial effect for several streets. Rail noise impacts would be a minor to moderate adverse impact along several segments due to increased rail activity and new track builds. Rail vibration impacts would be negligible. Construction impacts would be a minor to moderate adverse impact in the vicinity due to frequent operations of construction equipment. Operational impacts would be a minor to moderate exterior daytime adverse impact and major exterior nighttime impact in the vicinity due to standard train/crane operations. Negligible additive noise impacts would occur at Virginia Avenue (Traffic + Rail Noise) and minor to moderate additive noise impacts would occur at St. Johns Avenue (Traffic + Rail Noise). This Project, when combined with other Future Actions, could result in cumulative impacts.
Air quality	**Yes**	Alternative 1 (Proposed Project) would have minor impacts from criteria pollutants from both construction and operation. Criteria pollutants emitted for Alternative 1 (Proposed Project) along with the existing and projected criteria pollutants, would not put the Tri-County area into non-attainment for any criteria pollutants. Impacts from non-DPM HAP emissions would be within the acceptable range. Potential impacts from cancer risk would be within the acceptable range, and impacts from noncancer hazard would be negligible. There is a potential for cumulative impacts to air quality when combined with other Future Actions.
Climate Change	**No**	Climate Change impacts are inherently cumulative in nature. GHG emissions contribute cumulatively and adversely to Global Climate Change, such as sea level rise, increased frequency and intensity of storm events, and impacts to ecosystems. The GHG emissions Inventory would be 30,948 MT CO_2e from Alternative 1 (Proposed Project), resulting in minor long-term adverse impacts. Impacts due to sea level rise at the Proposed Project would be negligible. Impacts from increased frequency and intensity of storm events on the Proposed Project site would be major.

Resource Area	Potential to Contribute to Cumulative Impacts in More Than a Minor Way?	Rationale
Hazardous, Toxic and Radioactive Waste	**No**	Construction and operation activities would comply with the Navy's permitting process and all applicable laws for testing and disposal of contaminated soils and treatment and disposal of dewatering effluent. All buildings requiring demolition are required to have asbestos and metals-based paint surveys; any impacts would be abated prior to demolition. All fuel and hazardous waste operations would be conducted in compliance with state and federal regulations. No impacts to Superfund sites or dangerous concentrations of hazardous materials are anticipated. Potential minor adverse impacts could result from Alternative 1 (Proposed Project). Other Future Actions would be subject to the same regulatory standards and are not expected to interact with Alternative 1 (Proposed Project) in a way that would result in a cumulative impact related to hazardous materials and waste.
Socioeconomics and Environmental Justice	**Yes**	Construction and operation of Alternative 1 (Proposed Project) would impact community resources, cohesion, business resources, mobility and access, and safety. Major short-term and indirect long-term beneficial impact as a result of the construction and operation of the ICTF to local and regional economies. Major adverse impacts to neighborhoods and communities, primarily in the form of residential displacements, would occur under Alternative 1 (Proposed Project). Alternative 1 (Proposed Project) would also have disproportionately high and adverse impacts to Environmental Justice populations.
Human Health and Safety	**Yes**	Overall, impacts to human health and safety as a result of Alternative 1 (Proposed Project) are anticipated to be negligible to minor adverse, and localized. There is a potential that these Project impacts would accumulate with impacts from other Future Actions to create an adverse cumulative impact to human health and safety.
Section 4(f) and 6(f) Resources	**Yes**	Alternative 1 (Proposed Project) would result in a direct use of the CNH Historic District from permanent incorporation (demolition of contributing elements of the historic district) and USMC Barracks from permanent incorporation (placement of arrival/departure tracks within the southwest corner of the Parade Ground), which are 4(f) resources. There is the potential that these Project uses would accumulate with uses from other Future Actions to create a cumulative use of Section 4(f) or 6(f) resources.

