DRAFT
ENVIRONMENTAL IMPACT STATEMENT
FOR THE PROPOSED NAVY BASE
INTERMODAL CONTAINER TRANSFER FACILITY
NORTH CHARLESTON, SOUTH CAROLINA

Prepared for:

U.S. Army Corps of Engineers
Charleston District
69-A Hagood Avenue
Charleston, South Carolina 29403

Prepared by:

Atkins North America, Inc.
7406 Fullerton Street
Jacksonville, Florida 32256

April 2016

Contents

Page

List of Figures xi

List of Tables xiii

Acronyms and Abbreviations xvi

Executive Summary ES-1

1.0 PURPOSE AND NEED AND DESCRIPTION OF PROPOSED PROJECT 1-1

1.1 INTRODUCTION 1-1

1.2 THE NEPA PROCESS 1-3

1.2.1 What is NEPA? 1-3

1.2.2 What interest factors are evaluated? 1-4

1.2.3 How is the Corps implementing the requirements of NEPA in the evaluation of this project? 1-4

1.3 AGENCY INVOLVEMENT (ROLES AND RESPONSIBILITIES) 1-6

1.3.1 What is the role of the U.S. Army Corps of Engineers? 1-6

1.3.2 Public Interest Review 1-7

1.3.3 What Other Environmental Regulations must the Corps Consider? 1-11

1.3.4 Who are the Cooperating Agencies for this project? 1-11

1.3.4.1 U.S. Environmental Protection Agency 1-11

1.3.4.2 Federal Railroad Administration 1-12

1.3.5 What are the Roles of the Public, Other Agencies, and Tribes in this EIS? 1-12

1.4 PROJECT PURPOSE AND NEED 1-13

1.4.1 What is the Applicant's Stated Purpose and Need? 1-13

1.4.2 What is the Corps' evaluation of the Applicant's Need Statement? 1-17

1.4.3 Corps' Basic Project Purpose and Water Dependency 1-17

1.4.4 Corps' Overall Project Purpose and Alternatives Analysis 1-18

1.5 BACKGROUND OF PROPOSED PROJECT 1-18

1.5.1 Background and Other Relevant Activities Associated with the Former Charleston Naval Complex 1-18

1.5.2 Description of Proposed Site 1-20

1.6 FRAMEWORK FOR ANALYSIS 1-21

1.6.1 What is the Study Area? 1-21

1.6.2 What is the Project Site? 1-21

1.7 DESCRIPTION OF PROPOSED PROJECT 1-21

1.7.1 The Intermodal Container Transfer Facility 1-24

1.7.1.1 Facility Infrastructure 1-24

1.7.1.2 Road and Rail Improvements 1-27

1.7.1.2.1 Drayage Road 1-27

1.7.1.2.2 Road Improvements 1-27

Page

1.7.1.2.3 Rail Improvements 1-31
1.7.2 Operations 1-31
2.0 DEVELOPMENT AND DESCRIPTION OF ALTERNATIVES 2-1
2.1 ALTERNATIVES ANALYSIS 2-1
2.2 SCOPING AND DEVELOPMENT OF ALTERNATIVES 2-2
2.3 CORPS' SCREENING OF ALTERNATIVES 2-3
2.3.1 Alternatives Screening Criteria 2-3
2.3.1.1 Initial Screening Criteria: Presence of Private/Public Intermodal Container Terminals in the Charleston Harbor 2-4
2.3.1.2 Tier I Screening Criteria 2-4
2.3.1.2.1 Screening Criterion #IA: Proximity (within four miles) to Private/Public Intermodal Container Terminals in the Charleston Harbor 2-4
2.3.1.2.2 Screening Criterion #IB: Area of Available Land Required for an ICTF (65+ acres) 2-5
2.3.1.3 Tier II Screening Criteria 2-5
2.3.1.3.1 Screening Criterion #IIA: Available Infrastructure Required for an ICTF 2-5
2.3.1.3.1.1 Screening Criterion #IIA-1: Proximity to Existing Rail Lines for both Class I Carriers 2-6
2.3.1.3.1.2 Screening Criterion #IIA-2: Proximity (less than two miles) to Highway Network 2-6
2.3.1.3.1.3 Screening Criterion #IIA-3: Major Infrastructure Needed to Access Existing Rail and Highway Networks 2-6
2.3.1.3.2 Screening Criterion #IIB: Availability of a Private Drayage Road 2-6
2.3.1.3.3 Screening Criterion #IIC: Configuration of Available Acreage 2-7
2.3.2 Results of Screening Analyses 2-7
2.3.2.1 Results from Initial Screening Criterion: Presence of Private/Public Intermodal Container Terminals in the Charleston Harbor 2-7
2.3.2.1.1 Wando Welch Container Terminal 2-8
2.3.2.1.2 Hugh K. Leatherman, Sr. Terminal (HLT) 2-8
2.3.2.1.3 Columbus Street Terminal 2-8
2.3.2.1.4 North Charleston Container Terminal 2-8
2.3.2.2 Results from Tier I Screening Criteria 2-9

Page

2.3.2.2.1 Screening Criterion #IA: Proximity (within four miles) to Private/Public Intermodal Container Terminals in the Charleston Harbor 2-9
2.3.2.2.2 Screening Criterion #IB: Area of Available Land Required for an ICTF (65+ acres) 2-10
2.3.2.3 Results from Tier II Screening Criteria 2-10
2.3.2.3.1 Screening Criterion #IIA: Available Infrastructure Required for an ICTF 2-14
2.3.2.3.2 Screening Criterion #IIB: Availability of a Private Drayage Road 2-16
2.3.2.3.3 Screening Criterion #IIC: Configuration of Available Acreage 2-17
2.3.2.3.4 Summary 2-18
2.3.3 Alignments Considered but Not Further Evaluated 2-18
2.3.3.1 Arrival/Departure Track Alignments 2-18
2.3.3.2 Drayage Road Alignments 2-20
2.4 ALTERNATIVES RECOMMENDED FOR DETAILED EVALUATION IN THE EIS 2-20
2.4.1 No-Action Alternative 2-22
2.4.2 Alternative 1: The Applicant's Proposed Project (CSX – South via Milford / NS – North via Hospital District) 2-23
2.4.3 Alternative 2: Proposed Project Site (CSX – South via Milford / NS – S-line) 2-23
2.4.4 Alternative 3: Proposed Project Site (CSX – South via Kingsworth / NS – North via Hospital District) 2-25
2.4.5 Alternative 4: Proposed Project Site (CSX & NS – South via Milford) 2-25
2.4.6 Alternative 5: River Center Project Site (CSX – South via Milford / NS – North via Hospital District) 2-25
2.4.7 Alternative 6: River Center Project Site (CSX – South via Kingsworth / NS – North via Hospital District 2-30
2.4.8 Alternative 7: River Center Project Site (CSX & NS – South via Milford) 2-30
2.4.9 Related Activities 2-30
2.5 COMPARISON OF ALTERNATIVES 2-33
3.0 AFFECTED ENVIRONMENT 3-1
3.1 GEOLOGY AND SOILS 3-1
3.1.1 Introduction 3-1
3.1.2 Seismicity 3-3
3.1.3 Sand and Dirt Mines 3-3
3.2 HYDROLOGY 3-4
3.2.1 Introduction 3-4
3.2.2 Tides and Currents 3-4
3.2.3 Surface Water and Groundwater Flows 3-5
3.2.3.1 Stormwater Flows 3-5

Page

3.2.3.2 Groundwater Flows 3-5
3.2.4 Precipitation 3-5
3.2.5 Soil Characteristics Affecting Hydrology 3-7
3.2.6 Land Cover 3-8
3.2.6.1 Land Cover as Defined by Municipal Zoning 3-8
3.2.6.2 Land Cover as Defined by Aerial Photographic Interpretation 3-9
3.2.7 Floodplains 3-9
3.3 WATER QUALITY 3-13
3.3.1 Introduction 3-13
3.3.2 Surface Water Quality 3-13
3.3.2.1 Surface Water Quality Monitoring Stations 3-13
3.3.2.2 Waterbody Classifications 3-16
3.3.2.3 Surface Water Quality Standards 3-17
3.3.2.4 Summary of Surface Water Quality Variables 3-18
3.3.2.4.1 Dissolved Oxygen 3-18
3.3.2.4.2 Salinity 3-19
3.3.2.4.3 Total Suspended Solids and Turbidity 3-19
3.3.2.4.4 Nutrients 3-20
3.3.2.4.5 Bacteria 3-20
3.3.2.4.6 Heavy Metals 3-21
3.3.2.5 Point Source and Non-Point Source Surface Water Pollution 3-22
3.3.2.5.1 Point Source Discharges 3-22
3.3.3 Sediment Quality 3-24
3.3.3.1 Contaminants 3-25
3.3.3.2 Toxicity 3-25
3.3.4 Groundwater Quality 3-25
3.4 VEGETATION AND WILDLIFE 3-29
3.4.1 Introduction 3-29
3.4.2 Vegetation 3-29
3.4.2.1 Vegetation Classes 3-30
3.4.2.1.1 Marsh 3-30
3.4.2.1.2 Marine Water 3-31
3.4.2.1.3 Urban Development (High Intensity and Low Intensity) 3-31
3.4.2.2 Noxious Plants 3-31
3.4.3 Wildlife 3-33
3.4.3.1 Terrestrial 3-33
3.4.3.2 Aquatic 3-34
3.5 WATERS OF THE U.S. 3-38
3.5.1 Introduction 3-38

Page

3.5.2 Existing Conditions 3-39
3.5.3 Summary of Waters of the U.S. in the Study Area 3-41
3.6 PROTECTED SPECIES 3-44
3.6.1 Introduction 3-44
3.6.2 Federally Protected Species 3-44
3.6.2.1 Reptiles 3-48
3.6.2.2 Mammals 3-52
3.6.2.3 Fish 3-54
3.6.2.4 Amphibians 3-57
3.6.2.5 Birds 3-57
3.6.2.6 Plants 3-60
3.6.3 Federally Protected and At-Risk Species 3-63
3.6.4 State-Protected Species 3-70
3.6.5 State Rare Species 3-74
3.6.6 Underwater Noise 3-80
3.7 ESSENTIAL FISH HABITAT 3-81
3.7.1 EFH Categories Within the Study Area 3-81
3.7.1.1 Estuarine Emergent Marsh 3-81
3.7.1.2 Oyster Reefs/Shell Banks 3-83
3.7.1.3 Intertidal Flats 3-84
3.7.1.4 Estuarine Water Column 3-84
3.7.2 Common Fish and Shellfish Species Known to Use EFH Within the Study Area 3-87
3.7.3 Federally Managed Species that may Use EFH Within the Study Area 3-88
3.7.3.1 Penaeid Shrimp 3-88
3.7.3.2 Coastal Migratory Pelagics 3-90
3.7.3.3 Highly Migratory Species 3-90
3.7.3.4 Other Managed Species 3-91
3.8 TRAFFIC AND TRANSPORTATION 3-92
3.8.1 Roadways 3-92
3.8.1.1 Controlled Access Facilities 3-94
3.8.1.2 North Charleston Surface Streets 3-97
3.8.2 Railroads 3-102
3.8.2.1 Intermodal Facilities 3-102
3.8.2.2 At-Grade Rail Crossings 3-102
3.8.2.2.1 Crash History 3-103
3.8.2.2.2 Operations 3-103
3.8.2.3 Passenger Rail 3-104
3.8.3 Port of Charleston 3-105
3.8.4 Pedestrian and Bicycle Facilities 3-106

Page

3.8.5 Transit 3-106
3.9 LAND USE AND INFRASTRUCTURE 3-115
3.9.1 Land Use and Zoning 3-115
3.9.1.1 Land Use 3-115
3.9.1.2 Zoning 3-115
3.9.1.3 Comprehensive Plans 3-122
3.9.1.4 Other Local Plans 3-123
3.9.2 Infrastructure and Utilities 3-124
3.10 CULTURAL RESOURCES 3-127
3.10.1 Introduction 3-127
3.10.2 Historical Setting 3-127
3.10.3 Cultural Resources Investigations 3-130
3.10.4 Archaeological Features or Deposits within and near the Study Area 3-132
3.10.5 Historic Properties within and near the Study Area 3-133
3.10.5.1 Historic Districts 3-133
3.10.5.2 Historic Buildings within the CNC 3-137
3.10.5.3 Historic Properties outside the CNC 3-138
3.10.6 Agency Consultation 3-139
3.11 VISUAL RESOURCES AND AESTHETICS 3-140
3.11.1 Introduction 3-140
3.11.2 Visual Setting 3-140
3.11.2.1 Scenic Views 3-141
3.11.2.2 Natural Features 3-141
3.11.2.3 Built Features 3-143
3.11.2.4 Existing Light and Glare 3-149
3.11.3 Visual Conditions on the Proposed Project Site 3-150
3.11.4 Visual Conditions on Alternative 2: River Center Project Site 3-152
3.11.5 Viewer Sensitivity at Selected Viewpoints 3-154
3.12 NOISE AND VIBRATION 3-160
3.12.1 Noise Characteristics 3-160
3.12.2 Vibration Characteristics 3-162
3.12.3 Existing Noise Conditions 3-163
3.12.4 Train Noise and Vibration 3-167
3.13 AIR QUALITY 3-173
3.13.1 Existing Conditions 3-173
3.13.1.1 Air Resources 3-173
3.13.1.2 Climatology 3-173
3.13.2 Air Pollutants and Criteria 3-175
3.13.2.1 Emission Sources 3-178
3.13.2.2 Local Air Quality 3-178

Page

3.14 CLIMATE CHANGE 3-181
3.14.1 Existing Conditions 3-181
3.14.1.1 Climate Change 3-181
3.14.1.2 Climatology 3-182
3.14.2 Greenhouse Gases 3-182
3.14.2.1 Existing levels of GHGs 3-182
3.14.3 Predicted Effects of Climate Change 3-183
3.15 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE 3-185
3.15.1 Introduction 3-185
3.15.2 Navy Base ICTF 3-187
3.15.2.1 ICTF Facility 3-187
3.15.2.1.1 Parcel 11 3-187
3.15.2.1.2 Parcel 12 3-190
3.15.2.1.3 Parcel 13 (13A and 13B) 3-190
3.15.2.2 Navy Base ICTF Roadway and Rail Improvements 3-191
3.15.2.2.1 Parcels 14A and 14B 3-191
3.15.2.2.2 Parcel 15 3-192
3.15.2.2.3 Parcel 16 3-192
3.15.2.2.4 Southern Alternatives Area 3-192
3.15.2.2.5 Nearby Parcels and Contaminated Sites 3-194
3.15.3 River Center Project Site 3-194
3.15.4 Buildings with Potential ACMs and Metals-Based Paints 3-198
3.15.5 RECs within the Study Area 3-199
3.15.5.1 Macalloy Corporation Superfund Site 3-199
3.15.5.2 Montenay Incinerator Site 3-200
3.15.5.3 Charleston/Spruill Avenue Dump 3-200
3.15.5.4 ConGlobal Facility 3-201
3.16 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE 3-202
3.16.1 Introduction 3-202
3.16.2 Social Characteristics 3-202
3.16.2.1 Population Trends 3-205
3.16.2.2 Age Distribution 3-206
3.16.2.3 Racial Composition 3-206
3.16.2.4 Limited English Proficiency (LEP) 3-209
3.16.2.5 Educational Attainment 3-210
3.16.2.6 Housing Trends 3-213
3.16.2.7 Age of Housing 3-213
3.16.2.8 Median House Values 3-215
3.16.2.9 Home Ownership 3-216
3.16.2.10 Vehicle Availability 3-217

Page

3.16.3 Economic Characteristics 3-218
3.16.3.1 Median Household Income 3-219
3.16.3.2 Unemployment 3-219
3.16.3.3 Major Employers 3-219
3.16.3.4 Commuting 3-223
3.16.4 Community Characteristics 3-226
3.16.4.1 Park Circle, Palmetto Gardens, Cameron Terrace, and Oak Park 3-226
3.16.4.2 Liberty Hill, Olde North Charleston, and Mixson 3-226
3.16.4.3 Whipper Barony, Hunley Waters, and St. Charles Place Apartments 3-228
3.16.4.4 Chicora Place, Cherokee Place, Nafair 3-228
3.16.4.5 Windsor and Union Heights 3-228
3.16.5 Community Resources 3-229
3.16.5.1 Parks 3-229
3.16.5.2 Recreation and Community Centers 3-232
3.16.5.3 Health Care Facilities 3-233
3.16.5.4 Schools 3-233
3.16.5.4.1 Elementary Schools 3-233
3.16.5.4.2 Middle and High Schools 3-234
3.16.5.4.3 Private Schools 3-234
3.16.5.5 Places of Worship 3-234
3.16.5.6 Libraries 3-235
3.16.5.7 Post Offices 3-235
3.16.5.8 Grocery Stores 3-236
3.16.5.9 Other Notable Community Resources 3-236
3.16.6 Community Services 3-237
3.16.6.1 Fire Service 3-237
3.16.6.2 Police Service 3-237
3.16.6.3 Emergency Medical Services 3-238
3.16.7 Environmental Justice 3-238
3.16.7.1 Minority Population 3-240
3.16.7.2 Low-Income Households 3-240
3.17 HUMAN HEALTH AND SAFETY 3-242
3.17.1 State Data on Public Health and Safety 3-242
3.17.2 Water Quality and Human Health 3-242
3.17.3 Noise and Human Health 3-243
3.17.4 Air Quality and Human Health 3-243
3.17.5 Hazardous Material Sites and Human Health 3-244
3.17.6 Socioeconomics and Human Health 3-245
3.17.7 Emergency Response Times and Human Health 3-245

Page

3.18 SECTION 4(F) AND6(F) RESOURCES 3-246
3.18.1 Introduction 3-246
3.18.2 Existing Conditions 3-247
4.0 ENVIRONMENTAL CONSEQUENCES 4-1
4.1 GEOLOGY AND SOILS 4-2
4.1.1 Methods and Impact Definitions 4-2
4.1.2 No-Action Alternative 4-3
4.1.3 Alternative 1: Applicant's Proposed Project (CSX – South via Milford / NS – North via Hospital District) 4-4
4.1.4 Alternative 2: Proposed Project Site (CSX – South via Milford / NS – North via S-Line) 4-5
4.1.5 Alternative 3: Proposed Project Site (CSX – South via Kingsworth / NS – North via Hospital District) 4-5
4.1.6 Alternative 4: Proposed Project Site (CSX & NS – South via Milford) 4-5
4.1.7 Alternative 5: River Center Project Site (CSX – South via Milford / NS – North via Hospital District) 4-5
4.1.8 Alternative 6: River Center Project Site (CSX – South via Kingsworth / NS – North via Hospital District) 4-6
4.1.9 Alternative 7: River Center Project Site (CSX & NS – South via Milford) 4-6
4.1.10 Related Activities 4-6
4.1.11 Summary of Impacts Table 4-6
4.1.12 Mitigation 4-7
4.1.12.1 Applicant's Proposed Avoidance and Minimization Measures 4-7
4.1.12.2 Additional Potential Mitigation Measures 4-8
4.2 HYDROLOGY 4-9
4.2.1 Methods and Impact Definitions 4-9
4.2.2 No-Action Alternative 4-9
4.2.3 Alternative 1: Proposed Project (CSX – South via Milford / NS – North via Hospital District) 4-11
4.2.4 Alternative 2: Proposed Project Site (CSX – South via Milford / NS – North via S-line) 4-12
4.2.5 Alternative 3: Proposed Project Site (CSX – South via Kingsworth / NS – North via Hospital District) 4-12
4.2.6 Alternative 4: Proposed Project Site (CSX & NS – South via Milford) 4-16
4.2.7 Alternative 5: River Center Project Site (CSX – South via Milford / NS – North via Hospital District) 4-16
4.2.8 Alternative 6: River Center Project Site (CSX – South via Kingsworth / NS – North via Hospital District) 4-16
4.2.9 Alternative 7: River Center Project Site (CSX & NS – South via Milford) 4-20
4.2.10 Related Activities 4-20
4.2.11 Summary of Impacts Table 4-20

Page

4.2.12 Mitigation 4-23
4.2.12.1 Applicant's Proposed Avoidance and Minimization Measures 4-23
4.2.12.2 Additional Potential Mitigation Measures 4-23
4.3 WATER QUALITY 4-24
4.3.1 Methods and Impact Definitions 4-24
4.3.2 No-Action Alternative 4-25
4.3.2.1 Surface Waters 4-25
4.3.2.2 Accidental Spills 4-28
4.3.2.3 Stormwater Runoff 4-28
4.3.2.4 Sediments 4-29
4.3.2.5 Groundwater Resources 4-30
4.3.3 Alternative 1: Proposed Project (CSX – South via Milford / NS – North via Hospital District) 4-30
4.3.3.1 Surface Waters 4-30
4.3.3.2 Accidental Spills 4-33
4.3.3.3 Stormwater Runoff 4-34
4.3.3.4 Sediments 4-37
4.3.3.5 Groundwater Resources 4-38
4.3.4 Alternative 2: Proposed Project Site (CSX – South via Milford / NS – North via S-line) 4-38
4.3.5 Alternative 3: Proposed Project Site (CSX – South via Kingsworth / NS – North via Hospital) 4-38
4.3.6 Alternative 4: Proposed Project Site (CSX & NS – South via Milford) 4-38
4.3.7 Alternative 5: River Center Project Site (CSX – South via Milford / NS – North via Hospital District) 4-39
4.3.7.1 Surface Waters 4-39
4.3.7.2 Accidental Spills 4-42
4.3.7.3 Stormwater Runoff 4-42
4.3.7.4 Sediments 4-42
4.3.7.5 Groundwater Resources 4-42
4.3.8 Alternative 6: River Center Project Site (CSX – South via Kingsworth / NS – North via Hospital District) 4-43
4.3.9 Alternative 7: River Center Project Site (CSX & NS – South via Milford) 4-43
4.3.10 Related Activities 4-43
4.3.11 Summary of Impacts Table 4-44
4.3.12 Mitigation 4-46
4.3.12.1 Applicant's Proposed Avoidance and Minimization Measures 4-46
4.3.12.2 Additional Potential Mitigation Measures 4-47
4.4 VEGETATION AND WILDLIFE 4-48
4.4.1 Methods and Impact Definitions 4-48

Page

4.4.2 No-Action Alternative 4-49
4.4.3 Alternative 1: Applicant's Proposed Project (CSX – South via Milford / NS – North via Hospital District) 4-50
4.4.3.1 Construction Impacts 4-50
4.4.3.2 Operation and Maintenance Impacts 4-54
4.4.4 Alternative 2: Proposed Project Site (CSX – South via Milford / NS – North via S-line) 4-55
4.4.5 Alternative 3: Proposed Project Site (CSX – South via Kingsworth / NS – North via Hospital District) 4-57
4.4.6 Alternative 4: Proposed Project Site (CSX: & NS – South via Milford) 4-59
4.4.7 Alternative 5: River Center Site (CSX – South via Milford / NS – North via Hospital District) 4-61
4.4.8 Alternative 6: River Center Site (CSX – South via Kingsworth / NS – North via Hospital District) 4-63
4.4.9 Alternative 7: River Center Site (CSX & NS – South via Milford) 4-65
4.4.10 Related Activities 4-67
4.4.11 Summary of Impacts Table 4-67
4.4.12 Mitigation 4-70
4.4.12.1 Applicant's Proposed Avoidance and Minimization Measures 4-70
4.4.12.2 Additional Potential Mitigation Measures 4-70
4.5 WATERS OF THE U.S. 4-71
4.5.1 Methods and Impact Definitions 4-71
4.5.2 No-Action Alternative 4-71
4.5.3 Alternative 1: Applicant's Proposed Project (CSX – South via Milford / NS – North via Hospital District) 4-72
4.5.4 Alternative 2: Proposed Project Site (CSX – South via Milford / NS – North via S-line) 4-72
4.5.5 Alternative 3: Proposed Project Site (CSX – South via Kingsworth / NS – North via Hospital District) 4-76
4.5.6 Alternative 4: Proposed Project Site (CSX & NS – South via Milford) 4-76
4.5.7 Alternative 5: River Center Project Site (CSX – South via Milford / NS – North via Hospital District) 4-80
4.5.8 Alternative 6: River Center Project Site (CSX – South via Kingsworth / NS – North via Hospital District) 4-82
4.5.9 Alternative 7: River Center Project Site (CSX & NS – South via Milford) 4-84
4.5.10 Related Activities 4-86
4.5.11 Summary of Impacts Table 4-87
4.5.12 Mitigation 4-88
4.5.12.1 Applicant's Proposed Avoidance and Minimization Measures 4-88
4.5.12.2 Additional Potential Mitigation Measures 4-89

Page

4.6 PROTECTED SPECIES 4-90
4.6.1 Methods and Impact Definitions 4-90
4.6.2 No-Action Alternative 4-91
4.6.3 Alternative 1: Applicant's Proposed Project (CSX – South via Milford / NS – North via Hospital District) 4-91
4.6.4 Alternative 2: Proposed Project Site (CSX – South via Milford / NS – North via S-line) 4-98
4.6.5 Alternative 3: Proposed Project Site (CSX – South via Kingsworth / NS – North via Hospital District) 4-98
4.6.6 Alternative 4: Proposed Project Site (CSX: & NS – South via Milford) 4-98
4.6.7 Alternative 5: River Center Site (CSX – South via Milford / NS – North via Hospital District) 4-98
4.6.8 Alternative 6: River Center Site (CSX – South via Kingsworth / NS – North via Hospital District) 4-98
4.6.9 Alternative 7: River Center Site (CSX & NS – South via Milford) 4-99
4.6.10 Related Activities 4-99
4.6.11 Summary of Impacts Table 4-99
4.6.12 Mitigation 4-100
4.6.12.1 Applicant's Proposed Avoidance and Minimization Measures 4-100
4.6.12.2 Additional Potential Mitigation Measures 4-101
4.7 ESSENTIAL FISH HABITAT 4-103
4.7.1 Methods and Impact Definitions 4-103
4.7.2 No-Action Alternative 4-103
4.7.3 Alternative 1: Applicant's Proposed Project (CSX – South via Milford / NS – North via Hospital District) 4-103
4.7.4 Alternative 2: Proposed Project Site (CSX – South via Milford / NS – North via S-line) 4-106
4.7.5 Alternative 3: Proposed Project Site (CSX – South via Kingsworth / NS – North via Hospital District) 4-106
4.7.6 Alternative 4: Proposed Project Site (CSX & NS – South via Milford) 4-108
4.7.7 Alternative 5: River Center Site (CSX – South via Milford / NS – North via Hospital District) 4-108
4.7.8 Alternative 6: River Center Site (CSX – South via Kingsworth / NS – North via Hospital District) 4-108
4.7.9 Alternative 7: River Center Site (CSX & NS – South via Milford) 4-112
4.7.10 Related Activities 4-112
4.7.11 Summary of Impacts Table 4-112
4.7.12 Mitigation 4-116
4.7.12.1 Applicant's Proposed Avoidance and Minimization Measures 4-116
4.7.12.2 Additional Potential Mitigation Measures 4-116

Page

4.8 TRAFFIC AND TRANSPORTATION 4-117
4.8.1 Methods and Impact Definitions 4-117
4.8.2 No-Action Alternative 4-119
4.8.3 Alternative 1: Applicant's Proposed Project (CSX – South via Milford / NS – North via S-line) 4-126
4.8.3.1 Construction 4-127
4.8.3.2 Operations 4-128
4.8.4 Alternative 2: Proposed Project Site (CSX – South via Milford / NS – North via S-line) 4-140
4.8.5 Alternative 3: Proposed Project Site (CSX – South via Kingsworth / NS – North via Hospital District) 4-145
4.8.6 Alternative 4: Proposed Project Site (CSX & NS – South via Milford) 4-148
4.8.7 Alternative 5: River Center Project Site (CSX – South via Milford / NS – North via Hospital District) 4-152
4.8.8 Alternative 6: River Center Project Site (CSX – South via Kingsworth / NS – North via Hospital District) 4-164
4.8.9 Alternative 7: River Center Project Site (CSX & NS – South via Milford) 4-168
4.8.10 Related Activities 4-169
4.8.11 Summary of Impacts Table 4-172
4.8.12 Mitigation 4-174
4.8.12.1 Applicant's Proposed Avoidance and Minimization Measures 4-174
4.8.12.2 Additional Potential Mitigation Measures 4-175
4.9 LAND USE AND INFRASTRUCTURE 4-211
4.9.1 Methods and Impact Definitions 4-211
4.9.2 No-Action Alternative 4-212
4.9.3 Alternative 1: Proposed Project (CSX – South via Milford / NS – North via Hospital District) 4-212
4.9.3.1 Land Use and Zoning 4-212
4.9.3.2 Infrastructure and Utilities 4-215
4.9.3.2.1 Electricity 4-215
4.9.3.2.2 Natural Gas 4-215
4.9.3.2.3 Communications 4-216
4.9.3.2.4 Potable Water 4-216
4.9.3.2.5 Wastewater 4-216
4.9.3.2.6 Solid Waste 4-217
4.9.4 Alternative 2: Proposed Project (CSX – South via Milford / NS – North via S-line) 4-217
4.9.4.1 Land Use and Zoning 4-217
4.9.4.2 Infrastructure and Utilities 4-219
4.9.5 Alternative 3: Proposed Project (CSX – South via Kingsworth / NS – North via Hospital) 4-219

Page

4.9.5.1 Land Use and Zoning 4-219
4.9.5.2 Infrastructure and Utilities 4-219
4.9.6 Alternative 4: Proposed Project (CSX & NS – South via Milford) 4-221
4.9.6.1 Land Use and Zoning 4-221
4.9.6.2 Infrastructure and Utilities 4-221
4.9.7 Alternative 5: River Center Project Site (CSX – South via Milford / NS – North via Hospital District) 4-222
4.9.7.1 Land Use and Zoning 4-223
4.9.7.2 Infrastructure and Utilities 4-223
4.9.8 Alternative 6: River Center Project Site (CSX – South via Kingsworth / NS – North via Hospital) 4-224
4.9.8.1 Land Use and Zoning 4-225
4.9.9 Alternative 7: River Center Project Site (CSX & NS – South via Milford) 4-225
4.9.9.1 Land Use and Zoning 4-225
4.9.10 Related Activities 4-227
4.9.10.1 Land Use and Zoning 4-227
4.9.10.2 Infrastructure and Utilities 4-227
4.9.11 Summary of Impacts Table 4-228
4.9.12 Mitigation 4-230
4.9.12.1 Applicant's Proposed Avoidance and Minimization Measures 4-230
4.9.12.2 Additional Potential Mitigation Measures 4-230
4.10 CULTURAL RESOURCES 4-231
4.10.1 Methods and Impact Definitions 4-231
4.10.2 No-Action Alternative 4-232
4.10.3 Alternative 1: Applicant's Proposed Project (CSX – South via Milford / NS – North via Hospital District) 4-233
4.10.3.1 Construction 4-235
4.10.3.2 Operation 4-235
4.10.4 Alternative 2: Proposed Project Site (CSX – South via Milford / NS – North via S-Line) 4-236
4.10.4.1 Construction 4-237
4.10.4.2 Operation 4-237
4.10.5 Alternative 3: Proposed Project Site (CSX – South via Kingsworth / NS – North via Hospital District) 4-237
4.10.5.1 Construction 4-237
4.10.5.2 Operation 4-240
4.10.6 Alternative 4: Proposed Project Site (CSX & NS – South via Milford) 4-240
4.10.6.1 Construction 4-240
4.10.6.2 Operation 4-240

Page

4.10.7 Alternative 5: River Center Project Site (CSX – South via Milford / NS – North via Hospital District) 4-240
4.10.7.1 Construction 4-242
4.10.7.2 Operation 4-244
4.10.8 Alternative 6: River Center Project Site (CSX – South via Kingsworth / NS – North via Hospital District) 4-245
4.10.8.1 Construction 4-245
4.10.8.2 Operation 4-245
4.10.9 Alternative 7: River Center Project Site (CSX & NS – South via Milford) 4-247
4.10.9.1 Construction 4-247
4.10.9.2 Operation 4-247
4.10.10 Related Activities 4-247
4.10.10.1 Construction 4-247
4.10.10.2 Operation 4-249
4.10.11 Summary of Impacts Table 4-249
4.10.12 Mitigation 4-249
4.10.12.1 Applicant's Proposed Avoidance and Minimization Measures 4-249
4.10.12.2 Additional Potential Mitigation Measures 4-252
4.11 VISUAL RESOURCES AND AESTHETICS 4-253
4.11.1 Methods and Impact Definitions 4-253
4.11.1.1 Viewer Sensitivity 4-253
4.11.1.2 Impact Intensity 4-254
4.11.1.3 Impact Determination 4-256
4.11.2 No-Action Alternative 4-256
Scenic Views 4-257
Scenic Resources 4-257
Visual Quality and Character 4-257
Light and Glare 4-258
Selected Viewpoints 4-258
4.11.3 Alternative 1: Applicant's Proposed Project (CSX – South via Milford / NS – North via Hospital District) 4-260
Scenic Views 4-260
Scenic Resources 4-260
Visual Quality and Character 4-261
Light and Glare 4-263
Selected Viewpoints 4-265
4.11.4 Alternative 2: Proposed Project Site (CSX – South via Milford / NS –North via S-Line) 4-267
4.11.5 Alternative 3: Proposed Project Site (CSX – South via Kingsworth / NS – North via Hospital District) 4-268

Page

4.11.6 Alternative 4: Proposed Project Site (CSX & NS – South via Milford) 4-268
4.11.7 Alternative 5: River Center Project Site (CSX – South via Milford / NS – North via Hospital District) 4-269
4.11.8 Alternative 6: River Center Project Site (CSX – South via Kingsworth / NS – North via Hospital District) 4-271
4.11.9 Alternative 7: River Center Project Site (CSX & NS – South to Milford) 4-272
4.11.10 Related Activities 4-273
4.11.11 Summary of Impacts Table 4-273
4.11.12 Mitigation 4-277
4.11.12.1 Applicant's Proposed Avoidance and Minimization Measures 4-277
4.11.12.2 Additional Potential Mitigation Measures 4-277
4.12 NOISE AND VIBRATIONS 4-278
4.12.1 Methods and Impact Definitions 4-278
4.12.1.1 Traffic Noise Methodology and Impact Thresholds 4-278
4.12.1.2 Rail Noise Methodology and Impact Thresholds 4-280
4.12.1.3 Rail Vibration Methodology and Impact Thresholds 4-283
4.12.1.4 Construction Noise Methodology and Impact Thresholds 4-285
4.12.1.5 Operational Noise Methodology and Impact Thresholds 4-285
4.12.2 No-Action Alternative 4-287
4.12.2.1 Traffic Noise 4-287
4.12.2.2 Rail Noise 4-288
4.12.2.3 Rail Vibration 4-290
4.12.3 Alternative 1: Proposed Project (CSX – South via Milford / NS – North via Hospital District) 4-291
4.12.3.1 Traffic Noise 4-291
4.12.3.2 Rail Noise 4-291
4.12.3.3 Rail Vibration 4-296
4.12.3.4 Construction Noise 4-296
4.12.3.5 Operational Noise 4-297
4.12.4 Alternative 2: Proposed Project Site (CSX – South via Milford/ NS – North via S-line) 4-300
4.12.4.1 Traffic Noise 4-300
4.12.4.2 Rail Noise 4-301
4.12.4.3 Rail Vibration 4-304
4.12.4.4 Construction Noise 4-304
4.12.4.5 Operational Noise 4-305
4.12.5 Alternative 3: Proposed Project Site (CSX – South via Kingsworth / NS – North via Hospital District) 4-305
4.12.5.1 Traffic Noise 4-305
4.12.5.2 Rail Noise 4-305

Page

4.12.5.3 Rail Vibration 4-307
4.12.5.4 Construction Noise 4-307
4.12.5.5 Operational Noise 4-307
4.12.6 Alternative 4: Proposed Project Site (CSX & NS – South via Milford) 4-307
4.12.6.1 Traffic Noise 4-308
4.12.6.2 Rail Noise 4-308
4.12.6.3 Rail Vibration 4-311
4.12.6.4 Construction Noise 4-311
4.12.6.5 Operational Noise 4-311
4.12.7 Alternative 5: River Center Site (CSX – South via Milford / NS – North via Hospital Drive) 4-311
4.12.7.1 Traffic Noise 4-311
4.12.7.2 Rail Noise 4-312
4.12.7.3 Rail Vibration 4-314
4.12.7.4 Construction Noise 4-314
4.12.7.5 Operational Noise 4-315
4.12.8 Alternative 6: River Center Site (CSX – South via Kingsworth / NS – North via Hospital District) 4-317
4.12.8.1 Traffic Noise 4-317
4.12.8.2 Rail Noise 4-317
4.12.8.3 Rail Vibration 4-318
4.12.8.4 Construction Noise 4-319
4.12.8.5 Operational Noise 4-319
4.12.9 Alternative 7: River Center Site (CSX & NS – South via Milford) 4-319
4.12.9.1 Traffic Noise 4-319
4.12.9.2 Rail Noise 4-319
4.12.9.3 Rail Vibration 4-321
4.12.9.4 Construction Noise 4-321
4.12.9.5 Operational Noise 4-321
4.12.10 Summary of Impacts Table 4-321
4.12.11 Mitigation 4-324
4.12.11.1 Applicant's Proposed Avoidance and Minimization Measures 4-324
4.12.11.2 Additional Potential Mitigation Measures 4-324
4.13 AIR QUALITY 4-325
4.13.1 Methods and Impact Definitions 4-325
4.13.1.1 Construction NAAQS Emissions Inventory 4-325
4.13.1.2 Operational NAAQS Criteria Pollutant Emissions Inventory 4-325
4.13.1.3 NAAQS Dispersion Modeling 4-326
4.13.1.4 Hazardous Air Pollutants (HAPs) 4-328
4.13.1.5 Health Risk Assessment 4-330

Page

4.13.1.6 Impact Definitions 4-335
4.13.2 No-Action Alternative 4-336
4.13.2.1 Construction Criteria Pollutant Emissions Inventory 4-336
4.13.2.2 Operational Criteria Pollutant Emissions Inventory 4-336
4.13.2.3 Criteria Pollutant Dispersion Modeling 4-338
4.13.2.4 Hazardous Air Pollutants (HAPs) 4-340
4.13.2.5 Health Risk Assessment 4-340
4.13.3 Alternative 1: Proposed Project (CSX – South via Milford / NS – North via Hospital District) 4-343
4.13.3.1 Construction Criteria Pollutant Emissions Inventory 4-343
4.13.3.2 Operational Criteria Pollutant Emissions Inventory 4-344
4.13.3.3 Criteria Pollutant Dispersion Modeling 4-346
4.13.3.4 Hazardous Air Pollutants (HAPs) 4-347
4.13.3.5 Health Risk Assessment 4-348
4.13.4 Alternative 2: Proposed Project Site (CSX – South via Milford / NS – North via S-line) 4-350
4.13.4.1 Construction Criteria Pollutant Emissions Inventory 4-350
4.13.4.2 Operational Criteria Pollutant Emissions Inventory 4-352
4.13.4.3 Criteria Pollutant Dispersion Modeling 4-352
4.13.4.4 Hazardous Air Pollutants (HAPs) 4-352
4.13.4.5 Health Risk Assessment 4-353
4.13.5 Alternative 3: Proposed Project Site (CSX – South via Kingsworth / NS – North via Hospital) 4-355
4.13.5.1 Construction Criteria Pollutant Emissions Inventory 4-355
4.13.5.2 Operational Criteria Pollutant Emissions Inventory 4-356
4.13.5.3 Criteria Pollutant Dispersion Modeling 4-357
4.13.5.4 Hazardous Air Pollutants (HAPs) 4-358
4.13.5.5 Health Risk Assessment 4-358
4.13.6 Alternative 4: Proposed Project Site (CSX & NS – South via Milford) 4-360
4.13.6.1 Construction Criteria Pollutant Emissions Inventory 4-360
4.13.6.2 Operational Criteria Pollutant Emissions Inventory 4-361
4.13.6.3 Criteria Pollutant Dispersion Modeling 4-361
4.13.6.4 Hazardous Air Pollutants (HAPs) 4-362
4.13.6.5 Health Risk Assessment 4-362
4.13.7 Alternative 5: River Center Project Site (CSX – South via Milford / NS – North via Hospital District) 4-364
4.13.7.1 Construction Criteria Pollutant Emissions Inventory 4-364
4.13.7.2 Operational Criteria Pollutant Emissions Inventory 4-365
4.13.7.3 Criteria Pollutant Dispersion Modeling 4-367
4.13.7.4 Hazardous Air Pollutants (HAPs) 4-368

Page

4.13.7.5 Health Risk Assessment 4-369
4.13.8 Alternative 6: River Center Project Site (CSX – South via Kingsworth / NS – North via Hospital) 4-371
4.13.8.1 Construction Criteria Pollutant Emissions Inventory 4-371
4.13.8.2 Operational Criteria Pollutant Emissions Inventory 4-372
4.13.8.3 Criteria Pollutant Dispersion Modeling 4-373
4.13.8.4 Hazardous Air Pollutants (HAPs) 4-373
4.13.8.5 Health Risk Assessment 4-374
4.13.9 Alternative 7: River Center Project Site (CSX & NS – South via Milford) 4-376
4.13.9.1 Construction Criteria Pollutant Emissions Inventory 4-376
4.13.9.2 Operational Criteria Pollutant Emissions Inventory 4-376
4.13.9.3 Criteria Pollutant Dispersion Modeling 4-376
4.13.9.4 Hazardous Air Pollutants (HAPs) 4-378
4.13.9.5 Health Risk Assessment 4-378
4.13.10 Related Activities 4-380
4.13.11 Summary of Impacts Table 4-381
4.13.12 Mitigation 4-383
4.13.12.1 Applicant's Proposed Avoidance and Minimization Measures 4-383
4.13.12.2 Additional Potential Mitigation Measures 4-384
4.14 CLIMATE CHANGE 4-385
4.14.1 Methods and Impact Definitions 4-385
4.14.2 No-Action Alternative 4-387
4.14.2.1 Impacts on Climate Change by the No-Action Alternative: Construction GHG Emissions Inventory 4-387
4.14.2.2 Impacts on Climate Change by the No-Action Alternative: Operational GHG Emissions Inventory 4-387
4.14.3 Alternative 1: Proposed Project (CSX – South via Milford / NS – North via Hospital District) 4-389
4.14.3.1 Impacts on Climate Change by the Proposed Project: Construction GHG Emissions Inventory 4-389
4.14.3.2 Impacts on Climate Change by the Proposed Project: Operational GHG Emissions Inventory 4-390
4.14.4 Alternative 2: Proposed Project Site (CSX – South via Milford / NS – North via S-line) 4-391
4.14.4.1 Impacts on Climate Change by Alternative 2: Construction GHG Emissions Inventory 4-391
4.14.4.2 Impacts on Climate Change by Alternative 2: Operational GHG Emissions Inventory 4-392
4.14.5 Alternative 3: Proposed Project Site (CSX – South via Kingsworth / NS – North via Hospital) 4-392

Page

4.14.5.1 Impacts on Climate Change by Alternative 3: Construction GHG Emissions Inventory 4-392
4.14.5.2 Impacts on Climate Change by Alternative 3: Operational GHG Emissions Inventory 4-393
4.14.6 Alternative 4: Proposed Project Site (CSX & NS – South via Milford) 4-393
4.14.6.1 Impacts on Climate Change by Alternative 4: Construction GHG Emissions Inventory 4-393
4.14.6.2 Impacts on Climate Change by Alternative 4: Operational GHG Emissions Inventory 4-394
4.14.7 Alternative 5: River Center Project Site (CSX – South via Milford / NS – North via Hospital District) 4-394
4.14.7.1 Impacts on Climate Change by Alternative 5: Construction GHG Emissions Inventory 4-394
4.14.7.2 Impacts on Climate Change by Alternative 5: Operational GHG Emissions Inventory 4-395
4.14.8 Alternative 6: River Center Project Site (CSX – South via Kingsworth / NS – North via Hospital) 4-397
4.14.8.1 Impacts on Climate Change by Alternative 6: Construction GHG Emissions Inventory 4-397
4.14.8.2 Impacts on Climate Change by Alternative 6: Operational GHG Emissions Inventory 4-398
4.14.9 Alternative 7: River Center Project Site (CSX & NS – South via Milford) 4-398
4.14.9.1 Impacts on Climate Change by Alternative 7: Construction GHG Emissions Inventory 4-398
4.14.9.2 Impacts on Climate Change by Alternative 7: Operational GHG Emissions Inventory 4-399
4.14.10 Related Activities 4-399
4.14.11 Summary of Impacts Table 4-400
4.14.12 Mitigation 4-400
4.14.12.1 Applicant's Proposed Avoidance and Minimization Measures 4-400
4.14.12.2 Additional Potential Mitigation Measures 4-401
4.15 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE 4-402
4.15.1 Methods and Impact Definitions 4-402
4.15.2 No-Action Alternative 4-402
4.15.3 Alternative 1: Proposed Project (CSX – South via Milford / NS – North via Hospital District) 4-403
4.15.3.1 Construction 4-404
4.15.3.2 Operation 4-405
4.15.4 Alternative 2: Proposed Project Site (CSX – South via Milford / NS – North via S-line) 4-406
4.15.4.1 Construction 4-406