5.6 FURTHER ASSESSMENT OF CUMULATIVE IMPACTS

Alternative 1 (Proposed Project) and the alternatives, in combination with the Future Actions identified in Section 5.2, could result in cumulative impacts. Each resource area with the potential to result in more than minor cumulative impacts (Table 5.5-1) was further considered with regard to the past, present, and Future Actions. These resources are wetlands and other waters of the U.S., traffic and transportation, land use, visual resources and aesthetics, cultural resources, noise and vibration, air quality, and socioeconomics and Environmental Justice, human health and safety, and Section 4(f) and 6(f) resources.

5.6.1 Wetlands and Other Waters of the U.S.

The Charleston harbor estuary is the state's third largest estuary and is prized for its valuable marshlands and open water habitat; however, this region has been altered by anthropogenic activities for over three centuries (Van Dolah et al. 1990). Many of the developments in the region have taken place on or adjacent to waters of the U.S., resulting in thousands of acres of wetlands altered or filled. Due to historic rice production in the region, a large proportion of wetland loss was located along the Ashley and Cooper Rivers.

A record of Corps Charleston District DA permits issued from April 1997 to February 2016 was reviewed for the Cooper River watershed (HUC 03050201) (Figure 5.6-1) within the greater Charleston metro area (Charleston, Berkley and Dorchester counties). In this record, only projects with wetland fill impacts were considered for this review. Implementation of these past and present projects has resulted in impacts to 2,135.72 acres of wetland habitat, including 409.53 acres of palustrine wetlands, 112.38 acres of estuarine wetlands and 1,613.82 acres of other wetlands (lacustrine, marine, riverine, riparian, upland or unclassified). Alternative 1 (Proposed Project) would result in fill impacts to 12.09 acres of wetland habitat (8.94 acres of estuarine and 1.77 acres of palustrine habitat).

Future Actions projects are expected to result in impacts to 259.21 acres of wetland habitat (22.72 acres of estuarine and 236.49 acres of palustrine habitat). It is important to note that one of the largest Future Actions, the Post 45 dredging project, is not included in the Future Actions estimate as the project would have no direct impacts to wetlands resulting from dredging or disposal. The project is expected to indirectly impact approximately 324 acres of wetlands along the Ashley and Cooper Rivers through increases in salinity, which will slowly change portions of the plant assemblage due to salt stress; however, the Post 45 dredging project would likely require mitigation in the form of preservation of about 665.6 acres of wetlands (Corps 2015). Alternative 1 (Proposed Project) will have negligible cumulative impacts on salinity even when combined with the Post 45 project.


Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Legend
Cooper River Watershed
Study Area
Source: USGS 8-digit HUC and Atkins 2016
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0
5
10
Miles
NAVY BASE ICTF EIS
Cooper River Watershed
Figure 5.6-1
US Army Corps Of Engineers
Charleston District

It is anticipated that all permitted impacts to waters of the U.S., including Alternative 1 (Proposed Project) and other Future Actions, would be mitigated such that there is no net loss of functional value of estuarine and palustrine wetlands. Therefore, no cumulative impact to waters of the U.S. is anticipated.

5.6.2 Traffic and Transportation

The transportation study detailed in Appendix F was designed to account for other Future Actions in the study area, such as the HLT, committed STIP projects and background traffic growth to 2038. For example, the transportation study took into account projected (2038) port operations at each terminal and the resultant change in intermodal distribution (i.e. less cargo traveling to other terminals as a result of the HLT). Therefore, the impacts outlined below reflect cumulative effects.

Alternative 1 (Proposed Project) would have a negligible impact during construction to I-26, I-526, US 17, and at-grade rail crossings and a minor cumulative adverse impact during construction to North Charleston intersections. Alternative 1 (Proposed Project) would have a negligible impact on majority of the I-26 corridor in the opening year 2018 and design year 2038. For I-526, Alternative 1 (Proposed Project) would have a negligible impact on majority of the corridor in the opening year 2018 and design year 2038. Both of these would have beneficial or adverse permanent cumulative impacts on a few segments due to an LOS change. US 17 operations would have a negligible impact for the opening year 2018 and design year 2038 as Alternative 1 (Proposed Project) would have minimal influence on the US 17 traffic volumes. North Charleston intersection operations would experience a minor adverse cumulative impact for the opening year 2018 and design year 2038. Traffic patterns would change but slightly more intersections would degrade than improve operations. There would be a moderate adverse cumulative impact for the opening year 2018 and a major adverse cumulative impact for the design year 2038 for at-grade crossing operations as Alternative 1 (Proposed Project) would increase the frequency and number of train occurrences in North Charleston. Additionally, one new at-grade crossing would be created.