Page

4.15.4.2 Operation 4-406
4.15.5 Alternative 3: Proposed Project Site (CSX – South via Kingsworth / NS – North via Hospital District) 4-406
4.15.5.1 Construction 4-407
4.15.5.2 Operation 4-407
4.15.6 Alternative 4: Proposed Project Site (CSX & NS – South via Milford) 4-407
4.15.6.1 Construction 4-407
4.15.6.2 Operation 4-407
4.15.7 Alternative 5: River Center Project Site (CSX – South via Milford / NS – North via Hospital District) 4-408
4.15.7.1 Construction 4-408
4.15.7.2 Operation 4-409
4.15.8 Alternative 6: River Center Project Site (CSX – South via Kingsworth/NS – North via Hospital District) 4-409
4.15.8.1 Construction 4-409
4.15.8.2 Operation 4-409
4.15.9 Alternative 7: River Center Project Site (CSX & NS – South via Milford) 4-410
4.15.9.1 Construction 4-410
4.15.9.2 Operation 4-410
4.15.10 Related Activities 4-410
4.15.11 Summary of Impacts Table 4-410
4.15.12 Mitigation 4-415
4.15.12.1 Applicant's Proposed Avoidance and Minimization Measures 4-415
4.15.12.2 Additional Potential Mitigation Measures 4-415
4.16 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE 4-416
4.16.1 Methods and Impact Definitions 4-416
4.16.2 No-Action Alternative 4-418
4.16.3 Alternative 1: Proposed Project (CSX – South via Milford / NS – North via Hospital District) 4-420
4.16.4 Alternative 2: Proposed Project Site (CSX – South via Milford / NS – North via S-line) 4-426
4.16.5 Alternative 3: Proposed Project Site (CSX – South via Kingsworth / NS – North via Hospital District) 4-427
4.16.6 Alternative 4: Proposed Project Site (CSX & NS – South via Milford) 4-428
4.16.7 Alternative 5: River Center Project Site (CSX – South via Milford / NS – North via Hospital District) 4-429
4.16.8 Alternative 6: River Center Project Site (CSX – South via Kingsworth / NS – North via Hospital District) 4-433
4.16.9 Alternative 7: River Center Project Site (CSX & NS – South via Milford) 4-435
4.16.10 Related Activities 4-435
4.16.11 Summary of Impacts Table 4-436

Page

4.16.12 Mitigation 4-440
4.16.12.1 Applicant's Proposed Avoidance and Minimization Measures 4-440
4.16.12.2 Additional Potential Mitigation Measures 4-440
4.17 HUMAN HEALTH AND SAFETY 4-449
4.17.1 Methods and Impact Definitions 4-449
4.17.2 No-Action Alternative 4-449
4.17.2.1 Worker Safety 4-449
4.17.2.2 Drinking Water Quality 4-449
4.17.2.3 Noise and Vibration 4-450
4.17.2.4 Air Quality 4-451
4.17.2.5 Hazardous Materials 4-452
4.17.2.6 Community Safety and Emergency Response Times 4-452
4.17.2.7 Light and Glare 4-452
4.17.3 Alternative 1: Proposed Project (CSX – South via Milford / NS – North via Hospital District) 4-453
4.17.3.1 Worker Safety 4-453
4.17.3.2 Drinking Water Quality 4-453
4.17.3.3 Noise and Vibration 4-453
4.17.3.4 Air Quality 4-455
4.17.3.5 Hazardous Materials 4-456
4.17.3.6 Community Safety and Emergency Response Times 4-456
4.17.3.7 Light and Glare 4-457
4.17.4 Alternative 2: Proposed Project Site (CSX – South via Milford / NS – North via S-line) 4-458
4.17.4.1 Worker Safety 4-458
4.17.4.2 Drinking Water Quality 4-458
4.17.4.3 Noise and Vibration 4-458
4.17.4.4 Air Quality 4-459
4.17.4.5 Hazardous Materials 4-460
4.17.4.6 Community Safety and Emergency Response Times 4-460
4.17.4.7 Light and Glare 4-460
4.17.5 Alternative 3: Proposed Project Site (CSX – South via Kingsworth / NS – North via Hospital) 4-460
4.17.5.1 Worker Safety 4-460
4.17.5.2 Drinking Water Quality 4-461
4.17.5.3 Noise and Vibration 4-461
4.17.5.4 Air Quality 4-462
4.17.5.5 Hazardous Materials 4-462
4.17.5.6 Community Safety and Emergency Response Times 4-462
4.17.5.7 Light and Glare 4-463

Page

4.17.6 Alternative 4: Proposed Project Site (CSX & NS – South via Milford) 4-463
4.17.6.1 Worker Safety 4-463
4.17.6.2 Drinking Water Quality 4-463
4.17.6.3 Noise and Vibration 4-463
4.17.6.4 Air Quality 4-464
4.17.6.5 Hazardous Materials 4-465
4.17.6.6 Community Safety and Emergency Response Times 4-465
4.17.6.7 Light and Glare 4-465
4.17.7 Alternative 5: River Center Site (CSX – South via Milford / NS – North via Hospital District) 4-465
4.17.7.1 Worker Safety 4-466
4.17.7.2 Drinking Water Quality 4-466
4.17.7.3 Noise and Vibration 4-466
4.17.7.4 Air Quality 4-467
4.17.7.5 Hazardous Materials 4-468
4.17.7.6 Community Safety and Emergency Response Times 4-468
4.17.7.7 Light and Glare 4-469
4.17.8 Alternative 6: River Center Site (CSX – South via Kingsworth / NS – North via Hospital) 4-469
4.17.8.1 Worker Safety 4-469
4.17.8.2 Drinking Water Quality 4-470
4.17.8.3 Noise and Vibration 4-470
4.17.8.4 Air Quality 4-471
4.17.8.5 Hazardous Materials 4-471
4.17.8.6 Community Safety and Emergency Response Times 4-471
4.17.8.7 Light and Glare 4-472
4.17.9 Alternative 7: River Center Site (CSX & NS – South via Milford) 4-472
4.17.9.1 Worker Safety 4-472
4.17.9.2 Drinking Water Quality 4-472
4.17.9.3 Noise and Vibration 4-472
4.17.9.4 Air Quality 4-473
4.17.9.5 Hazardous Materials 4-474
4.17.9.6 Community Safety and Emergency Response Times 4-474
4.17.9.7 Light and Glare 4-474
4.17.10 Related Activities 4-474
4.17.10.1 Worker Safety 4-475
4.17.10.2 Drinking Water Quality 4-475
4.17.10.3 Noise and Vibration 4-475
4.17.10.4 Air Quality 4-475
4.17.10.5 Hazardous Materials 4-475

Page

4.17.10.6 Community Safety and Emergency Response Times 4-475
4.17.10.7 Light and Glare 4-475
4.17.11 Summary of Impacts Table 4-475
4.17.12 Mitigation 4-479
4.17.12.1 Applicant's Proposed Avoidance and Minimization Measures 4-479
4.17.12.2 Additional Potential Mitigation Measures 4-479
4.18 SECTION 4(F) AND 6(F) RESOURCES 4-480
4.18.1 Methods and Impact Definitions 4-480
4.18.2 No-Action Alternative 4-481
4.18.3 Alternative 1: Applicant's Proposed Project (CSX – South via Milford / NS – North via Hospital District) 4-482
4.18.4 Alternative 2: Proposed Project Site (CSX – South via Milford / NS – North via S-Line) 4-483
4.18.5 Alternative 3: Proposed Project Site (CSX – South via Kingsworth / NS – North via Hospital District) 4-484
4.18.6 Alternative 4: Proposed Project Site (CSX & NS – South via Milford) 4-484
4.18.7 Alternative 5: River Center Project Site (CSX – South via Milford / NS- North via Hospital District) 4-484
4.18.8 Alternative 6: River Center Project Site (CSX – South via Kingsworth / NS- via Hospital District) 4-485
4.18.9 Alternative 7: River Center Project Site (CSX & NS – South via Milford) 4-485
4.18.10 Related Activities 4-485
4.18.11 Summary of Uses of Section 4(f) and Section 6(f) Resources 4-485
4.18.12 Mitigation 4-488
4.18.12.1 Applicant's Proposed Avoidance and Minimization Measures 4-488
4.18.12.2 Additional Potential Mitigation Measures 4-488
5.0 CUMULATIVE IMPACTS 5-1
5.1 INTRODUCTION 5-1
5.2 GEOGRAPHIC AND TEMPORAL SCOPE 5-2
5.3 IDENTIFICATION OF PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE ACTIONS 5-3
5.3.1 Port and Navigational Projects 5-3
5.3.2 Other Urban and Industrial Development 5-5
5.3.3 Surface Transportation 5-5
5.4 METHODS 5-6
5.5 SCREENING FOR CUMULATIVE IMPACTS 5-7
5.6 FURTHER ASSESSMENT OF CUMULATIVE IMPACTS 5-12
5.6.1 Wetlands and Other Waters of the U.S. 5-12
5.6.2 Traffic and Transportation 5-14
5.6.3 Land Use 5-14

Page

5.6.4 Cultural Resources 5-15
5.6.5 Visual Resources and Aesthetics 5-15
5.6.6 Noise and Vibration 5-15
5.6.7 Air Quality 5-16
5.6.8 Socioeconomics and Environmental Justice 5-17
5.6.9 Human Health and Safety 5-18
5.6.10 Section 4(f) and 6 (f) Resources 5-19

6.0 MITIGATION 6-1
6.1 AVOIDANCE AND MINIMIZATION MEASURES UNDER NEPA 6-1
6.1.1 Avoidance and Minimization Measures Proposed by the Applicant 6-1
6.1.2 Additional Mitigation Measures Identified by the Corps 6-6

7.0 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES 7-1
7.1 UNAVOIDABLE ADVERSE IMPACTS 7-1
7.2 RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY 7-2

8.0 REGULATORY ENVIRONMENT OVERVIEW 8-1
8.1 FEDERAL LAWS AND REGULATIONS 8-6
8.2 STATE LAWS AND REGULATIONS 8-26
8.3 LOCAL LAWS AND REGULATIONS 8-34

9.0 PUBLIC, AGENCY, AND STAKEHOLDER COORDINATION AND CONSULTATION 9-1
9.1 PUBLIC AND STAKEHOLDER COORDINATION 9-1
9.1.1 Scoping Process 9-4
9.1.2 Public Meetings 9-5
9.1.3 Community and Stakeholder Meetings 9-7
9.1.4 Consulting Parties 9-8
9.1.5 Project Website 9-8
9.1.6 Project Newsletter 9-9
9.1.7 Community Engagement 9-9
9.2 AGENCY COORDINATION AND CONSULTATION 9-9
9.2.1 Cooperating Agencies 9-9
9.2.2 Agency Coordination and Consultation 9-10

10.0 REFERENCES 10-1
11.0 GLOSSARY 11-1
12.0 LIST OF PREPARERS 12-1

Appendices:

A Draft Clean Water Act Section 404(b)(1) Guidelines Evaluation
B Palmetto Railways Submittals
C Scoping Report and Addendum 1 to Scoping Report
D Planning Level Waters of the U.S. Analysis
E Essential Fish Habitat Assessment
F Transportation Technical Memorandum
G State Historic Preservation Office Documentation from Major Recent Investigations
H Noise and Vibration Technical Memorandum
I Air Quality and Climate Change Technical Memorandum
J Hazardous, Toxic, and Radioactive Waste Technical Memorandum
K Community Impact Assessment Technical Memorandum
L Design Assumptions for Environmental Consequences Impact Analysis
M Projects Evaluated in Cumulative Impact Analysis
N Mitigation Plan

Figures

		Page
ES-1	Proposed ICTF Components	ES-4
ES-2	Tier II Screening Results	ES-8
1.1-1	Regional Map	1-2
1.6-1	Study Area	1-22
1.7-1	Proposed ICTF Components	1-23
1.7-2	Proposed Project – ICTF Conceptual Design	1-25
1.7-3	Proposed Project – Drayage Road Improvements	1-28
1.7-4	Cosgrove Avenue to McMillan Avenue Intersection Improvements	1-29
1.7-5	Proposed Project – North Hobson Avenue/Viaduct Road/Bainbridge Avenue Intersection Improvements	1-30
1.7-6	Proposed Project – Northern Rail Connection	1-32
1.7-7	Proposed Project – Southern Rail Connection	1-33
2.3-1	Tier I Screening Results	2-11
2.3-2	Tier II Screening Results	2-19
2.4-1	Alternative 2: Proposed Project Site (CSX – South via Milford / NS – North via S-line)	2-24
2.4-2	Alternative 3: Proposed Project Site (CSX – South via Kingsworth / NS – North via Hospital District)	2-26
2.4-3	Alternative 4: Proposed Project Site (CSX & NS – South via Milford)	2-27
2.4-4	Alternative 5: River Center Project Site (CSX – South via Milford / NS – North via Hospital District)	2-28
2.4-5	Alternative 6: River Center Project Site (CSX – South via Kingsworth / NS – North via Hospital District)	2-31
2.4-6	Alternative 7: River Center Project Site (CSX & NS South via Milford)	2-32
3.2-1	Hydrology Study Area and Contributing Watersheds	3-6
3.2-2	Floodplains	3-11
3.3-1	STORET, USGS, and SCECAP Station Locations	3-15
3.3-2	Active NPDES Point Source Discharges	3-23
3.3-3	Groundwater Wells	3-27
3.4-1	Vegetation and Wildlife Study Area	3-36
3.4-2	Land Cover	3-37
3.5-1	U.S. Geological Service's HUCs	3-40
3.5-2	Location of Waters of the U.S.	3-43
3.6-1	Protected Species Study Area	3-45
3.6-2	Critical Habitat Designations	3-51
3.6-3	Element Occurrences of Protected Species	3-56
3.6-4	Wood Stork Rookeries and Bald Eagle Element Occurrences	3-61
3.7-1	Essential Fish Habitat	3-82
3.7-2	Oyster Reef and Shell Locations – Northern Study Area	3-85
3.7-3	Oyster Reef and Shell Locations – Southern Study Area	3-86

Figures, cont'd.

		Page
3.8-1	Transportation Study Area	3-109
3.8-2	Existing Intersection Operations	3-111
3.8-3	Existing Railways	3-113
3.9-1	Existing Land Use	3-116
3.9-2	City of North Charleston Existing Zoning	3-117
3.9-3	City of Charleston Existing Zoning	3-118
3.10-1	Cultural Resources Study Area	3-128
3.10-2	Locations of Previous Investigations	3-131
3.11-1	Selected Viewpoints	3-155
3.12-1	Typical A-weighted Sound Levels of Common Sounds	3-161
3.12-2	Typical Levels of Ground-Borne Vibration	3-164
3.12-3	Noise Monitoring Locations	3-165
3.12-4	Train Horn Noise	3-168
3.12-5	Quiet Zones	3-169
3.12-6	Train Passby Noise and Vibration Measurement Locations	3-171
3.13-1	Air Quality Regional Study Area	3-174
3.15-1	Hazardous, Toxic, and Radioactive Waste Study Area	3-186
3.15-2	Parcels Investigated through Phase 1 ESAs – Alternative 1 (Proposed Project)	3-188
3.15-3	Land Use Controls, Areas of Concern, and Monitoring Wells (Navy Base ICTF)	3-189
3.15-4	Southern Alternatives Area	3-193
3.15-5	Parcels Investigated through Phase 1 ESAs – River Center Site	3-196
3.16-1	Socioeconomics and Environmental Justice Study Area and Notable Populations	3-203
3.16-2	Neighborhoods	3-227
3.16-3	Socioeconomic Resources North	3-230
3.16-4	Socioeconomic Resources South	3-231
3.17-1.	Leading causes of death in Charleston County and the Low County Region	3-242
3.18-1	Section 4(f) and Section 6(f) Study Area	3-248
3.18-2	Section 4(f) and Section 6(f) Properties	3-249
4.2-1	Floodplains Alternative 1 (Proposed Project)	4-13
4.2-2	Floodplains Alternative 2	4-14
4.2-3	Floodplains Alternative 3	4-15
4.2-4	Floodplains Alternative 4	4-17
4.2-5	Floodplains Alternative 5	4-18
4.2-6	Floodplains Alternative 6	4-19
4.2-7	Floodplains Alternative 7	4-21
4.3-1	Locations of Dry Detention Sites – Alternative 1 (Proposed Project)	4-35
4.3-2	Locations of Dry Detention Sites – River Center ICTF	4-40
4.4-1	Land Cover – Alternative 1 (Proposed Project)	4-51

Figures, cont'd.

Page

4.4-2 Land Cover – Alternative 2 4-56
4.4-3 Land Cover – Alternative 3 4-58
4.4-4 Land Cover – Alternative 4 4-60
4.4-5 Land Cover – Alternative 5 4-62
4.4-6 Land Cover – Alternative 6 4-64
4.4-7 Land Cover – Alternative 7 4-66
4.5-1 Waters of the U.S. Impacts: Alternative 1 (Proposed Project) 4-73
4.5-2 Waters of the U.S. Impacts: Alternative 2 4-74
4.5-3 Waters of the U.S. Impacts: Alternative 4-77
4.5-4 Waters of the U.S. Impacts: Alternative 4 4-78
4.5-5 Waters of the U.S. Impacts: Alternative 5 4-81
4.5-6 Waters of the U.S. Impacts: Alternative 6 4-83
4.5-7 Waters of the U.S. Impacts: Alternative 7 4-85
4.7-1 Essential Fish Habitat Impacts: Alternative 1 (Proposed Project) 4-105
4.7-2 Essential Fish Habitat Impacts: Alternative 2 4-107
4.7-3 Essential Fish Habitat Impacts: Alternative 3 4-109
4.7-4 Essential Fish Habitat Impacts: Alternative 4 4-110
4.7-5 Essential Fish Habitat Impacts: Alternative 5 4-111
4.7-6 Essential Fish Habitat Impacts: Alternative 6 4-113
4.7-7 Essential Fish Habitat Impacts: Alternative 7 4-114
4.8-1 North Charleston Truck Restrictions 4-177
4.8-2 Intersection Operations 2018: No-Action Alternative 4-179
4.8-3 Intersection Operations 2038: No-Action Alternative 4-181
4.8-4 At-Grade Rail Crossings: No-Action Alternative 4-183
4.8-5 Intersection Operations 2018: Alternatives 1, 3, and 4 4-185
4.8-6 Intersection Operations 2038: Alternatives 1, 3, and 4 4-187
4.8-7 At-Grade Rail Crossings: Alternative 1 (Proposed Project) 4-189
4.8-8 Intersection Operations 2018: Alternative 2 4-191
4.8-9 Intersection Operations 2038: Alternative 2 4-193
4.8-10 At-Grade Rail Crossings: Alternative 2 4-195
4.8-11 At-Grade Rail Crossings: Alternative 3 4-197
4.8-12 At-Grade Rail Crossings: Alternative 4 4-199
4.8-13 Intersection Operations 2018: Alternatives 5, 6, and 7 4-201
4.8-14 Intersection Operations 2038: Alternatives 5, 6, and 7 4-203
4.8-15 At-Grade Rail Crossings: Alternative 5 4-205
4.8-16 At-Grade Rail Crossings: Alternative 6 4-207
4.8-17 At-Grade Rail Crossings: Alternative 7 4-209
4.9-1 Land Use Impacts: Alternative 1 (Proposed Project) 4-213

Figures, cont'd.

Page

4.9-2 Land Use Impacts: Alternative 2 4-218
4.9-3 Land Use Impacts: Alternative 3 4-220
4.9-4 Land Use Impacts: Alternative 4 4-222
4.9-5 Land Use Impacts: Alternative 5 4-224
4.9-6 Land Use Impacts: Alternative 6 4-226
4.9-7 Land Use Impacts: Alternative 7 4-228
4.10-1 Historic Properties: Alternative 1 (Proposed Project) 4-234
4.10-2 Historic Properties: Alternative 2 4-238
4.10-3 Historic Properties: Alternative 3 4-239
4.10-4 Historic Properties: Alternative 4 4-241
4.10-5 Historic Properties: Alternative 5 4-243
4.10-6 Historic Properties: Alternative 6 4-246
4.10-7 Historic Properties: Alternative 7 4-248
4.12-1 Noise Prediction Locations 4-279
4.12-2 Rail Segments for Noise Analysis 4-282
4.12-3 Rail Noise Contour –Rail Segment from Dorchester Road to Misroon Street: No-Action Alternative 4-289
4.12-4 Rail Noise Contour – Rail Segment from North of Dorchester Road to Misroon Street: Alternative 1 (Proposed Project) 4-293
4.12-5 Rail Noise Contour – Rail Segment from Hackemann Avenue to Discher Street: Alternative 1 (Proposed Project) 4-294
4.12-6 Rail Noise Contour – Rail Segment from Avenue B to ICTF: Alternative 1 (Proposed Project) 4-295
4.12-7 Rail Noise Contour – Rail Segment from O'Hear Avenue to ICTF: Alternative 2 4-302
4.12-8 Rail Noise Contour – Rail Segment from South of O'Hear Avenue to ICTF: Alternative 2 4-303
4.12-9 Rail Noise Contour – Rail Segment from Meeting Street to Spruill Avenue: Alternative 3 4-306
4.12-10 Rail Noise Contour – Rail Segment from Dorchester Road to Misroon Street: Alternative 4 4-309
4.12-11 Rail Noise Contour – Rail Segment from Hackemann Avenue to Discher Street, Alternative 4 4-310
4.12-12 Rail Noise Contour – Rail Segment from Pittsburg Avenue to ICTF: Alternative 5 4-313
4.12-13 Rail Noise Contour – Rail Segment from Pittsburg Avenue to ICTF: Alternative 7 4-320
4.13-1 Dispersion Modeling Receptors: Alternatives 1–4 4-327
4.13-2 Dispersion Modeling Receptors: Alternatives 5–7 4-329
4.13-3 Cancer Risk: No-Action Alternative 4-341
4.13-4 Putting Risks in Perspective 4-343
4.13-5 Cancer Risk: Alternative 1 (Proposed Project) 4-349

Figures, cont'd.

		Page
4.13-6	Cancer Risk: Alternative 2	4-354
4.13-7	Cancer Risk: Alternative 3	4-359
4.13-8	Cancer Risk: Alternative 4	4-363
4.13-9	Cancer Risk: Alternative 5	4-370
4.13-10	Cancer Risk: Alternative 6	4-375
4.13-11	Cancer Risk: Alternative 7	4-379
4.16-1	Notable Feature Key	4-441
4.16-2	Notable Features: Alternative 1 (Proposed Project)	4-442
4.16-3	Notable Features: Alternative 2	4-443
4.16-4	Notable Features: Alternative 3	4-444
4.16-5	Notable Features: Alternative 4	4-445
4.16-6	Notable Features: Alternative 5	4-446
4.16-7	Notable Features: Alternative 6	4-447
4.16-8	Notable Features: Alternative 7	4-448
5.3-1	Cumulative Impact Analysis: Past, Present, and Reasonably Foreseeable Future Actions	5-4
5.7-1	Cooper River Watershed	5-13

Tables

		Page
ES-1	Environmental Resources and Impacts Considered in the EIS	ES-10
ES-2	Summary of Proposed Project Impacts	ES-14
ES-3	Summary of Avoidance and Minimization Measures Proposed by the Applicant	ES-29
ES-4	Additional Mitigation Measures Being Identified by the Corps	ES-34
1.2-1	Interest Factors Evaluated in the Navy Base ICTF EIS	1-4
1.4-1	Projected TEU Container Traffic at Port of Charleston	1-14
1.7-1	Details of anticipated construction activities and associated materials for the Proposed Project	1-26
1.7-2	Estimated annual utility consumption levels for the Proposed Project	1-36
2.3-1	Potential Sites Associated with the HLT and the Wando Welch Port Facilities	2-12
2.3-2	Summary of Results for Tier II Screening Analysis (Screening Criterion #IIA)	2-15
2.3-3	Summary of Results for Tier II Screening Analysis (Screening Criterion #IIB	2-17
2.3-4	Summary of Results for Tier II Screening Analysis (Screening Criterion #IIC)	2-18
2.4-1	Alternatives Recommended for Detailed Evaluation in the EIS	2-21
2.4-2	Summary of Potential Impacts by Alternative and Environmental Resource	2-35
3.2-1	Average Precipitation Rates	3-7
3.2-2	Soil Characteristics That Affect Hydrology	3-7
3.2-3	Percent Impervious Cover by Land Use and Site	3-8
3.2-4	Average Percent Impervious Cover by Visual Interpretation	3-9
3.2-5	FEMA Flood Zone Area Within the Study Area	3-12
3.3-1	Existing STORET and USGS water quality stations within the study area	3-14
3.3-2	SCECAP Water Quality Stations	3-16
3.3-3	303(d) list of impaired waters in the Cooper River Watershed in 2012	3-17
3.3-4	Summary of concentrations, water quality criteria, and compliance for parameters of interest	3-22
3.3-5	Active NPDES Permits within study area	3-24
3.3-6	SCDNR Coastal Plain Water Well Records in the Study Area	3-28
3.4-1	Original GAP Land Cover Classes within the Study Area	3-30
3.4-2	Noxious Plants within the Study Area	3-32
3.5-1	Waters of the U.S. within the Study Area	3-42
3.6-1	Federally Protected Species with the Potential to Occur in the Study Area	3-46
3.6-2	Habitat for Federally Protected Species Within the Study Area	3-47
3.6-3	Federally Protected and At-Risk Species with the Potential to Occur in the Study Area	3-64
3.6-4	Potential Habitat for Federally Protected and At-Risk Species with the Potential to Occur in the Study Area	3-65
3.6-5	State-Protected Species Potentially Occurring in Charleston County, South Carolina	3-71
3.6-6	Potential Habitat for State-Listed Species Within the Study Area	3-72
3.6-7	Protected Rare Species in Charleston County, South Carolina, and their Habitats	3-75

Tables, cont'd.

Page

3.7-1 Common Fish and Shellfish Species Known to Use Estuarine EFH within the Study Area 3-87
3.7-2 Federally Managed Species That May Use EFH within the Study Area 3-89
3.8-1 Definitions of Levels of Service for Freeway Segments 3-93
3.8-2 Definitions of Levels of Service for Intersections 3-94
3.8-3 I-26 Existing Operations 3-95
3.8-4 I-526 Existing Operations 3-96
3.8-5 US 17 Existing Freeway Operations 3-97
3.8-6 US 17 Existing Intersection Operations 3-97
3.8-7 North Charleston Existing Intersection Operations 3-101
3.8-1 Definitions of Levels of Service for Freeway Segments 3-101
3.8-9 Year 2013 Existing At-Grade Rail Crossings Analysis Results 3-104
3.9-1 Study Area Land Uses 3-119
3.9-2 Utility Providers in Study Area 3-124
3.9-3 SCE&G Power Generation Capacity 3-125
3.10-1 Cultural Resources Investigations 3-134
3.10-2 Historic Properties 3-135
3.12-1 Existing Noise Levels 3-166
3.12-2 Noise Levels Measured at Rail Crossing 10 3-170
3.12-3 Ground-Borne Vibration Levels Measured at Rail Crossing 10 3-170
3.13-1 National Ambient Air Quality Standards 3-176
3.13-2 Local Air Quality Monitoring for 2013 3-180
3.16-1 Study Area Census Tracts, Block Groups and Associated Neighborhoods 3-204
3.16-2 Population Trends 2000–2010 3-205
3.16-3 Age Distribution 3-207
3.16-4 Racial Composition 3-208
3.16-5 Hispanic or Latino Origin 3-209
3.16-6 Limited English Proficiency 3-211
3.16-7 Educational Attainment for Persons Age 25 and Older 3-212
3.16-8 Housing Trends, 2000–2010 3-214
3.16-9 Year Housing Units Built 3-215
3.16-10 Median House Value 3-216
3.16-11 Occupancy Status of Housing Units 3-217
3.16-12 Vehicle Availability by Occupied Housing Units 3-218
3.16-13 Median Household Income in the Past 12 Months 3-220
3.16-14 Household Income in the Past 12 Months 3-221
3.16-15 Annual Unemployment Rate, 2004–2013 3-222
3.16-16 Largest Public and Private Sector Employers, Charleston S.C. MSA 3-222

Tables, cont'd.

		Page
3.16-17	Travel Time to Work	3-224
3.16-18	Means of Transportation to Work	3-225
3.16-19	Environmental Justice Analysis	3-239
3.16-20	Low-Income Households	3-241
4.1-1	Impact Definitions, Geology and Soils	4-3
4.1-2	Summary of Impacts, Geology and Soils	4-7
4.2-1	Impact Definitions, Hydrology	4-9
4.2-2	Impacts Summary, Hydrology	4-22
4.3-1	Impact Definitions, Water Quality	4-24
4.3-2	Percent Removal Estimates for Dry Detention and Vegetative Swales	4-37
4.3-3	Summary of Impacts, Water Quality	4-44
4.4-1	Impact Definitions, Vegetation and Wildlife	4-48
4.4-2	Land Cover Impacts for Alternative 1: Proposed Project	4-54
4.4-3	Land Cover Impacts for Alternative 2	4-55
4.4-4	Land Cover Impacts Alternative 3	4-57
4.4-5	Land Cover Impacts for Alternative 4	4-59
4.4-6	Land Cover Impacts for Alternative 5	4-61
4.4-7	Land Cover Impacts for Alternative 6	4-63
4.4-8	Land Cover Impacts for Alternative 7	4-65
4.4-9	Land Cover Impacts from Related Activities	4-67
4.4-10	Summary of Impacts, Vegetation and Wildlife	4-68
4.5-1	Impact Definitions, Waters of the U.S.	4-71
4.5-2	Waters of the U.S. Impacts for Alternative 1 (Proposed Project)	4-75
4.5-3	Waters of the U.S. Impacts for Alternative 2	4-75
4.5-4	Waters of the U.S. Impacts for Alternative 3	4-79
4.5-5	Waters of the U.S. Impacts for Alternative 4	4-79
4.5-6	Waters of the U.S. Impacts for Alternative 5	4-82
4.5-7	Waters of the U.S. Impacts for Alternative 6	4-84
4.5-8	Waters of the U.S. Impacts for Alternative 7	4-86
4.5-9	Waters of the U.S. Impacts for Related Activities	4-87
4.5-10	Summary of Impacts, Waters of the United States	4-87
4.6-1	Impact Definitions, Protected Species	4-90
4.6-2	Protected Species Impacts for Alternative 1 (Proposed Project)	4-92
4.6-3	Underwater Noise Analysis of Pile Driving Activities for Alternative 1 (Proposed Project)	4-95
4.6-4	Summary of Impacts, Protected Species	4-100
4.7-1	Impact Definitions, Essential Fish Habitat	4-103
4.7-2	Summary of Impacts, Essential Fish Habitat	4-115

Tables, cont'd.

		Page
4.8-1	Impact Definitions, Traffic and Transportation	4-119
4.8-2	I-26 Operations, No-Action Alternative	4-120
4.8-3	I-526 Operations, No-Action Alternative	4-121
4.8-4	US 17 Freeway Operations, No-Action Alternative	4-122
4.8-5	US 17 Intersection Operations, No-Action Alternative	4-122
4.8-6	North Charleston Intersection Operations, No-Action Alternative	4-123
4.8-7	Opening Year 2018 At-Grade Rail Crossings Analysis Results for the No-Action Alternative	4-125
4.8-8	Design Year 2038 At-Grade Rail Crossings Analysis Results for the No-Action Alternative	4-125
4.8-9	I-26 Operations, Alternative 1 (Proposed Project)	4-128
4.8-10	I-26 Freeway Segment Impacts for Alternative 1 (Proposed Project)	4-129
4.8-11	I-526 Operations, Alternative 1 (Proposed Project)	4-130
4.8-12	I-526 Freeway Segment Impacts for Alternative 1 (Proposed Project)	4-130
4.8-13	US 17 Freeway Operations, Alternative 1 (Proposed Project)	4-131
4.8-14	US 17 Intersection Operations, Alternative 1 (Proposed Project)	4-131
4.8-15	US 17 Freeway Segment Impacts for Alternative 1 (Proposed Project)	4-132
4.8-16	North Charleston Intersection Operations, Alternative 1 (Proposed Project)	4-133
4.8-17	North Charleston Intersection Impacts for Alternative 1 (Proposed Project)	4-136
4.8-18	Opening Year 2018 At-Grade Rail Crossings Analysis Results for Alternative 1 (Proposed Project)	4-138
4.8-19	Design Year 2038 At-Grade Rail Crossings Analysis Results for Alternative 1 (Proposed Project)	4-139
4.8-20	North Charleston Intersection Operations, Alternative 2	4-141
4.8-21	North Charleston Intersection Impacts for Alternative 2	4-142
4.8-22	Opening Year 2018 At-Grade Rail Crossings Analysis Results for Alternative 2	4-143
4.8-23	Design Year 2038 At-Grade Rail Crossings Analysis Results for Alternative 2	4-144
4.8-24	Opening Year 2018 At-Grade Rail Crossings Analysis Results for Alternative 3	4-146
4.8-25	Design Year 2038 At-Grade Rail Crossings Analysis Results for Alternative 3	4-147
4.8-26	Opening Year 2018 At-Grade Rail Crossings Analysis Results for Alternative 4	4-150
4.8-27	Design Year 2038 At-Grade Rail Crossings Analysis Results for Alternative 4	4-151
4.8-28	I-26 Operations, Alternative 5	4-153
4.8-29	Number of I-26 Freeway Segment Impacts, Alternative 5	4-154
4.8-30	I-526 Operations, Alternative 5	4-155
4.8-31	Number of I-526 Freeway Segment Impacts, Alternative 5	4-155
4.8-32	US 17 Freeway Operations, Alternative 5	4-156
4.8-33	US 17 Intersection Operations, Alternative 5	4-156
4.8-34	US 17 Freeway Segment Impacts for Alternative 5	4-157
4.8-35	US 17 Intersection Impacts for Alternative 5	4-158

Tables, cont'd.

		Page
4.8-36	North Charleston Intersection Operations, Alternative 5	4-159
4.8-37	North Charleston Intersection Impacts, Alternative 5	4-160
4.8-38	Opening Year 2018 At-Grade Rail Crossings Analysis Results for Alternative 5	4-162
4.8-39	Design Year 2038 At-Grade Rail Crossings Analysis Results for Alternative 5	4-163
4.8-40	Opening Year 2018 At-Grade Rail Crossings Analysis Results for Alternative 6	4-166
4.8-41	Design Year 2038 At-Grade Rail Crossings Analysis Results for Alternative 6	4-167
4.8-42	Opening Year 2018 At-Grade Rail Crossings Analysis Results for Alternative 7	4-170
4.8-43	Design Year 2038 At-Grade Rail Crossings Analysis Results for Alternative 7	4-171
4.8-44	Summary of Impacts, Traffic and Transportation	4-172
4.9-1	Impact Definitions, Land Use and Infrastructure	4-211
4.9-2	Summary of Impacts, Land Use and Infrastructure	4-229
4.10-1	Impact Definitions, Cultural Resources	4-232
4.10-2	Summary of Impacts, Cultural Resources	4-250
4.11-1	Viewpoint Sensitivity	4-254
4.11-2	Impact Definitions, Visual Resources and Aesthetics	4-256
4.11-3	Impact Determinations for Selected Viewpoints, No-Action Alternative	4-258
4.11-4	Outside Light Levels	4-264
4.11-5	Impact Determinations for Selected Viewpoints, Alternative 1 (Proposed Project)	4-266
4.11-6	Impact Determinations for Selected Viewpoints, Alternative 5	4-270
4.11-7	Summary of Impacts, Visual Resources and Aesthetics	4-274
4.12-1	Impact Definitions, Traffic Noise	4-280
4.12-2	Impact Definitions, Rail Noise	4-283
4.12-3	Impact Criteria for Ground-Borne Vibration of Freight Train Passby	4-284
4.12-4	2038 No-Action Alternative Exterior Ambient Noise Levels	4-287
4.12-5	Impact Definitions, Operational Noise	4-287
4.12-6	Average Traffic Noise Levels for 2013 Existing Conditions and 2038, No-Action Alternative	4-288
4.12-7	DNL Contour Distance from Track Centerline for 2038, No-Action Alternative	4-290
4.12-8	Average 2038 Traffic Noise Levels for Alternative 1 (Proposed Project) versus the No-Action Alternative	4-291
4.12-9	DNL Contour Distance from Track Centerline for Alternative 1 (Proposed Project)	4-292
4.12-10	Estimated Number of Noise Impacted Receptors for Alternative 1 (Proposed Project)	4-296
4.12-11	Predicted ICTF Construction Noise Levels	4-297
4.12-12	Operational Noise at Nearest Receivers, Alternative 1 (Proposed Project)	4-298
4.12-13	Operational Noise Impact at Nearest Receptors, Alternative 1 (Proposed Project)	4-299
4.12-14	Average 2038 Traffic Noise Levels for Alternatives 2 versus No-Action Alternative	4-301
4.12-15	Estimated Number of Noise Impacted Receptors for Alternative 2	4-304
4.12-16	Estimated Number of Noise Impacted Receptors for Alternative 3	4-307
4.12-17	Estimated Number of Noise Impacted Receptors for Alternative 4	4-308

Tables, cont'd.

Page

4.12-18 Averaged 2038 Traffic Noise Levels for Alternative 5 versus No-Action Alternative 4-311
4.12-19 Estimated Number of Noise Impacted Receptors for Alternative 5 4-314
4.12-20 Operational Noise at Nearest Receptors, Alternative 5 4-315
4.12-21 Operational Noise at Nearest Receivers, Alternative 5 4-316
4.12-22 Estimated Number of Noise Impacted Receptors for Alternative 6 4-318
4.12-23 Estimated Number of Noise Impacted Receptors for Alternative 7 4-321
4.12-24 Summary of Impacts, Noise and Vibration 4-322
4.13-1 HAP Ratios 4-330
4.13-2 Impact Definitions, Criteria Pollutants on Air Quality 4-335
4.13-3 Impact Definitions, Hazardous Air Pollutants on Air Quality 4-336
4.13-4 Annual Operational Criteria Pollutant Emissions Inventory, No-Action Alternative 4-337
4.13-5 Comparison of Study Area Criteria Pollutant Emissions Inventory to No-Action Alternative Emissions 4-338
4.13-6 Criteria Pollutant Dispersion Modeling, No-Action Alternative 4-339
4.13-7 Comparison of Study Area HAP Emissions to No-Action Alternative HAP Emissions 4-340
4.13-8 Cancer Risk and HQ by Source Group, No-Action Alternative 4-342
4.13-9 Total Construction Criteria Pollutant Emissions Inventory, Alternative 1 (Proposed Project) 4-344
4.13-10 Total Annual Operational Criteria Pollutant Emissions Inventory, Alternative 1 (Proposed Project) 4-345
4.13-11 Comparison of Study Area Criteria Pollutant Emissions Inventory to Proposed Project Alternative Emissions 4-345
4.13-12 Criteria Pollutant Dispersion Modeling, Alternative 1 (Proposed Project) 4-347
4.13-13 Comparison of Study Area HAP Emissions to the Proposed Project Alternative HAP Emissions 4-347
4.13-14 Cancer Risk and HQ by Source Group, Alternative 1 (Proposed Project) 4-348
4.13-15 Total Construction Criteria Pollutant Emissions Inventory, Alternative 2 4-351
4.13-16 Criteria Pollutant Dispersion Modeling, Alternative 2 4-353
4.13-17 Cancer Risk and HQ by Source Group, Alternative 2 4-355
4.13-18 Total Construction Criteria Pollutant Emissions Inventory, Alternative 3 4-356
4.13-19 Criteria Pollutant Dispersion Modeling, Alternative 3 4-357
4.13-20 Cancer Risk and HQ by Source Group, Alternative 3 4-358
4.13-21 Total Construction Criteria Pollutant Emissions Inventory, Alternative 4 4-360
4.13-22 Criteria Pollutant Dispersion Modeling, Alternative 4 4-362
4.13-23 Cancer Risk and HQ by Source Group, Alternative 4 4-364
4.13-24 Total Construction Criteria Pollutant Emissions Inventory, Alternative 5 4-365
4.13-25 Annual Operational Criteria Pollutant Emissions Inventory, Alternative 5 4-366
4.13-26 Comparison of Study Area Criteria Pollutant Emissions Inventory to Alternative 5 Emissions 4-367

Tables, cont'd.

Page

4.13-27 Criteria Pollutant Dispersion Modeling, Alternative 5 4-368
4.13-28 Comparison of Study Area HAP Emissions to Alternative 5 HAP Emissions 4-369
4.13-29 Cancer Risk and HQ by Source Group, Alternative 5 4-371
4.13-30 Total Construction Criteria Pollutant Emissions Inventory, Alternative 6 4-372
4.13-31 Criteria Pollutant Dispersion Modeling, Alternative 6 4-373
4.13-32 Cancer Risk and HQ by Source Group, Alternative 6 4-374
4.13-33 Total Construction Criteria Pollutant Emissions Inventory, Alternative 7 4-377
4.13-34 Criteria Pollutant Dispersion Modeling, Alternative 7 4-378
4.13-35 Cancer Risk and HQ by Source Group, Alternative 7 4-380
4.13-36 Summary of Impacts, Air Quality 4-381
4.14-1 Global Warming Potential (GWP) of GHGs 4-386
4.14-2 Impact Definitions, Climate Change 4-386
4.14-3 Annual Operational GHG Emissions Inventory, No-Action Alternative 4-388
4.14-4 Total Construction GHG Emissions Inventory, Alternative 1 4-389
4.14-5 Annual Operational GHG Emissions Inventory, Alternative 1 (Proposed Alternative) 4-390
4.14-6 Total Construction GHG Emissions Inventory, Alternative 2 4-392
4.14-7 Total Construction GHG Emissions Inventory, Alternative 3 4-393
4.14-8 Total Construction GHG Emissions Inventory, Alternative 4 4-394
4.14-9 Total Construction GHG Emissions Inventory, Alternative 5 4-395
4.14-10 Annual Operational GHG Emissions Inventory, Alternative 5 4-396
4.14-11 Total Construction GHG Emissions Inventory, Alternative 6 4-397
4.14-12 Total Construction GHG Emissions Inventory, Alternative 7 4-398
4.14-13 Summary of Impacts, Climate Change 4-400
4.15-1 Impact Definitions, Hazardous, Toxic, and Radioactive Waste 4-402
4.15-2 Summary of Impacts, Hazardous, Toxic, and Radioactive Waste 4-411
4.16-1 Impact Definitions, Socioeconomics and Environmental Justice 4-417
4.16-2 Summary of Impacts, Socioeconomics and Environmental Justice 4-437
4.17-2 Summary of Impacts, Human Health and Safety 4-476
4.18-1 Impact Definitions for Section 4(f) and Section 6(f) Resources 4-481
4.18-2 Section 4(f) and Section 6(f) Resources 4-486
5.5-1 Screening of Cumulative Impacts by Resource Area 5-7
6-1 Summary of Avoidance and Minimization Measures Proposed by the Applicant 6-1
6-2 Additional Mitigation Measures Being Identified by the Corps 6-7
8-1 Overview of Applicable Laws, Regulations, and Executive Orders 8-1
9.1-1 Chronological summary of public and agency involvement activities (2013–2014) 9-2

Acronyms and Abbreviations

ACM	Asbestos-containing material
ACS	American Community Survey
AM	Morning
AMSL	Above mean sea level
AOC	Area of Concern
APE	Area of Potential Effect
ARNI	Aquatic Resources of National Importance
ASMFC	Atlantic States Marine Fisheries Commission
AST	Above-ground storage tank
BCDCOG	Berkeley-Charleston-Dorchester Council of Governments
BFE	Base flood elevation
bls	Below land surface
BMP	Best Management Practice
BOD	Biochemical oxygen demand
BRAC	Federal Defense Base Closure and Realignment Act
CAA	Clean Air Act
CARTA	Charleston Area Regional Transportation Authority
C-CAP	Coastal Change Analysis Program
CCL	Coastal Conservation League
CCRAB	Charleston Community Research to Action Board
CDF	Confined disposal facility
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CEQ	Council on Environmental Quality
cf	Cubic feet
CFR	Code of Federal Regulations
CH_4	Methane
CMCI	Charleston Marine Container, Inc.
Cm/s	Centimeters per second
CNC	Charleston Naval Complex
CNCRDA	Charleston Naval Complex Redevelopment Authority
CNH	Charleston Navy Hospital
CNY	Charleston Naval Yard
CNYOQ	Charleston Naval Yard Officers' Quarters
CO	Carbon monoxide
CO_2	Carbon dioxide

Corps	U.S. Army Corps of Engineers
CSX	CSX Transportation
CWA	Clean Water Act
cy	cubic yards
DA	Department of the Army
dB	Decibel
dB(A)	A-weighted decibel
DCIA	Direct Community Impact Area
DE	Diesel exhaust
DEIS	Draft Environmental Impact Statement
DEM	Digital elevation model
DO	Dissolved oxygen
DOD	Department of Defense
DPM	Diesel particulate matter
DPR	Division of Public Railways
DSA	Demographic Study Area
EBST	Environmental Baseline Survey for Transfer
EFH	Essential fish habitat
EIS	Environmental Impact Statement
EMS	Emergency Medical Service
EPA	Environmental Protection Agency
ESA	Endangered Species Act; Environmental Site Assessment
ESI	Environmental Sensitivity Index
FDS	Fuel Distribution System
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FLETC	Federal Law Enforcement Training Center
FMP	Fisheries Management Plan
FONSI	Finding of No Significant Impact
FRA	Federal Railroad Administration
fps	feet per second
ft	feet
GHG	Greenhouse gas
GIS	Geographic Information System

GNSS	Global Navigation Satellite System
gpd	gallons per day
HAP	Hazardous air pollutant
HCM	Highway Capacity Manual
HCS	Highway Capacity Software
HHS	U.S. Department of Health and Human Services
HLT	Hugh K. Leatherman, Sr. Terminal
Hospital District	Charleston Naval Hospital Historic District
HQCORPS	Corps Headquarters
HTRW	Hazardous, Toxic, and Radioactive Waste
HUC	Hydrologic Unit Code
HVAC	heating, ventilation, air conditioning
Hz	Hertz
I-26	Interstate Highway 26
I-526	Interstate Highway 526
IARC	International Agency for Research on Cancer
ICTF	Intermodal Container Transfer Facility
LAMC	Lowcountry Alliance for Model Communities
LEDPA	Least Environmentally Damaging Practicable Alternative
LEP	Limited English Proficiency
IPCC	United Nations Intergovernmental Panel on Climate Change
Leq(h)	Hourly equivalent sound level
LF	linear feet
mg/L	milligrams per liter
LiDAR	Light Detection and Ranging remote sensing technology
LOS	Level of service
LRR	Land Resource Region
LTM	Long-term monitoring
LUC	Land Use Control
MLRA	Major Land Resource Area
MOS	Margin of safety
MOUA	Memorandum of Understanding and Agreement
MPSSZ	Middle Place-Summerville Seismic Zone
MS4	Municipal Separate Storm Sewer System
MSA	Metropolitan Statistical Area
N_2O	Nitrous oxide
NAAQS	National Ambient Air Quality Standard

NBIF	Navy Base Intermodal Facility
NCTC	North Charleston Terminal Company
NEPA	National Environmental Policy Act
NFA	No Further Action
NHD	National Hydrography Dataset
NMFS	National Marine Fisheries Service
NO_2	Nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
No_x	Nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPS	National Park Service
nps	Non-point source
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NS	Norfolk Southern Railway
NTU	Nephelometric turbidity units
NVCS	National Vegetation Classification Standard
NWI	National Wetlands Inventory
OCR	Optical Character Recognition
OCRM	Ocean and Coastal Resource Management
OHWM	Ordinary high water mark
OTR	Over the road
PA	Programmatic agreement
PAH	Polycyclic aromatic hydrocarbon
Palmetto Railways	South Carolina Department of Commerce Division of Public Railways d/b/a Palmetto Railways
Pb	Lead
PCB	Polychlorinated biphenyl
PDD	Planned Development District
PM	Afternoon
$PM_{2.5}$	Fine particulate matter
PM_{10}	Respirable particulate matter
Port	Port of Charleston
ppb	parts per billion
ppm	parts per million

ppt	Parts per thousand
RCRA	Resource Conservation and Recovery Act
REC	Recognized Environmental Condition
RFFA	Reasonably foreseeable future action
RHA	Rivers and Harbors Act
ROD	Record of Decision
ROW	Right of way
RPW	Relatively permanent waters
RSS	Rare and sensitive species
SAFMC	South Atlantic Fisheries Management Council
SAFMP	South Atlantic Fisheries Management Plan
SC 7	South Carolina Highway 7
SC 642	South Carolina Highway 642
SCAAQS	South Carolina Ambient Air Quality Standard
SCDHEC	South Carolina Department of Health and Environmental Control
SCDNR	South Carolina Department of Natural Resources
SCDOT	South Carolina Department of Transportation
SCECAP	South Carolina Estuarine and Coastal Assessment Program
SCPCA	South Carolina Pollution Control Act
SCORE	South Carolina Oyster Restoration and Enhancement Program
SCPA	South Carolina State Ports Authority
SF	square feet
SFH	Shellfish harvesting waters
SFHA	Special Flood Hazard Area
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SO_2	Sulfur dioxide
SPCC	Spill Prevention, Control, and Countermeasures
SR 52	State Route 52
SR 78	State Route 78
SRT	Status Review Team
SRTS	Safe Routes to School
STB	Surface Transportation Board
STORET	EPA Storage and Retrieval Data Warehouse
SVOC	Semivolatile organic compound
SWMU	Solid Waste Management Unit
SWPPP	Storm Water Pollution Prevention Plan

TBD	to be determined
TDS	Total dissolved solids
TEC	Threatened, Endangered, or Candidate species
TES	Threatened and Endangered Species
TEUs	twenty-foot equivalent units
TIF	Tax Increment Financing
TMDL	Total Maximum Daily Load
TN	Total nitrogen
TNC	The Nature Conservancy
TNW	Traditional navigable waters
TP	Total phosphorus
TR-55	USDA *Urban Hydrology for Small Watersheds*, technical release 55, 6/86
TSA	Transportation Study Area
TSS	Total suspended solids
UNESCO	United Nations Educational, Scientific, and Cultural Organization
UOD	Ultimate oxygen demand
UR	Urban land
US 17	U.S. Highway 17
USCG	U.S. Coast Guard
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USMC	U.S. Marine Corps
USN	U.S. Navy
UST	Underground storage tank
UTR	Utility Tractor Rig
VCC	Voluntary Cleanup Contract
VdB	Ground-borne vibration
VOC	Volatile organic compound
VRSA	Visual Resource Study Area
WHO	World Health Organization
WLA	Wasteload allocation
WQV	Water quality volume
WWI	World War I
WWII	World War II
WWTP	Wastewater treatment plant

Executive Summary

The South Carolina Department of Commerce Division of Public Railways d/b/a Palmetto Railways (Palmetto Railways, or the Applicant) has applied to the U.S. Army Corps of Engineers (Corps) for a Department of the Army (DA) permit to impact Waters of the United States[1], including wetlands (Waters of the U.S.), during construction and operation of a Navy Base Intermodal Container Transfer Facility (ICTF) in South Carolina. As a Federal agency, the Corps is required to comply with the National Environmental Policy Act (NEPA) of 1969, which is the "basic national charter for the protection of the environment" (40 Code of Federal Regulations [CFR]1500.1[a]) and requires that all "major Federal actions affecting the quality of the human environment" must undergo a review process that culminates in a "detailed statement" of the environmental impact of the proposed action, of any adverse effects, and of alternatives to the proposed action (42 U.S. Code [USC] 4332 [C]).

This Executive Summary describes the role of the Environmental Impact Statement (EIS) in the Corps' decision-making process and the NEPA process. It summarizes the Proposed Project, the potential project-related impacts, alternatives to the Proposed Project, and measures to minimize potential impacts. The Executive Summary also explains how public, Federal, State, and local agencies with jurisdiction and cooperating Indian tribes participated in preparing the EIS by determining the investigative scope of the EIS, and by reviewing and commenting on the results.

Question 1 – What is the purpose of this EIS?

The purpose of this EIS is to inform regulatory decision makers and the public of the likely environmental effects of the Proposed Project and alternatives.

Further Information

The Proposed Project involves the placement of fill material into wetlands and Waters of the U.S. during construction and operation of a Navy Base ICTF. These actions require a Department of the Army (DA) permit pursuant to Section 404 of the Clean Water Act of 1972 (CWA) and Section 10 of the Rivers and Harbors Act. The Corps serves as the lead agency for jurisdictional determinations and permit actions associated with wetlands and Waters of the U.S.; the Corps has set forth implementing regulations in 33 CFR 320–332.

Based on preliminary information provided by the Applicant, the Corps determined that the proposed Navy Base ICTF has the potential to significantly affect the quality of the human and natural environment. Issuing a DA permit for a project with significant effects constitutes a major Federal action that must undergo a review process culminating in a "detailed statement" of the

[1] The definition of "Waters of the United States" can be found at http://water.epa.gov/lawsregs/guidance/wetlands/CWAwaters.cfm; http://www.sac.usace.army.mil/Missions/Regulatory.aspx

environmental impact of the proposed action, of any adverse effects, and of alternatives to the proposed action (42 USC 4332 [C]). On July 10, 2013, the Corps notified the Applicant that this determination warranted preparation of an EIS. This EIS has been prepared pursuant to (1) Section 102(2)(c) of NEPA (42 USC 4321 et seq.); (2) the Council on Environmental Quality (CEQ) regulations for implementing the procedural provisions of NEPA (40 CFR 1502.4 et seq.); (3) Section 404 of the CWA on permitting disposal sites for dredged or fill material (33 USC 1344), as amended; and (4) NEPA "Implementation Procedures for the Regulatory Program" (33 CFR 325, Appendix B).

An EIS is not a Corps regulatory decision document; it is used by the Corps and other agency officials in conjunction with additional relevant information in a permit application file, including public and agency comments presented in this EIS, to inform the final decision on a permit application.

The EIS is prepared in cooperation with other regulatory agencies and tribes with regulatory authority or special expertise with respect to environmental issues. Cooperating agencies for this EIS include the U.S. Environmental Protection Agency (USEPA) and the Federal Railroad Administration (FRA).

Question 2 – What is the Navy Base ICTF Project?

Palmetto Railways proposes to build and operate the Navy Base ICTF, including a facility site and off-site roadway and rail improvements. The intermodal facility consists of, but is not limited to, processing and classification railroad tracks, wide-span gantry cranes, container stacking areas, administrative buildings, and vehicle driving lanes. The Proposed Project is located in North Charleston, South Carolina.

Further Information

The proposed Navy Base ICTF is located on the Charleston Naval Complex (CNC) in North Charleston, South Carolina, on the former Clemson Site. The ICTF site is approximately 130 acres in addition to off-site roadway and rail improvements. As of September 2015, the site contains both open land and developed areas interspersed within a network of private roads. Land uses on the site consist primarily of open fields and parking lots. The northern portion of the site contains Sterett Hall and the North Charleston Fire Department Station 2 (relocated in January 2016). The central portion of the site contains various abandoned buildings and athletic fields associated with the Charleston County's Academic Magnet High prior to its relocation. The Chapel of the Eternal Father of the Sea was located in the northern portion of the site between North Hobson Avenue and Avenue B South, but has been relocated to another part of the CNC that is outside of the ICTF. A tank farm and the Viaduct Road overpass are located on the southern portion of the site.

The intermodal facility would include, but is not limited to, processing and classification railroad tracks, wide-span gantry cranes, container stacking areas, administrative buildings, and vehicle driving lanes. The off-site infrastructure improvements would include building: (1) a private drayage road approximately 1 mile long connecting the ICTF to the Hugh K. Leatherman Sr. Terminal (HLT),

(2) rail improvements to the north and south of the ICTF, and (3) several roadway improvements and modifications, including the construction of a new overpass. Specific Proposed Project components are identified on Figure ES-1. Operations of the Navy Base ICTF would take place 24 hours a day, 7 days a week.

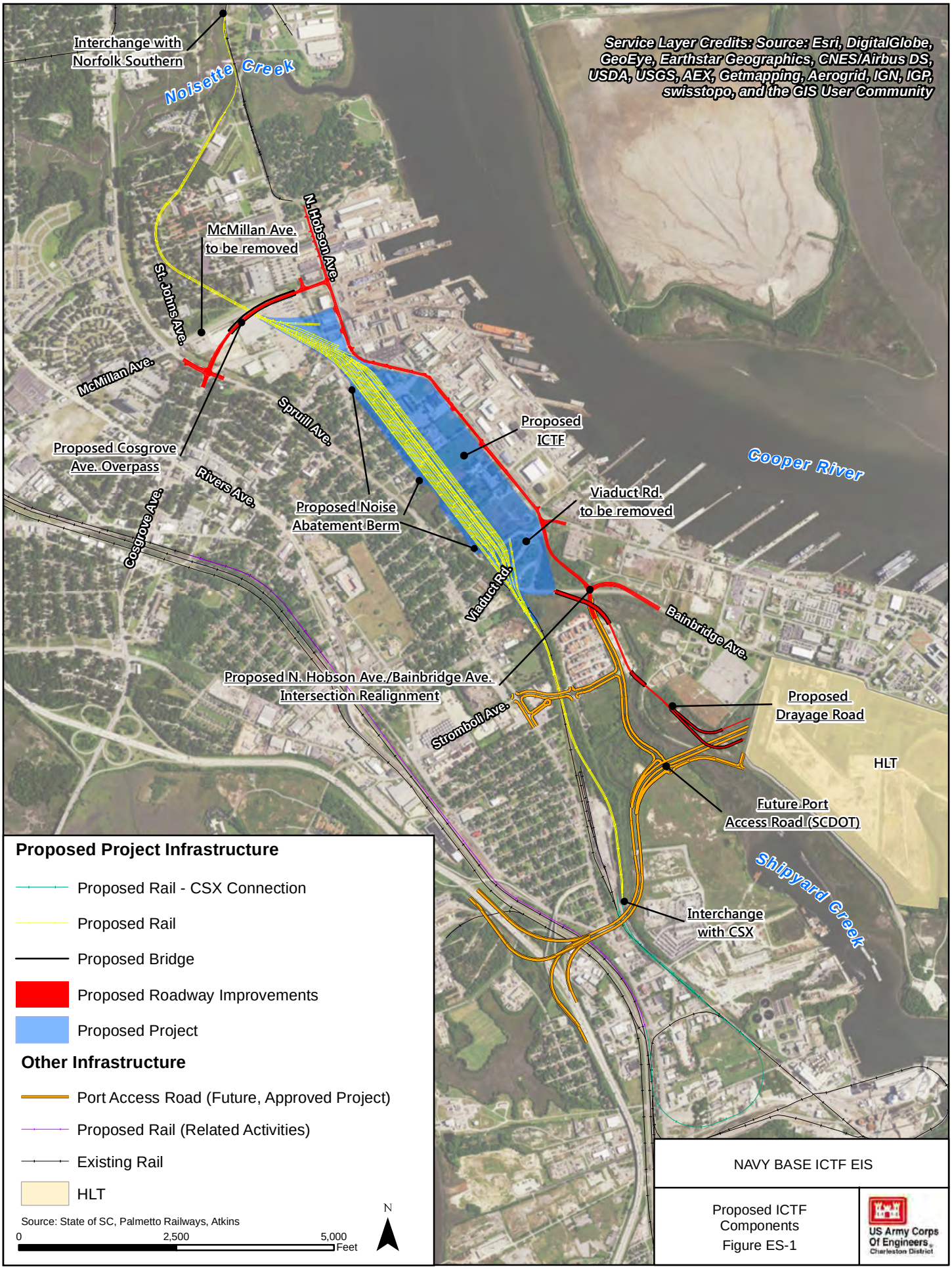
Question 3 – What is the purpose and need for the Project?

Palmetto Railways' stated purpose for the project is:

> *"To locate, build, and operate a state-of-the-art intermodal container transfer facility serving the Port of Charleston with near-dock, equal access for the two Class I rail carriers serving the area (e.g., CSX Transportation [CSX] and Norfolk Southern Railway [NS]) to meet future demand in the Charleston region to facilitate the movement of goods and commerce over rail, thus stimulating and supporting economic development in the region and providing and maintaining connections to key regional and national transportation corridors (Appendix B – 12/22/15 alt analysis)."*

In addition to the Applicant's purpose, the Section 404(b)(1) Guidelines require that the Corps define the "overall project purpose" to evaluate practicable alternatives. In accordance with the Section 404(b)(1) Guidelines, the overall project purpose must be specific enough to define the Applicant's needs, but not so narrow and restrictive as to preclude a proper evaluation of alternatives. In this regard, defining the overall project purpose for review and approval of Corps permits is the sole responsibility of the Corps. While generally focusing on the Applicant's purpose and need statement, the Corps will, in all cases, exercise independent judgment in defining the purpose and need for the project from both the Applicant's and the public's perspectives (33 CFR Part 325; 53 Fed. Reg. 3120). The Corps has reviewed and discussed Palmetto Railways' proposal, and has defined the overall project purpose as:

> *The overall project purpose is to provide a state-owned, near-dock ICTF that provides equal access to both Class I rail carriers and accommodates existing and projected future increases in intermodal container cargo transport through the Port of Charleston to enhance transportation efficiency in the state of South Carolina*.


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
Interchange with Norfolk Southern
Noisette Creek
N. Hobson Ave.
McMillan Ave. to be removed
St. Johns Ave.
McMillan Ave.
Spruill Ave.
Proposed Cosgrove Ave. Overpass
Rivers Ave.
Cosgrove Ave.
Proposed Noise Abatement Berm
Proposed ICTF
Cooper River
Viaduct Rd. to be removed
Viaduct Rd.
Bainbridge Ave.
Proposed N. Hobson Ave./Bainbridge Ave. Intersection Realignment
Stromboli Ave.
Proposed Drayage Road
HLT
Future Port Access Road (SCDOT)
Shipyard Creek
Interchange with CSX
Proposed Project Infrastructure
Proposed Rail - CSX Connection
Proposed Rail
Proposed Bridge
Proposed Roadway Improvements
Proposed Project
Other Infrastructure
Port Access Road (Future, Approved Project)
Proposed Rail (Related Activities)
Existing Rail
HLT
Source: State of SC, Palmetto Railways, Atkins
0
2,500
5,000
Feet
N
NAVY BASE ICTF EIS
Proposed ICTF Components
Figure ES-1
US Army Corps Of Engineers
Charleston District

The Corps has reviewed the information provided by Palmetto Railways, including the need for a near-dock ICTF in the region to have capacity for existing and projected future growth of intermodal container traffic. The Corps recognizes the need and projected increase of rail-based twenty-foot equivalent units (TEUs) in the Port EIS of 2006, where the future projected rail-based TEUs would be approximately 20–25 percent of TEUs throughput from the Port of Charleston. The Corps also recognizes the need for Palmetto Railways, a state agency, to promote competitive rail service by providing equal access to both Class I rail carriers (CSX and NS).

The Corps has found, based on the Applicant's information and its own independent review, that the Applicant's stated need is not unduly speculative.

The CWA also requires the Corps to determine whether the Proposed Project, by its very nature, must be located in Waters of the U.S., such as in wetlands or rivers and streams, in order to fulfill its basic purpose (referred to as a *water-dependent* project). The Corps has determined that the basic purpose of Palmetto Railways' discharge of fill material is to create the elevations necessary to facilitate the construction of an ICTF that would handle the transfer of intermodal containers. However, this action does not require access or proximity to, or siting within, a special aquatic site to fulfill its basic purpose. Therefore, the Corps has found that the basic purpose of this Proposed Project is not water dependent.

Question 4 – What alternatives to the Proposed Project were considered and how were they identified?

A thorough analysis was undertaken to identify reasonable and practicable alternatives to the Proposed Project. The outcome of this analysis identified eight alternatives that are evaluated in detail in the EIS:

- No-Action Alternative – Application for DA permit would be denied; the Proposed Project would not occur; CSX and NS would undertake operational and structural modifications to Ashley Junction and 7-Mile rail yards. Future use of the Proposed Project and River Center project sites would likely be mixed-use and industrial (e.g., rail-served warehousing distribution center).
- Alternative 1: Applicant's Proposed Project (CSX – South via Milford / NS – North via Hospital District) – Palmetto Railways Project would be constructed and operated as proposed.
- Alternative 2: Proposed Project Site (CSX – South via Milford / NS – S-line) – A variation of the Proposed Project where the northern rail connection for NS would be relocated along Spruill Avenue within existing CSX right of way (ROW) to the S-line, and turn east along Aragon Avenue to the existing North Charleston Terminal Company (NCTC) rail line; road and rail improvements would be adjusted accordingly to facilitate rail and road traffic as a result of the NS northern rail connection alignment.
- Alternative 3: Proposed Project Site (CSX – South via Kingsworth / NS – North via Hospital District) – A variation of the Proposed Project where the southern rail connection for CSX

would connect to an existing CSX rail line near Kingsworth Avenue (and adjacent to existing NS rail and ROW); road and rail improvements would be adjusted accordingly to facilitate rail and road traffic as a result of the CSX southern rail connection alignment.

- Alternative 4: Proposed Project Site (CSX & NS – South via Milford) – A variation of the Proposed Project where NS, like CSX, would also enter and exit the Navy Base ICTF from a southern rail connection. While CSX would enter and exit the Navy Base ICTF as described in the Proposed Project, NS would connect to an existing NS rail line near Milford Street (and adjacent to existing CSX rail and ROW). Proposed rail for train switching (building) through the Hospital District would stop short of Noisette Creek.
- Alternative 5: River Center Project Site (CSX – South via Milford / NS – North via Hospital District) – A variation of the 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.
- Alternative 6: Alternative 6: River Center Project Site (CSX – South via Kingsworth / NS – North via Hospital District) – A variation of the Proposed Project with the project site being moved to the River Center project site and the southern rail connection for CSX would connect to an existing CSX rail line near Kingsworth Avenue (and adjacent to existing NS rail and ROW). Road and rail improvements would be adjusted accordingly to facilitate rail and road traffic at the new site.
- Alternative 7: River Center Project Site (CSX & NS South via Milford) – A variation of the Proposed Project with the project site being moved to the River Center project site and NS, like CSX, would also enter and exit the Navy Base ICTF from a southern rail connection; road and rail improvements would be adjusted accordingly to facilitate rail and road traffic at the new site.

Further Information

NEPA regulations consider the alternatives analysis to be the "heart of the environmental impact statement" (40 CFR 1502.14). NEPA requires that Federal agencies reasonably explore and objectively evaluate all *reasonable* alternatives, including the No-Action Alternative. The Corps also must evaluate *practicable* alternatives as required by Section 404 of the CWA (33 CFR 325, Appendix B, Paragraph 9[b][5]). Since the "action" in this case is a permit decision, not an action proposed to be undertaken by the Corps, the decision options available to the District Engineer include (1) issuing the permit; (2) issuing the permit with conditions; or (3) denying the permit. Only reasonable and practicable alternatives must be considered in detail. "Reasonable" is understood to mean those technically and economically feasible project alternatives that would satisfy the primary objectives of the project defined in the statement of project purpose. Reasonable alternatives include those that are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant.[2] An alternative is considered to be

[2] 46 Fed. Reg. 18026, at 18027 (March 23, 1981), Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations (https://ceq.doe.gov/nepa/regs/40/40P1.HTM)

"practicable" if it is, "available and capable of being done after taking into consideration cost, existing technology, and logistics in light of the overall project purpose. If it is otherwise a practicable alternative, an area not presently owned by the applicant which could reasonably be obtained, utilized, expanded or managed in order to fulfill the basic purpose of the proposed activity may be considered."[3]

An EIS informing a DA permit decision by the Corps must be thorough enough to determine compliance with NEPA and the Section 404(b)(1) guidelines, as well as all Federal, state, and local requirements with respect to the Proposed Project activities and permit approvals. Based on information submitted by Palmetto Railways (Appendix B) and the Corps' independent review, the Corps has completed an initial identification, screening, and evaluation of all alternatives for the Navy Base ICTF, and has identified the alternatives to be evaluated in detail in the DEIS. The alternatives analysis conducted by the Corps and described in this DEIS complies with NEPA, and provides the basis for the Corps to make the required findings under the Section 404(b)(1) guidelines.

In consideration of the purpose and need for the Proposed Project, screening criteria were developed to identify possible alternative ICTF sites that would be evaluated in the EIS. Three different levels of screening were used: Initial, Tier I, and Tier II. Initial screening criteria narrowed the analysis to private/public intermodal container terminals in Charleston Harbor. Tier I screening criteria narrowed the realm of possible alternative ICTF locations to specific sites, and then Tier II screening criteria further narrowed these sites to those to be carried forward in the EIS.

There are four public and no private port facilities in the Charleston Harbor that handle, or are planning to handle, intermodal container traffic. The other two facilities associated with the Port (Union Pier and Veterans Terminal) do not handle intermodal containers. Accordingly, the four public port facilities (Wando Welch, HLT, Columbus Street, and North Charleston) were carried forward into Tier I Screening. Out of the four port facilities in the Charleston Harbor that were identified during the initial screening process, two were eliminated based on their proximity to private/public intermodal facilities in the Charleston Harbor (Columbus Street Terminal and North Charleston Container Terminal), and two were carried forward for evaluation based on area of available land required for an ICTF (Wando Welch and HLT). This analysis resulted in 12 potential sites that were carried forward to evaluation by Tier II screening criteria. All 12 sites were evaluated in a step-wise fashion, where potential sites that were screened out by a particular Tier II criterion were not carried forward for further evaluation in subsequent criteria. The analysis resulted in two sites—the River Center project site and the Proposed Project site—that would meet the purpose and need of the Proposed Project, and that would be carried forward for further consideration in the EIS (Figure ES-2).

[3] 40 CFR 230.10 [a][1–3]

NAVY BASE ICTF EIS

Tier II
Screening Results
Figure ES-2

US Army Corps Of Engineers
Charleston District

Question 5 – What environmental issues were considered in the EIS and how were they selected?

The Corps implemented an extensive public involvement program that included public notices, public meetings and a project website (www.NavyBaseICTF.com) to assist with the identification of issues to be considered in the EIS. The public scoping process identified impact issues for consideration in the EIS in the following resource categories:

- Geology and soils
- Hydrology
- Water quality
- Vegetation and wildlife
- Waters of the United States
- Protected species
- Essential Fish Habitat
- Traffic and transportation
- Land use and infrastructure
- Cultural resources
- Visual resources and aesthetics
- Noise and vibration
- Air quality
- Climate change
- Hazardous, toxic and radioactive waste
- Socioeconomics and environmental justice
- Human health and safety
- Section 4(f)/6(f) Resources

Further Information

NEPA requires the analysis of potential direct and indirect impacts on various elements of the human and natural environment. The CEQ guidelines provide categories of impacts to be considered, but all categories may not pertain to all projects. A preliminary understanding of the project and the environmental conditions in the area where the project is to occur is needed to determine the scope of analysis to be considered in an EIS. If there is no indication that the project would affect an environmental resource, the EIS does not need to include an analysis of impacts on that resource. In addition, the Corps is required to conduct a "public interest review." The public interest review involves more than a review of impacts on Waters of the U.S. The decision of whether to issue a permit is based on an evaluation of the probable impacts, including cumulative impacts, of the proposed activity and its intended use on the public interest. Evaluation of the probable impact which the proposed activity may have on the public interest requires a careful weighing of all those factors which become relevant in a particular case. The benefits which reasonably may be expected to accrue

from the proposal must be balanced against its reasonably foreseeable detriments. The decision whether to authorize a proposal, and if so, the conditions under which it will be allowed to occur, are therefore determined by the outcome of this general balancing process.

Table ES-1 shows the categories of environmental resources and key impact issues that were included in the scope of the EIS as a result of the Corps' initial review and the public scoping process.

Table ES-1
Environmental Resources and Impacts Considered in the EIS

Environmental Resource Category	Potential Impacts
Geology and Soils	Erosion or compaction of soils and surface materials from project activities and associated changes to slopes and drainage patterns at the site. Long-term changes in soil type and cover across the study area from changes in the landscape. Disturbance or loss of unique geologic features. Breach of confining layer(s) overlying an aquifer. Availability of fill material to meet project requirements.
Hydrology	Hydrologic alterations (changes in surface water or groundwater flows or circulation) causing changes to creek and/or river configurations or impacting use for municipal water supplies. Potential floodplain encroachment and inundation from watershed alterations (increased impervious surface or placement of fill in the floodplain).
Water Quality	Changes in surface water quality from land disturbance activities and watershed alterations. Changes in groundwater recharge and quality.
Vegetation and Wildlife	Changes in vegetation or plant communities (habitat) that sustain animal populations. Potential habitat fragmentation and effects on plant communities. Changes in composition of vegetative and wildlife species. Potential introduction of invasive/noxious species.
Waters of the United States	Direct impacts from filling and shading of wetlands and other Waters of the U.S. Direct impacts to wetlands and other Waters of the U.S. from temporary construction activities.
Protected Species	Potential impacts on species listed as Threatened, Endangered, or Candidate by the U.S. Fish and Wildlife Service under the Endangered Species Act. Potential impacts to Protected Species habitat or critical habitat for listed species.

Environmental Resource Category	Potential Impacts
Essential Fish Habitat	Loss or alteration of Essential Fish Habitat as defined by the Magnuson-Stevens Fishery Conservation and Management Act. Temporary or permanent displacement of federally managed and common fishery species.
Traffic and Transportation	Potential traffic congestion on roadways, intersections, and at-grade rail crossings in the Transportation Study Area that would impact the Level-of-service of the transportation network.
Land use and Infrastructure	Potential for conflicts in and between land use districts (incompatibility with existing zoning and the adopted Comprehensive Plan, restricted access, or incompatible visual and/or noise impacts) as a result of construction and/or operation activities. Displacement or demolition of structures. Capacity of utilities to serve the project. Potential for interruption of utility services.
Cultural Resources	Disturbance or impacts to cultural (historical and archaeological) sites.
Visual Resources and Aesthetics	Changes in scenic views, scenic resources, visual quality and character, and light and glare of the study area in the short term during construction and operation and during the long-term during operation.
Noise and Vibration	Potential for construction and operational impacts due to operation of construction equipment and train/crane operations. Potential for traffic noise and rail noise and vibration impacts.
Air Quality	Impact on criteria pollutant emissions and the potential to put the Tri-County area into non-attainment with the National Ambient Air Quality Standard.
Climate Change	Potential for Greenhouse Gas emissions associated with construction and operation activities. Effects of sea level rise and the increased frequency and intensity of storm events resulting from Climate Change.
Hazardous, Toxic and Radioactive Waste	Potential involvement with contaminated soil and groundwater or disturbance of existing hazardous materials/wastes. Potential risks of handling, transportation, and storage of potentially hazardous materials and waste.

Environmental Resource Category	Potential Impacts
Socioeconomics and Environmental Justice	Potential impacts to community resources, cohesion, and stability as indicated by economic and business resource impacts; mobility and access impacts; community safety and response impacts; and community and neighborhood impacts. Potential for disproportionate impacts on environmental justice populations.
Health and Human Safety	Potential impacts to the human health and safety of construction workers during construction, operations staff during project operation, and residents in the surrounding community.
Section 4(f)/6(f) Resources	Potential impacts to the function and use of 4(f) and 6(f) resources in light of the analysis and comparative evaluations of cultural resources and socioeconomics and environmental justice.

In addition to the evaluation of direct and indirect impacts on specific resources, an analysis of the cumulative effects of past, present, and reasonably foreseeable future actions was undertaken. Relevant projects, plans, and programs that could interact with the Proposed Project or the alternatives were identified during the environmental analysis for the specific resource areas. A literature review indicated that cumulative impacts would result primarily from port and navigational projects, urban and industrial development, and surface transportation projects. The potential effects of other Future Actions, to the extent that they could be identified and quantified, were added to the projected effects of the Navy Base ICTF to determine the magnitude and extent of any cumulative effects.

Question 6 – How were potential environmental impacts of the Project analyzed?

Potential environmental impacts were analyzed for each of the issues listed by environmental resource category in Table ES-1. For each resource category, a relevant study area was defined and the existing environmental conditions were described. In most cases, this involved collecting existing environmental data. For some resources, such as Waters of the U.S., empirical data were used in conjunction with computer models to estimate existing conditions. Environmental impacts were identified by comparing the No-Action Alternative and the seven alternatives, including the Applicant's Proposed Project, to each other.

The anticipated environmental effects of the Proposed Project and each of the alternatives were analyzed for each of the identified environmental resources. The interrelated effects for several of the resources—such as hydrology, water quality, and Waters of the U.S., for example—were considered during the impact analysis.

Question 7 – Were mitigation measures included in the environmental analysis?

The Applicant has committed to a number of measures to minimize environmental impacts from the Proposed Project, in the event that the permit is granted. Although some of the measures discussed are not strictly mitigation measures under the CWA or NEPA, they are identified in Table ES-3 and Chapter 6, "Mitigation" to provide a complete summary for public review of all measures that have been considered in the design and development of the Proposed Project, and those that are being considered by the Corps as additional measures. These measures are identified as avoidance, minimization, and compensatory mitigation under the CWA and as avoidance and minimization measures under NEPA, although many would apply to both regulations.

Question 8 – Are there other impacts of the Proposed Project and the alternatives?

Impacts were assessed for all of the environmental resources identified in Table ES-1. For each resource, impacts were evaluated under the No-Action Alternative, Proposed Project Alternative, and other Project alternatives.

Further Information

A general summary of the potential impacts by resource category is provided in Chapter 2, "Development and Description of Alternatives." The table includes impacts associated with the No-Action Alternative, Proposed Project Alternative, and other Project alternatives. More detailed discussions of the analysis of impacts for each alternative are contained in Chapter 4, Environmental Consequences. Impacts were determined by comparing the Proposed Project and River Center site alternatives to the No-Action Alternative, and to each other. Table ES-2 provides a summary of the impacts of the Proposed Project only.

Question 9 – How would the Project affect Waters of the United States, and how would impacts be mitigated?

The Proposed Project would have direct, permanent impacts on 12.09 acres of Waters of the U.S. The wetland types receiving the largest impacts would be tidal salt marsh and freshwater wetlands; however, tidal open waters also would be directly impacted. Under Alternatives 2–4, the Proposed Project would result in between 10.59 and 12.92 acres of direct, permanent impacts to Waters of the U.S. Similarly, direct, permanent impacts to Waters of the U.S. under the River Center alternatives would range from 11.87 to 12.26 acres. The wetland types receiving the largest impacts would be the same as those under the Proposed Project. Potential mitigation measures incorporated into project site design to reduce impacts to Waters of the U.S. include bridging tidal salt marsh where possible and reducing side slopes to a 2:1 ratio where practicable. The Applicant proposes to offset losses to Waters of the U.S. consistent with 33 CFR 332.

Table ES-2, Summary of Proposed Project Impacts

Resource Area	Alternative 1
Geology and Soils	Negligible effects to unique geologic features. Potential minor adverse impact resulting from a short-term increase in soil erosion, a loss of topsoil, soil compaction, and runoff.
Hydrology	• Negligible impact to surface water flows and circulation resulting from roadway and rail improvements (e.g., arrival/departure tracks, bridges) across Noisette Creek and Shipyard Creek; negligible impact to groundwater. • Permanent, minor adverse impact from increase in impervious surface; minor beneficial impact from improved stormwater management. • Negligible effect on groundwater recharge. • Negligible impact to base floodplains resulting from the placement of fill; negligible impact to flood hazard for other adjacent areas.
Water Quality	• Negligible to minor temporary effect on TSS, turbidity and concentrations of heavy metals and other toxic contaminants due to disturbance of sediments in Shipyard Creek and Noisette Creek during construction. • Negligible effect on water quality from stormwater runoff with implementation of current stormwater management practices. • Possible beneficial effect on DO, TSS, and concentrations of nutrients, heavy metals and other toxic contaminants in downstream waters. • Minor effect on groundwater quality due to excavation and use of stormwater infrastructure and ponds in vicinity of contaminated groundwater.
Vegetation and Wildlife	• Minor adverse effect on habitat. Loss of habitat from removal of vegetation during construction but would not degrade the stability of animal populations; approximately 213.51 acres of vegetation would be removed, of which 95.0 percent would consist of previously disturbed communities and 5.0 percent of natural communities; increase in habitat fragmentation. • Minor adverse effect from routine maintenance (cutting and mowing) of vegetation could result in the proliferation of invasive/noxious plants present within the study area. • Minor adverse short-term effect on species displacement. Potential exists for direct and indirect species displacement during construction; common species are relatively abundant and adapted to living in close association with human activity and infrastructure. • Minor adverse effect on species mortality. Potential exists for mortality of species during construction; wildlife would likely move away in the presence of human activity.
Waters of the United States	• Major adverse impacts to Waters of the U.S. • Direct impacts from fill activities during construction would result in the permanent loss of approximately 12.09 acres of Waters of the U.S., including 8.94 acres of tidal salt marsh, 1.77 acres of freshwater wetlands, and 1.31 acres of tidal open waters.

Resource Area	Alternative 1
Protected Species	• Negligible effect on habitat alteration/ fragmentation of Protected Species with implementation of avoidance and minimization measures during construction activities. • Potential exists for direct and indirect short-term species displacement effects during construction; but negligible with implementation of Applicant's prescribed avoidance and minimization measures in combination with the additional Corps mitigation measures listed in Section 4.6.12.
Essential Fish Habitat	• Minor Approximately 11.57 acres of EFH would be removed. • Minor Potential exists for a small impact to federally managed species during construction; common fishery species (brown and white shrimp) are relatively abundant. • Negligible impact to oysters with the implementation of water quality BMPs and the potential for future oyster settlement and propagation with the new pilings.
Traffic and Transportation	• Negligible short-term impact during construction to I-26, I-526, US 17, and at-grade rail crossings; minor short-term adverse impact during construction to North Charleston intersections. • Negligible permanent impact on majority of I-26 corridor in the opening year 2018 and design year 2038; beneficial or adverse permanent impact on a few segments due to a LOS change. • Negligible permanent impact on majority of I-526 corridor in the opening year 2018 and design year 2038; beneficial or adverse permanent impact on a few segments due to a LOS change. • Negligible permanent impact on the opening year 2018 and design year 2038 US 17 operations as the Proposed Project would have minimal influence on the US 17 traffic volumes. • Minor permanent adverse impact on the opening year 2018 and design year 2038 North Charleston intersection operations. Traffic patterns would change but slightly more intersections would degrade than improve operations. • Moderate permanent adverse impact on the opening year 2018 and major permanent adverse impact design year 2038 at-grade crossing operations as the Proposed Project would increase the frequency and number of train occurrences in North Charleston. Additionally, one new at-grade crossing would be created.

Resource Area	Alternative 1
Land Use and Infrastructure	• Major permanent impact on land use change. Rezoning of the residential area along the eastern boundary of the ICTF and rezoning of portions of the project site from Institutional future land use. Comprehensive Plan amendment required. • Major permanent impact on displacement of structures. Approximately 100 non-Palmetto Railways owned or specially designated structures would have to be displaced or demolished. Additional off-site roadway and rail improvements would cause the displacement of approximately 50 structures. • Negligible short-term impact on infrastructure and utilities as any interruption of service to local area residents and businesses would be less than 12 hours.
Cultural Resources	• No effect on Charleston Naval Hospital (CNH) Historic District from vibration; adverse effect from demolition of contributing elements of the Historic District, and altered setting of the District. • No effect on Charleston Naval Yard (CNY) Historic District from vibration or other construction/operation activities. • No effect on Charleston Navy Yard Officer's Quarters (CNYOQ) Historic District from vibration or other construction/operation activities. • No effect on U.S. Marine Corps (USMC) Barracks from vibration; adverse effect from altered setting. • No effect on other historic properties outside the Charleston Naval Complex (CNC).

Resource Area	Alternative 1
Visual Resources and Aesthetics	• Minor, permanent adverse impact to scenic views from construction of new rail bridge (adjacent to an existing rail bridge) over Noisette Creek along Noisette Boulevard. • Major, permanent adverse impact to scenic resources from the removal of contributing elements of the CNH Historic District and mature trees, as well as the altered setting of the USMC Barracks. • Moderate, permanent adverse impact to visual quality and character from new vertical elements in the VRSA (wide-span gantry cranes, high mast lighting, Cosgrove-McMillan Overpass). • Negligible impact to visual quality and character from construction of new built structures on the ICTF. • Major, permanent adverse impact to visual quality and character from demolition of contributing elements of the CNH historic district and altered setting of the USMC Barracks. • Minor, permanent adverse impact to visual quality and character from construction of new rail bridge (adjacent to an existing rail bridge) over Noisette Creek. • Negligible impact to visual quality and character from the arrival/departure tracks to the south of the ICTF. • Negligible impact to visual quality and character from the realignment of Hobson Ave/Bainbridge Ave and construction of the drayage road; minor, permanent adverse impact from the removal of the Viaduct Road Overpass. • Minor, permanent adverse impact to visual quality and character from the construction of the earthen berm adjacent to the Chicora-Cherokee neighborhood. • Minor, permanent adverse impact from light and glare associated with the new 85-foot tall mast lighting that will be illuminated from dusk to dawn, and from nighttime train head lamps.
Noise and Vibration	• Negligible traffic noise impacts with negligible beneficial effect for several streets. • Minor to moderate rail noise impact along several segments due to increased rail activity and new track builds. • Negligible rail vibration impact. • Minor to moderate construction noise impact in the vicinity of noise berm. • Minor to Moderate exterior daytime impact and major exterior nighttime impact. Refer to subsection 4.12.3.5 for information on exterior to interior noise reduction. Interior noise levels are not anticipated to disrupt sleep.

Resource Area	Alternative 1
Air Quality	• Impacts from construction emissions of criteria pollutants would be minor short-term adverse because emissions would be short-term and spread out over 5 years. • Operational criteria pollutant emissions would be less than one percent of study area's criteria pollutant emissions. Potential impacts would be minor permanent adverse. • Criteria pollutants emitted, along with the existing and projected criteria pollutants, would not put the Tri-County area into non-attainment for any criteria pollutants and the NAAQS would remain in compliance. Potential impacts would be minor permanent adverse. • Non-DPM HAP emissions would each equal less than one-tenth of one percent of the total HAPs emitted in the Study Area. Potential impacts would be minor permanent adverse. • Potential excess cancer risk would fall within the acceptable range. Impacts from cancer risk would be acceptable. • The maximum noncancer hazard would be below 1. Potential impacts from noncancer hazard would be negligible.
Climate Change	• Because the GHG emissions from the construction phase provide the needed infrastructure for the increased efficiency in the transport of goods, the short-term impacts would be minor adverse. • Annual Operational GHG Emissions Inventory would be 30,948 MT CO_2e. The Proposed Project would be the most efficient. Long-term effects would be minor adverse.
Hazardous, Toxic, and Radioactive Waste	• Approximately 150 buildings requiring demolition/renovation. • Potential minor adverse impacts to soil (contamination) from excavation activities (after compliance with the Navy's permitting process, RCRA Permit #SC0 170 022 560 and all applicable laws for testing and disposal of contaminated soils). • Potential minor adverse impacts to groundwater (contamination) from dewatering in excavation areas (after compliance with the Navy's permitting process, RCRA Permit SC0 170 022 560, and all applicable laws for treatment and disposal of dewatering effluent. • Potential minor adverse impact from demolition of approximately 150 structures with asbestos and/or metals-based paints (after survey and applicable abatement measures). • Potential for minor and/or major adverse impacts from accidental spills resulting from use of above ground storage tanks (ASTs) (diesel fuel), storage of other minor amounts of solvents on the premises, and from containers containing hazardous materials.