5.6.3 Land Use

The construction and operation of Alternative 1 (Proposed Project) and Alternatives 2-4 would primarily be consistent with the current zoning designation of M-2 (Heavy Industrial District) for the majority of the project area; however, a portion of the project site has a Future Land Use Designation of Institutional and a portion of the site is also zoned for Planned Development (PD). See section 4.9.3 for additional details. Construction of the berm on the western boundary (being constructed as part of the proposed mitigation) would also require a zoning and land use change for residential uses converted to industrial. As a result, Alternative 1 (Proposed Project) and its alternatives would require a rezoning as well as an amendment to the Comprehensive Plan. Alternative 1 (Proposed Project) would also require the demolition of approximately 88 structures. Additional off-site roadway and rail improvements would cause the demolition of approximately 23 structures, all of

which would be considered a major adverse impact. Overall impacts to land use as a result of the Proposed Project and its alternatives would be major.

The other Future Actions considered include projects consistent with the study area (port and navigation projects, urban and industrial development); however, zoning and a comprehensive plan amendment may be required as well. Because the contribution of the Proposed Project is a major land use impact, when combined with other Future Actions, there would be a cumulative impact. However, as discussed in Section 4.9, the Corps anticipates that the plan amendment will be approved and therefore will not result in a cumulative impact.

5.6.4 Cultural Resources

Alternative 1 (Proposed Project) and Alternatives 3–7 would have an Adverse effect to historic properties, including the CNH Historic District and the USMC Barracks. Alternative 5 would also have an Adverse effect on the CNY and CNYOQ Historic Districts. There would be negligible impacts to the remaining historic properties near the Proposed Project. The potential for archaeological sites to exist within the Project site is minimal. Alternative 1 (Proposed Project) and alternatives would not result in cumulative impacts in light of the other Future Actions because the Future Actions are not located in the historic districts nor on or adjacent to the other historic properties within the study area. In addition, potential project-related impacts would be mitigated through the Cultural Resources MOA (Appendix G).

5.6.5 Visual Resources and Aesthetics

Construction and operation of Alternative 1 (Proposed Project) would result in a minor, permanent adverse impact to scenic views from renovation and slight elevation of the existing rail bridge over Noisette Creek; major, permanent adverse impacts to scenic resources from the removal of contributing structures to the CNH Historic District and mature trees, as well as altered setting of USMC Barracks; and negligible to major impacts on visual quality and character of the Visual Resource study area. The introduction of high-mast lighting (illuminated from dusk until dawn) for all alternatives would introduce minor, permanent impacts from light and glare, and nighttime lighting from train headlamps could disturb sleep for residential structures along rail curvatures.

Other Future Actions in the study area also have the potential to impact visual resources. The HLT would include high-mast lighting and gantry cranes, but the impacts of these features are not anticipated to extend to the same areas that would be impacted by Alternative 1 (Proposed Project). The Port Access Road will introduce a new interchange with vertical elements in the study area that will be visible from the area surrounding Alternative 1 (Proposed Project); however, the new vertical elements would be consistent with existing two-story structures in the study area, as well as Port structures and would not represent an incongruent visual feature that would result in an adverse

visual effect. Alternative 1 (Proposed Project) and alternatives would result in cumulative impacts to visual resources and aesthetics when combined with Future Actions.