Resource Area	Alternative 1
Socioeconomics and Environmental Justice	• Major short-term and long-term benefit to local and regional economy; minor indirect adverse impact to local businesses adjacent to project (access, relocations, and aesthetics). • Minor short-term adverse impacts from construction; minor adverse access impacts for Chicora-Cherokee residents; minor adverse mobility impacts from new at-grade rail crossings and increased delay at intersections and at-grade crossings. • Potential minor adverse emergency response time impacts due to additional delay at at-grade crossings; potential minor safety impacts due to additional conflict points at at-grade crossings. • Negligible impact from displacement of Sterett Hall and surrounding arts facilities as they would be displaced with or without Alternative 1 (Proposed Project). • Major adverse impacts to Chicora-Cherokee neighborhood from 106 residential displacements; minor to moderate adverse impact from visual and noise impacts. • Minor adverse impacts to Olde North Charleston, Howard Heights, Union Heights, and Windsor neighborhoods from noise. • Negligible impact in terms of new barriers to the elderly and handicapped. • Environmental Justice considerations are applicable: Major adverse impact from displacement of 106 residential units would result in a disproportionately high and adverse impact to Chicora-Cherokee neighborhood.
Human Health and Safety	• Negligible impact on worker safety, drinking water quality, hazardous materials, traffic noise, ICTF operational noise (nighttime) and vibration. • Minor to moderate impact (several areas) from rail noise, construction noise (short-term), and operational noise (daytime). • Minor impact to air quality (criteria pollutants and the NAAQS would remain in compliance). • Potential impacts from non-DPM HAP emissions would be acceptable. Potential excess cancer risk and cancer risk would be acceptable. Potential impacts from noncancer hazard would be negligible. • Potential for localized minor adverse impact on emergency response times and minor indirect adverse impact to community safety. • Negligible effect from high mast lighting, minor, permanent adverse impact from light and glare associated with nighttime train head lamps to residential structures along curvatures of the track.
Section 4(f)/6(f)	• Direct uses of Section 4(f) resources: Charleston Naval Hospital (CNH) Historic District and the USMC Barracks from permanent incorporation (demolition of contributing elements of the historic district and placement of arrival/departure tracks within the Parade Ground, respectively)-

Further Information

Under the Proposed Project, 12.09 acres of Waters of the U.S. would be directly impacted by placement of fill and/or shading activities. These impacts would include 8.94 acres of tidal salt marsh followed by 1.77 acres of freshwater wetlands and 1.31 acres of tidal open waters. While the construction of the ICTF would be the largest land disturbance associated with the Proposed Project, the roadway and rail improvements have the largest overall impact to Waters of the U.S. Improvements that would result in direct impacts include the drayage road, the Hobson/Bainbridge realignment, the ICTF, the Northern Connection, the bridge over Noisette Creek, and the Southern Connection. Additional details specific to each impact area are provided in Section 4.5.

Similar to the Proposed Project, impacts to Waters of the U.S. under Alternatives 2-7 would primarily result from roadway and rail improvements. Improvements that would result in direct impacts include the drayage road, the Hobson/Bainbridge realignment, the ICTF, the Northern Connection, the bridge over Noisette Creek, and the Southern Connection.

Question 10 – How would the Project affect traffic and transportation?

On November 22, 2013, the Corps held a meeting with the Berkeley-Charleston-Dorchester Council of Governments (BCDCOG), SCDOT, and Palmetto Railways to discuss the scope of the Transportation Study for the EIS. Another meeting was held on October 23, 2014, to gather input and discuss the status of the Transportation Study for the EIS. On October 6, 2015, the Corps held a meeting with the BCDCOG to provide an update on Palmetto Railways' revised proposal. Coordination with the BCDCOG and SCDOT will be ongoing throughout the EIS process.

The Proposed Project would have relatively minor impacts on the surrounding transportation network. The regional roadways of I-26, I-526, and US 17 would mostly not experience any change in operations. Within North Charleston, roadway improvements and connectivity changes would cause the operations to improve at some intersections while others would become worse. Overall, slightly more intersections would degrade than improve operations. At-grade rail crossing operations in North Charleston would be impacted due to an increase in the number of train occurrences, in addition to one new at-grade rail crossing.

Further Information

Traffic patterns around the ICTF change compared to the No-Action Alternative due to the ICTF and modifications to the roadway network. In its opening year 2018, the ICTF would handle 1,100 trucks per day and 500 employee and visitor vehicles per day with access via North Hobson Avenue. By the design year 2038, the ICTF would handle 3,900 trucks and 1,100 employee and visitor vehicles per day. Of the 3,900 trucks per day, 1,400 would be on the drayage road between the ICTF and the HLT. In the No-Action Alternative, the 1,400 truck trips would be on public roadways. In the Proposed Project Alternative, the ICTF and associated roadway modifications,including the Cosgrove Avenue/

McMillan Avenue realignment and overpass and the removal of Viaduct Road between Spruill Avenue and North Hobson Avenue, lead to increased volumes on Noisette Boulevard, Cosgrove Avenue and the Local Access Road compared to the No-Action Alternative. In the River Center Alternative, the alternate ICTF site and removal of McMillan Avenue between Spruill Avenue and Noisette Boulevard would alter traffic patterns from the Proposed Project alternatives.

In the design year 2038, I-26, I-526, and US 17 would operate similarly for all alternatives. All options would have a negligible impact (no change in level-of-service [LOS]) on the majority of the I-26, I-526, and US 17 corridors as they would experience relatively small changes in volumes. A few locations would improve or degrade one LOS grade because they are near an LOS threshold. Within North Charleston, the Proposed Project alternatives adds two new intersections, the ICTF truck driveway at North Hobson Avenue and the ICTF employee and visitor driveway at North Hobson Avenue. Alternative 2 would add a third intersection, St. Johns Avenue at Turnbull Avenue. The River Center alternatives would add one new intersection, the ICTF employee and visitor driveway at St. Johns Avenue. Under all project alternatives, all new intersections are projected to operate at Good LOS in both the AM and PM peak hours.

Additionally within North Charleston, the Proposed Project alternatives would substantially improve the McMillan Avenue intersections with North Hobson Avenue and Spruill Avenue. The LOS and operations of the North Hobson intersection would improve as the Proposed Project alternatives modify the lane geometry and adds a traffic signal to the intersection. The Spruill Avenue intersection operations would improve because the Proposed Project alternatives would remove McMillan Avenue from St. Johns Avenue to Kephart Street (Alternative 2 removes McMillan Avenue from Spruill Avenue), thereby reducing the volumes on McMillan Avenue. Similarly, the intersection LOS would improve at the intersection of Spruill Avenue and McMillan Avenue under the River Center site alternatives because the traffic volume on McMillan Avenue would go down as McMillan Avenue would be closed between St. Johns Avenue and Noisette Boulevard to accommodate the ICTF. In contrast, all Proposed Project and River Center site alternatives would havea a moderate adverse impact on the four-way stop-controlled Noisette Boulevard at Turnbull Avenue intersection. The Proposed Project alternatives would also havea major adverse impact on Bainbridge Avenue at the Local Access Road and Spruill Avenue at the Cosgrove Avenue/McMillan Avenue realignment intersections. The River Center alternatives would also have a substantial adverse impact on the Virginia Avenue intersections with Avenue B and Montague Avenue.

In the design year 2038, the Proposed Project and River Center site alternatives would have moderate to major impacts on the majority of at-grade rail crossings due to changing train and vehicular volumes and routes. Under all alternatives, the increase in the number of train occurrences and longer durations would lead to 7 of the 12 at-grade crossing locations operating with a Poor LOS (counting the Spruill Avenue and Meeting Street at-grade crossings in Alternatives 3 and 6 separately, although they were analyzed as one location). Additionally, all alternatives except Alternative 5

would have a major adverse impact on seven at-grade rail crossings in the design year 2038. Alternative 5 would have a major adverse impact on eight locations. One new at-grade crossing would be created under Alternatives 1, 4, 5 and 7, while two new at-grade crossings would be created under Alternatives 2, 3, and 6.

Question 11 – What is the effect of the Project on noise and vibration?

Construction of the ICTF would result in minor to moderate exterior daytime noise impacts in the immediate vicinity due to frequent operations of construction equipment. During operation of the ICTF, standard train/crane operations would cause minor to moderate exterior daytime noise impacts in the vicinity of the vegetated earthen berm, and major exterior impacts at night. The Proposed Project includes the construction of a noise abatement wall/berm along the western boundary of the site, between the ICTF and adjacent neighborhoods, to minimize noise impacts. The Proposed Project would have negligible noise impacts from traffic, including negligible beneficial effects for several streets. In contrast, minor to moderate rail noise impacts would occur along several modeled segments due to increased rail activity and new track builds; however, only negligible rail vibration impacts would occur.

Further Information

Potential noise and vibration sources for the Proposed Project include traffic noise, rail noise, rail vibration, construction noise, and operational noise. Under the Proposed Project, there would be a negligible increase in traffic noise (0 to 3 decibels) as a result of the proposed improvements. The Proposed Project is expected to result in a minor (3 to 5 decibels) to moderate (5 to 10 decibels) increase in rail noise along several modeled segments as a result of increased rail activity and new track builds. Rail vibration impacts are expected to be negligible (less than the impact criterion established for vibration-sensitive land uses) under the Proposed Project. During construction, frequent operations of construction equipment would result in a minor to moderate increase in construction noise to receptors in the vicinity of the proposed earthen berm. Operations of the Proposed Project would also result in minor to moderate exterior daytime impacts due to standard train/crane operations. The varying hourly average noise levels from the daytime operations would increase noise at the first row of receptors in closest proximity (10 feet from the noise berm) in the Chicora-Cherokee communities by up to 7 decibels. Daytime noise levels would decline to minor (up to 4 decibels) for the second row of homes, then negligible (below 3 decibels) for the third row of homes. Negligible noise increases would occur at receptors located beyond approximately 180 feet from the earthen berm.

The Proposed Project would result in moderate to major nighttime exterior noise levels (14 to 17 dB[A]) due to operations. However, the nighttime hours are generally associated with sleep. The manner in which older homes were constructed generally provides a reduction of exterior-to-interior noise levels of about 20 to 25 dB(A) (Caltrans 1998) with closed windows. Taking into

account a minimum 20 dB(A) reduction in noise levels from exterior to interior, interior noise levels would range from 38 to 41 dB(A) during the nighttime hours. Based on a study conducted for sleep disturbance as a function of single-event noise exposure, less than 1 percent are awakened at noise levels of 45 dB(A)[4]. Thus, the nighttime interior levels expected as a result of the ICTF operations are expected to be less than the 45 dB(A).

Noise and vibration impacts under Alternatives 2–7 would be similar to those reported for the Proposed Project. However, a major rail noise impact (greater than 10 decibels) would occur for up to four receptors along a future track segment under Alternative 2.

Question 12 – What is the effect of the Project on air quality?

Construction and operation of the Proposed Project would have relatively minor impacts on air quality. For all Proposed Project alternatives, construction criteria pollutant emissions would be short term and spread out over five years. Criteria pollutant emissions from the operation of the Proposed Project would each equal less than 1 percent of the total criteria pollutants emitted in the study area and the Proposed Project would not put the Tri-County area into non-attainment for any National Ambient Air Quality Standard (NAAQS). Impacts of non-diesel particulate matter (DPM) hazardous air pollutants (HAPs) from the Operational Inventory of the Proposed Project would each equal less than one-tenth of 1 percent of the total HAPs emitted in the study area. Potential impacts would be minor adverse. Potential excess cancer risk associated with the Proposed Project would fall within the acceptable range. Impacts from cancer risk would be acceptable. The maximum noncancer hazard would be below 1. Potential impacts from noncancer hazard would be negligible. The River Center site alternatives would result in similar impacts with the exception of non-compliance with the NAAQS for 1-hour NO_2; therefore, Alternatives 5–7 would put the Tri-County area into non-attainment for NO_2.

Further Information

Criteria pollutant emissions from construction activities for the Proposed Project would include operation of construction equipment, haul truck trips for the import and export of material, and commutes by construction workers and vendors. Although road and rail improvements for the alternatives differ from the Proposed Project, resulting in different construction equipment exhaust criteria pollutant emissions, haul truck activities, worker and vendor commute, architectural coating, asphalt paving, material movement, and demolition were assumed to be the same as the Proposed Project. Similarly, for the River Center site alternatives, haul truck activities, worker and vendor commute, architectural coating, asphalt paving, and material movement were assumed to be the same as the Proposed Project; however, demolition of buildings at the River Center project site would be different than that for the Proposed Project because of the difference in building square footage

[4] Finegold and Bartholomew, "A Predictive Model of Noise Induced Awakenings from Transportation Noise Sources," in *Noise Control Engineering Journal*, 2001; pp. 331-338.

that would need to be demolished. For all Proposed Project and River Center site alternatives, construction criteria pollutant emissions would be short-term and spread out over 4 years, resulting in minor impacts to air quality.

Criteria pollutant emissions from operational activities for the Proposed Project alternatives would include operation of locomotives, utility tractor rig (UTR) trucks, over-the-road (OTR) trucks, and commutes by workers. Criteria pollutant emissions from the Proposed Project alternatives would each equal less than 1 percent of the total criteria pollutants emitted in the study area. Impacts of criteria pollutants from the operation of the Proposed Project alternatives would be minor. Notably, with the exception of CO, the No-Action Alternative would emit approximately the same or more criteria pollutants annually than the Proposed Project. This is due to the efficient operations and transport of goods under the Proposed Project, including the use of Tier 4 switch locomotive engines and Tier 4 UTR trucks at full build-out. The Proposed Project would also include a semi-automated facility that would reduce UTR and OTR truck idle times compared to the No-Action Alternative. Under the River Center site alternatives, the private drayage road is 2 miles long, which is twice the distance of the private drayage road in the Proposed Project. To maintain the daily container throughput, twice as many UTR trucks at the same rate of daily truckloads are required for operating the River Center site alternatives compared to the Proposed Project. Therefore, the River Center site alternatives have twice as many criteria pollutant emissions from UTR truck running as the Proposed Project alternatives. However, criteria pollutant emissions from the each River Center site alternative would each equal less than 1 percent of the total criteria pollutants emitted in the study area. As a result, impacts of criteria pollutants from the operation inventory of the River Center site alternatives would be minor adverse.

Criteria pollutants emitted from the operation of the Proposed Project alternatives, along with the existing and projected criteria pollutants, would not exceed the applicable NAAQS; therefore, the Proposed Project alternatives would not put the Tri-County area into non-attainment for any NAAQS. In contrast, criteria pollutants emitted from the operation of the River Center site alternatives, along with the existing and projected criteria pollutants, would exceed the NAAQS for 1-hour NO_2; therefore, the River Center site alternatives would put the Tri-County area into non-attainment for NO_2. Under full operation of the River Center site alternatives, the Tri-County area would not remain in compliance with the NAAQS, resulting in a major adverse impact to air quality.

Non-DPM HAP emissions from the Proposed Project alternatives would each contribute to less than one-tenth of 1 percent of the total non-DPM HAPs emitted in the study area. As a result, impacts of non-DPM HAPs from the Operational Inventory of the Proposed Project Alternative would be minor adverse. Despite the longer private drayage road and associated additional UTR truck activity under the River Center site alternatives, non-DPM HAP emissions would be similar to those under the Proposed Project alternatives.

The maximum potential cancer risk from Alternative 1 (Proposed Project), would occur directly adjacent to the Proposed Project site due to on-site rail and truck activity. The excess cancer risk falls between the 1 per million and 100 per million, which is within the acceptable risk range. When discussing risk it is important to provide the size of risks in context. The cancer risk is the likelihood, or chance, of getting cancer. The term "excess cancer risk" is used because people also have a "background risk" of about 4 in 10 chances of being diagnosed with cancer in their lifetimes (NCI 2015). The maximum noncancer hazard would be below 1. Potential impacts from noncancer hazard would be negligible.

Question 13 – How would the Project affect the socioeconomics of the local community?

Construction and operation of the Navy Base ICTF, would affect the socioeconomics of the surrounding community, including potential impacts to environmental justice populations. Adverse impacts to a community may occur from a project if it disrupts community cohesion or stability, has a detrimental effect on the economy of the area, results in a loss of community facilities, reduces mobility, increases emergency response times, or causes recurring impacts to neighborhoods impacted by previous projects. Impacts to environmental justice populations are considered significant if they are disproportionately high and adverse compared to the adverse effect that will be suffered by the non-minority and/or non-low-income population. The project may also have beneficial impacts to socioeconomic resources by providing employment opportunities for the local community and the region.

Impacts to community resources, cohesion, and stability were evaluated in terms of five indicators: economic and business resource impacts; mobility and access impacts; community safety and emergency response impacts; community and neighborhood impacts; and barriers to the elderly and handicapped persons.

Further Information

The Proposed Project is not consistent with the City of North Charleston's previous vision (i.e., the Noisette Master Plan) for a mixed-use new urban community on the northern portion of the CNC. Moreover, the concept of an industrial intermodal rail facility is not what the community has been expecting based on the previous local plan. As a result, the Proposed Project may indirectly impact the stability of many new businesses and residential developments that were developed in the area under the impression that they would be part of a mixed-use new urban community. At public meetings and neighborhood meetings, the community has voiced concerns that the project may reverse the positive investments and changes that have been made in the area in recent years.

The Proposed Project would directly and indirectly create employment opportunities, providing indirect, long-term economic benefits to the regional and local community. Palmetto Railways

estimates that the ICTF would employ approximately 120 people and would result in the relocation of five businesses. However, the queuing of trucks and employees at the main gate of the facility, as well as noise and aesthetic impacts associated with the Proposed Project, may cause a loss of customers at local businesses. In addition, the Lowcountry Orphan Relief and an office building currently being used by the Department of Defense have the potential to be directly impacted due to the location of the northern lead track through the River Center site. Overall, impacts to economic and business resources as a result of the Proposed Project would be minor adverse with Palmetto Railways' proposed mitigation measures. Similar economic and business impacts would result from Alternatives 2-4. The River Center site alternatives would have greater adverse economic and resource impacts than the Proposed Project alternatives due to new noise and visual impacts to offices and businesses located on the east side of Noisette Boulevard adjacent to the ICTF, the relocation of additional residences and commercial properties, termination of existing leases, and the increased volume of trucks on Cosgrove Avenue east of Spruill Avenue, indirectly impacting businesses.

Temporary detours during construction of the Proposed Project alternatives would likely increase travel times, change or remove access to properties, and limit mobility in the project site. These indirect adverse impacts would be short-term and localized to the study area. Implementation of a traffic control plan and the provision of safe and efficient detour routes and advance notice of road closures would minimize impacts; therefore, the intensity of construction-related mobility and access adverse impacts is anticipated to be minor adverse. Long-term impacts of the Proposed Project alternatives would include changes in the way destinations are accessed and decreased mobility at new and existing at-grade rail crossings, resulting in the delay of community residents, interruptions to bus routes, and increased emergency response times. The new at-grade crossing would also have an adverse indirect impact to community safety by introducing new conflict points between trains and automobiles, bicycles, and pedestrians. Additional major access impacts would result from the River Center site alternatives because east-west mobility would be limited with construction of the River Center project site and drayage road. In addition, closure of McMillan Avenue would affect the Charleston Area Regional Transportation Authority (CARTA) Route 104. Overall, impacts to mobility and access would be minor.

The Proposed Project would directly impact the Chicora-Cherokee, Olde North Charleston Union Heights/Windsor neighborhoods, and indirectly impact the Park Circle and Oak Park neighborhoods. The Chicora-Cherokee neighborhood has the potential for minor to moderate adverse noise, air quality, aesthetic, mobility, access, and community cohesion impacts as a result of the Proposed Project alternatives. The overall intensity of impacts to the Chicora-Cherokee neighborhood would be major adverse, primarily as a result of the displacement of 106 structures. The southern portion of the Olde North Charleston neighborhood has the potential for minor adverse noise, mobility, and safety impacts as a result of the proposed northern rail line and daily addition of 1–2 commodity trains travelling through the neighborhood. The overall intensity of impacts to the Olde North

Charleston neighborhood would be minor adverse due to the limited extent of influence. The Park Circle and Oak Park neighborhoods would be indirectly impacted by increased rail traffic on existing tracks and at-grade crossings. The Howard Heights, Union Heights, and Windsor neighborhoods would also experience an increase in rail activity on their boundaries, resulting in minor adverse air quality, localized minor adverse noise, and access and mobility impacts. Under Alternative 3, the new ROW acquisition for rail track and the at-grade rail crossing would directly impact the Union Heights Neighborhood and would result in the need for relocation of eight residential units. The loss of these eight residential units represents 1 percent of the housing units in the neighborhood and would be considered a minor impact to community cohesion. Communities and neighborhoods under the River Center site alternatives would experience similar impacts as those under the Proposed Project; like Alternative 3, Alternative 6 would also result in the displacement of 8 residential units.

The Proposed Project and River Center site alternatives have the potential for disproportionately high and adverse impacts to Environmental Justice populations. With regard to benefits and burdens, the benefits of the Proposed Project and alternatives would extend to the greater Charleston region, while the burdens would be borne by the environmental justice community adjacent to the project. Therefore, the benefits and burdens of the Proposed Project and the alternatives are not equitably distributed.

Palmetto Railways' measures to avoid and minimize potential impacts to the socioeconomics of the community as a result of the Proposed Project are described in Chapter 4, "Environmental Consequences," and are summarized in Chapter 6, "Mitigation."

Question 14 – How would the Project affect cultural resources?

Construction and operation of the Proposed Project, would affect several of the cultural resources of the surrounding area. The impact evaluation considers both construction and operation activities within the study area. Impacts to historic properties were characterized as adverse, not adverse, or no effect as defined under Section 106 of the National Historic Preservation Act (NHPA). In addition, an evaluation was conducted to determine whether there were ways to avoid or minimize adverse effects. The Corps, in consultation with the SHPO, determines the nature of the effects and recommends appropriate mitigation where adverse effects cannot be avoided. Mitigative efforts generally are handled through the implementation of a Memorandum of Agreement (MOA) between the applicant, the lead Federal agency, the SHPO, and any other major stakeholders, including, as appropriate, Cooperating Agencies. Consulting party status pursuant to Section 106 of the NHPA was requested by the Historic Charleston Foundation, the Preservation Society of Charleston, and the Naval Order of the United States in three separate letters received by the Corps during the 2015 public scoping period. The Corps granted these entities consulting party status on January 19, 2016.

Further Information

In June 2014, reports of architectural and archaeological surveys undertaken for Palmetto Railways in 2011 were submitted to the State Historic Preservation Office (SHPO) for review with respect to the adequacy of the survey coverage and the identification of historic properties. On July 24, 2014, the SHPO concurred with the findings of the reports with respect to the identification of historic properties and the adequacy of the coverage of the areas examined. This coordination resulted in a determination of areas within the study area that required additional inventory to identify historic properties. Additional surveys within the study area and an assessment of NRHP eligibility of potential Cold War era resources within the CNC was completed in September 2014 and sent to SHPO for review. On December 3, 2014, the SHPO concurred with the survey results and recommendations of eligibility for individual resources. As a result of Palmetto Railways' September 2015 revised proposal, an additional architectural survey was submitted to the SHPO for review on March 11, 2016 (Appendix G).

Two historic properties, the Charleston Naval Hospital (CNH) Historic District and USMC Barracks (CNC Building M-17) lie within the Proposed Project. Ten additional historic properties lie near the Proposed Project, including the Charleston Navy Yard (CNY) Historic District, the Charleston Navy Yard Officers' Quarters (CNYOQ) Historic District, the Chicora Elementary School, the Six Mile Elementary School, the Ben Tillman Graded School, Ben Tillman Homes, two Charleston freedman's cottages (Resources 4306 and 4309), and GARCO Employee Housing residences (Resources 1663 [which includes two buildings] and 1664). There would be a permanent adverse effect from demolition of NRHP-listed buildings and altered setting of the CNH District. There would be a permanent adverse effect from the altered setting of the USMC Barracks. Other properties or historic districts nearby would have no effect.

Question 15 – What mitigation commitments have been made?

The Applicant's measures to avoid and minimize potential impacts of the Proposed Project are summarized by resource area in Table ES-3, based on information provided in Appendix B. The Corps views these elements as part of the Applicant's Proposed Project for purposes of the environmental impacts analysis presented in Chapter 4. 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 the Proposed Project.

Measures from a number of categories in Table ES-3 may be applicable to more than one resource area. For example, certain measures listed under surface water resources may also help to avoid or minimize potential impacts to Waters of the U.S. These avoidance and minimization measures, except the items noted with an asterisk (*), have been considered in the impact analysis in Chapter 4.

Table ES-3
Summary of Avoidance and Minimization Measures Proposed by the Applicant

Resource Area	Avoidance and Minimization Measures
Geology and Soils	• Implement a Storm Water Pollution and Prevention Plans (SWPPP) as required by the National Pollutant Discharge Elimination System (NPDES) permit, including management of sediment and erosion control. • Implement a Spill Prevention Control and Countermeasures (SPCC) Plan for petroleum products. • Use Best Management Practices (BMPs) and/or methods of managing sediment and erosion control during construction pursuant to the South Carolina Stormwater Management Handbook (South Carolina Department of Health and Environmental Control [SCDHEC] 2005). • Capping contaminated sites within the ICTF to "seal" existing soil and groundwater contamination. • Perform all land disturbance activities in compliance the U.S. Navy Construction Process Document (Navy "Dig" Permit) which identifies the permit process and requirements for conducting construction or other land disturbing activities in Land Use Control (LUC) Areas at the former Navy Base (Charleston Naval Complex). • Development of a soil management plan during design to be implemented during construction. • Capping much of the project site with pavements to mitigate spread of existing contaminants. • Use of clean fill material.
Hydrology	• Design culverts and/or bridges to maintain existing surface drainage patterns and to prevent erosion. • Where possible, limit the placement of pilings for bridges within waterways. • Design culverts and bridges to maintain existing flow and hydrology for wetland areas and to prevent flooding upstream. • Provide stormwater capacity improvements by constructing new stormwater infrastructure where the existing systems are failing from lack of maintenance.
Water Quality	• Comply with requirements of the NPDES permit, including applicable groundwater and surface monitoring. • Implement a SWPPP as required by the industrial storm water NPDES permit. • Construct stormwater detention ponds to contain and manage storm water runoff. • Implement sediment and erosion control measures to mitigate sediment and sediment-associated pollutant loading from disturbed areas. • Implement dust control measures for roads and construction areas. • Use of clean fill material. • Employ the use of oil-water separators at the locomotive shop and the "Repair in Place" tracks to ensure treatment of any oily waste from on-terminal equipment maintenance activities. • Inclusion of forebay in stormwater management system to provide pretreatment of stormwater runoff before it discharges to the primary water quantity and quality control BMP.
Vegetation and Wildlife	• Redevelopment of an existing industrial site. • Replacement of significant and/or grand trees under City of North Charleston tree ordinance and payment to the tree bank account. • Plant native vegetation and trees on the earthen berm along the western property boundary.

Resource Area	Avoidance and Minimization Measures
Waters of the United States	• Locate the ICTF on an existing vacant industrial site. • Design the ICTF and roadway and rail improvements to minimize impacts to waters of the U.S., such as the drayage road placement that reduce impacts to Waters of the U.S. associated with Shipyard Creek. • Minimize impacts by placing new rail infrastructure adjacent to existing bridges that cross Noisette Creek. • Where possible, limit the placement of pilings for bridges within waterways. • Use of 2:1 slopes in areas that are not bridged. • Bridge over Noisette Creek would use a portion of an existing causeway to reduce impacts. • Design culverts and bridges to maintain existing flow/exchange and hydrology for wetland areas and marshes. • Replacement of earthen berm with a sound attenuation and security wall, where appropriate, in areas adjacent to Waters of the U.S. to avoid filling of wetlands. • Submit application for Section 404 Permit as promulgated by Clean Water Act and comply with any requirements as determined by the Corps. • Develop and execute wetland mitigation plan to ensure any wetland impacts have been minimized and that compensation will be provided for all remaining unavoidable impacts.
Protected Species	• Timing construction to avoid potential impacts to aquatic species. • Require contractors to use air bubble curtains or sleeve piles to mitigate underwater noise from pile driving activities.
Essential Fish Habitat	• Where possible limit the placement of pilings for bridges within waterways, ensuring channels are not blocked. • Require contractors to use air bubble curtains or sleeve piles to mitigate underwater noise from pile driving activities.
Traffic and Transportation	• Perform Surface Transportation Study to identify rail and traffic impacts to traffic associated with the Proposed Project. • Project has been designed to enhance efficiency of train movements so that trains are not required to stop while accessing the intermodal terminal and exacerbating traffic congestion associated with at-grade crossings. • *Provide access to St. Johns Ave. for residents and businesses located on the former Navy Base and west of project North Lead railroad track. • *Evaluate engineering options to minimize traffic impacts near the southern loop in response to City of Charleston request. • Extend Cosgrove Ave. with a new overpass over the ICTF north rail lead to facilitate access to the CNC. • Construct improvements to Bainbridge Avenue and N. Hobson Avenue intersection. • Construct auxiliary turn lanes at the ICTF entrance to minimize queuing and reduce traffic delays on N. Hobson Avenue. • Maintain Viaduct Road overpass until the local segment of the port access road is complete. • Construct a private road to eliminate truck traffic on local roadways. • *Open the gate at Turnbull Avenue to provide multiple entry/exit routes for residences along St. John's Avenue. • *Locate roadway improvements to minimize/avoid at-grade crossings and traffic delays associated with rail operations. • *Additional intermodal capacity will encourage rail use and reduce truck traffic on local roads.
Land Use and Infrastructure	• Ensure the Proposed Project and its operations are consistent with zoning.

Resource Area	Avoidance and Minimization Measures
Cultural and Community Resources	• Minimize and avoid impacts to buildings and structures on the CNC. • Minimize and avoid direct interaction with historic buildings and structures. • Relocation of Eternal Father of the Sea Chapel. • Exploration of redevelopment opportunities for historically relevant structures including the Power House. • Mitigate for community impacts associated with the project, including the loss of Sterett Hall. • Support the City of Charleston in setting up Quiet Zones. • Construct a landscaped earthen berm with security fence, use directional lighting, and implement other identified mitigation measures that minimize noise, visual, and air quality impacts to adjacent communities. • Construct a noise abatement wall in areas where there are engineering and environmental constraints with the earthen berm. • *To maximize positive benefit and minimize negative impacts, an expanded Community Mitigation Plan will be developed in partnership with community organizations and State agencies and made a part of the Final EIS. • *A community engagement and awareness plan (Appendix B) is being implemented to keep stakeholders and the public engaged and informed. • Evaluate short and long-term employment and job training opportunities for the local community. • Implement four-container-tall stacking limits to reduce visual impacts on surrounding neighborhoods. • Palmetto Railways is working with the Lowcountry Orphan Relief to mitigate impacts on their location or aid in their relocation if desired. • All business and residential relocations follows federal and state guidelines.
Visual resources and Aesthetics	• Construct a noise wall/earthen berm along the western boundary of the site to minimize visual impacts. • Direct operating lights downward to shield light sources and minimize light impacts. • Install landscaping within and around the facility footprint to reduce visual impacts. • Replacement of significant and/or grand trees under City of North Charleston tree ordinance and/or payment to the tree bank account and adhere to any zoning requirements for tree plantings along building setbacks and road frontages. • Provide photometric design for facility high-mast lighting to less than 0.5 foot-candles outside of property boundary. • Direct operating lights downward and shield light sources to minimize light impacts to adjacent areas. • Project locomotive shop and administration buildings will incorporate architectural elements from historic naval buildings to maintain and enhance aesthetics.
Noise and Vibration	• Construct a noise abatement wall/berm along the western boundary of the site, between the ICTF and adjacent neighborhoods to minimize noise impacts. • Use state-of-the-art equipment, such as electric wide-span gantry cranes, that minimize sound emissions during operations. • Implement a 100-foot buffer to reduce the impacts of vibrations from construction and operations of the facility. • *The existing topography of the North Lead will require a substantial cut section to provide adequate grades to accommodate train movements. This cut section will mitigate visual and noise impacts that may result from the movement of trains in and out of the facility from the north.

Resource Area	Avoidance and Minimization Measures
Air Quality	• *Construct an earthen berm between the processing and classification tracks and adjacent neighborhoods. • *Comply with Air Quality State Construction and Operating permit requirements, conditions, and reporting. • *Operate and maintain air pollution control equipment in accordance with permit requirements. • *Implement dust control measures (such as watering unpaved work areas, temporary and permanent seeding and mulching, covering stockpiled materials, and using covered haul trucks) in accordance with the conditions set forth in the SCDHEC Air permit issued for the Proposed Project. • Reduction of truck traffic on local roads by providing additional intermodal capacity. • Use electric wide-span gantry cranes that emit zero air emissions versus diesel-powered lift equipment. • Construct a semi-automated facility that minimize air quality emissions during operations as a result of increased efficiencies during the handling and processing of containers. • Use Tier 4 Utility Truck Rigs (UTR) on the private drayage road to transfer containers to the ICTF versus transferring the same containers using overt the road trucks on public roadways to minimize emissions. • Limit switching activity within the ICTF to Tier 4 locomotive engines at full build-out. • Utilize automated gate system for the over-the-road (OTR) trucks entering/exiting the facility from the Wando Welch and North Charleston Container Terminals and an OCR portal at the connection from the facility (drayage road) to the HLT to reduce onsite idle times of trucks to 7.5 minutes/truckload and UTR to 5 minutes/ truckload.

Resource Area	Avoidance and Minimization Measures
Climate Change	• See measures in Air Quality.
Hazardous and Toxic Waste	• Implement a Solid and Hazardous Waste Management Plan. • Implement a SPCC Plan. • Comply with Resource Conservation and Recovery Act (RCRA) and SCDHEC requirements for storage and handling of hazardous and toxic wastes. • Implement waste minimization measures. • Perform all land disturbance activities in compliance the U.S. Navy Construction Process Document (Navy "Dig" Permit) which identifies the permit process and requirements for conducting construction or other land disturbing activities in Land Use Control (LUC) Areas at the former Navy Base (Charleston Naval Complex).
Socioeconomics and Environmental Justice	• Placement of a noise abatement wall/earthen berm, and other Proposed Project features that minimize noise, visual, and air quality impacts to adjacent communities. • Contribution to The City of North Charleston of $8 million to mitigate the impacts to the adjacent communities including loss of Sterret Hall. • Construct a noise abatement wall/earthen berm in areas where there are engineering and environmental constraints with the earthen berm. • Palmetto Railways is working with DHEC and community groups to determine concerns and identify mitigation measures. • *An expanded community mitigation plan will be developed in partnership with community organizations and State agencies. • *A community engagement and awareness plan (Appendix B) is being implemented to keep stakeholders and the public engaged and informed.
Human Health and Safety	• Provide around-the-clock security through a combination of security fencing, video cameras, and other security measures. • Develop detailed pollution prevention plans and implement BMPs to minimize the potential for spills. • Conduct construction and operations in accordance with appropriate regulations, permits, best practices, and codes. • Placement of a noise abatement wall/earthen berm, and other Proposed Project features that minimize noise, visual, and air quality impacts to adjacent communities. • Construct a semi-automated facility that minimize air quality emissions during operations as a result of increased efficiencies during the handling and processing of containers. • Employ the use of automated switches to eliminate the need for train crews to get out of trains to manually throw switches and thus enhancing the safety of railroad workers. • Use of inter-box connector (IBC) carts to provide enhanced safety for railroad workers by avoiding slip, trip, and fall incidents while accessing railcars to (un)lock IBCs on containers. • Employ the use of an automated gate system to eliminate the need for railroad workers to complete inbound, container and chassis damage inspections by walking in a congested gate area thus enhancing safety of railroad workers.

The additional measures the Corps has identified to further mitigate potential impacts of the Navy Base ICTF are listed by resource area in Table ES-4. These measures are summarized from Chapter 4 and presented here for convenience. Additional avoidance, minimization, and mitigation may be identified by the Corps in its decision-making process.

Table ES-4
Additional Mitigation Measures Identified by the Corps

Resource Area	Avoidance and Minimization Measures
Geology and soils	No additional measures have been identified.
Hydrology	The Corps proposes an additional mitigation measure that the pre-construction course, condition, capacity, and location of open waters must be maintained.
Water quality	No additional measures have been identified.
Vegetation and wildlife	Any disturbed areas could be sprayed in order to prevent the establishment of invasive, noxious weeds within the disturbed areas.
Waters of the United States	In addition to the measures proposed by the Applicant, the Corps will consider other potential mitigation measures to reduce the impacts on wetlands and Waters of the U.S. resulting from the Proposed Project, which will be included in the FEIS and Record of Decision.
Protected Species	• Adherence to the following USFWS Manatee Guidelines during in-water construction: ○ The permittee will stop work if a manatee is seen near the project site. ○ The project manager shall instruct all personnel associated with the project of the potential presence of manatees and the need to avoid collisions with manatees. All construction personnel must monitor water-related activities for the presence of manatee(s) during May 15 through October 15. ○ The project manager shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act of 1972 and the Endangered Species Act of 1973. ○ Any siltation barriers used during the project shall be made of material in which manatees cannot become entangled and must be properly secured, and regularly monitored to avoid manatee entrapment. ○ All vessels associated with the project shall operate a “no wake/idle” speeds at all times while in the construction area and while in water where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will follow routes of deep water whenever possible. ○ If manatee(s) are see within 100 yards of the active construction area all appropriate precautions shall be implemented to ensure protection of the manatee. These precautions shall include the operation of all moving equipment no closer than 50 feet to a manatee. Operation of any equipment closer than 50 feet to a manatee shall necessitate immediate shutdown of that equipment. Activities will not resume until the manatee(s) has departed the project area of its own volition. ○ Any collision with and/or injury to a manatee shall be reported immediately to Jim Valade of the U.S. Fish and Wildlife Service, North Florida Field Office, at (904) 731-3116. • The permittee will also stop work if a turtle or sturgeon is seen near the project site during construction.

Resource Area	Avoidance and Minimization Measures
	• The contractor will utilize soft-start techniques for pile driving activities. This will consist of a series of taps at 25-40% of the pile driver's energy, followed by a one-minute waiting period. • During in-water work, a floating semi-permeable turbidity curtain will be deployed around areas where pile driving is taking place. • Adherence to environmental work windows for in-water construction during the winter months when sea turtles are less abundant. • The contractor will hire a qualified marine biologist to be on-site during in-water construction activities to avoid potential impacts to aquatic Protected Species.
Essential Fish Habitat	• The contractor will utilize soft-start techniques for pile driving activities. This will consist of a series of taps at 25-40% of the pile driver's energy, followed by a one-minute waiting period. • During in-water work, a floating semi-permeable turbidity curtain will be deployed around areas where pile driving is taking place. • Adherence to environmental work windows for in-water construction during the winter months when sea turtles are less abundant. • The contractor will hire a qualified marine biologist to be on-site during in-water construction activities to avoid potential impacts to marine resources and EFH. • Implement a SPCC Plan to minimize the impact of a potential spill event on EFH.
Traffic and transportation	No additional measures have been identified
Land use and infrastructure	No additional measures have been identified
Cultural resources	• Coordination is required with the SHPO prior to the demolition of any historic properties to determine the level and extent of documentation (will require development of a Memorandum of Agreement that outlines the appropriate mitigative actions) • If any previously unknown historic, cultural, or archaeological remains or artifacts are discovered during construction, the District Engineer for the Charleston District, U.S. Army Corps of Engineers must be notified immediately. Construction activity in the area should be avoided until required coordination has occurred.
Visual resources and aesthetics	No additional measures have been identified.
Noise and vibration	No additional measures have been identified.
Air quality	No additional measures have been identified.
Climate change	No additional measures have been identified.
Hazardous, toxic, radioactive waste (HTRW)	No additional measures have been identified.
Socioeconomics and environmental justice	No additional measures have been identified.
Human health and safety	No additional measures have been identified.
Section 4(f) and 6(f) resources	See measures for cultural resources.

Question 16 – What role did the public, tribal members, and agencies have in preparing the EIS?

The Corps has provided several opportunities and mechanisms to share/receive information with the public, stakeholders, governmental agencies, tribes, and non-governmental organizations (NGOs). Opportunities/mechanisms for information sharing include: 1) two public scoping meetings; 2) public meetings; 3) community and stakeholder meetings; 4) a project website (www.NavyBase ICTF.com); and 5) distribution of "Navy Base ICTF EIS News," the project-developed newsletter.

Further Information

During the official comment periods following the public scoping meetings in 2013 and 2015, comments on the range of actions, alternatives, and impacts to be considered in the EIS were received by the Corps. Verbal comments received and documented by a court reporter and comments in written form (letter, flyer, or comment card) and electronic form (email or website) were accepted. A community meeting was held at the Military Magnet Academy on May 6, 2014. Written comments were accepted at the community meeting and via the website. In addition, seven community and stakeholder meetings were held in July and August 2014, December 2015, and January and February 2016 which allowed for sharing of information and a forum for discussion concerning the Proposed Project and the EIS. All comments were entered into the administrative record. All comments were reviewed and changes or additions were made to the original text of the EIS based on the comments received.

In response to the public notice sent out by the Corps on October 25, 2013, to Federal and State agencies and the Catawba Indian Nation, letters were received from USFWS, SCDHEC, City of North Charleston Housing Authority, and USEPA indicating their specific involvement in the project and desire for coordination throughout the duration of the project. Comments received from these agencies during scoping were used in the development of this EIS.

In a letter to the Corps dated January 14, 2015, the U.S. Coast Guard determined that the proposed bridge across Noisette Creek will not require a Coast Guard bridge permit under Section 9 of the Rivers and Harbors Act; however, other areas of U.S. Coast Guard jurisdiction apply such as pre-construction notification and the submission of "as built" drawings.

The Corps has developed and maintains a mailing list through the public involvement process that includes attendees at public meetings, commenters during the scoping process, and individuals who signed up for the project mailing list on the public Navy Base ICTF EIS website maintained by the Corps.

Question 17 – Who decides whether the Project can be implemented?

On behalf of the Secretary of the Army, the District Engineer for the Charleston District is responsible for making the Federal permit decision on Palmetto Railways' application for placement of fill material into Waters of the U.S. during construction and operations of the Navy Base ICTF. Officials at the SCDHEC have state regulatory authority for additional permit decisions that are necessary for Palmetto Railways to implement the Proposed Project.

Further Information

Completion of the Final EIS does not constitute approval of the Proposed Project. The Final EIS provides required information about the potential environmental effects of the Project. The Corps will consider this information when determining whether a DA permit should be issued and, if so, what specific conditions should be included in the permit. The Corps would issue a permit through the authority delegated to the Corps by the CWA. The Corps will prepare and make available to the public a Record of Decision (ROD) that summarizes the permit application, describes the Corps' review of the application, and includes other pertinent information such as the Final EIS and its findings regarding Section 404(b)(1) of the CWA.

A DA permit would only authorize Palmetto Railways to place fill material in Waters of the U.S. in the project site. Other activities such as management of stormwater discharge and construction in areas under Land Use Controls would require additional permit authorizations from other agencies.

Question 18 – Where can I find more information about the Project?

The Corps maintains a publicly accessible website at www.NavyBaseICTF.com devoted to this Project. The Navy Base ICTF EIS website contains project updates, a project overview, an explanation of the NEPA process, supporting documents, and information about the public's opportunities to participate in preparation of the EIS.

SUMMARY OF CONTENTS

Executive Summary	The Executive Summary answers frequently asked questions about the Navy Base ICTF Project (the Proposed Project). It describes key elements of the Proposed Project and the regulatory framework of the Environmental Impact Statement (EIS).
Chapter 1 **Purpose and Need and Description of Proposed Project**	Chapter 1 describes the NEPA process, agency roles and responsibilities, the project purpose and need, background of the Proposed Project, framework for analysis, and an overview and description of the Proposed Project.
Chapter 2 **Development and Description of Alternatives**	Chapter 2 summarizes the development and consideration of a range of alternatives, leading to the selection of alternatives carried through detailed analysis and alternatives considered but not evaluated in further detail in the EIS.
Chapter 3 **Affected Environment**	Chapter 3 describes the existing conditions for the 18 resource areas evaluated in the EIS. The current conditions of these resources, form the basis for the No-Action Alternative that is used as the baseline for comparison of the environmental consequences of the action alternatives.
Chapter 4 **Environmental Consequences**	Chapter 4 provides a comprehensive analysis of potential environmental impacts on the 18 resource areas across alternatives, including the methods of analysis and impact summaries.
Chapter 5 **Cumulative Impacts**	Chapter 5 addresses the potential cumulative impacts of the Proposed Project and the alternatives when considering other past, present, and reasonably foreseeable future projects that are likely to occur within the same geographic and temporal scope.
Chapter 6 **Mitigation**	Chapter 6 addresses the compensatory mitigation required under the Clean Water Act for impacts on wetlands and other Waters of the United States. The chapter identifies the Applicant's proposed avoidance and minimization measures and the additional mitigation measures being considered by the Corps.
Chapter 7 **Irreversible and Irretrievable Commitments of Resources**	Chapter 7 considers the irretrievable and irreversible commitment of resources with implementation of the Proposed Project, the adverse environmental impacts that cannot be avoided if the Proposed Project is implemented, and the relationship between local short-term uses of man's environment and maintenance and enhancement of long-term productivity.
Chapter 8 **Regulatory Environment Overview**	Chapter 8 describes the regulatory setting for the 18 resource areas evaluated in the EIS.