5.6.6 Noise and Vibration

The noise and vibration technical memorandum detailed in Appendix H utilized information developed during the transportation study (Appendix F) which was designed to account for other Future Actions in the study area, such as the HLT, committed STIP projects, and background traffic growth to 2038. For example, the transportation study took into account projected (2038) port operations at each terminal and the resultant change in intermodal distribution (i.e., less cargo traveling to other terminals as a result of the HLT). Traffic volumes and rail crossing data, developed for the No-Action Alternative and Project alternatives for the 2038 design year, accounted for the background growth rates within that timeframe, and thus incorporated cumulative effects of other concurrent and reasonably foreseeable projects in the study area and the vicinity. Therefore, the resulting traffic and rail noise predictions are considered conservative and incorporate cumulative impacts of other projects. The potential rail vibration impacts, as well as construction and operational noise impacts are local, confined within the immediate vicinity of the rail tracks, Project site, or River Center site, and thus are not considered cumulative.

For Alternative 1 (Proposed Project), traffic noise impacts would result in a negligible impact with a negligible beneficial effect for several streets. Rail noise impacts would be a minor to moderate adverse impact along several segments due to increased rail activity and new track builds. Rail vibration impacts would be negligible. Construction impacts would be a minor to moderate adverse impact in the vicinity due to frequent operations of construction equipment. Operational impacts would be a minor to moderate exterior daytime adverse impact, and major exterior nighttime impact, in the vicinity due to standard train/crane operations. Refer to subsection 4.12.3.5 for information on exterior to interior noise reduction. Interior noise levels are not anticipated to disrupt sleep. Negligible additive noise impacts would occur at Virginia Avenue (Traffic + Rail Noise) and minor to moderate additive noise impacts would occur at St. Johns Avenue (Traffic + Rail Noise).

Based on the noise and vibration projections analyzed in Section 4.12, the Corps has determined that other concurrent and reasonably foreseeable future actions provide negligible additional noise or vibration impacts in the study area for Alternative 1 (Proposed Project) and Alternatives 2 through 7; therefore, no cumulative impacts are anticipated.

5.6.7 Air Quality

As discussed in Section 5.3, there are several recent and foreseeable future projects in the study area such as the Charleston Harbor Post 45, construction of the HLT, and Port Access Road Interchange. The analysis below focuses on long-term operational emissions from Alternative 1 (Proposed

Project) and alternatives when combined with anticipated air quality impacts from other Future Actions.

The Charleston Harbor Post 45 project proposes to deepen Charleston Harbor to accommodate larger vessels. The Final Integrated Feasibility Report and Environmental Impact Statement (FR/FEIS) for Post 45 included an analysis of cumulative air quality impacts from construction of the Post 45 project and the proposed ICTF facility. The FR/FEIS determined that since the total throughput is not predicted to change as a result of deepening, no landside changes in overall air pollutant emissions would result from channel improvements. However, implementation of any of the alternatives results in a reduction in the number of vessels used to transport cargo. As a result, total air emissions within the harbor and at each terminal would decrease as a result of any of the alternatives, with the 52/48 alternative resulting in the lowest overall emissions and the lowest emissions at each terminal. Additionally, increased depths would reduce congestion and allow vessels more flexibility of movement than under the without project conditions. This would allow traffic to be spread over wider time ranges rather than concentrating all of the largest vessel traffic during high tide stages (Corps 2015).

The HLT project proposes a marine container terminal at the south end of the former Charleston Naval Complex. The HLT development would support cargo marshalling areas, cargo processing areas, cargo-handling facilities, and related terminal operating facilities. To provide access to this Project, the South Carolina Department of Transportation will be constructing a new freeway interchange on I-26, located south of the existing Meeting Street ramps (Exit 217). The proposed Port Access Road Interchange project will remove the existing Spruill Avenue ramps (Exit 218) and build a new full movement directional T-interchange connecting to the new Port Access Road. The Final EIS prepared for the terminal project included analysis of the I-26 improvements, and these improvements were assumed in the Proposed Project analysis. The Final EIS determined that the projects would result in an increase in emissions from mobile sources, such as marine vessels, container trucks, employee automobiles, and support equipment; however, overall these additional air quality emissions represent a very small percentage of total permitted and mobile emissions in the region. Therefore, the Final EIS determined that the terminal project would result in a minimal adverse impact to regional air quality from its emissions inventory.

Alternative 1 (Proposed Project) and alternatives would have the potential to increase air pollutant emissions in the study area, including criteria pollutant and Hazardous Air Pollutants (HAPs). Direct impacts of Alternative 1 (Proposed Project) and alternatives are addressed in Section 4.13; however, the air quality analyses prepared for the cumulative projects determined that these projects would have a minimal impact on regional air quality from their operational emissions inventories. Therefore, although Alternative 1 (Proposed Project) and alternatives would result in greater direct air pollutant emissions, Alternative 1 (Proposed Project) and alternatives, in combination with the

reasonably foreseeable cumulative projects, would not result in a cumulative impact to the criteria pollutant emissions inventory of the study area.

The HLT project also included dispersion modeling in its air quality analysis to further analyze impacts to the NAAQS (Corps 2006). The Final EIS determined that the total anticipated ambient concentration would remain at or below the NAAQS; however, when the anticipated ambient concentrations of the HLT project are added to the existing ambient concentrations and the anticipated ambient concentrations of the Alternative 1 (Proposed Project), the resulting cumulative concentrations would not exceed the applicable NAAQS; therefore, the Alternative 1 (Proposed Project) would not put the Tri-County area into non-attainment for any NAAQS. Alternatives 2-4 cumulative concentrations would not exceed the applicable NAAQS and thus not put the Tri-County area into non-attainment for any NAAQS. Therefore, Alternative 1 (Proposed Project) and Alternatives 2-4 would not result in beneficial or adverse cumulative impacts to the NAAQS. Alternatives 5-7 may put the Tri-County area into non-attainment for NO_2. Under full operation of Alternatives 5-7, the Tri-County area may not remain in compliance with the NAAQS (see also Section 4.13.7.3). Therefore, there may be an adverse cumulative impact to the NAAQS for Alternatives 5-7 (River Center site alternatives).

5.6.8 Climate Change

Climate Change impacts are inherently cumulative in nature. GHG emissions contribute cumulatively and adversely to Global Climate Change, such as sea level rise, increased frequency and intensity of storm events, and impacts to ecosystems. The GHG emissions Inventory would be 30,948 MT CO2e from Alternative 1 (Proposed Project), resulting in minor long-term adverse impacts. Alternatives would result in impacts with similar magnitude, with the exception of the No-Action Alternative, which would result in a major adverse impact. Impacts due to sea level rise at the Proposed Project and River Center project sites would be negligible. Impacts from increased frequency and intensity of storm events on the Proposed Project and River Center project sites would be major; therefore, this impact is discussed in more detail below.

Although major hurricanes make landfall in the South Carolina and Georgia approximately once every 25 years, it is likely the Proposed Project site would experience at least one over the life of the Project, between 2018 and 2068. According to the SLOSH model estimates shown in Table 4.14-8, the Proposed Project site would likely experience a storm surge of greater than 9 feet above ground (NOAA 2016c). This level of inundation could damage on-site structures to the point of altering their structural integrity, move and damage heavy equipment, and pose a threat to human health and safety of people on-site. This would be a major impact on the Proposed Project by climate change due to increased frequency and intensity of storm events.

Approximately 5 percent of containers at the ICTF are estimated to hold hazardous materials, as described in Section 4.15. It is possible that an intense storm could lead to a hazardous material spill

on-site if the containers of those materials are compromised during handling or derailment. Hazardous materials stored on-site and in containers should be tracked and stored with caution. Hazardous materials would also need to be checked after storm events to confirm no spill occurred. If the storage of hazardous materials is compromised due to the severity of a storm event, human health and safety of on-site employees would be comprised. To prevent such spillage, Palmetto Railways would create and implement an SPCC plan. Implementation of such a plan would make the Proposed Project site more resilient to Climate Change effects. While an SPCC Plan would work to prevent hazardous material from spilling, there would remain a threat to human health and safety from inundation expected from major hurricanes. Therefore, impacts on Alternative 1 (Proposed Project) by increased frequency and severity of storm events would be major.

5.6.9 Socioeconomics and Environmental Justice

The direct and indirect effects of Alternative 1 (Proposed Project) and alternatives on socioeconomic resources and Environmental Justice are presented in Section 4.16. This cumulative effects section focuses on the potential for socioeconomic resources and low-income and minority populations to be impacted by the collective effect of other past, present, and Future Actions in combination with Alternative 1 (Proposed Project) and alternatives.