Chapter 9 **Public, Agency, and Stakeholder Coordination and Consultation**	Chapter 9 provides the full range of public, tribal, and agency involvement activities implemented to date to ensure that (1) the public understands the proposed Navy Base ICTF Project; and (2) the public has ample opportunity to comment on all aspects of the Proposed Project, to participate in the National Environmental Policy Act process, and to review the environmental analysis and proposed mitigation and monitoring.
Chapter 10 **References**	Chapter 10 provides references for all citations used in the EIS.
Chapter 11 **Glossary**	Chapter 11 provides a glossary of terms used in the EIS.

Appendixes

A Draft Clean Water Act Section 404(b)(1) Guidelines Evaluation
B Palmetto Railways Submittals
C Scoping Report and Addendum 1 to Scoping Report
D Planning Level Waters of the U.S. Analysis
E Essential Fish Habitat Assessment
F Transportation Technical Memorandum
G State Historic Preservation Office Documentation from Major Recent Investigations
H Noise and Vibration Technical Memorandum
I Air Quality and Climate Change Technical Memorandum
J Hazardous, Toxic, and Radioactive Waste Technical Memorandum
K Community Impact Assessment Technical Memorandum
L Design Assumptions for Environmental Consequences Impact Analysis
M Projects Evaluated in Cumulative Impact Analysis
N Mitigation Plan

This page intentionally left blank.

1.0 PURPOSE AND NEED AND DESCRIPTION OF PROPOSED PROJECT

1.1 INTRODUCTION

The United States Army Corps of Engineers (Corps), Charleston District, Regulatory Division, is evaluating a proposal from the South Carolina Department of Commerce Division of Public Railways d/b/a Palmetto Railways (Palmetto Railways or the Applicant) that will require a Department of the Army (DA) permit under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. Palmetto Railways has proposed to construct a state-of-the-art Intermodal Container Transfer Facility (ICTF) at the former Charleston Naval Complex (CNC) to facilitate the transfer of international cargo containers between ships/trucks and rail (e.g., trains). The Proposed Project, also referred to as the Navy Base Intermodal Container Transfer Facility (Navy Base ICTF), would provide equal access to the Class I rail carriers (CSX Transportation [CSX] and Norfolk Southern Railway [NS]) that serve the Port of Charleston (Port) and various local businesses and industries (see Figure 1.1-1). The proposed facility would be designed to accommodate existing and projected future intermodal container traffic within the region.

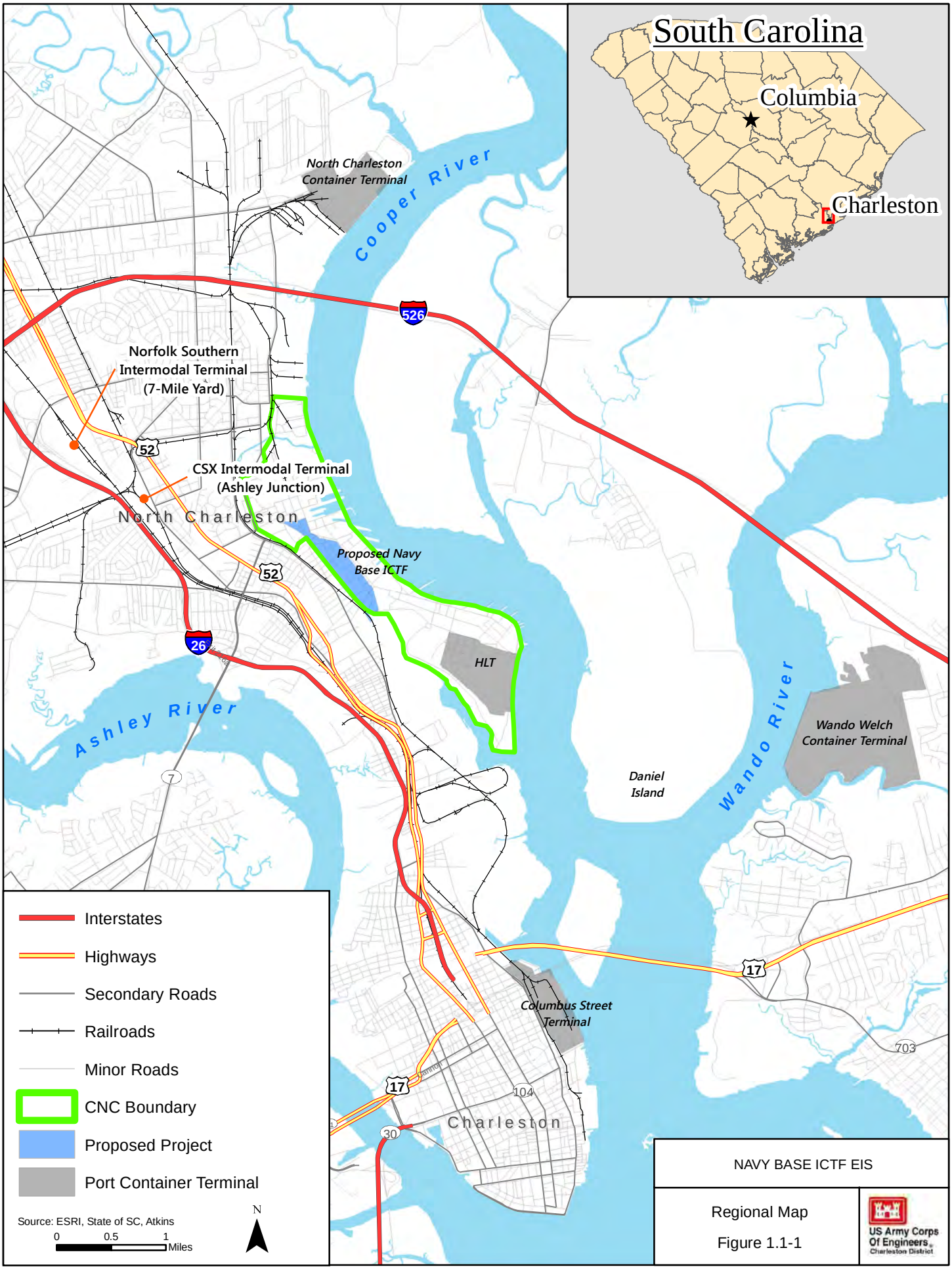
Intermodal Container Transfer Facility:

Location where containerized cargo is transferred from one mode of transport (such as truck) to another mode (such as rail).

Palmetto Railways initially submitted a proposal to the Corps on September 27, 2013, and after several revisions, a final proposal was submitted on September 8, 2015. A description of the Proposed Project is located in Section 1.7.

Equal access: The same, but independent, opportunity for approach and entry to the ICTF. In this case, CSX and NS would have "equal access" to the ICTF.

In light of the ongoing construction and future operation of the Hugh K. Leatherman, Sr., Terminal (HLT), and the future placements of the associated Port Access Road and Local Access Road, permitting the construction and operation of the Navy Base ICTF would have potentially significant impacts on the quality of the human environment. As a result, the Corps determined that this was a major Federal action that warranted the preparation of


South Carolina
Columbia
Charleston
North Charleston Container Terminal
Cooper River
526
Norfolk Southern Intermodal Terminal (7-Mile Yard)
52
CSX Intermodal Terminal (Ashley Junction)
North Charleston
Proposed Navy Base ICTF
52
26
HLT
Ashley River
Wando River
Wando Welch Container Terminal
Daniel Island
7
17
Columbus Street Terminal
703
17
104
Charleston
30
Interstates
Highways
Secondary Roads
Railroads
Minor Roads
CNC Boundary
Proposed Project
Port Container Terminal
Source: ESRI, State of SC, Atkins
0 0.5 1 Miles
N
NAVY BASE ICTF EIS
Regional Map
Figure 1.1-1
US Army Corps Of Engineers Charleston District

an Environmental Impact Statement (EIS) in accordance with the National Environmental Policy Act of 1969 (NEPA), and notified Palmetto Railways of this determination in a letter dated July 10 2013. Accordingly, the Corps published a "Notice of Intent to Prepare an Environmental Impact Statement"[5] in the *Federal Register*, Volume 78, No. 205, on October 23, 2013. The Corps also issued a local notice notifying the public of the Proposed Project, the intent to prepare an EIS, and the scheduling of a scoping meeting (held on November 14, 2013). The Corps determined that the changes to Palmetto Railways' proposal in September 2015 were significant enough to warrant a new scoping meeting (held October 27, 2015) and a new scoping comment period to solicit additional public input on the revised project.

1.2 THE NEPA PROCESS

1.2.1 What is NEPA?

Signed into law on January 1, 1970, NEPA is the basic national charter for the protection of the environment. It established a national environmental policy and goals for the protection, maintenance, and enhancement of the environment and it provides a process for implementing these goals within the Federal agencies. NEPA requires Federal agencies to:

- consider the potential environmental consequences of their actions,
- consult with other interested agencies,
- document their analysis,
- make this environmental information available to the public for comment before the decisions are made and before actions are taken,
- identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these actions upon the quality of the human environment, and
- use all practicable means to restore and enhance the quality of the human environment and avoid or minimize any possible adverse effects of their actions upon the quality of the human environment.

NEPA is only applicable to Federal actions, including projects and programs funded by Federal agencies and those that require a Federal permit or other regulatory decision. NEPA also established the Council on Environmental Quality (CEQ), which published the *Council on Environmental Quality Regulations for Implementing NEPA (40 CFR Parts 1500-1508)*, which are regulations that implemented the law. These regulations required each Federal agency to issue its own individual implementing regulations. More information on NEPA can be found through the CEQ publication "A Citizen's Guide to NEPA," which is an informational guide that provides an explanation of NEPA,

[5] An EIS is not a Corps regulatory decision document. It is used by agency officials in conjunction with other relevant information in a permit application file, including public and agency comments on the Final EIS, to aid in the final permit decision.

explains how it is implemented, and identifies how the public can participate in the assessment of environmental impacts conducted by Federal agencies[6].

1.2.2 What interest factors are evaluated?

The Proposed Project and alternatives are evaluated to determine the impacts or changes that may occur on both people and the environment as a result of the potential effects of the proposed improvements. Effects can be ecological, aesthetic, historic, cultural, economic, social, or health-related. Table 1.2-1 identifies the factors to be evaluated in this EIS.

TABLE 1.2-1. INTEREST FACTORS EVALUATED IN THE NAVY BASE ICTF EIS

Geology and Soils	Cultural Resources
Hydrology	Visual Resources and Aesthetics
Water Quality	Noise and Vibration
Vegetation and Wildlife	Air Quality
Waters of the United States	Climate Change
Protected Species	Hazardous, Toxic, Radioactive Waste
Essential Fish Habitat	Socioeconomics and Environmental Justice
Transportation	Human Health and Safety
Land Use and Infrastructure	Section 4(f) and Section 6(f)[7]

1.2.3 How is the Corps implementing the requirements of NEPA in the evaluation of this project?

In accordance with the CEQ requirements, the Corps published its implementing regulations in 33 CFR Part 325, Appendix B and this EIS was developed in accordance with both those regulations and the CEQ regulations. The purpose of this EIS is to inform decision makers and the public of the likely environmental consequences of the Proposed Project and alternatives. To that end, the EIS identifies, documents, and evaluates potential effects of construction and operation of the Navy Base ICTF on the natural and human environment using a period of analysis from 2018 (facility opening) through 2038 (20-year planning horizon).

An interdisciplinary team of scientists, planners, economists, engineers, archaeologists, and historians has analyzed the Proposed Project and alternatives with respect to existing conditions in the study area, and has identified relevant beneficial and adverse effects associated with the project.

[6] http://ceq.hss.doe.gov/publications/citizens_guide_to_nepa.html

[7] U.S Department of Transportation Act of 1966.

The impacts can be direct effects (those caused by the action that occur at the same time and place), indirect effects (those caused by the action that take place later in time or farther removed in distance), or cumulative effects (the incremental impacts of the project when combined with past, present, and reasonably foreseeable future activities).

The Proposed Project is described in detail in Chapter 1, followed by a discussion in Chapter 2 of the development and screening of alternatives, resulting in the identification of alternatives carried forward for analysis in the EIS. Chapter 3 presents the "Affected Environment" or baseline conditions of the resources potentially impacted by the project. The potential direct and indirect impacts of each alternative on these resources are discussed in Chapter 4, "Environmental Consequences," while cumulative impacts are discussed in Chapter 5. Mitigation measures to reduce project impacts are identified throughout Chapter 4, but are consolidated into one discussion in Chapter 6. The remaining chapters of the EIS (Chapters 7–12) provide information that supports and documents the NEPA process followed during consideration of a permit decision.

1 Purpose and Need and Description of Proposed Project
2 Development and Description of Alternatives
3 Affected Environment
4 Environmental Consequences
5 Cumulative Impacts
6 Mitigation
7 Irreversible and Irretrievable Commitments of Resources
8 Regulatory Environment Overview
9 Public, Agency, and Stakeholder Coordination and Consultation
10 References
11 Glossary
12 List of Preparers

An EIS is not a regulatory decision document. It is used by agency officials, in this case, the Corps, in conjunction with other relevant information in a permit application file, to inform the final permit decision. Since the "action" in this case is a permit decision, not an action proposed to be undertaken by the Corps, the decision options available to the District Engineer are: 1) to issue the permit; 2) to issue the permit with conditions, or 3) to deny the permit. As required by NEPA, the final decision will be documented in a Record of Decision (ROD).

In compliance with the CEQ regulations, when an EIS is being prepared and more than one Federal agency has jurisdiction over a proposed action, a lead agency shall supervise the preparation of the EIS. In this case, the Corps is the lead Federal agency for the preparation of this EIS. As provided for by NEPA, the United States Environmental Protection Agency (USEPA) and the Federal Railroad Administration (FRA) have agreed to formally become cooperating agencies in the preparation of this EIS. A "Cooperating Agency" can be any Federal agency with jurisdiction by law or special

The U.S. Army Corps of Engineers is the Lead Federal Agency for the Navy Base ICTF EIS.

expertise with respect to any environmental impact (or reasonable alternative) involved in a proposed project or action. Under CEQ regulations (40 CFR Section 1501.6), a Cooperating Agency may, "assume on request of the lead agency responsibility for developing information and preparing environmental analyses including portions of the environmental impact statement concerning which the Cooperating Agency has special expertise. In addition, pursuant to CEQ Regulations (40 CFR Section 1506.3), a Cooperating Agency may adopt without recirculation the environmental impact statement of a lead agency when, after an independent review of the statement, the Cooperating Agency concludes that its comments and suggestions have been satisfied."

1.3 AGENCY INVOLVEMENT (ROLES AND RESPONSIBILITIES)

1.3.1 What is the role of the U.S. Army Corps of Engineers?

The Department of the Army regulatory program is one of the oldest in the Federal Government. Initially, it served a fairly simple, straightforward purpose: to protect and maintain the navigable capacity of the nation's waters. Time, changing public needs, evolving policy, case law, and new statutory mandates have changed the complexion of the program, adding to its breadth, complexity, and authority.

The Corps has direct permit authority to evaluate applications for certain activities in our nation's waters pursuant to three separate laws:

- Section 10 of the Rivers and Harbors Act regulates the construction, excavation, or deposition of materials in, over, or under "navigable waters of the U.S.," or any work which would affect the course, location, condition, or capacity of those waters;
- Section 404 of the Clean Water Act regulates the discharge of dredged or fill material into "waters of the U.S."; and
- Section 103 of the Marine Protection, Research and Sanctuaries Act regulates the transportation of dredged material for the purpose of disposal in the ocean.

It is noted that there are no discharges of dredged material proposed to be transported to the ocean; therefore, Section 103 of the Marine Protection, Research and Sanctuaries Act is not applicable to this project. In addition, it is noted that the construction of bridges, and improvements to existing bridges, is permitted by the U.S. Coast Guard pursuant to 33 CFR Part 114.

The regulations found at 33 CFR 320–332 govern the regulatory program of the U.S. Army Corps of Engineers. These regulations outline the laws and procedures utilized by the Corps in assessing applications for permits.

Waters of the U.S.

- *All Navigable Waters of the U.S.;*
- *All interstate waters including interstate wetlands;*
- *All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters:*
  - *Which are or could be used by interstate or foreign travelers for recreational or other purposes; or from which fish or shellfish could be taken and sold in interstate or foreign commerce; or,*
  - *Which are used or could be used for industrial purposes by industries in interstate commerce.*
- *All impoundments of waters otherwise defined as waters of the United States under the definition;*
- *Tributaries of waters;*
- *The territorial seas; and*
- *Wetlands adjacent to waters (other than waters that are themselves wetlands).*

1.3.2 Public Interest Review

One of the major aspects of the Corps' evaluation process is the "public interest review." The decision whether to issue a permit will be based on an evaluation of the probable impacts, including cumulative impacts, of the proposed activity and its intended use on the public interest. Evaluation of the probable impact which the proposed activity may have on the public interest requires a careful weighing of all those factors which become relevant in each particular case. The benefits which reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments. The decision whether to authorize a proposal, and if so, the conditions under which it will be allowed to occur, are therefore determined by the outcome of this general balancing process. That decision should reflect the national concern for both protection and utilization of important resources. All factors that may be relevant to the proposal must be considered, including the cumulative effects thereof, as shown below.

PUBLIC INTEREST FACTORS

Conservation	Shore erosion and accretion
Economics	Recreation
Aesthetics	Water supply and conservation
General environmental concerns	Water quality
Wetlands	Energy needs
Historic properties	Safety
Fish and wildlife values	Food and fiber production
Flood hazards	Mineral needs
Floodplain values	Considerations of property ownership
Land use	Needs and welfare of the people
Navigation	

For activities that are also subject to Section 404 of the Clean Water Act, a permit will be denied if the project would not comply with the Environmental Protection Agency's Section 404(b)(1) Guidelines (discussed below). Subject to the preceding sentence and any other applicable laws and regulations, a permit will be granted unless the District Engineer determines that it would be contrary to the public interest.

Section 404 (b)(1) Guidelines

Under Section 404(b)(1) of the Clean Water Act, the USEPA, in conjunction with the Corps, developed "Guidelines" to ensure compliance with Section 404 of the Clean Water Act when evaluating permit applications. These "Guidelines" are specifically referred to as the "404(b)(1) Guidelines." The Draft 404(b)(1) Guidelines Evaluation (Subparts C-G) for the proposed Navy Base ICTF project is included in Appendix A. These guidelines are heavily weighted towards preventing environmental degradation of Waters of the U.S. and therefore place additional constraints on Section 404 discharges. The 404(b)(1) Guidelines specifically outline four conditions that must be satisfied in order to make a determination that a proposed discharge complies with these Guidelines. These conditions are referred to as "restrictions on discharge." In general, these four "restrictions on discharge" do not allow the Corps to issue a permit if a discharge would:

1. have a "practicable" alternative which would have less adverse impact on the aquatic ecosystem as long as the alternative does not have other significant adverse environmental consequences;

2. cause or contribute to violations of any applicable State water quality standard; violate toxic effluent standards; jeopardize the continued existence of an endangered or threatened species; or violate any marine sanctuary;
3. cause or contribute to significant degradation of the Waters of the U.S.; and
4. not have taken appropriate and practicable steps to minimize potential adverse impacts of the discharge on the aquatic ecosystem.

Per 40 CFR 230.10, each of these "restrictions" has specific requirements in order to determine compliance. The direct excerpt for the 404(b)(1) Guidelines that outlines these "restrictions" is provided below.

> *"(A) Except as provided under section 404(b)(2), no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences.*
>
> > *(1) For the purpose of this requirement, practicable alternatives include, but are not limited to:*
> >
> > > *(i) Activities which do not involve a discharge of dredged or fill material into the waters of the United States or ocean waters;*
> > >
> > > *(ii) Discharges of dredged or fill material at other locations in waters of the United States or ocean waters;*
> >
> > *(2) An alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes. If it is otherwise a practicable alternative, an area not presently owned by the applicant, which could reasonably be obtained, utilized, expanded or managed in order to fulfill the basic purpose of the proposed activity may be considered.*
> >
> > *(3) Where the activity associated with a discharge which is proposed for a special aquatic site (as defined in subpart E) does not require access or proximity to or siting within the special aquatic site in question to fulfill its basic purpose (i.e., is not "water dependent"), practicable alternatives that do not involve special aquatic sites are presumed to be available, unless clearly demonstrated otherwise. In addition, where a discharge is proposed for a special aquatic site, all practicable alternatives to the proposed discharge, which do not involve a discharge into a special aquatic site are presumed to have less adverse impact on the aquatic ecosystem, unless clearly demonstrated otherwise.*
> >
> > *(4) For actions subject to NEPA, where the Corps of Engineers is the permitting agency, the analysis of alternatives required for NEPA environmental documents, including supplemental Corps NEPA documents, will in most cases provide the information for the evaluation of alternatives under these Guidelines. On occasion, these NEPA documents may address a broader range of alternatives than required to be considered under this paragraph or may not have considered the alternatives in sufficient detail to respond to the requirements of these Guidelines. In the latter case, it may be necessary to supplement these NEPA documents with this additional information.*

(5) To the extent that practicable alternatives have been identified and evaluated under a Coastal Zone Management program, a section 208 program, or other planning process, such evaluation shall be considered by the permitting authority as part of the consideration of alternatives under the Guidelines. Where such evaluation is less complete than that contemplated under this subsection, it must be supplemented accordingly.

(B) No discharge of dredged or fill material shall be permitted if it:

(1) Causes or contributes, after consideration of disposal site dilution and dispersion, to violations of any applicable State water quality standard;

(2) Violates any applicable toxic effluent standard or prohibition under section 307 of the Act;

(3) Jeopardizes the continued existence of species listed as endangered or threatened under the Endangered Species Act of 1973, as amended, or results in likelihood of the destruction or adverse modification of a habitat which is determined by the Secretary of Interior or Commerce, as appropriate, to be a critical habitat under the Endangered Species Act of 1973, as amended. If an exemption has been granted by the Endangered Species Committee, the terms of such exemption shall apply, in lieu of this subparagraph;

(4) Violates any requirement imposed by the Secretary of Commerce to protect any marine sanctuary designated under Title III of the Marine Protection, Research, and Sanctuaries Act of 1972.

(C) Except as provided under section 404(b)(2), no discharge of dredged or fill material shall be permitted which will cause or contribute to significant degradation of the waters of the United States. Findings of significant degradation related to the proposed discharge shall be based upon appropriate factual determinations, evaluations, and tests required by subparts B and G, after consideration of subparts C through F, with special emphasis on the persistence and permanence of the effects outlined in those subparts. Under these Guidelines, effects contributing to significant degradation considered individually or collectively, include:

(1) Significantly adverse effects of the discharge of pollutants on human health or welfare, including but not limited to effects on municipal water supplies, plankton, fish, shellfish, wildlife, and special aquatic sites.

(2) Significantly adverse effects of the discharge of pollutants on life stages of aquatic life and other wildlife dependent on aquatic ecosystems, including the transfer, concentration, and spread of pollutants or their byproducts outside of the disposal site through biological, physical, and chemical processes;

(3) Significantly adverse effects of the discharge of pollutants on aquatic ecosystem diversity, productivity, and stability. Such effects may include, but are not limited to, loss of fish and wildlife habitat or loss of the capacity of a wetland to assimilate nutrients, purify water, or reduce wave energy; or

(4) Significantly adverse effects of discharge of pollutants on recreational, aesthetic, and economic values.

(D) Except as provided under section 404(b)(2), no discharge of dredged or fill material shall be permitted unless appropriate and practicable steps have been taken which will minimize potential adverse impacts of the discharge on the aquatic ecosystem. Subpart H identifies such possible steps."

1.3.3 What Other Environmental Regulations must the Corps Consider?

As discussed in 33 CFR 320.3, the Corps must review projects for compliance with numerous other Federal, state, and local laws, regulations, memoranda of agreement, and EOs, such as the Fish and Wildlife Coordination Act, the Endangered Species Act, the National Historic Preservation Act, and the Magnuson-Stevens Fishery Conservation and Management Act. Relevant laws and regulations that the Corps considered for the Navy Base ICTF EIS are identified in Chapter 8 (Regulatory Environment Overview).

1.3.4 Who are the Cooperating Agencies for this project?

1.3.4.1 U.S. Environmental Protection Agency

The U.S. Environmental Protection Agency and the Federal Railroad Administration are cooperating agencies for the Navy Base ICTF EIS.

The U.S Environmental Protection Agency (USEPA) mission is to protect human health and the environment. Through a suite of environmental laws and Executive Orders (EOs) (e.g., Clean Air Act, Clean Water Act, EO 12898 Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, and EO 13045 Protection of Children from Environmental Health Risks and Safety Risks), USEPA has jurisdiction over/interest in multiple topics relevant to the Proposed Project. These topics include air quality, climate change, wetlands, socioeconomics, environmental justice, and health and safety. Additionally, under Section 309 of the Clean Air Act, USEPA reviews and comments on EIS' prepared by other Federal agencies, including (but not limited to): (1) the adequacy of the analysis and the environmental impacts of the proposed action, (2) issues related to its duties and responsibilities, and (3) potential violation of or inconsistency with national environmental standards, and determines whether the scopes of the impacts analyses are adequate. Due to their interest in the potential air quality, socioeconomic/environmental justice, and human health and safety impacts from the Proposed Project, USEPA is a Cooperating Agency on this EIS. As a Cooperating Agency, USEPA is afforded the opportunity to participate in NEPA coordination meetings, discuss technical studies, and provide information on alternatives/mitigation.

1.3.4.2 Federal Railroad Administration

The Federal Railroad Administration (FRA) was created by the Department of Transportation Act of 1966, and is one of ten agencies within the U.S. Department of Transportation concerned with intermodal transportation. The FRA mission is to enable the safe, reliable, and efficient movement of people and goods now and in the future. Regarding Palmetto Railways Proposed Project, FRA understands the project would provide increased opportunity for CSX Transportation and NS Railway, both Class I railroads, to service intermodal traffic handled by the South Carolina State Ports Authority (SCPA) at the CNC.

Palmetto Railways has indicated to the Corps that it has submitted a draft Railroad Rehabilitation and Improvement Financing (RRIF) loan application to FRA in May 2015. Under the RRIF program, the FRA Administrator is authorized to provide direct loans and loan guarantees that may be used to acquire, improve, or rehabilitate rail equipment or facilities, or develop new intermodal or railroad facilities. The FRA will consider the potential environmental impacts resulting from the Proposed Project when making a decision on the loan application and the EIS must comply with FRA's Procedures for Considering Environmental Impacts[8] and other applicable statutes and regulations, including the National Historic Preservation Act and Sections 4(f)[9] of the U.S. Department of Transportation Act of 1966 and 6(f)[10] of the Land and Water Conservation Fund Act. In addition, before the loan application is approved, FRA must have completed the NEPA process. The FRA is participating in the EIS as a Cooperating Agency. As a Cooperating Agency, The FRA is afforded the opportunity to participate in NEPA coordination meetings, discuss technical studies, review and comment on the EIS, and provide information on alternatives/mitigation, all of which would help ensure the EIS conforms to FRA's Procedures. In addition, because Palmetto Railways is considering an RRIF loan to fund the Proposed Project, the FRA will issue a separate ROD in addition to the Corps' ROD.

1.3.5 What are the Roles of the Public, Other Agencies, and Tribes in this EIS?

The opportunity for public input is one element of the Corps' overall public participation program for the Navy Base ICTF EIS. This program includes a framework for: (1) broadly distributing and providing public access to information regarding development of the Draft Environmental Impact Statement (DEIS) and the Final EIS (FEIS); (2) promoting an understanding of the NEPA process, studies, alternatives evaluation, and environmental analyses; and (3) providing a number of opportunities for public input. The program incorporates several means for engaging and providing

8 http://www.fra.dot.gov/eLib/details/L02561

9 http://www.ecfr.gov/cgi-bin/text-idx?c=ecfr&SID=4d6e96ee8621f248ff93759fb1c8e4d6&rgn=div5&view=text&node=23:1.0.1.8.46&idno=23

10 http://www.ecfr.gov/cgi-bin/text-idx?c=ecfr&SID=8f547e6f2f6824f81dcfefe97961349c&rgn=div8&view=text&node=36:1.0.1.1.25.0.45.3&idno=36

information to the public, agencies, and tribes, including public meetings, community outreach meetings, mailings to interested parties, a project website (www.NavyBaseICTF.com), and newsletters.

Upon initiation of the NEPA process, a public scoping period, including a scoping meeting, was opened to solicit input from agencies and the public on issues of concern for the Proposed Project. As a result of a revised proposal by Palmetto Railways, the Corps opened a second public scoping period, and a second scoping meeting was held, to inform the public of the revised project. The comments received during the scoping periods and meetings assisted the Corps in determining the overall scope of the analysis for this EIS. Additional information about consultation and coordination is included in Chapter 9.

1.4 PROJECT PURPOSE AND NEED

In accordance with NEPA, the Corps must specify the underlying purpose and need for the Proposed Project (40 CFR 1502.13). Considered together, the purpose and need establish part of the framework to identify the range of alternatives for a proposed action to be evaluated in an EIS.

Corps regulations define three ways of stating the purpose of a project. As described below, one statement is provided by the Applicant, the other two are determined by the Corps:[11]

- Palmetto Railways has included a stated purpose and need in its proposal to the Corps.
- The Corps determines the "basic" purpose of the project, which in turn is used to determine whether the project is water dependent as it relates to Section 404(b)(1) of the Clean Water Act.
- The Corps determines the "overall" purpose of the project, which is used to determine the range of practicable alternatives for the Proposed Project.

1.4.1 What is the Applicant's Stated Purpose and Need?

The Applicant's stated purpose and need is an expression, typically in the applicant's own words, of the underlying goals for a proposed project. Palmetto Railways' Statement of Purpose and Need is included as Appendix B. The Corps takes an applicant's purpose and need into account when determining the overall project purpose. Elements of the applicant's proposal are important from the Corps' perspective, as they establish the basis for the Proposed Project. These elements are factored into the evaluation of alternatives under NEPA and the Section 404(b)(1) guidelines.

Palmetto Railways has stated that the purpose of the Proposed Project is:

[11] 33 CFR 325, Appendix B, "NEPA Implementation Procedures for the Regulatory Program"; 40 CFR 230.10(a).

To locate, build, and operate a state-of-the-art intermodal container transfer facility serving the Port of Charleston with near-dock, equal access for the two Class I rail carriers serving the areas (e.g., CSX Transportation [CSX] and Norfolk Southern Railway [NS]) to meet future demand in the Charleston region to facilitate the movement of goods and commerce over rail, thus stimulating and supporting economic development in the region and providing and maintaining connections to key regional and national transportation corridors (Appendix B – 12/22/15 alt analysis)."

As stated by the Applicant, the need for the Proposed Project is to provide consolidated intermodal facility capacity beyond the current footprints of the two existing intermodal terminals in the Charleston region that serve the Port and other regional businesses, and to accommodate projected future increases in the volume of intermodal container cargo in the region (Appendix B). The SCPA anticipates that, by the year 2018, the Port will handle approximately 2.2 million twenty-foot equivalent units (TEUs) of container traffic, or "throughput," the majority of which are international import and export. The projected increase in container throughput is expected to reach approximately 4.0 million TEUs by 2038 (Table 1.4-1)[12].

Table 1.4-1
Projected TEU Container Traffic at Port of Charleston

Port of Charleston Container Terminals	Projected TEU Container Traffic in 2018	Projected TEU Container Traffic in 2038
Columbus Street Terminal	66,000	305,060
North Charleston Container Terminal	645,213	694,727
Wando Welch Container Terminal	1,492,481	1,583,740
Hugh K. Leatherman, Sr. Terminal	–	1,400,000
Total	2,203,694	3,983,527

Source: Pers. comm. with Barbara Melvin, August 12, 2014.

[12] Pers. comm. with Barbara Melvin, August 12, 2014.

A Twenty-Foot Equivalent Unit (TEU), or the volume of one 20-foot container, is the standard volume unit for describing a container terminal's cargo-handling capacity.

Currently, the existing intermodal facilities in the Charleston region include the CSX Ashley Junction intermodal terminal and the NS 7-Mile intermodal terminal (see Figure 1.1-1). CSX's Ashley Junction/Bennett Yard includes four working tracks with grounded trackside storage, as well as storage for chassis and containers on chassis. The NS 7-Mile yard has a single loading track and both grounded and wheeled storage for containers and chassis. To promote competitive rail service, the new ICTF would provide equal access to both Class I rail carriers, allowing the facility to accommodate and provide equal service to both rail carriers simultaneously. The reported combined capacity of the two existing intermodal terminals is approximately 498,800 TEUs (Appendix B). Both existing intermodal facilities could increase the total throughput capacity with infrastructure and operational improvements to handle a portion of the projected future growth in intermodal container cargo volume at the Port; however, constraints such as available land and height restrictions may limit potential improvements (Appendix B).

As stated by the Applicant, today and historically at the Port of Charleston, intermodal containers transported by rail account for approximately 13 percent of the total container volumes handled by the Port, with the remainder being transported by truck. The recent creation of the Inland Port in Greer, South Carolina, is projected to raise the rail intermodal container transport volume percentage to nearly 20 percent of the total throughput. At that percentage, rail intermodal container volumes are projected to outgrow the region's existing rail intermodal capacity to transport them in 2022 (Appendix B).

To handle the next generation of container vessels, U.S. ports will require significant improvements to both waterside and landside infrastructure (Corps 2012). To successfully compete with other ports, Post-Panamax container terminals will need to provide "on-dock" or "near-dock" intermodal rail capabilities to serve these vessels and to minimize the truck traffic and environmental impacts associated with rapid transfers of large numbers of containers.

Near-dock or on-dock facilities:

Near-dock facilities are located landward of the marine terminal and cargo containers are transported by over-the-road (OTR) trucks and/or Utility Tractor Rig (UTR) trucks to the near-dock facility from the marine terminal or from the near-dock facility to the marine terminal. Near-dock facilities may serve multiple marine terminals. On-dock facilities are located proximate to the marine terminal and cargo containers may be transferred directly between the marine terminal and the on-dock facility.

The Port's main competitor to the north, the Virginia Ports Authority, handled intermodal container transport by rail at a rate of approximately 30 percent of total container cargo volumes in 2013 (Port of Virginia 2014). The Georgia Ports Authority, the main competitor to the south, handled approximately 19 percent of its total container transport volumes by rail in 2013, with consistent increases over the past four years (Georgia Ports Authority 2013). The historical intermodal container transport volumes by rail for both Virginia and Georgia ports were approximately 15–18 percent of the total container volumes prior to their expanding intermodal capacity through the development of new intermodal terminals (Appendix B). Both of these ports operate "on-dock" intermodal facilities, thereby eliminating a public dray move of containers.

The State of South Carolina has a need for a regional ICTF to service the Port of Charleston's container terminals in order to provide capacity to accommodate existing and future growth of intermodal containerized cargo projected to move through the Port. In addition, the regional ICTF would need to be "near-dock." Palmetto Railways proposes to maximize their throughput capacity by connecting their near-dock facility with a private drayage road. Equally important is the need to connect the near-dock facility to a Port container terminal that handles and processes sufficient TEU volumes to support ICTF operations 24 hours per day, seven days a week. A private drayage road would eliminate interaction of truck drayage with public traffic (from the connected Port container terminal), and would provide operational efficiency to reach approximately 12,000 TEUs per acre of ICTF site. Increased operational efficiency of the Navy Base ICTF can be achieved because the private drayage road would enable the facility to operate 24 hours per day.

With a minimum throughput goal of 800,000 TEUs (20 percent of future projected throughput), the facility site size would need to be a minimum of approximately 65 acres. According to Palmetto Railways, at full build-out, the Navy Base ICTF is designed to accommodate a throughput capacity of 1.2 million TEUs, or 30 percent of the projected future volume of intermodal containers. While there is not a specific definable configuration that is required, the site configuration must be conducive to process the intended throughputs of the Navy Base ICTF.

1.4.2 What is the Corps' evaluation of the Applicant's Need Statement?

The concept of public and private need for the Proposed Project is important to the balancing process of the Corps' public interest review. Regulations at 33 CFR 320.4(a)(2) state that part of the public interest review in the evaluation of every application is to consider the relative extent of the public and private need for the proposed structure or work. It is assumed that an applicant has considered economic viability and need in the market place; however, regulations indicate that the Corps should make an independent review of the need for a project from the perspective of the overall public interest. This independent review is relevant to the Corp's permit decision. The Corps will question the public need for a project if the Proposed Project appears to be unduly speculative.

The Corps has reviewed the information provided by Palmetto Railways, including the need for a near-dock ICTF in the region to have capacity for existing and projected future growth of intermodal container traffic. The Corps recognizes the need and projected increase of rail-based TEUs in the *Final Environmental Impact Statement Proposed Marine Container Terminal at the Charleston Naval Complex* (2006),[13] where the future projected rail-based TEUs would be approximately 20-25 percent of TEUs throughput from the Port of Charleston. The Corps also recognizes the need for Palmetto Railways, a state agency, to promote competitive rail service by providing equal access to both Class I rail carriers (CSX and NS).

The Corps has found, based on the Applicant's information and its own independent review, that the Applicant's stated need is not unduly speculative.

1.4.3 Corps' Basic Project Purpose and Water Dependency

The Section 404(b)(1) Guidelines require that the Corps determine whether a project is "water dependent." Water dependent means that the project requires access or proximity to, or siting within, a special aquatic site to fulfill its basic purpose. If a project is determined not to be water dependent, the regulations presume that: (1) an alternative site that does not involve special aquatic sites is available, and (2) practicable alternatives are available that would result in less environmental loss, unless clearly demonstrated otherwise by the applicant (40 CFR 230.10 [a][3]). The Corps has determined that the basic purpose of Palmetto Railways' discharge of fill material is to create the elevations necessary to facilitate the construction of an ICTF that would handle the transfer of intermodal containers; however, this action does not require access or proximity to, or siting within, a special aquatic site to fulfill its basic purpose. Therefore, the Corps has found that the basic purpose of this Proposed Project is not water dependent.

[13] The Final Environmental Impact Statement Proposed Marine Container Terminal at the Charleston Naval Complex is available at www.navybaseictf.com. The Corps issued a DA permit to the SCPA (No. 2003-1T-016) in April 2007.

1.4.4 Corps' Overall Project Purpose and Alternatives Analysis

In addition to the Applicant's purpose discussed above, the Section 404(b)(1) Guidelines require that the Corps define the "overall project purpose" to evaluate practicable alternatives. In accordance with the Section 404(b)(1) Guidelines, the overall project purpose must be specific enough to define the Applicant's needs, but not so narrow and restrictive as to preclude a proper evaluation of alternatives. In this regard, defining the overall project purpose for review and approval of Corps permits is the sole responsibility of the Corps. While generally focusing on the Applicant's purpose and need statement, the Corps will, in all cases, exercise independent judgment in defining the purpose and need for the project from both the Applicant's and the public's perspectives (33 CFR Part 325; 53 Fed. Reg. 3120). The Corps has reviewed and discussed Palmetto Railways' proposal, and has defined the overall project purpose as follows:

> *The overall project purpose is to provide a state-owned, near-dock ICTF that provides equal access to both Class I rail carriers and accommodates existing and projected future increases in intermodal container cargo transport through the Port of Charleston to enhance transportation efficiency in the state of South Carolina*.

1.5 BACKGROUND OF PROPOSED PROJECT

1.5.1 Background and Other Relevant Activities Associated with the Former Charleston Naval Complex

In 1996, under the Federal Defense Base Closure and Realignment Act (BRAC), the Department of Defense (DOD) closed the CNC, which included the Shipyard, Naval Station, Naval Annex, Defense Distribution Depot, and part of the Naval Supply Center in Charleston, South Carolina. The state of South Carolina set up the Charleston Naval Complex Redevelopment Authority (Redevelopment Authority) to oversee the property's conversion and to replace the jobs lost by the closing of the base (SCLAC 2000). The SCPA was granted the southern portion of the property (an approximately 350-acre parcel) and its docks by state legislation. The Redevelopment Authority deeded the northern end of the property to the City of North Charleston for redevelopment (DOD 2006). Subsequently, a Memorandum of Understanding and Agreement (MOUA) was signed by the SCPA and the City of North Charleston, in which the City of North Charleston agreed to develop the northern portion of the former CNC site and SCPA would develop the southern portion of the site (Port Facility Area). The MOUA further specified that, "certain minimum infrastructure must be in place before the SCPA commences container operations." This minimum infrastructure included a truck access road from the Port Facility Area to Interstate 26 (I-26), as well as several rail overpasses. Rail and highway access to serve the Port would be coordinated by the South Carolina Department of Transportation (SCDOT) in conjunction with the State Infrastructure Bank, South Carolina Public Railways (now Palmetto Railways), and the Charleston Area Transportation Study (Corps 2006).

For the northern portion of the CNC property, the City of North Charleston entered into a public-private agreement with developer John Knott to revitalize the 3,000-acre historic core of North Charleston, which included the former CNC. Knott's Noisette Company created The North Charleston Noisette Community Master Plan, which was accepted by the City of North Charleston in 2003. Ten years after the plan was unveiled, some elements—such as a Riverfront Park—have been implemented, while others—such as a new urban core along eastern McMillan Avenue and Storehouse Row—have not (Behre 2012).

During the same time period that the City of North Charleston was developing their plans for the northern portion of the former CNC, the SCPA was developing plans to build a marine container terminal on the Cooper River at the south end of the site. The SCPA proposed to develop a new marine container terminal on 240 acres of land that is located within the Port Facility Area (Corps 2006), and submitted an application for a DA permit from the Corps. The proposed marine container terminal consisted of the following major components: wharf, berth and access channel, container yard and support facilities, improvements to Tidewater Road, and stormwater management facilities. The SCDOT also submitted an application for a DA permit for the proposed Port Access Road, which consisted of the following major components: Port Access Road, Meeting Street interchange (Exit 217), local access roadway (four-lane roadway at Stromboli Avenue), Stromboli Avenue improvements, and a bridge to Tidewater Road (Corps 2006). After evaluating and comparing the proposed projects and alternatives, the Corps released its findings in the 2006 *Final EIS Proposed Marine Container Terminal at the Charleston Naval Complex.* Subsequently, the Corps issued DA permits to the SCPA (No. 2003-1T-016) and the SCDOT (No. 2005-1N-440) in April 2007. Construction of the marine container terminal is currently ongoing, with an anticipated completion date in 2019. Construction of the Port Access Road, including its components, will begin in the future; however, the work would have to be completed prior to the operation of the marine container terminal in 2019.

In April 2013, an EA was completed for the proposed I-26 and Port Access Road Interchange Project. The project involved removing the existing Spruill Avenue ramps (Exit 218) and building a new full movement directional T-interchange connecting to the new Port Access Road. The Federal Highway Administration (FHWA) issued a Finding of No Significant Impact (FONSI) for the proposed I-26 and Port Access Road Interchange Project in August 2013 (FHWA 2013). The EA was conducted to enable the FHWA to make a decision on the Interchange Modification Report, which included updated traffic information from what was available for the *Final EIS Proposed Marine Container Terminal at the Charleston Naval Complex* and on the Naval Base Terminal Access Road Interchange modification as it was proposed to tie into the Port Access Road and the Interstate system (SCDOT 2013).

In March 2013, Palmetto Railways submitted a written request to initiate environmental review as per NEPA for its proposed Navy Base ICTF on the former Clemson Site in the CNC. The Corps prepared a Memorandum for Record[14] in July 2013 regarding the need for an EIS to evaluate the Proposed Project.

1.5.2 Description of Proposed Site

The Proposed Project is located on the CNC in North Charleston, South Carolina, on the former Clemson Site. It lies on the west bank of the Cooper River 6 miles north of the confluence with the Ashley River. It is centrally located between several terminals operated by the SCPA, including the North Charleston Container Terminal, Veterans Terminal, the future Hugh K. Leatherman, Sr. Terminal (HLT), Union Pier Terminal, Columbus Street Terminal, and the Wando Welch Container Terminal. The CNC is bounded by the Cooper River to the east, the neighborhoods of Chicora and Cherokee to the west, the Park Circle neighborhood to the north, and residential and industrial areas (e.g., the Macalloy site) to the south (see Figure 1.1-1). As of September 2015, the site contains both open land and developed areas that are interspersed within a network of private roads. Land uses on the site consist primarily of open fields and parking lots. The northern portion of the site contains Sterett Hall and the North Charleston Fire Department Station 2 (relocated in January 2016). The central portion of the site contains various abandoned buildings and athletic fields associated with Charleston County's Academic Magnet High prior to its relocation. The Chapel of the Eternal Father of the Sea was located in the northern portion of the site between North Hobson Avenue and Avenue B South, but has been relocated to another part of the CNC that is outside of the ICTF. A tank farm and the Viaduct Road overpass are located on the southern portion of the site.

Terminology used in this EIS:

- ICTF – the 130-acre facility site.
- Project Site – the 130-acre facility site (ICTF), and associated impact areas for the ICTF and off-site roadway and rail improvements.
- Navy Base ICTF – generic term to mean the Proposed Project, including components and functionality.

The Corps recognizes that Palmetto Railways is conducting voluntary cleanup and site preparation of the project site, and that these activities will be required to redevelop the site regardless of whether the DA Permit is issued or not.

[14] Department of the Army Memorandum for Record. Need for an Environmental Statement, South Carolina Public Railways Intermodel Container Transfer Facility, Charleston County, SC. July 8.

1.6 FRAMEWORK FOR ANALYSIS

1.6.1 What is the Study Area?

A study area was defined to represent the area of resources that may be directly and indirectly affected by the Proposed Project (Figure 1.6-1). The study area was optimized to be the most appropriate boundary for the most resources; if the study area varies for a specific resource, it is defined in the affected environment section for that resource (Chapter 3). The study area for this EIS is based on and includes areas that may be directly impacted by construction and operation of the ICTF and components (off-site rail and roadway improvements).

1.6.2 What is the Project Site?

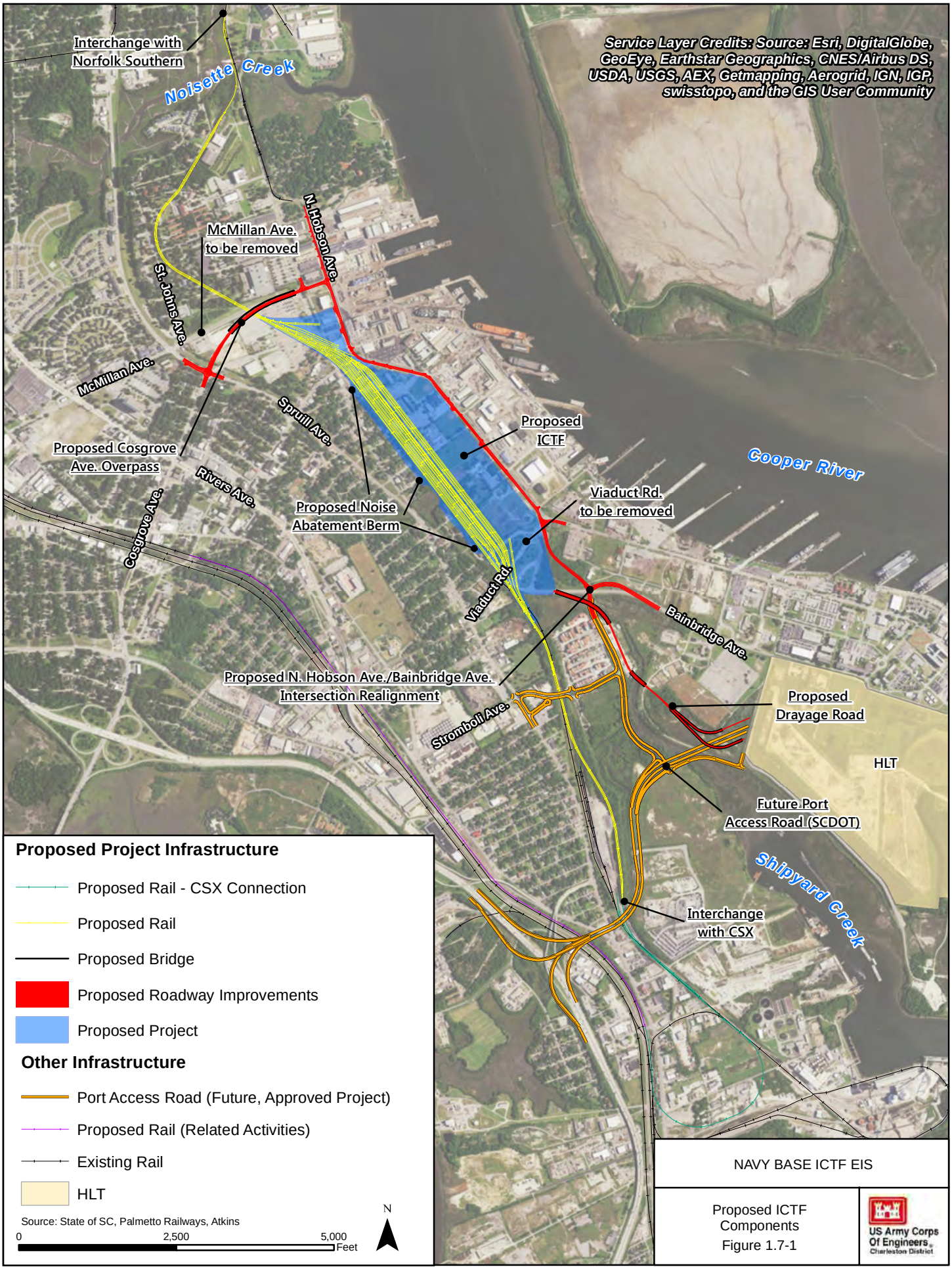
The project site is a subset of the study area and defines the area of potential direct impacts on the resources. The project site is shown on Figure 1.6-1 and includes the impact areas, also known as limits of construction, for the 130-acre ICTF and the associated roadway and rail improvements.

1.7 DESCRIPTION OF PROPOSED PROJECT

The Proposed Project, as submitted by Palmetto Railways, consists of constructing and operating an ICTF on approximately 130 acres for the facility site, and undertaking off-site roadway and rail improvements. The intermodal facility would include, but is not limited to, processing and classification railroad tracks, wide-span gantry cranes, container stacking areas, administrative buildings, and vehicle driving lanes. The off-site infrastructure improvements would include building: (1) a private drayage road approximately 1 mile long connecting the ICTF to the HLT, (2) rail improvements to the north and south of the ICTF, and (3) several roadway improvements and modifications, including the construction of a new overpass. As identified on Figure 1.7-1, the Proposed Project consists of the ICTF and proposed rail and roadway improvements.

Wide-span gantry crane:
A crane that may be rail mounted or on tires, with a span of adequate width to straddle several rows of cargo containers. The crane is used to manage and stack cargo.

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
526
Noisette Creek
Cooper River
Shipyard Creek
26
Ashley River
Proposed Project
Study Area
Existing Rail
Source: State of SC, Atkins
0
1
2
Miles
N
NAVY BASE ICTF EIS
Study Area
Figure 1.6-1
US Army Corps Of Engineers
Charleston District



NAVY BASE ICTF EIS

Proposed ICTF Components

Figure 1.7-1

US Army Corps Of Engineers Charleston District

1.7.1 The Intermodal Container Transfer Facility

1.7.1.1 Facility Infrastructure

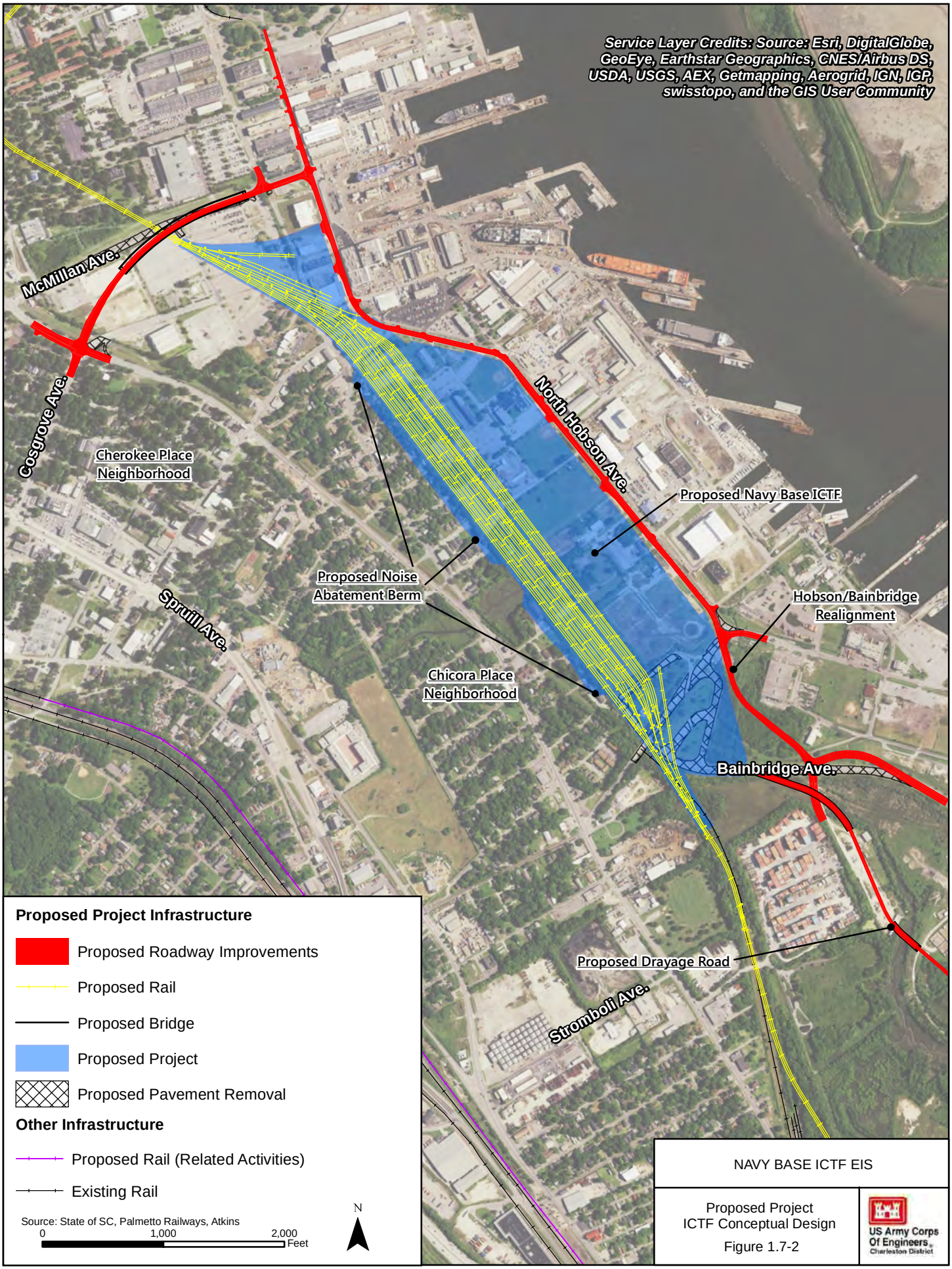
The proposed 130-acre ICTF is bordered to the east by Bainbridge Avenue/North Hobson Avenue, to the north by McMillan Avenue and Cosgrove Avenue, to the south by Stromboli Avenue, and to the west by Spruill Avenue and the Chicora and Cherokee neighborhoods (Figure 1.7-2). Detailed designs for various components of the ICTF can be found in Appendix B.

The ICTF would encompass the following permanent structures:

- Two two-story buildings (a locomotive repair shop and an administration and maintenance building, including heating, ventilation, air conditioning [HVAC] systems; plumbing; mechanical systems; security systems; and electrical systems); the area of the buildings would be approximately 26,576 square feet (SF);
- A parking area for operational and commercial vehicles (141 parking spaces and 7 handicap parking spaces);
- A landscaped earthen berm with security fence to provide for sound attenuation along the length of the processing and classification railroad tracks adjacent to the Chicora and Cherokee neighborhoods; in areas adjacent to Waters of the U.S., a sound attenuation and security wall would replace the earthen berm.
- Approximately 31,700 linear feet (LF) of processing railroad track;
- Approximately 25,505 LF of classification railroad track;
- Six electric, wide-span gantry cranes, each at a height of 91 feet, and the potential for up to five "nested" cranes that would be placed east of the wide-span gantry cranes, resulting in a maximum total combined height of 115 feet (Appendix B);
- Container stacking areas, up to four containers in height: Container area for Production/ Stacking (Production Cranes) at approximately 256,500 SF;
- One automated gate system for on-road trucks entering/exiting the ICTF from the Wando Welch and North Charleston port facilities and an optical character recognition (OCR) portal on the drayage road between the ICTF and the HLT;
- Vehicle driving lanes: Gate Area at 7,225 LF, Yard Circulations at 6,425 LF; and
- Stormwater management improvements, including placement of 21,000 LF of pipe of varying sizes and approximately 55,300 LF of underdrains, and construction of four dry detention ponds, totaling approximately 2,358,000 cubic feet (cf) of storage for on-site water, and vegetated swales.

Processing and classification tracks: One of several sets of railroad tracks devoted to sorting and classifying rail cars for their next destination.

Inbound cars arrive on receiving tracks, are inspected, assigned priority for departure, and sent to classification tracks in "blocks" with common destinations.


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
McMillan Ave.
Cosgrove Ave.
Cherokee Place Neighborhood
North Hobson Ave.
Proposed Navy Base ICTF
Proposed Noise Abatement Berm
Spruill Ave.
Hobson/Bainbridge Realignment
Chicora Place Neighborhood
Bainbridge Ave.
Proposed Drayage Road
Stromboli Ave.
Proposed Project Infrastructure
Proposed Roadway Improvements
Proposed Rail
Proposed Bridge
Proposed Project
Proposed Pavement Removal
Other Infrastructure
Proposed Rail (Related Activities)
Existing Rail
Source: State of SC, Palmetto Railways, Atkins
0
1,000
2,000
Feet
N
NAVY BASE ICTF EIS
Proposed Project
ICTF Conceptual Design
Figure 1.7-2
US Army Corps Of Engineers
Charleston District

Actions supporting the facility construction include land clearing, paving, fencing, general site improvements, and extension of utilities to serve the project. Approximately 3 acres of land disturbance would be expected per day during daylight hours, Monday through Saturday. All drainage infrastructure—including dry detention ponds, outlet control structures, and storm sewers—would be constructed as part of Phase I construction. A staging area (or more, as needed) would be located within the 130-acre facility site for equipment storage and stockpiling of materials to be used for construction. One hundred sixty-six structures, or 740,500 SF (includes buildings such as Sterett Hall, Viaduct Road bridge, and concrete structures adjacent to Noisette Creek), would be demolished. The Chapel of the Eternal Father of the Sea has been relocated to another part of the CNC that is outside of the ICTF (independent of this Proposed Project). Details regarding anticipated construction activities and materials for the Proposed Project are provided in Table 1.7-1. Use of proper Best Management Practices (BMPs) for erosion and sedimentation control would be implemented during all construction phases, such as installation of silt fences and turbidity barriers and re-vegetating areas of exposed soil immediately following construction. Sediment basins with temporary diversion ditches for runoff would be used to control sediment loading to surface waters during land-disturbing activities.

Table 1.7-1
Details of anticipated construction activities and associated materials for the Proposed Project

Material or Activity	Quantity
Export material (site ~15 mi away)	263,000 CY
Import material	105,000 CY
Demolition of facility site buildings	740,500 SF
Demolition of asphalt and sidewalks for facility site	2,040,000 SF
Demolition of roadway paving	1,529,000 SF
Total asphalt/concrete to be reused/recycled	All paving/concrete demolished on site
Vegetation removal/paving	150 acres
Soil imported for grading facility site	0 CY
Soil imported for grading roadways (site ~28 miles away)	105,000 CY
Soil exported for roadway	3,000 CY
Architectural coating	2,000 SF

Source: Palmetto Railways 2015.

1.7.1.2 Road and Rail Improvements

1.7.1.2.1 Drayage Road

Establishing a direct connection between the ICTF and the HLT would involve the construction of a drayage road of approximately 1 mile in length, and 50 feet in width (two lanes). The drayage trucks would exit the HLT, continue north through Federal Law Enforcement Training Center (FLETC)-owned property and across Shipyard Creek, and then would pass through the OCR portal before entering the southern portion of the ICTF (see Figure 1.7-3). The route for the drayage road would require bridge construction over Shipyard Creek. The drayage road would be a private roadway, would include security fencing as required, and would accommodate two-way traffic from Utility Tractor Rig (UTR) trucks transporting intermodal containers from the HLT to the ICTF. The drayage road would be elevated across Shipyard Creek and two areas of associated marsh and grade separated over the Port Access Road.

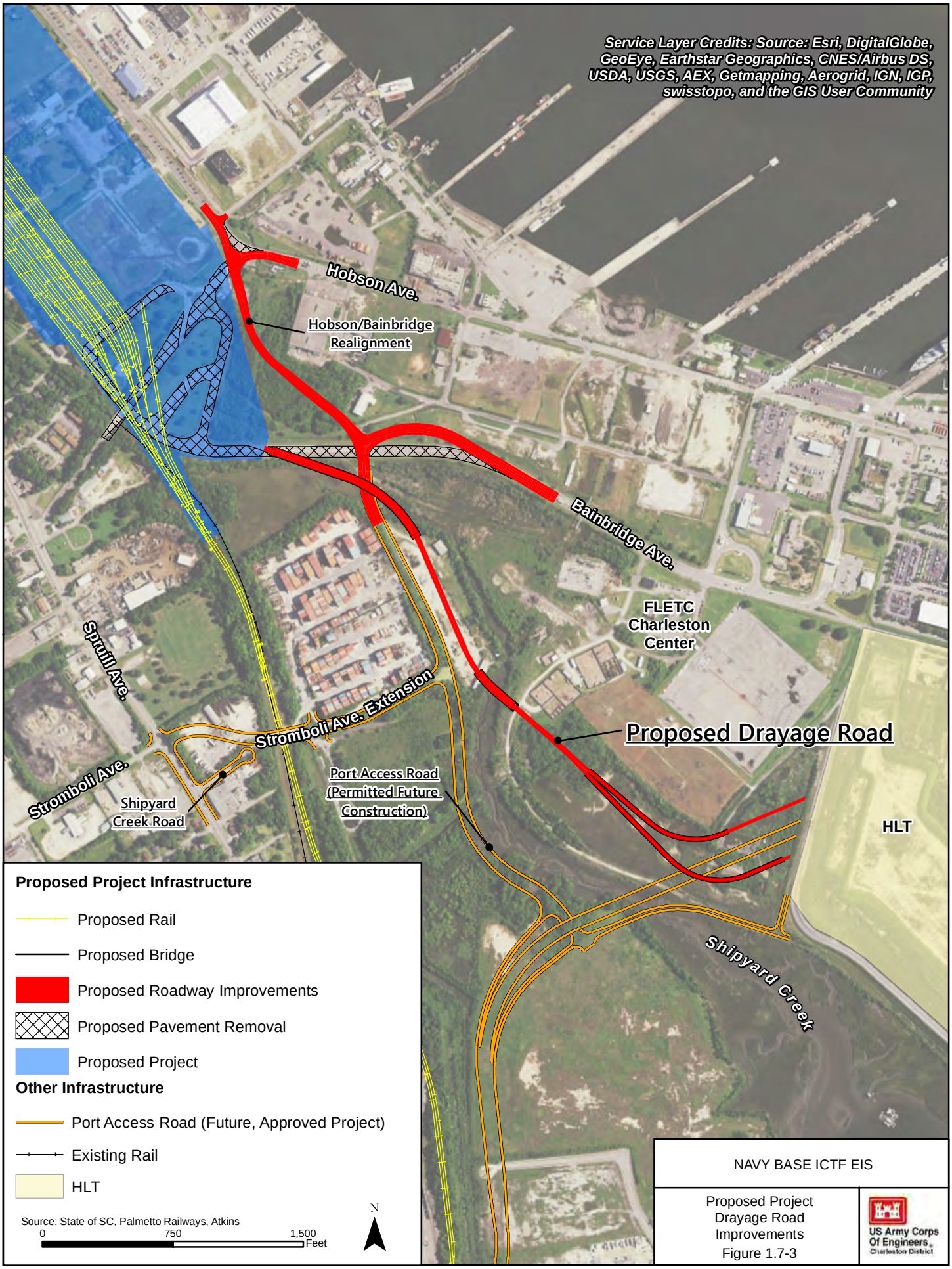
PRIVATE DRAYAGE ROAD: For intermodal freight transport, a dedicated, private roadway used for the transfer of goods or cargo over a short distance between ocean ports or rail ramps and shipping docks or intermodal transfer container facilities.

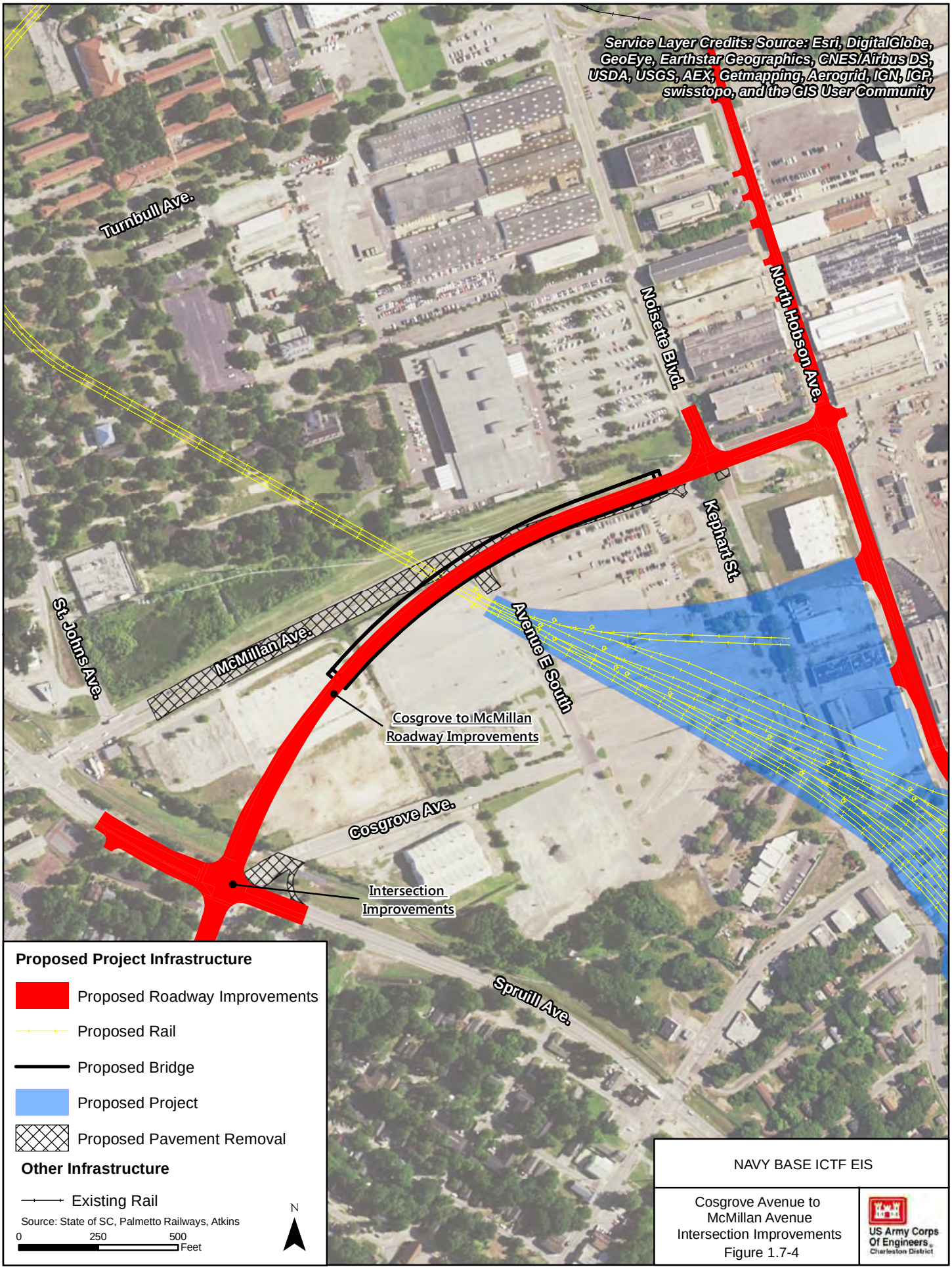
1.7.1.2.2 Road Improvements

Several roadway improvements and modifications would be constructed to facilitate operation of the Proposed Project.

At the northern end of the ICTF, the segment of McMillan Avenue between St. Johns Avenue and Kephart Street would be closed. The remainder of McMillan Avenue would become an extension of St. Johns Avenue. The segment of Cosgrove Avenue that is located east of Spruill Avenue would be realigned and replaced with a flyover above the new rail lines. The flyover would provide future roadway access between Spruill Avenue and North Hobson Avenue after McMillan Avenue is closed. The CNC gate at Turnbull Avenue and St. Johns Avenue would remain closed (Figure 1.7-4). Turnbull Avenue would be closed.

At the southern end of the ICTF, the Viaduct Road Overpass would be closed and removed. Bainbridge Avenue and North Hobson Avenue would be realigned, including improvements to their intersection (Figure 1.7-5). With the removal of Viaduct Road, vehicular access to the southern end of the CNC would use Stromboli Avenue, which would be elevated from its existing at-grade configuration. The construction of the local access segment of the Port Access Road including the elevation of Stromboli Avenue is part of the Port Access Road Design Build project to be undertaken by the SCDOT, Palmetto Railways will not begin closure and removal of Viaduct Road until SCDOT's project is completed (Chapter 6).

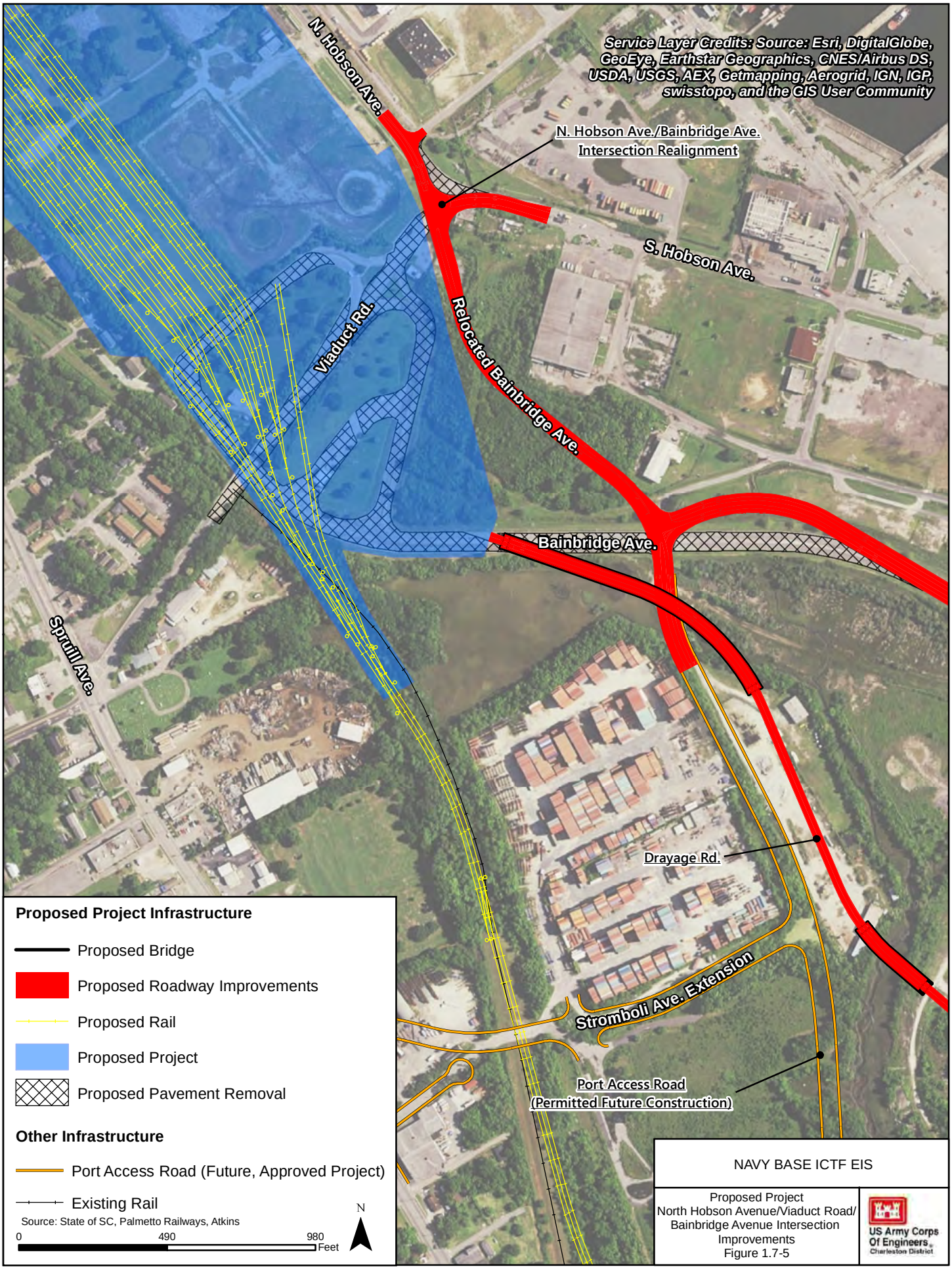

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
Hobson Ave.
Hobson/Bainbridge Realignment
Bainbridge Ave.
FLETC Charleston Center
Proposed Drayage Road
Sprull Ave.
Stromboli Ave. Extension
Stromboli Ave.
Shipyard Creek Road
Port Access Road (Permitted Future Construction)
HLT
Shipyard Creek
Proposed Project Infrastructure
Proposed Rail
Proposed Bridge
Proposed Roadway Improvements
Proposed Pavement Removal
Proposed Project
Other Infrastructure
Port Access Road (Future, Approved Project)
Existing Rail
HLT
Source: State of SC, Palmetto Railways, Atkins
0
750
1,500
Feet
N
NAVY BASE ICTF EIS
Proposed Project Drayage Road Improvements
Figure 1.7-3
US Army Corps Of Engineers
Charleston District



NAVY BASE ICTF EIS

Cosgrove Avenue to McMillan Avenue Intersection Improvements
Figure 1.7-4

US Army Corps Of Engineers Charleston District


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
N. Hobson Ave.
N. Hobson Ave./Bainbridge Ave. Intersection Realignment
S. Hobson Ave.
Viaduct Rd.
Relocated Bainbridge Ave.
Bainbridge Ave.
Spruill Ave.
Drayage Rd.
Stromboli Ave. Extension
Port Access Road (Permitted Future Construction)
Proposed Project Infrastructure
Proposed Bridge
Proposed Roadway Improvements
Proposed Rail
Proposed Project
Proposed Pavement Removal
Other Infrastructure
Port Access Road (Future, Approved Project)
Existing Rail
Source: State of SC, Palmetto Railways, Atkins
0
490
980
Feet
N
NAVY BASE ICTF EIS
Proposed Project
North Hobson Avenue/Viaduct Road/
Bainbridge Avenue Intersection
Improvements
Figure 1.7-5
US Army Corps Of Engineers
Charleston District

1.7.1.2.3 Rail Improvements

Several rail improvements would be undertaken to facilitate operation of the Proposed Project and accommodate equal access for CSX and NS. These include:

- Construct a northern rail connection for NS through the Charleston Naval Hospital Historic District (Hospital District), which would connect to an existing interchange point with the North Charleston Terminal Company (NCTC) located across Noisette Creek (Figure 1.7-6).
- As part of the northern rail connection, construct a new railroad bridge across Noisette Creek that is adjacent to the existing railroad bridge (Figure 1.7-6). This new rail bridge is required because the existing bridge does not have capacity for a second rail track.
- Construct a southern rail connection for CSX that begins in the vicinity of Viaduct Road, extends to the south on the east side of Cooper Yard, crosses Meeting Street, then connects to existing CSX ROW (Figure 1.7-7). One major at-grade rail crossing on Meeting Street would be required.

1.7.2 Operations

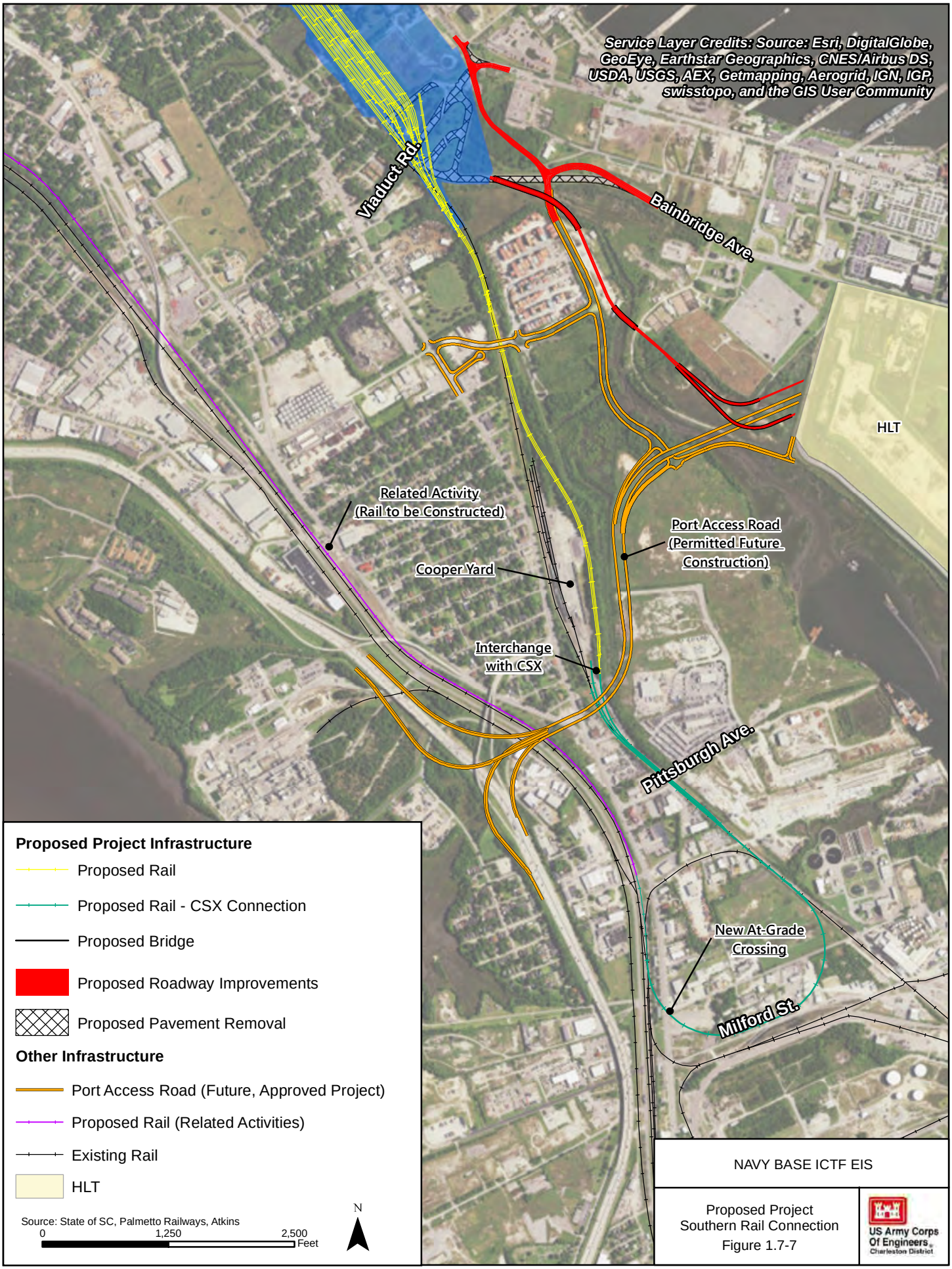
Operation activities associated with the Navy Base ICTF would include transferring intermodal containers from UTR trucks and over the road (OTR) trucks; classifying, processing, and storing the intermodal containers; switching (building) train segments; inbound and outbound train activity; and maintenance and administrative activities associated with daily operations. Operations of the Navy Base ICTF would take place 24 hours a day, 7 days a week. Palmetto Railways would employ approximately 120 employees overall, which would include shift workers (approximately 30 employees per shift, three shifts in total) and non-shift workers.

There would be two different methods for the Navy Base ICTF to accept intermodal containers from the Port's various container terminals. Intermodal containers that arrive at the HLT would be transported to the Navy Base ICTF using the private, secure drayage road, and would enter through the OCR portal at the southern end of the facility site. These transfers would take place on a 24-hour-per-day schedule, seven days a week. The intermodal containers would initially be transported by as many as 16 diesel-engine yard trucks during the start-up of the facility; however, the number of diesel-engine yard trucks would increase to as many as 40 with full build-out.

NAVY BASE ICTF EIS

Proposed Project
Northern Rail Connection
Figure 1.7-6

US Army Corps Of Engineers Charleston District



NAVY BASE ICTF EIS

Proposed Project
Southern Rail Connection
Figure 1.7-7

US Army Corps Of Engineers
Charleston District

Intermodal containers that arrive from the port facilities would first be placed on OTR trucks and driven on public roadways (primarily I-26 and Interstate 526 [I-526]) into the ICTF through its main gate, which is located in the middle of the facility site along North Hobson Avenue. Gate hours for trucks that transport these intermodal containers would be aligned with the Port's gate hours to allow for early staging of containers at the Port gate in the mornings, and for final cut-off for containers at the ICTF in the evening. The ICTF gate would be operational seven days a week.

Once intermodal containers enter the ICTF by UTR trucks and OTR trucks, a network of rail-mounted electric wide-span gantry cranes would be used to offload the containers. Off-loaded containers then would be classified and processed, including the storing and stacking of containers in designated areas (four-container high stacking limit). Containers come in varying lengths (e.g., 20-ft, 40-ft, 45-ft, and 53-ft), and are typically 8 feet wide and 9.5 feet height in height. Initially, three 91-foot-tall wide-span gantry processing cranes would be operated, though full build-out of the facility would increase this number to six processing cranes. In addition, "nested wide-span cranes," which can be positioned east of the existing wide-span gantry cranes, may be employed in the future to meet projected demand for processing and transporting intermodal containers to/from the Navy Base ICTF. The addition of nested cranes would result in a potential maximum height of 115 feet (Appendix B).

The design of the Navy Base ICTF, and the presence of two separate arrival/departure tracks that connect to both CSX and NS rail lines, would allow for equal access by the Class I rail carriers so that the facility can manage and switch two trains at the same time. In the initial years of operation, the facility would load/unload up to eight trains (i.e., two inbound and two outbound trains for NS (north) and CSX (south) for a total of eight train movements) every day. Average train lengths may be less than 8,000 feet in light of the TEU throughput that would occur at the ICTF. By the year 2038 (full build-out), the facility is expected to load/unload up to eight trains (i.e., two inbound and two outbound trains for NS (north) and CSX (south) for a total of eight train movements) every day, although the average train lengths would be greater than 8,000 feet. Containers would be moved using a specially designed rail car with a depressed section (well) that carries the containers low, hence, allowing them to be double stacked. An 8,000-foot train (approximately 1.5 miles) would equate to approximately 145 individual intermodal wells.

Train with intermodal wells.

The Navy Base ICTF design also would accommodate the assembly of outbound trains up to 10,000 feet in length; however, the mainline capacity entering and exiting Class I mainline routes is 9,000 feet because the infrastructure east of the Mississippi River is a constraining factor (infrastructure cannot accommodate very large trains). There is potential that rail infrastructure east of the Mississippi River could improve over time to accommodate longer trains. In the initial years of the operation of the ICTF, the average train length is expected to be smaller (5,000–8,000 feet). Palmetto Railways would assemble the longer train length by building separate 1,500–3,150-foot train segments by utilizing the southern and northern leads and tracks within the ICTF. During the switching of trains, existing and proposed future at-grade crossings would not be blocked by the train. While incoming trains from CSX and NS would be on a regular schedule, deviations from the schedule and delays could occur. Similarly, outbound trains from the ICTF to these rail carriers also would be on a schedule, though delays could occur. Trains could enter or exit the ICTF during day or night. Train speeds entering and leaving the ICTF would be approximately 10 miles per hour or less. Anecdotally, with regards to the size of trains being processed, a trend seen in existing Charleston intermodal rail operations is that larger trains come at the end of the week. During nighttime hours, the ICTF would use high mast lights, approximately 85 feet in height, and they would operate from dusk to dawn, 7 days a week. Security patrols also would be employed within the ICTF and along the drayage road.

Maintenance activities would involve work on machinery, such as locomotives, UTR trucks, and cranes, and would involve tasks such as basic rail car, chassis and container maintenance, brake jobs, wheel repair, etc.

Estimated annual utility needs and consumption levels during operation of the Proposed Project are summarized in Table 1.7-2.

Table 1.7-2
Estimated annual utility consumption levels for the Proposed Project

Utility Consumption	Estimated Usage
Electricity for total project	18 million kilowatt hours/year
Total water consumption	264,625 gallons/year
Water used per employee	28.9 gallons/day
Indoor water consumption	36,500 gallons/year
External water consumption	38,325 gallons/year
Solid waste generation	21 tons/year

Source: Palmetto Railways 2015.

2.0 DEVELOPMENT AND DESCRIPTION OF ALTERNATIVES

2.1 ALTERNATIVES ANALYSIS

This EIS will identify and evaluate a range of reasonable and practicable alternatives for the proposed action. The analysis of alternatives serves two purposes: (1) it must meet the requirements of NEPA (reasonable alternatives), and (2) it must provide the basis for the Corps to make specific findings under Section 404(b)(1) of the Clean Water Act (practicable alternatives).

NEPA

To comply with NEPA, guidelines developed by the CEQ and the Corps require a detailed analysis of reasonable alternatives and the potential environmental consequences of each so that their comparative merits may be considered by agency decision makers (40 CFR 1502.14[b]). The alternatives evaluation must include the applicant's Proposed Project, a no-action or no-build alternative, and a range of other reasonable alternatives for the Proposed Project. The range of reasonable alternatives can include alternative sites, alternative project configurations, alternative technologies, and alternative project sizes.

Section 404(b)(1) Guidelines

In addition to meeting the requirements of NEPA, the Section 404(b)(1) Guidelines stipulate that the Corps may not issue a DA permit without identifying whether the proposed action is the least environmentally damaging practicable alternative (LEDPA). This regulatory review must be supported by an alternatives analysis.

After alternatives have been identified and evaluated, only those alternatives that are found to be reasonable (40 CFR 1502.14[a]) and practicable (40 CFR 230.10 [a][1-3]) are moved forward for detailed review in the Draft EIS (DEIS). "Reasonable" is understood to mean those technically and economically feasible project alternatives that would satisfy the primary objectives of the project defined in the statement of project purpose. Reasonable alternatives include those that are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant.[15] An alternative is considered to be "practicable" if it is, "available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes. If it is otherwise a practicable alternative, an area not

[15] 46 Fed. Reg. 18026, at 18027 (March 23, 1981), Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations (https://ceq.doe.gov/nepa/regs/40/40P1.HTM)

presently owned by the applicant which could reasonably be obtained, utilized, expanded or managed in order to fulfill the basic purpose of the proposed activity may be considered."[16]

An EIS informing a DA permit decision by the Corps must be thorough enough to determine compliance with NEPA and the Section 404(b)(1) Guidelines, as well as all Federal, state, and local requirements with respect to the Proposed Project activities and permit approvals. Based on information submitted by Palmetto Railways (Appendix B) and the Corps' independent review, the Corps has completed an initial identification, screening, and evaluation of all alternatives for the Navy Base ICTF, and has identified the alternatives to be evaluated in detail in the DEIS. The alternatives analysis conducted by the Corps and described in this DEIS complies with NEPA, and provides the basis for the Corps to make the required findings under the Section 404(b)(1) Guidelines.