During public involvement activities, the community voiced concerns that Alternative 1 (Proposed Project) may impact community cohesion and stability by reversing the positive investments and changes that have been made in the area in recent years, and may also indirectly impact the stability of newer businesses and residential developments in the area. These potential effects may be exacerbated when combined with the impacts of additional industrial development and associated rail and truck traffic anticipated as a result of other past, present, and Future Actions in the study area.

In terms of economic and business resources, all Project alternatives would provide major short-term and indirect, long-term economic benefits to the regional and local community as employment opportunities are directly and indirectly created as a result of Alternative 1 (Proposed Project). There is potential for cumulative benefits to economic and business resources as employment opportunities would also be provided by other Future Actions, such as the Boeing Assembly Plant Expansion and the HLT.

As presented in Section 4.16, Alternative 1 (Proposed Project) and alternatives have the potential for disproportionately high and adverse impacts to Environmental Justice populations. The adverse impacts associated with Alternative 1 (Proposed Project) and Alternatives 2-4 would be predominantly borne by the minority and low-income population of the Chicora-Cherokee neighborhood and are appreciably more severe than the adverse effects that would be suffered by the nonminority and non-low-income population of the City of North Charleston and Charleston County. Alternatives 5-7 would be predominantly borne by the minority and low-income population

in the Hospital District neighborhood (West Yard Lofts) and are appreciably more severe than the adverse effects that would be suffered by the nonminority and non-low-income population of the City of North Charleston and Charleston County. However, the Applicant and community groups entered into a Memorandum of Agreement on October 18, 2016 (see the Community Mitigation Plan and MOA in Appendix N for additional details). Measures outlined in this agreement would mitigate the adverse burdens borne by the Environmental Justice community.

The combination of Alternative 1 (Proposed Project) and activities at the port and other past, present, and Future Actions in the area, including the HLT, the Port Access Road, and the former Charleston County incinerator to the south of the Proposed Project, would result in cumulative impacts. These cumulative effects would be limited to areas impacted by these previous and ongoing projects, which generally includes the Chicora-Cherokee neighborhood.

5.6.10 Human Health and Safety

As discussed in Section 4.17, human health and safety impacts as a result of Alternative 1 (Proposed Project) and alternatives include increased risk of respiratory problems due to air quality impacts (Alternatives 5-7), increased potential for spill incidents involving petroleum products or hazardous waste, increased noise, and potential minor adverse impacts to community safety due to an additional at-grade crossing and potential for emergency response routes to be blocked by trains. Overall, impacts to human health and safety as a result of Alternative 1 (Proposed Project) and alternatives are anticipated to be minor to moderate and localized. Due to the spatial extent of the other Future Actions, and localized nature of Alternative 1 (Proposed Project) impacts, no cumulative impacts to human health and safety are anticipated.

5.6.11 Section 4(f) and 6 (f) Resources

Alternative 1 (Proposed Project) would result in a direct use of the CNH Historic District and USMC Barracks, which are 4(f) resources. Other Future Actions were researched to determine if there would be a permanent incorporation of a 4(f) resource or a constructive use of a Section 6(f) resources. The only project within the Section 4(f)/6(f) study area that involved 4(f)/6(f) was the I-26 Port Access Road Interchange project. The Port Access Road project has no 6(f) properties within the project area, but two Section 4(f) resources; Park South Recreation Center and Rosemont field. The intended use of this land is not anticipated to be impacted by the proposed project; however, designs of the field may have to be adjusted. The City of Charleston entered into a lease agreement with Liquid Transport Corporation for property in with Rosemont Field is located, which states, “in the event that the premises shall be taken for public use by the city, state, federal government, public authority or other corporation having the power of eminent domain, then this lease shall terminate. . .” Therefore, because of this lease, Section 4(f) is not applicable for this resource (FHWA 2013). No cumulative impacts to Section 4(f) or 6 (f) resources are anticipated.