2.2 SCOPING AND DEVELOPMENT OF ALTERNATIVES

Participation by the public, governmental agencies, tribes, and non-governmental organizations is critical to the NEPA process, which requires an early and open process for determining the scope of the issues to be addressed as part of the preparation of an EIS. The Corps has provided and will continue to offer opportunities for participation through public and agency meetings, input on the scope of the EIS, and review and comment on the EIS. Input for the scope of the EIS was obtained through a scoping process that included the following elements:

- **Initiation of the scoping process via the Notice of Intent (NOI)**. The Corps, Charleston District, initiated the public scoping process with the publication of the NOI in the *Federal Register* on October 23, 2013.
- **Public scoping meeting and comments**. The Corps conducted a public scoping meeting on November 14, 2013, to solicit public, agency, and Tribe comments.
- **Scoping comment period**. Written and oral comments were received via email, letters, and the project website (www.NavyBaseICTF.com) during the public scoping meeting and during the scoping period, which ended on December 14, 2013.
- **Additional Comments**: The Corps received additional comments after the formal scoping period, and these comments have been considered in the development of the EIS.
- **Second public scoping meeting and comments.** The Corps conducted a second public scoping meeting on October 27, 2015 to inform the public, agencies, and Tribes of the revised project and to solicit comments.
- **Second scoping comment period.** Written and oral comments were received via email, letters, and the project website during the additional public scoping meeting and during the scoping period, which ended on November 27, 2015.
- **Additional Comments**: The Corps received additional comments after the second formal scoping period, and these comments have been considered in the development of the EIS.

[16] 40 CFR 230.10 [a][1–3]

The Corps received a number of comments on a broad range of topics. A summary of the scoping process and all of the comments are available on the Corps' Navy Base ICTF EIS website at www.NavyBaseICTF.com. Several comments were submitted that pertain to identification and evaluation of alternatives for the proposed action, and they are summarized in Appendix C. These comments were taken into consideration during the alternatives development process.

2.3 CORPS' SCREENING OF ALTERNATIVES

This section describes the process used by the Corps to identify and screen potential alternatives to the Proposed Project that would be considered further in the EIS, in compliance with the applicable CEQ and Corps regulations. The analysis of alternatives is considered to be the "heart of the environmental impact statement" (40 CFR 1502.14). The Corps is required to "rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated" (40 CFR 1502.14). Determining a range of reasonable alternatives to be evaluated is the first step in this process. For some proposals, a large number of possible reasonable alternatives may exist. Therefore, the Corps typically develops appropriate screening criteria that are used to pare down a large list to a reasonable number of alternatives to evaluate in an EIS.

Reasonable alternatives do not include remote or speculative alternatives, or alternatives that would not achieve the project purpose. The CEQ provides guidance on the range of alternatives that should be considered in an EIS and on how to define whether an alternative is sufficiently reasonable to be considered in detail in an EIS. As noted earlier, reasonable alternatives include those that are practical or feasible from a technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant[17]; however, first and foremost, a reasonable alternative must meet the purpose and need of the project.

The following sections introduce the alternatives screening criteria (Section 2.3.1) and then provide the results of the analysis using the screening criteria (Section 2.3.2).

2.3.1 Alternatives Screening Criteria

In consideration of the purpose of and need for the Proposed Project, screening criteria were developed to identify possible alternative ICTF sites that would be evaluated in the EIS. Three different levels of screening were used: Initial, Tier I, and Tier II. Initial screening criteria narrowed the analysis to private/public intermodal container terminals in Charleston Harbor. Tier I screening criteria narrowed the realm of possible alternative ICTF locations to specific sites, and then Tier II screening criteria further narrowed these sites to those to be carried forward in the EIS.

[17] NEPA's Forty Most Asked Questions (http://ceq.hss.doe.gov/nepa/regs/40/40p3.htm).

2.3.1.1 Initial Screening Criteria: Presence of Private/Public Intermodal Container Terminals in the Charleston Harbor

The Corps recognizes that the construction and operation of an economically viable ICTF is dependent on the facility being located near a container terminal that currently handles or is planning to handle intermodal containers. Locating a facility too far from the container terminal would not be feasible as the distance to transport the containers from the terminal to the facility would be cost prohibitive. For example, drayage services may account for up to 40 percent of total shipping cost, and this cost increases sharply if rail facilities are not located near points of origin or destination.[18] Furthermore, considering the service territory for Palmetto Railways, the Corps recognizes that the ICTF must be located near a private or public intermodal container terminal in the Charleston Harbor. Therefore, the initial screening criterion used in the formulation of viable alternatives is the presence of private/public intermodal container terminals in the Charleston Harbor.

2.3.1.2 Tier I Screening Criteria

The Tier I screening criteria were used in a step-wise fashion to identify specific alternative sites for the Proposed Project. The criteria included:

- Proximity (within 4 miles) to private/public intermodal container terminals in the Charleston Harbor with a projected 400,000 rail-shipped TEU annual throughput
- Area required for an ICTF (65+ acres)

2.3.1.2.1 Screening Criterion #IA: Proximity (within four miles) to Private/Public Intermodal Container Terminals in the Charleston Harbor

The maximum distance between the placement of the ICTF and a private or public intermodal container terminal is dictated by the purpose and need statement, which requires that the ICTF be a near-dock facility. While there is not a definitive distance associated with the term "near-dock," approximately 4 miles has generally been considered by the rail industry as the furthest viable distance because of the need for the drayage road (and the use of UTR trucks) to link the nearest intermodal container terminal with the associated ICTF. Intermodal containers from other nearby container terminals would be transported by OTR trucks as they would not have a drayage road connection (other than the public road/highway network). Accordingly, this conservative distance of 4 miles was used as the limit for determining potential locations for siting an ICTF.

Containers would be brought to the ICTF by both private drayage road via UTR trucks and public streets via OTR trucks from the off-site terminals. The advantage of the near-dock facility is that

[18] "Time to market and overall logistics costs are prime factors driving freight facility location decisions," National Cooperative Freight Research Program, Report 13 – Freight Facility Location Selection: A Guide for Public Officials, at 39, 54 (NCFRP Report 13).

containers can continue to be moved between the terminal and the ICTF on the private drayage road even after the external gates of the terminal are closed (e.g., for truck shipments). Therefore, in addition to being "near-dock," the ICTF also must be connected to a container terminal that has existing or projected TEU volumes to support the ICTF's 24-hour-per-day, 7-day-a-week operations. The connection to a high-volume container terminal is needed for the ICTF to reach a minimum operational capacity of 800,000 TEUs per year (per the Applicant's purpose and need statement).

2.3.1.2.2 Screening Criterion #IB: Area of Available Land Required for an ICTF (65+ acres)

The ability for an ICTF to handle existing and projected future intermodal container traffic from the Port and/or other businesses in the region also would require a minimum facility footprint. For an ICTF to handle a minimum of 20 percent of intermodal traffic that would be shipped by rail from the Port, or approximately 800,000 TEUs, a TEU capacity throughput per acre must be established. Whereas a conventional ICTF typically has a throughput capacity of 3,500 TEUs/acre, the Proposed Project would be a state-of-the-art facility that could process as much as 12,000 TEUs/acre (primarily due to the use of a private drayage road connected with a high TEU-capacity container terminal). As a result, a contiguous 65-acre minimum footprint would be necessary to handle the 800,000 TEUs/year. Sites were considered available if they were: (1) undeveloped and could be acquired by Palmetto Railways[19]; (2) identified in the South Carolina State Rail Plan (Wilbur Smith Associates 2009); or (3) owned by Palmetto Railways.

2.3.1.3 Tier II Screening Criteria

For those potential sites that were carried forward from the Tier I analysis, more detailed Tier II screening criteria were used in a step-wise process to narrow the realm of specific alternative sites for the Proposed Project. The criteria included:

- Available infrastructure required for an ICTF
  - Proximity to existing rail lines for both Class I carriers
  - Proximity to highway network
  - Major infrastructure needed to access existing rail and/or highway network
- Availability of a private drayage road
- Configuration of available acreage

2.3.1.3.1 Screening Criterion #IIA: Available Infrastructure Required for an ICTF

The availability of key infrastructure is critical in determining if a potential ICTF location would be viable. In light of the project's purpose and need, infrastructure needed for an ICTF would include

[19] Palmetto Railways cannot acquire federally owned property and property owned by the Class I carriers; therefore, these lands are not considered to be available.

rail lines for both Class I carriers, and major road networks for trucks that are transporting containers from other Port terminals and/or local businesses and industries. Potential sites without rail/road networks in close proximity, or that would need the construction of major new infrastructure (e.g., interstate or highway bridges), could be cost-prohibitive to develop as an ICTF.

2.3.1.3.1.1 Screening Criterion #IIA-1: Proximity to Existing Rail Lines for both Class I Carriers

The provision of equal access to CSX and NS is a requirement identified in the purpose and need for the Proposed Project. For the purposes of this analysis, the potential cost and impacts to the human and natural environment associated with the construction of new rail connections that access existing Class I rail carrier lines would be considered as part of the screening criterion. This criterion also considers the anticipated wetland impacts from extending the rail alignment for both Class I carriers. Adding long-distance rail connections would be cost-prohibitive.

2.3.1.3.1.2 Screening Criterion #IIA-2: Proximity (less than two miles) to Highway Network

Access from the ICTF to major road networks and highways is also imperative for delivery of intermodal containers by trucks from other nearby intermodal container terminals and/or businesses in the region. Nearby access to a highway system, less than two miles (Bochner, Higgins, and Frawley 2010), minimizes the need for truck traffic to navigate through local and secondary road networks, while simultaneously minimizing adverse impacts to the roads, residents, and businesses located along these secondary road networks. This criterion also considers the anticipated wetland impacts from extending roadway alignments to major roadways. Adding long-distance connections to or extensions of major roadways would be cost-prohibitive.

2.3.1.3.1.3 Screening Criterion #IIA-3: Major Infrastructure Needed to Access Existing Rail and Highway Networks

The Corps recognized that locating an ICTF in an area that would require major infrastructure projects and/or improvements, such as new interstate or highway bridges or exit ramps, would be cost prohibitive. Accordingly, each potential site was evaluated to determine whether such major infrastructure would be needed to accommodate an ICTF.

2.3.1.3.2 Screening Criterion #IIB: Availability of a Private Drayage Road

One of the key elements for a competitive and cost effective near-dock facility is the ability to transport intermodal containers from the Port terminal to the ICTF on a private road, or private road network. As discussed in the project's purpose and need statement from Palmetto Railways, the ability to achieve a throughput capacity of 12,000 TEUs/acre is dependent on operational efficiencies from the presence of a private drayage road.

The primary reason for this project element is that the private drayage road provides a critical operational efficiency by allowing for 24 hour/day, seven days/week delivery of intermodal containers from the associated Port container terminal. This steady flow of containers enables the ICTF to operate 24 hours per day, maximize the throughput of intermodal containers to approximately 12,000 TEUs/acre, and, as a result, meet the purpose and need for transporting a minimum of 20 percent, or 800,000 TEUs, of the Port's total intermodal container traffic using rail. To be considered as a near-dock facility, the private drayage road would need to be a length of less than 4 miles in distance from a container terminal.

In addition, many international containers have a weight that exceeds the limits allowed on public roadways and highways, typically 80,000 pounds. In the absence of a private drayage road, these overweight containers would have to undergo additional handling and processing so the goods could be divided and transferred to an additional container to comply with all applicable public roadway weight restrictions. The use of a private drayage road eliminates this double handling of heavier international containers, and is a more cost-effective approach to handling intermodal container traffic.

2.3.1.3.3 Screening Criterion #IIC: Configuration of Available Acreage

While it is important to have a parcel of land large enough to accommodate an ICTF, the configuration of the parcel is equally important. Any potential parcel of land that is at least 65 acres in size must also be able to accommodate the numerous processing and classification railroad tracks, wide-span gantry cranes, container storage areas, administrative and maintenance buildings, and other associated infrastructure for an ICTF to achieve a throughput capacity of at least 800,000 TEUs per year. While there is not a specific definable configuration that is required, examples of ICTFs across the country indicate the most cost-effective configuration for an ICTF would be an extended rectangular-shaped parcel. Regardless of specific shape, the site configuration should be conducive to process the intended throughput capacity.

2.3.2 Results of Screening Analyses

2.3.2.1 Results from Initial Screening Criterion: Presence of Private/Public Intermodal Container Terminals in the Charleston Harbor

There are four public and no private container terminals in the Charleston Harbor that handle, or are planning to handle, intermodal container traffic. The four intermodal public terminals are part of the Port: North Charleston Container Terminal, HLT (under construction), Wando Welch Container Terminal, and Columbus Street Terminal. The other two terminals associated with the Port (Union Pier and Veterans Terminal) do not handle intermodal containers. Union Pier Terminal is almost exclusively a cruise terminal but also handles "break-bulk" (e.g., paper, wire rods) and roll-on/roll-

off items such as heavy equipment and cars. Veterans Terminal has very few ship calls, and primarily handles "bulk" (e.g., aggregate) and "break-bulk" cargo.

Accordingly, the four public container terminals carried forward into Tier I Screening are Wando Welch Container Terminal, HLT, Columbus Street Terminal, and North Charleston Container Terminal.

2.3.2.1.1 Wando Welch Container Terminal

The Wando Welch Container Terminal is located in Mt. Pleasant on the east bank of the Wando River. It currently handles a majority of the container traffic through the Port of Charleston, and has a total throughput capacity of approximately 1.6 million TEUs per year. The Port projects that the terminal will handle approximately 1.5 million TEUs per year in 2018, and approximately 1.6 million TEUs per year in 2038[20]. Currently, intermodal containers that will be transported by rail are first carried by truck to CSX's Ashley Junction rail yard or NS's 7-Mile rail yard.

2.3.2.1.2 Hugh K. Leatherman, Sr. Terminal (HLT)

The HLT is located in North Charleston along the west bank of the Cooper River, and is within the boundary of the former CNC. After the terminal is completed (projected completion is 2019), it would be able to handle a total throughput capacity of 1.4 million TEUs of container traffic per year. While the terminal would not be completed by the time that the proposed ICTF would be in operation (2018), the Port projects that the terminal would handle approximately 1.4 million TEUs per year by 2038.

2.3.2.1.3 Columbus Street Terminal

The Columbus Street Terminal is located in the City of Charleston on the west bank of the Cooper River, and south of the former CNC. The Columbus Street Terminal is a combination "break-bulk" and container terminal that primarily serves the automobile manufacturer BMW. The Port projects that the terminal will handle approximately 66,000 TEUs per year in 2018, and approximately 300,000 TEUs per year in 2038.[21]

2.3.2.1.4 North Charleston Container Terminal

The North Charleston Container Terminal is located in the City of North Charleston along the west bank of the Cooper River, and is adjacent to the Charleston Naval Weapons Station. The Port projects

[20] Pers. comm. with Barbara Melvin, August 12, 2014.

[21] Pers. comm. with Barbara Melvin, August 12, 2014.

that the terminal will handle approximately 650,000 TEUs per year in 2018, and approximately 700,000 TEUs per year in 2038.[22]

2.3.2.2 Results from Tier I Screening Criteria

The Wando Welch Container Terminal, HLT, Columbus Street Terminal, and North Charleston Terminal were evaluated using the Tier I screening criteria. The screening criteria were adapted into a GIS-based approach to identify potential alternative sites.

2.3.2.2.1 Screening Criterion #IA: Proximity (within four miles) to Private/Public Intermodal Container Terminals in the Charleston Harbor

As described below, out of the four container terminals in the Charleston Harbor that were identified during the initial screening process, two were eliminated based on Screening Criterion IA (Columbus Street Terminal and North Charleston Container Terminal), and two were carried forward for evaluation based on Screening Criterion IB (Wando Welch Container Terminal and HLT).

The Port currently projects that Columbus Street Terminal would handle approximately 14,000–20,000 TEUs that would be shipped by rail in 2018 (the projected opening of the proposed ICTF), and further projects that, in Year 2038, the terminal would handle no more than 90,000 TEUs per year that would be transported by rail.[23] In light of these low TEU volumes, it would be impractical, and would not meet the purpose and need for the Proposed Project, to site an ICTF on or near the Columbus Street Terminal solely for the purposes of accommodating existing and/or projected future intermodal traffic through the Port.

The inability to meet a minimum throughput TEU capacity of 800,000 TEUs/year (as defined in the purpose and need) also would prevent placement of an ICTF near or on the North Charleston Container Terminal. The Port currently projects that the North Charleston Container Terminal would handle approximately 120,000–160,000 TEUs that would be shipped by rail in 2018, and further projects that, in Year 2038, the terminal would handle no more than 210,000 TEUs that would be transported by rail.[24] Neither container terminal processes a sufficient volume to warrant the use of a private drayage road for 24/7 operations to the ICTF; therefore, they were eliminated from further consideration.

In comparison, the Port projects that Wando Welch Container Terminal and the HLT (under construction) would handle as much as 475,000 TEUs and 420,000 TEUs, respectively, which would be transported by rail in 2038. Both of these projected volumes would be sufficient to warrant a connection of an ICTF with a private drayage road, and to operate efficiently to reach a minimum

[22] Pers. comm. with Barbara Melvin, August 12, 2014.

[23] Pers. comm. with Barbara Melvin, August 12, 2014.

[24] Pers. comm. with Barbara Melvin, August 12, 2014.

800,000 TEU throughput; therefore, these two container terminals are carried forward for additional screening.

2.3.2.2.2 Screening Criterion #IB: Area of Available Land Required for an ICTF (65+ acres)

To efficiently identify potential ICTF sites associated with the Wando Welch Container Terminal and the HLT, data from the National Oceanic and Atmospheric Administration's (NOAA) Coastal Change Analysis Program (C-CAP) was utilized. C-CAP produces a nationally standardized database of land cover and land change information for the coastal regions of the U.S. To identify suitable sites, all developed land uses within a 4-mile radius of the two terminals were eliminated. Wetlands were identified to determine suitable sites with minimal wetland impacts. After all non-suitable land uses were eliminated, a query was performed to determine contiguous land uses that were 65 acres or greater (minimum size necessary for the site). After all the remaining sites were identified, each site then was reviewed a final time to ensure development potential. If sites had additional constraints (i.e., Federal lands, state parks, etc.) that would prevent their use, they were removed from further consideration.

This analysis resulted in twelve potential sites (Figure 2.3-1) that were carried forward to evaluation by Tier II screening criteria. Descriptions of the 12 sites are contained in Table 2.3-1.

2.3.2.3 Results from Tier II Screening Criteria

Twelve sites near Wando Welch Container Terminal and the HLT were evaluated using Tier II screening criteria. Three of the 12 sites were previously identified in the South Carolina State Rail Plan (Wilbur Smith Associates 2009) as potential locations for an ICTF. These three sites are identified in this analysis as the Macalloy Site, the project site (Former Clemson Site), and the River Center project site (Former Noisette Site). All 12 sites were evaluated in a step-wise fashion, where potential sites that were screened out by a particular Tier II criterion were not carried forward for further evaluation in subsequent criteria.

NAVY BASE ICTF EIS

Tier I
Screening Results
Figure 2.3-1

US Army Corps Of Engineers
Charleston District

Table 2.3-1
Potential Sites Associated with the HLT
and the Wando Welch Port Facilities

Site	Description	Driving Distance to Container Terminals*
1	This 238-acre parcel primarily consists of evergreen forest with sparse areas of scrub/shrub habitat and grassland. This site is adjacent to the interchange at I-526 and Clements Ferry Road. The nearest existing rail line for Class I carriers is approximately 8.96 miles away.	Driving distance along existing roadway(s) from Site 1 to Wando Welch is approximately 5.6 miles. Driving distance to HLT is 11.2 miles.
2	This 80-acre parcel consists of evergreen forest land. The site is adjacent to the Wando River, 1.67 miles northeast of I-526, and south of the Daniel Island Country Club. This site is approximately 7.45 miles away from an existing rail line for a Class I carrier.	Driving distance along existing roadway(s) from Site 2 to Wando Welch is approximately 6.6 miles. The distance from Site 2 to the HLT is 17 miles.
3	This 153-acre parcel consists of an even mixture of evergreen forest and scrub/shrub habitat. The evergreen forest appears to be planted rows of pine trees. The site is adjacent to the Wando River on Point Hope Island and lies south of Clements Ferry Road. The site is approximately 2.59 miles to a major highway network and 7.05 miles away from an existing rail line for a Class I carrier.	Driving distance along existing roadway(s) from Site 3 to Wando Welch is approximately 11.1 miles. Distance to the HLT is approximately 18.7 miles
4	This 214-acre parcel consists of a mixture of pastureland, evergreen forest, and cultivated crops with some scrub/shrub habitat. The site is adjacent to U.S. Highway 17 (US 17) and Long Point Road. This site is 10.09 miles from an existing rail line for a Class I carrier.	Driving distance along existing roadway(s) from Site 4 to Wando Welch is approximately 5.7 miles. Distance to the HLT is approximately 13.8 miles.
5	This 1,117-acre parcel is classified as an active and inactive confined disposal facility (CDF) and a mixture of cultivated crops, cleared land, and scrub/shrub habitat. The site is located on the southern tip of Daniel Island, and is bounded by the Wando River to the east and the Cooper River to the west. This site is approximately 2.59 miles from a major highway network and approximately 11.58 miles from an existing rail line for a Class I carrier.	Driving distance along existing roadway(s) from Site 5 to Wando Welch is approximately 6.4 miles and from Site 5 to the HLT is 17.2 miles.
6	This 102-acre parcel primarily consists of evergreen forest with patches of scrub/shrub habitat and mixed forest. The site is adjacent to the Wando Welch Terminal on the north side and lies adjacent to I-526. The nearest existing rail line for Class I carriers is approximately 9.55 miles away.	Site 6 is adjacent to the Wando Welch Terminal and is approximately 20.2 miles to the HLT.

Table 2.3-1, cont'd

Site	Description	Driving Distance to Container Terminals*
7	This 80-acre parcel consists of a mixture of undeveloped grassland and evergreen forest. The site is located just south of the Wando Welch Terminal. This site is approximately 0.43 mile south of I-526 and is adjacent to an existing rail line for a Class I carrier.	The Wando Welch Terminal is adjacent to Site 7, while driving distance to the HLT is approximately 13.4 miles.
8	This 139-acre parcel primarily consists of grassland/cleared land with scattered areas of scrub/shrub habitat. The site is located off of Romney Street and is bordered by the Cooper River on the east side. US 17 is close by to the north of the parcel (0.20 mile). An existing rail line for a Class I carrier is located adjacent to the site to the west.	Driving distance along existing roadway(s) from Site 8 to the HLT is approximately 4.5 miles. Distance to Wando Welch Terminal is approximately 8.7 miles.
9	This 80-acre parcel is located on Drum Island, and consists primarily of cleared land. The Arthur Ravenel Jr. Bridge along US 17 spans the site on the south side. The site is approximately 0.62 mile from an existing rail line for a Class I carrier and is adjacent to a major highway network, but there are no connections to either from the island.	Driving distance along existing roadway(s) from Site 9 to the HLT is approximately 6.0 miles. Distance to Wando Welch Terminal is approximately 7.5 miles.
10	This 185-acre parcel consists of a mixture of high-intensity and medium-intensity development. Formerly known as the Noisette Site (Wilbur Smith Associates 2009), this site is located at the northern end of the former CNC and is referred to as the "River Center project site" for this analysis. The majority of the site is owned by Palmetto Railways; however, several tracts of property that are owned by the City of North Charleston will be transferred into ownership by Palmetto Railways in 2017. The site is nearby to an existing rail line for a Class I carrier and to a major highway network.	Driving distance along existing roadway(s) from Site 10 to the HLT is approximately 2.2 miles. Distance to Wando Welch Terminal is approximately 13.9 miles.
11	This 100-acre parcel consists of a mixture of low- to medium-intensity development with some developed open space (i.e., ball fields). Formerly known as the Clemson Site (Wilbur Smith Associates 2009), this site is located in the middle of the former CNC and is referred to as the project site for this analysis. There is an existing rail line for a Class I carrier nearby to the west. The site is also adjacent to a major highway network.	Driving distance along existing roadway(s) from Site 11 to the HLT is approximately 1.2 miles. Distance to Wando Welch Terminal is approximately 12.3 miles.

Table 2.3-1, cont'd

Site	Description	Driving Distance to Container Terminals*
12	This 228-acre parcel consists of a mixture of medium-intensity development, developed open space, and cleared land. Undeveloped land accounts for approximately 151 acres, while 76 acres are developed on the western portion of the property, which currently provides isotainer (i.e., a bulk liquid tank in a container) cleaning and storage. Known as the Macalloy Site (Wilbur Smith Associates2009), the site lies west of the HLT and Shipyard Creek, and is a Superfund site. There is an existing rail line for a Class I carrier adjacent to the west. The site is also adjacent to a major highway network.	Driving distance along existing roadway(s) from Site 12 to the HLT is approximately 0.5 mile. Distance to Wando Welch Terminal is approximately 11.8 miles.

* Driving distance was determined along the roadways that were assumed to have more through-traffic and not along roads going through neighborhoods.

The alternatives analysis resulted in two sites—the River Center project site and the Proposed Project site—that "passed" all of the Tier I and Tier II screening criteria and that would meet the purpose and need of the Proposed Project (Figure 2.3-2). Because these two sites were deemed acceptable locations for potential placement of an ICTF, they would be carried forward for further consideration in the EIS. Tables 2.3-2, Table 2.3-3 and Table 2.3-4 provide the summary results of the Tier II screening analysis, including the conclusion from the Tier I screening (eliminated/reason or carried forward to Tier II screening).

2.3.2.3.1 Screening Criterion #IIA: Available Infrastructure Required for an ICTF

When the final 12 potential sites were determined (Figure 2.3-1), each site was then evaluated to determine: (1) its proximity and distance to existing rail lines and highway networks; (2) the need to construct new, major road/rail improvements (e.g., highway and/or interstate bridges) to connect with existing rail and highway networks; (3) the impact (wetlands and rough cost) for connecting the existing road/rail connection to the potential site; and (4) proximity of the potential sites to the associated container terminal.

Table 2.3-2
Summary of Results for Tier II Screening Analysis (Screening Criterion #IIA)

Site	Tier II Screening Criterion #IIA: Available Infrastructure Required for an ICTF				Carried Forward to #IIB Screening?
	Proximity to Existing Rail Lines for Class I Carriers (Miles)	Proximity to Major Highway Network (Miles)	Estimated Wetland Impacts (Acres) for Rail, Public Road Access	New Major Infrastructure Needed to Access Rail/Road Network?	YES/NO
1	8.96	Adjacent	16.6 rail, 0.00 road	Y	NO
2	7.45	1.67	14.2 rail, 6.75 road	Y	NO
3	7.05	2.59	3.56 rail, 2.33 road	Y	NO
4	10.09	Adjacent	13.8 rail, 0.00 road	Y	NO
5	11.58	2.59	20.40 rail, 15.8 road	Y	NO
6	9.55	Adjacent	16.3 rail, 0.00 road	Y	NO
7	10.67	0.43	16.7 rail, 0.79 road	Y	NO
8	Adjacent	0.20	0.00 rail, 0.00 road	N	YES
9	0.62	Adjacent	2.19 rail, 0.00 road	Y	NO
10	Less than 0.50	Adjacent	0.99 rail, 0.00 road	N	YES
11	Less than 0.50	Adjacent	0.00 rail, 0.00 road	N	YES
12	Adjacent	Adjacent	0.00 rail, 0.00 road	N	YES

As a result of this screening criterion, eight sites were eliminated from further Tier II screening, while the remaining four sites associated with the HLT (8, 10, 11, and 12) were carried forward to screening Criterion IIB (shown in Table 2.3-2).

When calculating wetland impacts for rail lines, a buffer of 25 feet[25] on each side of the rail center line was used. For roadway alignments, a buffer of 62 feet on each side of the roadway centerline was used. Industry standards for costs to construct or modify infrastructure for rail and road access are:

- $225/LF, or $1 million/mile for new main rail line track
- $1 million/mile to resurface a two-lane rural road
- $2 million/mile to construct a two-lane rural road
- $5 million/mile to construct a 4-lane urban arterial road

Therefore, adding long-distance connections to existing road or rail networks would be considered cost-prohibitive and therefore unreasonable. Likewise, the need to construct major roadway improvements such as highway exits or interstate bridges would be considered cost-prohibitive and therefore unreasonable.

2.3.2.3.2 Screening Criterion #IIB: Availability of a Private Drayage Road

Four sites (8, 10, 11, and 12) were evaluated for the feasibility of constructing a private drayage road linking the potential site with the HLT. Table 2.3-3 provides the results of Screening Criterion #IIB.

- Establishing a private drayage road from Site 8 would not be practical due to the location of the HLT entry gate. The private drayage road would exceed the four-mile maximum length that is identified in the screening criterion (4.5 miles long) and would cross multiple rail crossings, and private property that would have to be condemned. Without the private drayage road, the ICTF would not be a near-dock facility and, therefore, would not meet the project's purpose and need. In addition, Site 8 is located on a former landfill (dredged material disposal site on top of unconsolidated trash), and would not be suitable for placement of an ICTF. For these reasons, this site was not carried forward for screening.
- Site 10 (the River Center project site) would be able to support a private drayage road from the HLT entry gate to the southernmost portion on the River Center project site. The private drayage road would be approximately 2 miles in length and would have approximately 1 acre of wetland impacts.
- Site 11 (the project site) also would be able to support a private drayage road from the HLT's entry gate to the southern boundary of the project site. The private drayage road would be 1 mile in length, and would have approximately 1 acre of wetland impacts.
- Site 12 (the Macalloy Site) would support a private drayage road from the HLT. The private drayage road would be approximately 0.5 mile in length and would have approximately 1 acre of wetland impacts.

[25] Twenty-five feet was used for this planning level analysis to cover the ROW width and allow some additional width for temporary construction. In sections to follow, a limits-of-construction file with an average of twenty-nine feet from rail center to buffer edge was used to calculate wetland impacts.

Table 2.3-3
Summary of Results for Tier II Screening Analysis (Screening Criterion #IIB)

Site	Tier II Screening Criterion #IIB: Availability of a Private Drayage Road	Estimated Wetland Impact (acres) from Drayage Road	Carried Forward to #IIC Screening?
	YES/NO		YES/NO
8	NO	N/A	NO
10	YES	1	YES
11	YES	1	YES
12	YES	1	YES

2.3.2.3.3 Screening Criterion #IIC: Configuration of Available Acreage

The three sites carried forward (10, 11, and 12) were evaluated to determine whether the site's configuration would support an ICTF that would meet the purpose and need of the project. At more than 185 acres, Site 10 (the River Center project site) has sufficient acreage to support a state-of-the-art ICTF, and has sufficient configuration to place an ICTF on an extended rectangular-shaped parcel. Similarly, Site 11 (the project site) has sufficient acreage (118 acres) in an acceptable configuration to support a state-of-the-art ICTF.

Site 12 (the Macalloy Site) has sufficient acreage with 228 acres (approximately 170 acres on the south side of the Port Access Road); however, existing and proposed future infrastructure on the site (e.g., Port Access Road) constrains the site's ability to achieve a throughput capacity of at least 800,000 TEUs per year, which is necessary to meet the purpose and need of the Proposed Project. In light of the encumbrances that result from existing and future infrastructure, the site configuration cannot achieve the required throughput capacity for several reasons, including: the number of wide-span gantry cranes that can be placed on the site is limited (available space and required buffers between cranes); the inability to physically place a sufficient number of arrival/departure tracks and associated processing and classification tracks required for the operation of the wide-span gantry cranes (a minimum of 500 feet of track is needed for each crane, 3) the inability to place tail tracks on the site, which contributes to the inability to assemble multiple 3,000-foot train segments (for building 9,000- to 10,000-foot trains); and physical constraints to train switching requirements within the site as a result of configuring the various elements of an ICTF in the existing available acreage. Land adjacent to the Macalloy property that could provide additional space for placement of processing and classification tracks is not available because the property is owned by CSX, and it cannot be condemned.

Tail track: A section of rail track that is stub-ended and allows for the staging of approximately 3,000-foot train segments while building an approximately 9,000- to 10,000-foot train.

2.3.2.3.4 Summary

As a result of this screening criterion, and as shown in Table 2.3-4, one site (Site 12) was eliminated from further analysis. The remaining two sites, Sites 10 and 11, are carried forward for detailed evaluation in the EIS (shown on Figure 2.3-2).

Table 2.3-4
Summary of Results for Tier II Screening Analysis (Screening Criterion #IIC)

Site	Tier II Screening Criterion #IIC: Configuration of Available Acreage	Carried Forward for Analysis in the EIS?
	YES/NO	YES/NO
10	YES	YES
11	YES	YES
12	NO	NO

2.3.3 Alignments Considered but Not Further Evaluated

2.3.3.1 Arrival/Departure Track Alignments

In addition to the two arrival/departure track options presented under the Proposed Project, there were other alternative rail routes leaving the project site that were considered but eliminated from further evaluation. These included placement along Noisette Boulevard, and placement along Spruill Avenue adjacent to the CSX ROW.

The Noisette Boulevard Route was eliminated because geometry of the proposed grade separation of Cosgrove Ave would not be able to give adequate clearances to tie into the existing roadways, it would block pedestrian access to parking areas across Noisette Blvd, and create safety hazards due to having to add more at grade railroad crossings. This alignment would also require demolition of additional structures along Noisette Blvd and limit operations and access to existing businesses and other land uses for extended periods of time. Redevelopment efforts of adjacent buildings would also be impacted.

Placing the route along Spruill Avenue adjacent to, but not within, the CSX ROW was eliminated from further evaluation due to property acquisition associated with construction. In order to have the correct track geometry, this option would require impacts to existing businesses and residences along Aragon Avenue and Spruill Ave. As many as 50 properties or more would need to be acquired.

NAVY BASE ICTF EIS

Tier II
Screening Results
Figure 2.3-2

US Army Corps Of Engineers
Charleston District

2.3.3.2 Drayage Road Alignments

Several alignments for the drayage road were considered during the development of the Proposed Project and alternatives analysis but not further evaluated. These included an alignment along Bainbridge Avenue, and various alignments in the western portion of the FLETC-owned property to the north of the HLT.

The placement of the drayage road along Bainbridge Avenue was eliminated from further evaluation because all FLETC operations west of Bainbridge Avenue would be cut off, and the placement would require a secondary entrance to the HLT. Placement along the furthest western boundary of the FLETC-owned property was also considered at the request of FLETC so as to minimize impacts to its operations at the site; however, even with using the centerline of the tidelands road for the alignment, this placement would result in acres of additional tidal salt marsh impacts. As a result, this alignment was eliminated from further evaluation. Similarly, placement of the drayage road on uplands within the western boundary of the FLETC-owned property was considered so that impacts to wetlands would be minimized; however, such placement would require relocation of two training areas that FLETC uses just south of Shipyard Creek, and would impact an area that the U.S. Coast Guard leases from FLETC for two radio towers used for emergency VHF communications along the east coast. As a result, this alignment was eliminated from further evaluation. The proposed alignment of the drayage road minimizes impacts to Waters of the U.S. and avoids impacts to FLETC training facilities and the U.S. Coast Guard facilities.

2.4 ALTERNATIVES RECOMMENDED FOR DETAILED EVALUATION IN THE EIS

Based on information submitted by the Applicant in their proposal, and the Corps' own independent review, the Corps has completed the initial identification and evaluation of alternatives for the Navy Base ICTF. At this time, the Corps has determined that eight alternatives be evaluated in detail in this EIS (see Table 2.4-1). In addition to the No-Action Alternative, four alternatives are associated with the project site, and three alternatives are associated with the River Center project site. Variations of alternatives within a project site are primarily based on differing arrival/departure track alignments.

Terminology used for River Center alternatives:

- River Center ICTF – the 113-acre facility site.
- River Center project site – the 113-acre facility site (ICTF), and associated impact areas for the ICTF and off-site roadway and rail improvements.

Table 2.4-1
Alternatives Recommended for Detailed Evaluation in the EIS

Alternative	Description
No-Action Alternative	Application for DA permit would be denied; the Proposed Project would not occur; CSX and NS would undertake operational and structural modifications to Ashley Junction and 7-Mile rail yards. Future use of the Proposed Project and River Center project sites would likely be mixed-use and industrial (e.g., rail-served warehousing distribution center).
Alternative 1: Applicant's Proposed Project (CSX – South via Milford / NS – North via Hospital District)	Palmetto Railways Project would be constructed and operated as proposed (Section 1.7).
Alternative 2: Proposed Project Site (CSX – South via Milford / NS – S-line)	A variation of the Proposed Project where the northern rail connection for NS 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 NS northern rail connection alignment.
Alternative 3: Proposed Project Site (CSX – South via Kingsworth / NS – North via Hospital District)	A variation of the Proposed Project where the southern rail connection for CSX would connect to an existing CSX rail line near Kingsworth Avenue (and adjacent to existing NS rail and ROW); road and rail improvements would be adjusted accordingly to facilitate rail and road traffic as a result of the CSX southern rail connection alignment.
Alternative 4: Proposed Project Site (CSX & NS – South via Milford)	A variation of the Proposed Project where NS, like CSX, would also enter and exit the Navy Base ICTF from a southern rail connection. While CSX would enter and exit the Navy Base ICTF as described in the Proposed Project, NS would connect to an existing NS rail line near Milford Street (and adjacent to existing CSX rail and ROW). Proposed rail for train switching (building) through the Hospital District would stop short of Noisette Creek.
Alternative 5: River Center Project Site (CSX – South via Milford / NS – North via Hospital District)	A variation of the 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.
Alternative 6: Alternative 6: River Center Project Site (CSX – South via Kingsworth / NS – North via Hospital District)	A variation of the Proposed Project with the project site being moved to the River Center project site and the southern rail connection for CSX would connect to an existing CSX rail line near Kingsworth Avenue (and adjacent to existing NS rail and ROW). Road and rail improvements would be adjusted accordingly to facilitate rail and road traffic at the new site.

Table 2.4-1, concluded

Alternative	Description
Alternative 7: River Center Project Site (CSX & NS South via Milford)	A variation of the Proposed Project with the project site being moved to the River Center project site and NS, like CSX, would also enter and exit the Navy Base ICTF from a southern rail connection; road and rail improvements would be adjusted accordingly to facilitate rail and road traffic at the new site.

2.4.1 No-Action Alternative

The No-Action Alternative represents the future without the Proposed Project, and is used as a baseline from which to compare alternatives. Under the No-Action Alternative, there are two possible scenarios: (1) the Corps would not issue a DA permit, or (2) the project would proceed in a manner that does not require a DA permit. As the project is currently proposed, impacts to Waters of the U.S. at Shipyard Creek and Noisette Creek would be unavoidable, and a DA permit would be required for the project to proceed. As a result, the second scenario would not be feasible. Therefore, 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. It is assumed that the SCDOT would construct the Port Access Road, which would elevate Stromboli Avenue.[26]

Related to the purpose and need as stated by the Applicant, it is assumed that the two existing rail yards (Ashley Junction/Bennett Yard and 7-Mile) would continue to handle and process current and projected future intermodal container traffic that would be transported by rail. CSX and NS would implement operational and structural modifications to their respective rail yards to increase their capabilities; however, the capacities and size limitations of the two rail yards would constrain the region's ability to accommodate the projected 25–30 percent of intermodal containers that could be transported by rail in 2038. Intermodal containers would continue to be delivered by truck to the two rail yards. The majority of intermodal containers coming through the Port's container terminals would continue to be transported by truck to their destinations, using public roadways.

For the purposes of this EIS, it is assumed 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. A rail-served warehousing and distribution center typically consists of a yard in the center of the property, with either multiple "smaller" warehouses or the construction of a large warehouse (1,000,000+ SF). Rail tracks could be placed alongside the warehouse(s). Other features associated with a rail-served warehousing

[26] The SCDOT released a request for proposals (RFP) for the Port Access Road (Project ID 0037345) Design-build Project on November 5, 2015. The RFP is available at http://www.scdot.org/doing/portAccessRoad.aspx.

distribution center could include impervious parking, green space, administrative buildings, storm-water retention, and other infrastructure. Truck traffic to a rail-served warehousing and distribution center would most likely occur using the Cosgrove Avenue exit on I-26.

2.4.2 Alternative 1: The Applicant's Proposed Project (CSX – South via Milford / NS – North via Hospital District)

Alternative 1 is the Applicant's Proposed Project as defined in Section 1.7 and shown on Figure 1.7-1.

2.4.3 Alternative 2: Proposed Project Site (CSX – South via Milford / NS – S-line)

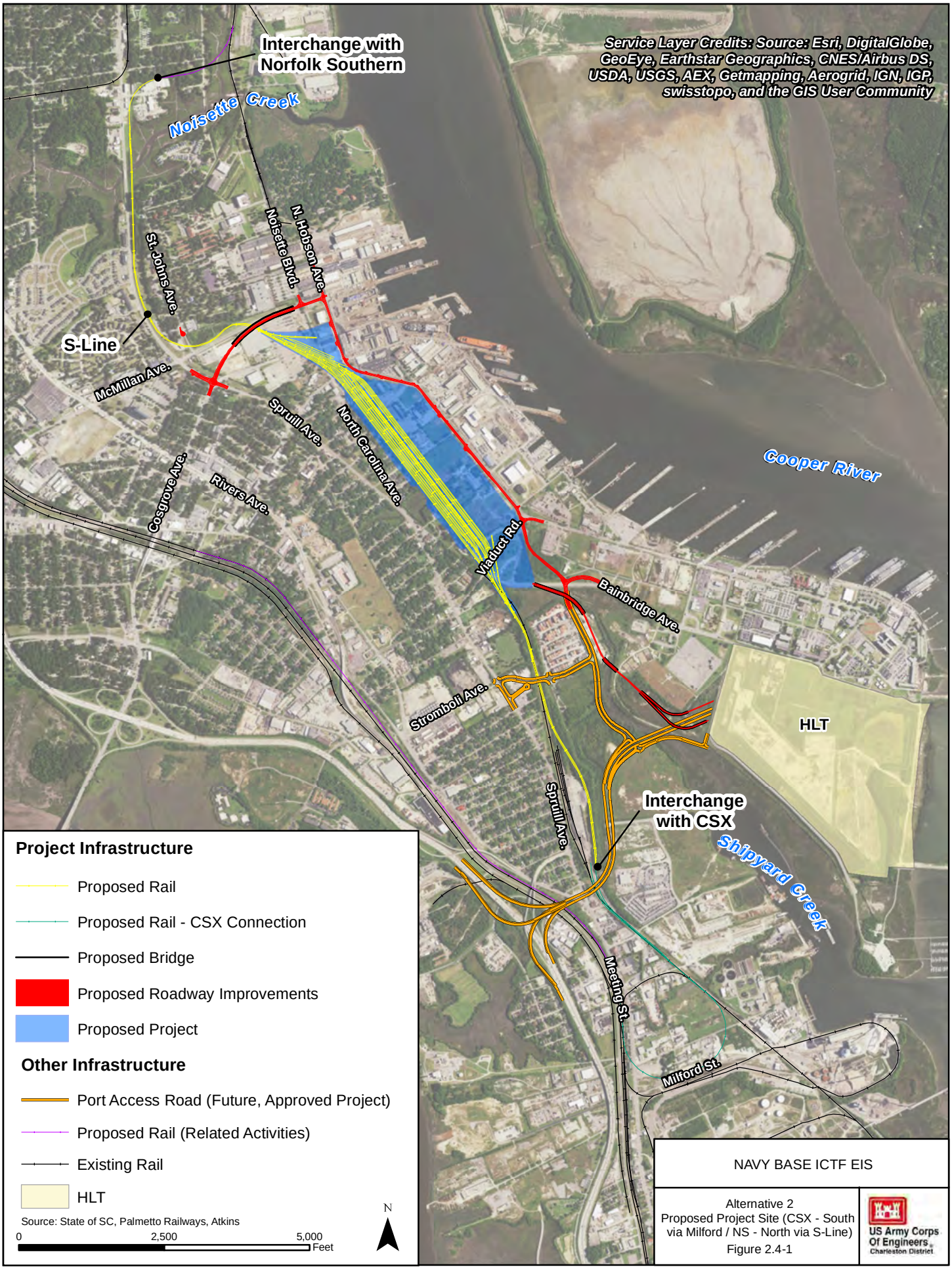
Under Alternative 2, the intermodal facility would include all of the facility components of the Proposed Project. Road and rail improvements associated with the CSX southern rail connection would be the same as the Proposed Project. The following road and rail improvements would be required to place the northern rail connection for NS along the CSX S-line (Figure 2.4-1):

- At the northern end of the ICTF, close the segment of McMillan Avenue between Spruill Avenue and Kephart Street. The segment of Cosgrove Avenue that is located east of Spruill Avenue would be realigned and replaced with a flyover over the new rail lines. The flyover would provide future roadway access between Spruill Avenue and Noisette Boulevard and Spruill Avenue and North Hobson Avenue after McMillan Avenue is closed. In this same vicinity, a cul-de-sac would be constructed at the southern end of St. Johns Avenue, and the CNC gate at Turnbull Avenue would be reopened to provide future access from St. Johns Avenue to Noisette Boulevard (Figure 2.4-1).

- In the vicinity of McMillan Avenue and St. Johns Avenue, install an arrival/departure track tie-in to the existing CSX line right of way (ROW) that runs parallel to Spruill Avenue (to provide rail access into the ICTF for NS). An agreement with CSX would be required for this proposed rail improvement; however, such an agreement between Palmetto Railways and CSX has not yet taken place.

- Reactivate the existing track within the existing CSX ROW that runs parallel to Spruill Avenue. A new rail bridge would be constructed within the existing ROW across Noisette Creek.

- Make NCTC and CSX ROW improvements and construct a new track to the east of the Spruill Avenue and Aragon Avenue intersection (to connect the NS arrival/departure track from the ICTF to the existing NCTC track along Virginia Avenue).


Interchange with Norfolk Southern
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
Noisette Creek
St. Johns Ave.
Noisette Blvd.
N. Hobson Ave.
S-Line
McMillan Ave.
Spruill Ave.
North Carolina Ave.
Cosgrove Ave.
Rivers Ave.
Cooper River
Viaduct Rd.
Bainbridge Ave.
Stromboli Ave.
HLT
Spruill Ave.
Interchange with CSX
Shipyard Creek
Meeting St.
Milford St.
Project Infrastructure
Proposed Rail
Proposed Rail - CSX Connection
Proposed Bridge
Proposed Roadway Improvements
Proposed Project
Other Infrastructure
Port Access Road (Future, Approved Project)
Proposed Rail (Related Activities)
Existing Rail
HLT
Source: State of SC, Palmetto Railways, Atkins
0
2,500
5,000
Feet
N
NAVY BASE ICTF EIS
Alternative 2
Proposed Project Site (CSX - South via Milford / NS - North via S-Line)
Figure 2.4-1
US Army Corps Of Engineers
Charleston District

2.4.4 Alternative 3: Proposed Project Site (CSX – South via Kingsworth / NS – North via Hospital District)

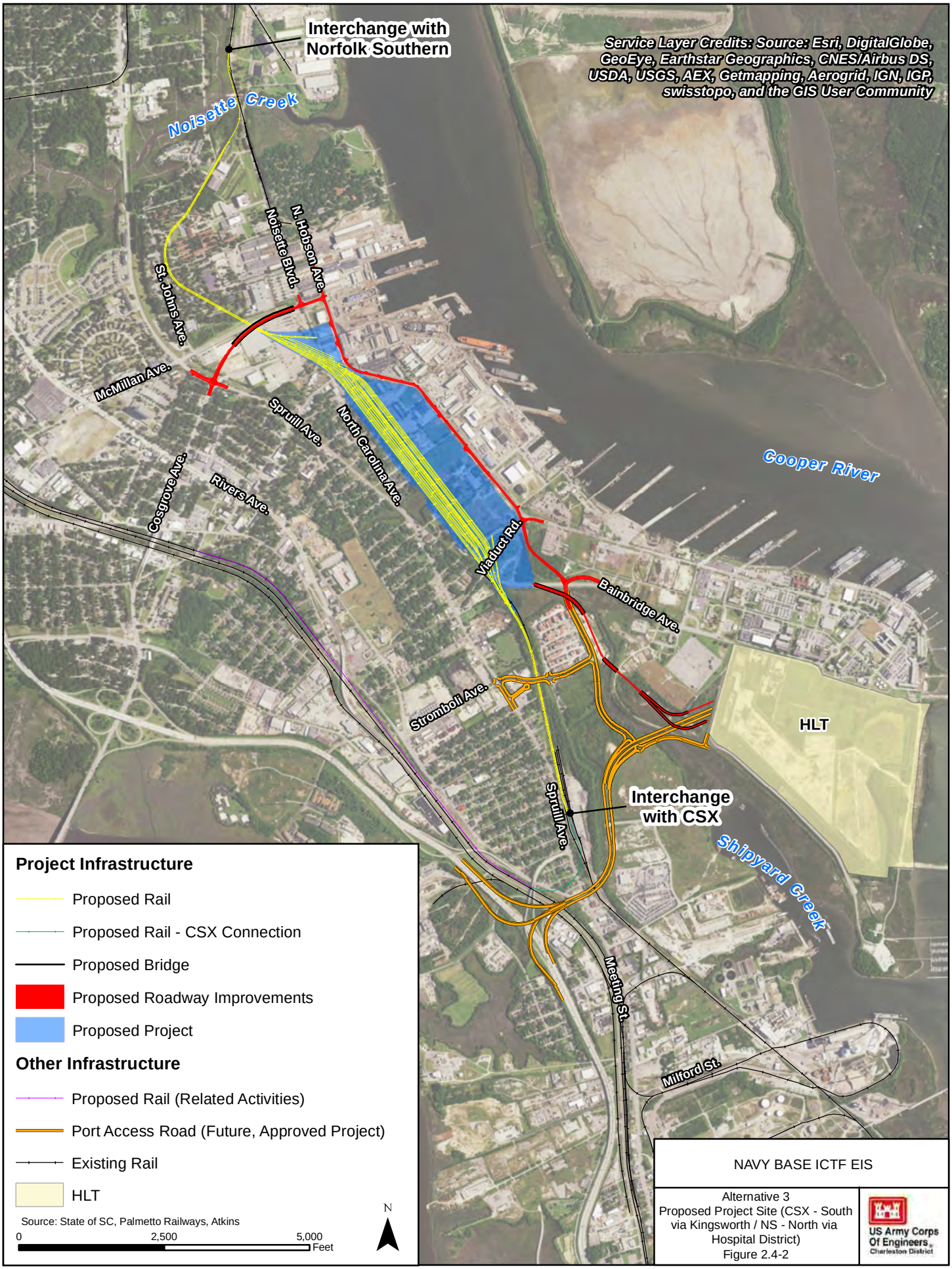
Under Alternative 3, the intermodal facility would include all of the facility components of the Proposed Project, and road improvements would be the same as those identified in the Proposed Project. The arrival/departure track design would be the same as described in the Proposed Project; however, the southern rail connection for CSX would connect to an existing CSX rail line near Kingsworth Avenue (and adjacent to existing NS rail and ROW), which would require acquisition of new ROW. Construction of the rail and ROW improvements under Alternative 3 would result in an at-grade crossing at Spruill Avenue and Meeting Street, west of Cooper Yard (Figure 2.4-2).

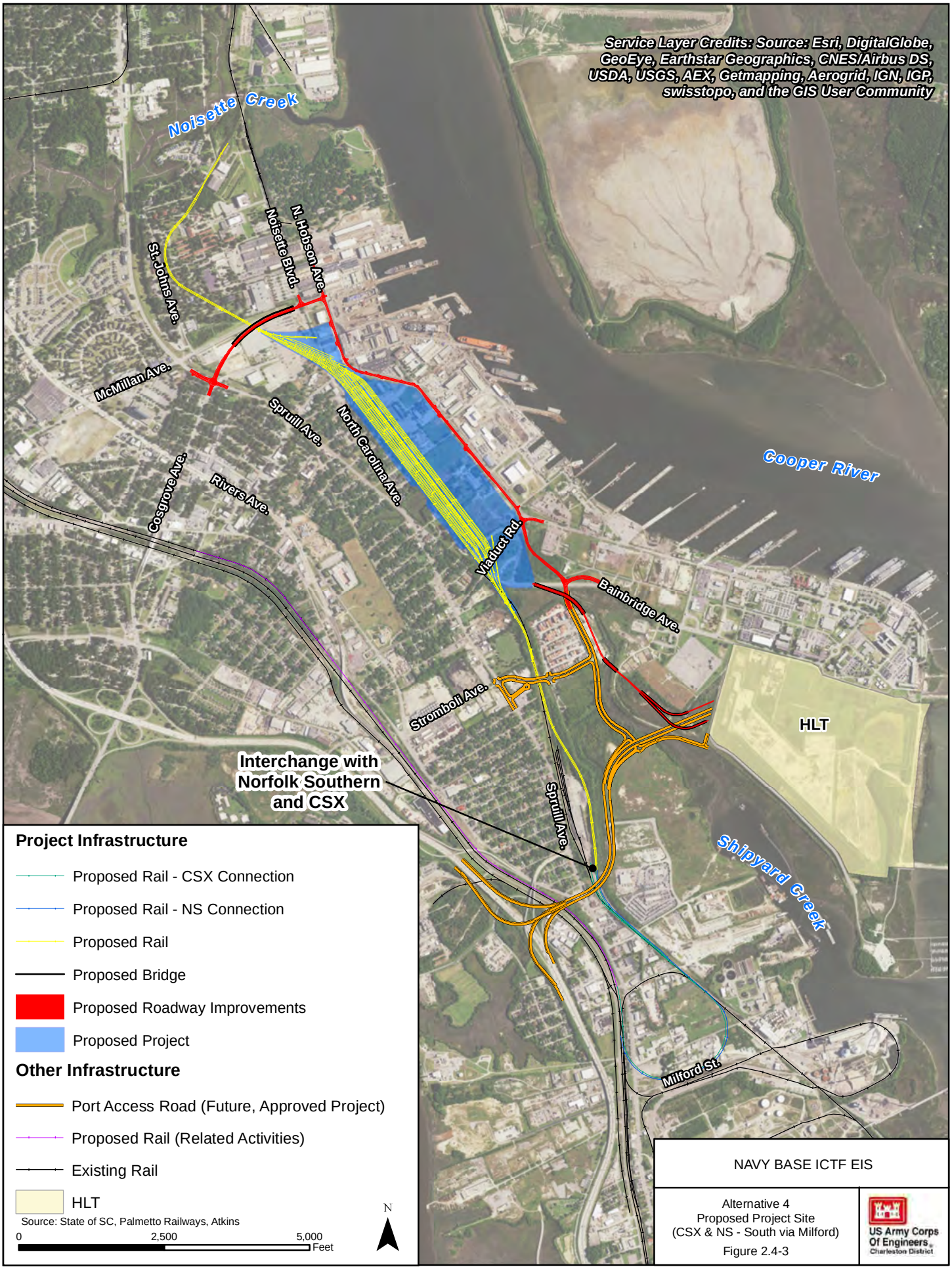
2.4.5 Alternative 4: Proposed Project Site (CSX & NS – South via Milford)

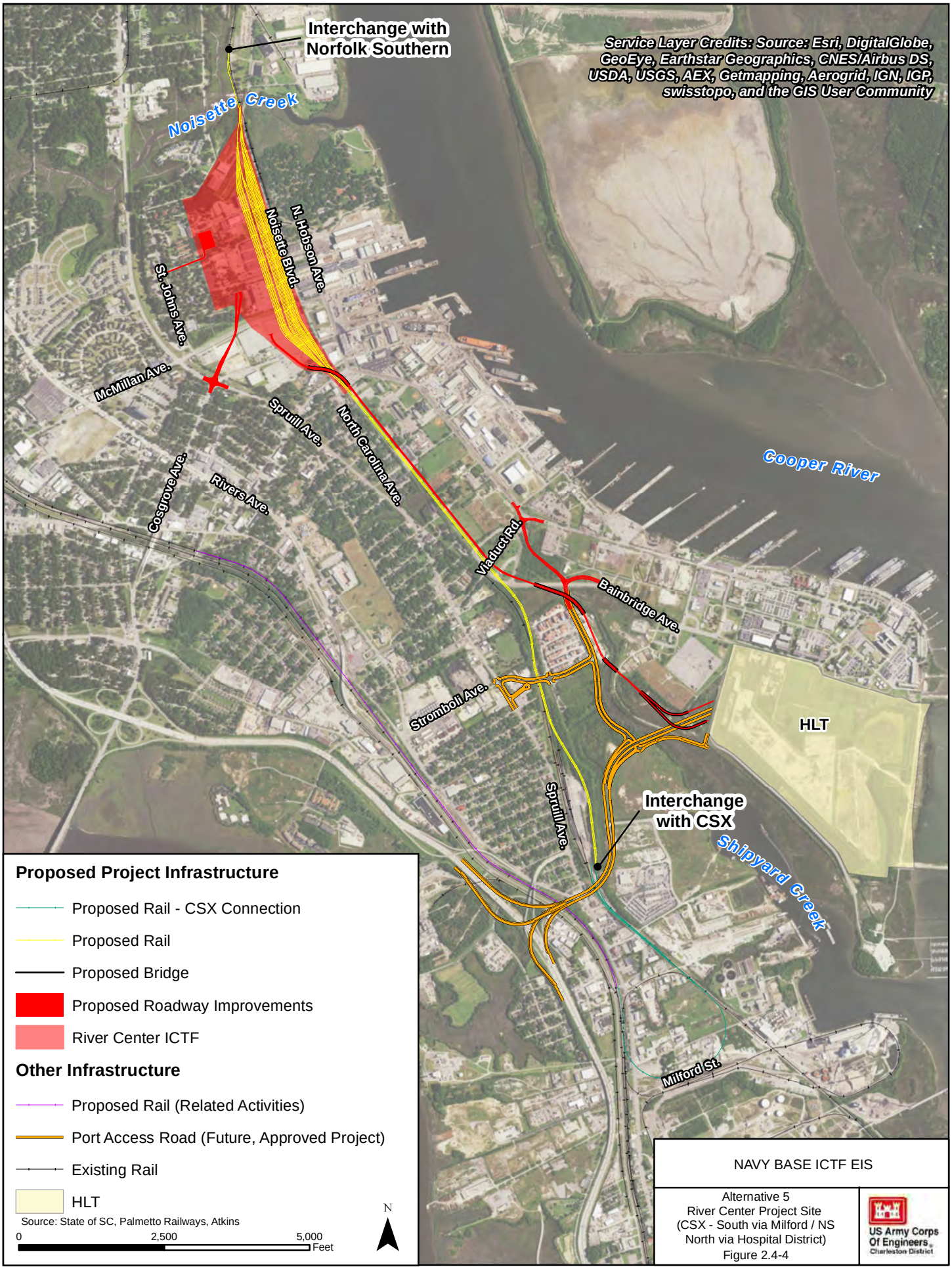
Under Alternative 4, the intermodal facility would include all of the facility components of the Proposed Project, and road improvements would be the same as those identified in the Proposed Project. Rail improvements would be similar to those described for the CSX southern rail connection in the Proposed Project, with the exception that a second track would need to be constructed for NS, which would then tie into the existing NS rail lines. To the north of the intermodal facility, a rail spur or tail track is proposed to extend from the facility through the Hospital District as is identified in the Proposed Project, but would stop short of Noisette Creek (Figure 2.4-3).

2.4.6 Alternative 5: River Center Project Site (CSX – South via Milford / NS – North via Hospital District)

Based on the screening process described in Section 2.3, the River Center project site was identified as a reasonable and practicable alternative to Palmetto Railways' Proposed Project. The River Center alternative would consist of approximately 113 acres for the ICTF and associated off-site road and rail improvements (Figure 2.4-4). The intermodal facility would include all of the facility components of the Proposed Project, with the exception that a sound attenuation and security wall would be constructed adjacent to Noisette Boulevard along the length of the eastern boundary of the facility site.


Interchange with Norfolk Southern
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
Noisette Creek
N. Hobson Ave.
Noisette Blvd.
St. Johns Ave.
McMillan Ave.
Spruill Ave.
North Carolina Ave.
Cosgrove Ave.
Rivers Ave.
Cooper River
Viaduct Rd.
Bainbridge Ave.
Stromboli Ave.
HLT
Spruill Ave.
Interchange with CSX
Shipyard Creek
Meeting St.
Milford St.
Project Infrastructure
Proposed Rail
Proposed Rail - CSX Connection
Proposed Bridge
Proposed Roadway Improvements
Proposed Project
Other Infrastructure
Proposed Rail (Related Activities)
Port Access Road (Future, Approved Project)
Existing Rail
HLT
Source: State of SC, Palmetto Railways, Atkins
0
2,500
5,000
Feet
N
NAVY BASE ICTF EIS
Alternative 3
Proposed Project Site (CSX - South via Kingsworth / NS - North via Hospital District)
Figure 2.4-2
US Army Corps Of Engineers
Charleston District


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
Noisette Creek
St. Johns Ave.
Noisette Blvd.
N. Hobson Ave.
McMillan Ave.
Spruill Ave.
North Carolina Ave.
Cosgrove Ave.
Rivers Ave.
Cooper River
Viaduct Rd.
Bainbridge Ave.
Stromboli Ave.
HLT
Interchange with Norfolk Southern and CSX
Spruill Ave.
Shipyard Creek
Milford St.
Project Infrastructure
Proposed Rail - CSX Connection
Proposed Rail - NS Connection
Proposed Rail
Proposed Bridge
Proposed Roadway Improvements
Proposed Project
Other Infrastructure
Port Access Road (Future, Approved Project)
Proposed Rail (Related Activities)
Existing Rail
HLT
Source: State of SC, Palmetto Railways, Atkins
0
2,500
5,000
Feet
N
NAVY BASE ICTF EIS
Alternative 4
Proposed Project Site
(CSX & NS - South via Milford)
Figure 2.4-3
US Army Corps Of Engineers
Charleston District


Interchange with Norfolk Southern
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
Noisette Creek
N. Hobson Ave.
Noisette Blvd.
St. Johns Ave.
McMillan Ave.
Spruill Ave.
North Carolina Ave.
Cosgrove Ave.
Rivers Ave.
Cooper River
Viaduct Rd.
Bainbridge Ave.
Stromboli Ave.
HLT
Spruill Ave.
Interchange with CSX
Shipyard Creek
Milford St.
Proposed Project Infrastructure
Proposed Rail - CSX Connection
Proposed Rail
Proposed Bridge
Proposed Roadway Improvements
River Center ICTF
Other Infrastructure
Proposed Rail (Related Activities)
Port Access Road (Future, Approved Project)
Existing Rail
HLT
Source: State of SC, Palmetto Railways, Atkins
0
2,500
5,000
Feet
N
NAVY BASE ICTF EIS
Alternative 5
River Center Project Site
(CSX - South via Milford / NS
North via Hospital District)
Figure 2.4-4
US Army Corps Of Engineers
Charleston District

Roadway improvements and modifications for the River Center project site alternative would include:

- A private drayage road that would follow the same initial route as currently proposed in the Proposed Project, with the exception that it would continue north through the Proposed Project's ICTF site to the southern end of the River Center project site, a distance of 2 miles. The drayage road would cross over the southern rail connection for CSX and enter the ICTF gate using a newly constructed flyover bridge. As with the Proposed Project, the Viaduct Road Overpass would be closed and removed and the Bainbridge Avenue and North Hobson realignment and intersection improvements would also be completed.
- The segment of McMillan Avenue between St. Johns Avenue and Noisette Boulevard would be closed. Hipp Street, Goldberg Avenue, Hobby Street, and portions of Turnbull Avenue, Truxtun Avenue, Avenue F, and Avenue H would be closed. The segment of Cosgrove Avenue that is located east of Spruill Avenue would be closed to through-traffic, and would instead be used as the primary on-road truck access to the ICTF. Employee and visitor access for the ICTF would use St. Johns Avenue and Turnbull Avenue (after removal of the existing street closure at the intersection). Placement of the main gate to the ICTF would be on Cosgrove Avenue.
- To accommodate NS rail access in a northern rail connection, a new rail bridge would be constructed similar to the one described under the Proposed Project. The NS rail connection would cross Noisette Creek and tie into the existing NCTC tracks along Virginia Avenue.
- To accommodate rail access for CSX in a southern rail connection, rail improvements identified under the Proposed Project would be undertaken with the exception that approximately 1 mile of additional arrival/departure track would be constructed alongside the drayage road through the Proposed Project's ICTF site.

Operation activities associated with the ICTF at the River Center project site would be identical to the Proposed Project, with the exception that intermodal containers would initially be transported from the HLT on the private drayage road using as many as 24 diesel-engine UTR trucks during the start-up of the facility. The number of UTR trucks would increase to as many as 60 diesel-engine UTR trucks at full build-out. The increased distance of the drayage road (2 miles versus the 1-mile road associated with the project site) requires more vehicles to transport the same volume of rail intermodal containers, and meet the purpose and need of the Proposed Project. Also all railcar switching activities would occur south of the site.

2.4.7 Alternative 6: River Center Project Site (CSX – South via Kingsworth / NS – North via Hospital District

Under Alternative 6, the intermodal facility would include all of the facility components, road improvements, and northern rail connection as described in Alternative 5. Rail improvements would be similar to those described for the CSX southern rail connection in Alternative 5, with the exception that the southern rail connection for CSX would connect to an existing CSX rail line near Kingsworth Avenue (and adjacent to existing NS rail and ROW), which would require acquisition of new ROW. Construction of the rail and ROW improvements under Alternative 6 would result in a new at-grade crossing at Spruill Avenue and Meeting Street (Figure 2.4-5).

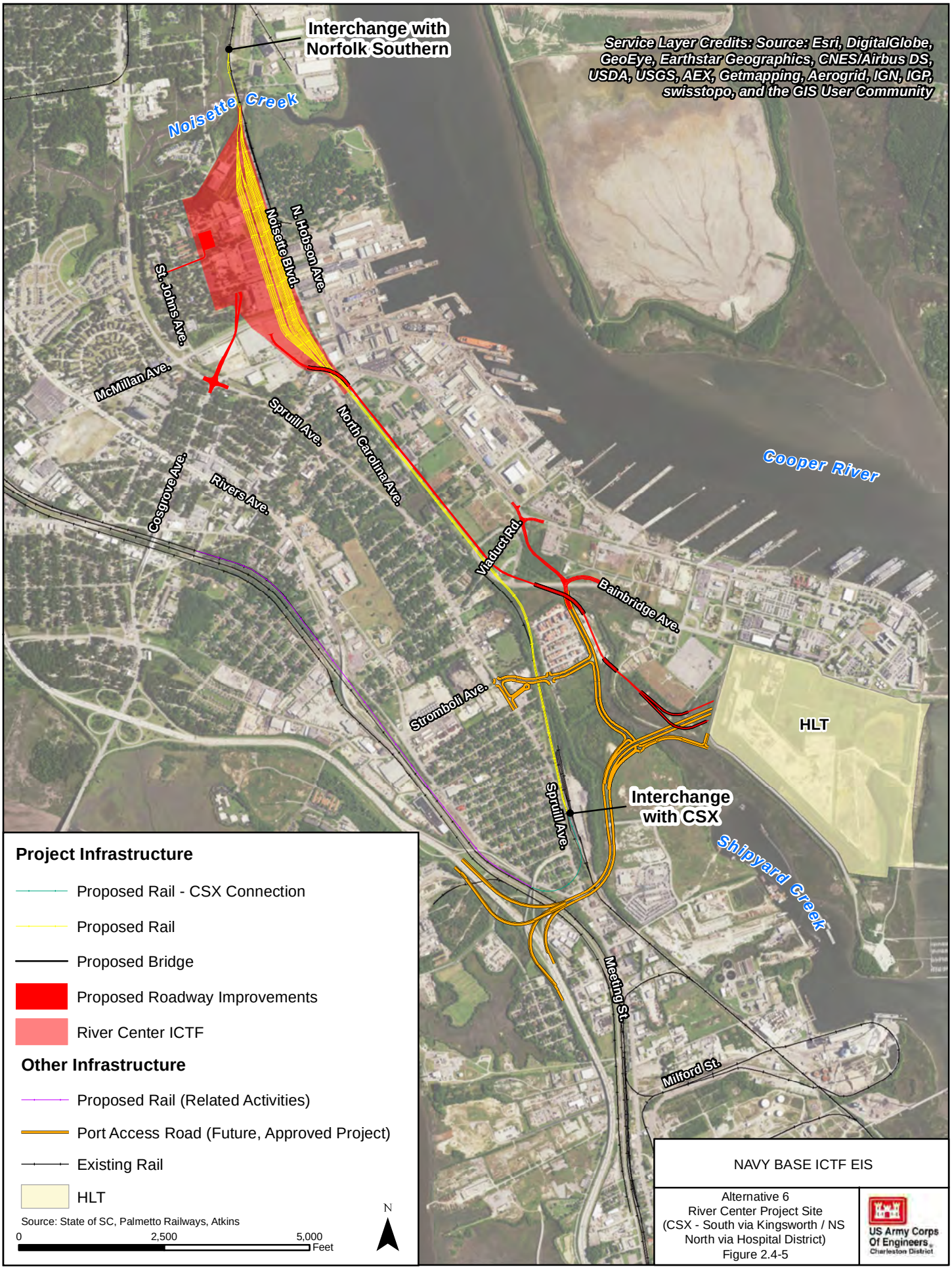
2.4.8 Alternative 7: River Center Project Site (CSX & NS – South via Milford)

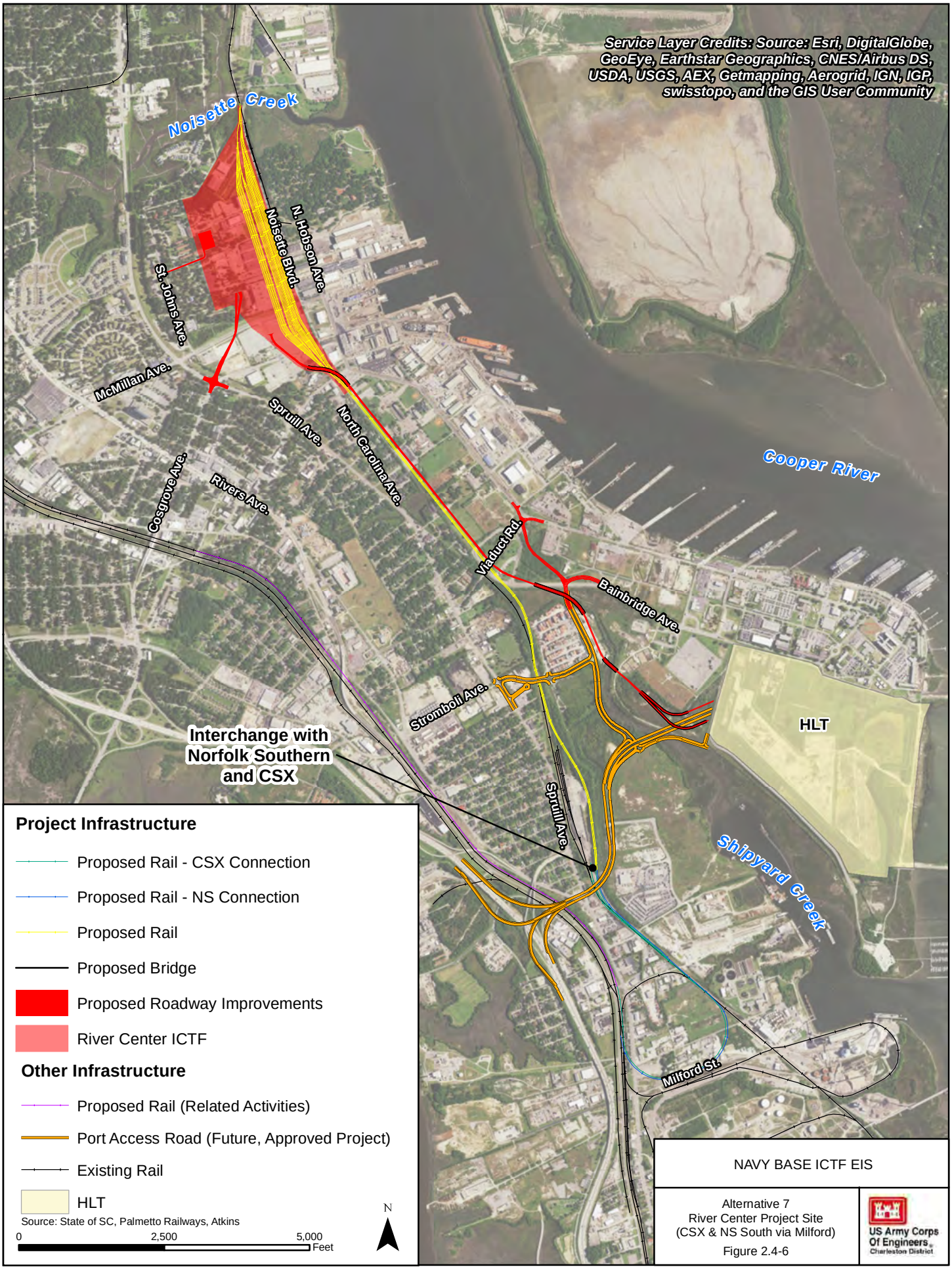
Under Alternative 7, the intermodal facility would include all of the facility components of the Proposed Project, with the exception that the sound attenuation and security wall would be constructed adjacent to Noisette Boulevard along the length of the eastern boundary of the site. Operational activities and roadway improvements and modifications for Alternative 7 would be the same as those described under Alternative 5 with the exception that NS would also enter and exit the Navy Base ICTF from a southern rail connection. Rail improvements and modifications would be similar to those described under Alternative 5 (Figure 2.4-6).

2.4.9 Related Activities

Additional construction of new track is required in order to connect the ICTF to existing Class I carrier rail networks. This construction is not a part of the Proposed Project. It would be constructed by the Class I carriers and may require separate environmental permitting. This additional construction is collectively referred to as Related Activity.

If the Proposed Project was constructed, new track would be constructed on a section of out-of-service CSX ROW to accept intermodal trains at the proposed new at-grade crossing at Meeting Street. Construction would extend from the vicinity of Discher Street to Misroon Street. Existing track would be reactivated from Misroon Street into Ashley Junction as needed. This Related Activity would apply to Alternatives 1, 2, 4, 5, and 7. Under Alternatives 3 and 6, the Related Activity construction would be the same as for Alternatives 1, 2, 4, 5, and 7; however, construction of new track would begin at the proposed new at-grade crossing at Meeting Street in the vicinity of Kingsworth Avenue. Under Alternative 2, an additional Related Activity, reactivating an out-of-service ROW and constructing a new railroad bridge, would be required to connect the NS arrival/departure track from the ICTF across a portion of marsh that drains to Noisette Creek to the existing NCTC track along Virginia Avenue.


Interchange with Norfolk Southern
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
Noisette Creek
N. Hobson Ave.
Noisette Blvd.
St. Johns Ave.
McMillan Ave.
Spruill Ave.
North Carolina Ave.
Cosgrove Ave.
Rivers Ave.
Cooper River
Viaduct Rd.
Bainbridge Ave.
Stromboli Ave.
HLT
Spruill Ave.
Interchange with CSX
Shipyard Creek
Meeting St.
Milford St.
Project Infrastructure
Proposed Rail - CSX Connection
Proposed Rail
Proposed Bridge
Proposed Roadway Improvements
River Center ICTF
Other Infrastructure
Proposed Rail (Related Activities)
Port Access Road (Future, Approved Project)
Existing Rail
HLT
Source: State of SC, Palmetto Railways, Atkins
0
2,500
5,000
Feet
N
NAVY BASE ICTF EIS
Alternative 6
River Center Project Site
(CSX - South via Kingsworth / NS North via Hospital District)
Figure 2.4-5
US Army Corps Of Engineers
Charleston District


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
Noisette Creek
N. Hobson Ave.
Noisette Blvd.
St. Johns Ave.
McMillan Ave.
Spruill Ave.
North Carolina Ave.
Cosgrove Ave.
Rivers Ave.
Cooper River
Viaduct Rd.
Bainbridge Ave.
Stromboli Ave.
HLT
Interchange with Norfolk Southern and CSX
Spruill Ave.
Shipyard Creek
Milford St.
Project Infrastructure
Proposed Rail - CSX Connection
Proposed Rail - NS Connection
Proposed Rail
Proposed Bridge
Proposed Roadway Improvements
River Center ICTF
Other Infrastructure
Proposed Rail (Related Activities)
Port Access Road (Future, Approved Project)
Existing Rail
HLT
Source: State of SC, Palmetto Railways, Atkins
0
2,500
5,000
Feet
N
NAVY BASE ICTF EIS
Alternative 7
River Center Project Site
(CSX & NS South via Milford)
Figure 2.4-6
US Army Corps Of Engineers
Charleston District

2.5 COMPARISON OF ALTERNATIVES

The current condition of environmental resources potentially affected by the Applicant's Proposed Project and the associated environmental consequences of the Navy Base ICTF activities on these resources are described in Chapters 3 and 4, respectively. The results of the impact analyses for the No-Action Alternative and the seven alternatives, including the Proposed Project, are summarized in Table 2.4-2.

This page intentionally left blank.

Table 2.4-2
Summary of Potential Impacts by Alternative and Environmental Resource

Resource Area	No Action	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7
Geology and Soils	Negligible effects to unique geologic features. Potential minor adverse impact resulting from a short-term increase in soil erosion, a loss of topsoil, soil compaction, and runoff.	Negligible effects to unique geologic features. Potential minor adverse impact resulting from a short-term increase in soil erosion, a loss of topsoil, soil compaction, and runoff.	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Potential minor adverse impact resulting from a short-term increase in soil erosion, a loss of topsoil, soil compaction, and runoff.	Same as Alternative 5	Same as Alternative 5
Hydrology	• Negligible impact to surface water flows and circulation resulting from construction activities within and/or adjacent to waterways (e.g., bridges); negligible impact to groundwater. • Permanent, minor adverse impact from increase in impervious surface; minor beneficial impact from improved stormwater management. • Negligible impact to base floodplains resulting from the placement of fill; negligible impact to flood hazard for other adjacent areas.	• Negligible impact to surface water flows and circulation resulting from roadway and rail improvements (e.g., arrival/departure tracks, bridges) across Noisette Creek and Shipyard Creek; negligible impact to groundwater. • Permanent, minor adverse impact from increase in impervious surface; minor beneficial impact from improved stormwater management. • Negligible effect on groundwater recharge. • Negligible impact to base floodplains resulting from the placement of fill; negligible impact to flood hazard for other adjacent areas.	Similar to Alternative 1 (Proposed Project)	Similar to Alternative 1 (Proposed Project)	Similar to Alternative 1 (Proposed Project)	• Negligible impact to surface water flows and circulation resulting from roadway and rail improvements (e.g., arrival/departure tracks, bridges) across Noisette Creek and Shipyard Creek; negligible impact to groundwater. • Minor beneficial impact from improved stormwater management. • Negligible impact to base floodplain resulting from the placement of fill; negligible impact to flood hazard for other adjacent areas.	Similar to Alternative 5	Similar to Alternative 5
Water Quality	• Negligible surface water quality impact in vicinity of the project, downstream, and throughout tidal segments of on-site creeks from potential changes in stormwater runoff, watershed alterations, and increased vehicular and rail traffic.. • As stormwater	• Negligible to minor temporary effect on TSS, turbidity and concentrations of heavy metals and other toxic contaminants due to disturbance of sediments in Shipyard Creek and Noisette Creek during construction. • Negligible effect on	• Similar to Alternative 1 (Proposed Project). Impacts to surface waters may be slightly reduced as construction over Noisette Creek would be limited to a new rail bridge. • Stormwater runoff, sediment quality and groundwater resources impacts are similar to	• Impacts to surface water quality, stormwater runoff, and sediment quality similar to the No Action Alternative. • Impacts to groundwater resources similar to the No Action Alternative.	• Similar to Alternative 1 (Proposed Project). Impacts to surface waters of Noisette Creek would be negligible to minor and limited to those associated with a temporary increase in stormwater runoff from disturbed lands during upland construction activities.	• Surface water quality impacts, stormwater runoff, and sediment quality impacts are similar to Alternative 1 (Proposed Project). Similar to Alternative 1 (Proposed Project) but with fewer areas with existing groundwater contamination and monitoring wells.	• Surface water quality impacts, stormwater runoff, and sediment quality impacts are similar to Alternative 5. • Similar to Alternative 5 but with 12 fewer potentially contaminated sites impacted.	• Impacts to surface water quality are similar to Alternative 4. • Stormwater runoff, sediment quality, and groundwater resources are similar to Alternative 5.

Table 2.4-2, cont'd

Resource Area	No Action	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7
	treatment does not currently exist on the sites, the addition of current stormwater management practices may result in a possible beneficial effect on DO, TSS, and concentrations of nutrients, heavy metals and other toxic contaminants in Shipyard Creek, Noisette Creek, and the Lower Cooper River. Minor effect from accidental spills. • Minor effect during construction activities from disturbance of sediments and associated release of pollutants into the water column. • Negligible effect on groundwater recharge. Minor effect on groundwater quality due to excavation and use of stormwater infrastructure and ponds in vicinity of contaminated groundwater.	water quality from stormwater runoff with implementation of current stormwater management practices. • Possible beneficial effect on DO, TSS, and concentrations of nutrients, heavy metals and other toxic contaminants in downstream waters. • Minor effect on groundwater quality due to excavation and use of stormwater infrastructure and ponds in vicinity of contaminated groundwater.	the No Action Alternative.		• Impacts to stormwater runoff similar to the No Action Alternative. • Stormwater runoff, sediment quality and groundwater resources impacts are similar to the Alternative 1 (Proposed Project).			
Vegetation and Wildlife	• 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 effect on species displacement.	• Minor adverse effect on habitat. Loss of habitat from removal of vegetation during construction but would not degrade the stability of animal populations; approximately 213.51 acres of vegetation would be removed, of which 95.0 percent would consist of previously disturbed communities and 5.0 percent of natural communities; increase in habitat fragmentation.	• Same as Alternative 1 (Proposed Project) but approximately 217.49 acres of vegetation would be removed, of which 94.2 percent would consist of previously disturbed communities and 5.8 percent of natural communities. • Potential for introduction of invasive/noxious species, species displacement, and species mortality would be the same as	• Same as Alternative 1 (Proposed Project) but approximately 200.87 acres of vegetation would be removed, of which 94.6 percent would consist of previously disturbed communities and 5.4 percent of natural communities. • Potential for introduction of invasive/noxious species, species displacement, and species mortality would be the same as	• Same as Alternative 1 (Proposed Project) but approximately 214.97 acres of vegetation would be removed, of which 95.7 percent would consist of previously disturbed communities and 4.3 percent of natural communities. • Potential for introduction of invasive/noxious species, species displacement, and species mortality would be the same as	• Minor adverse effect on habitat. Loss of habitat from removal of vegetation during construction but would not degrade the stability of animal populations; approximately 187.91 acres of vegetation would be removed, of which 94.1 percent would consist of previously disturbed communities and 5.9 percent of natural communities; increase in habitat fragmentation.	• Same as Alternative 5 but approximately 171.48 acres of vegetation would be removed, of which 93.6 percent would consist of previously disturbed communities and 6.4 percent of natural communities. Potential for introduction of invasive/noxious species, species displacement, and species mortality would be the same as Alternative 1 (Proposed Project).	• Same as Alternative 5 but approximately 189.07 acres of vegetation would be removed, of which 95.0 percent would consist of previously disturbed communities and 5.0 percent of natural communities. • Potential for introduction of invasive/noxious species, species displacement, and species mortality would be the same as Alternative 1

Table 2.4-2, cont'd

Resource Area	No Action	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7
	Existing and future land uses are not expected to directly or indirectly displace the wildlife species inhabiting the study area. • Negligible effect on species mortality. Existing and future land uses are not expected to result in the mortality of species inhabiting the study area.	• Minor adverse effect from routine maintenance (cutting and mowing) of vegetation could result in the proliferation of invasive/noxious plants present within the study area. • Minor adverse short-term effect on species displacement. Potential exists for direct and indirect species displacement during construction; common species are relatively abundant and adapted to living in close association with human activity and infrastructure. • Minor adverse effect on species mortality. Potential exists for mortality of species during construction; wildlife would likely move away in the presence of human activity.	Alternative 1 (Proposed Project).	Alternative 1 (Proposed Project).	Alternative 1 (Proposed Project).	• Routine maintenance (cutting and mowing) of vegetation could result in the proliferation of invasive/noxious plants present within the study area resulting in a minor adverse impact. • Minor short-term adverse effect on species displacement. Potential exists for direct and indirect species displacement during construction; common species are relatively abundant and adapted to living in close association with human activity and infrastructure. • Minor adverse effect on species mortality. Potential exists for mortality of species during construction; wildlife would likely move away in the presence of human activity.		(Proposed Project).
Waters of the United States	Future construction and/or other human activities could adversely impact Waters of the U.S. within the Waters of the U.S. Study Area; any permanent or temporary impacts would require a permit from the Corps.	• Major adverse impacts to Waters of the U.S. • Direct impacts from fill activities during construction would result in the permanent loss of approximately 12.09 acres of Waters of the U.S., including 8.94 acres of tidal salt marsh, 1.77 acres of freshwater wetlands, and 1.31 acres of tidal open waters.	• Major adverse impacts to Waters of the U.S. • Similar to Alternative 1 (Proposed Project) but would result in the permanent loss of approximately 12.92 acres of Waters of the U.S. including 10.24 acres of tidal salt marsh, 1.27 acres of freshwater wetlands, and 1.34 aces of tidal open waters.	• Major adverse impacts to Waters of the U.S. • Similar to Alternative 1 (Proposed Project) but would result in the permanent loss of approximately 12.33 acres of Waters of the U.S. including 9.11 acres of tidal salt marsh, 1.68 acres of freshwater wetlands, and 1.34 acres of tidal open waters.	• Major adverse impacts to Waters of the U.S. • Similar to Alternative 1 (Proposed Project) but would result in the permanent loss of approximately 10.59 acres of Waters of the U.S. including 8.04 acres of tidal salt marsh, 1.49 acres of freshwater wetlands, and 1.02 acres of tidal open waters.	• Major adverse impacts to Waters of the U.S. • Similar to Alternative 1 (Proposed Project) but would result in the permanent loss of approximately 12.22 acres of Waters of the U.S. including 9.41 acres of tidal salt marsh, 1.65 acres of freshwater wetlands, and 1.10 acres of tidal open waters.	• Major adverse impacts to Waters of the U.S. • Similar to Alternative 1 (Proposed Project) but would result in the permanent loss of approximately 12.26 acres of Waters of the U.S. including 9.41 acres of tidal salt marsh, 1.63 acres of freshwater wetlands, and 1.02 acres of tidal open waters.	• Major adverse impacts to Waters of the U.S. • Similar to Alternative 1 (Proposed Project) but would result in the permanent loss of approximately 11.87 acres of Waters of the U.S. including 8.33 acres of tidal salt marsh, 2.60 acres of freshwater wetlands, and 0.86 acre of tidal open waters.
Protected Species	• Negligible effect on habitat alteration/ fragmentation with implementation of avoidance and	• Negligible effect on habitat alteration/ fragmentation of Protected Species with implementation of	Same as Alternative 1 (Proposed Project).	Same as Alternative 1 (Proposed Project).	• Habitat alteration/ fragmentation impacts would be the same as Alternative 1 (Proposed Project).	• Negligible effect on habitat alteration/fragmentation of Protected Species with	Same as Alternative 1 (Proposed Project).	Same as Alternative 1 (Proposed Project).

Table 2.4-2, cont'd

Resource Area	No Action	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7
	minimization measures due to the continuation of mixed use and industrial land uses. • Potential exists for direct and indirect species displacement during future land use activities but minor effects with implementation of avoidance and minimization measures.	avoidance and minimization measures during construction activities. • Potential exists for direct and indirect short-term species displacement effects during construction; but negligible with implementation of Applicant's prescribed avoidance and minimization measures in combination with the additional Corps mitigation measures listed in Section 4.6.12.			• Species displacements impacts would be the same as Alternative 1 (Proposed Project) but in-water construction activities would be limited to Shipyard Creek.	implementation of avoidance and minimization measures during construction. • Potential exists for direct and indirect effects during construction, but minor effects with implementation of Applicant's prescribed avoidance and minimization measures in combination with the additional potential mitigation measures listed in Section 4.6.12.		
Essential Fish Habitat	• Negligible effect on loss of EFH that currently exists within the study area. • Negligible effect to federally managed species during construction. Common fishery species (brown and white shrimp) are relatively abundant.	• Minor Approximately 11.57 acres of EFH would be removed. • Minor Potential exists for a small impact to federally managed species during construction; common fishery species (brown and white shrimp) are relatively abundant. • Negligible impact to oysters with the implementation of water quality BMPs and the potential for future oyster settlement and propagation with the new pilings.	Same as Alternative 1 except approximately 12.95 acres of EFH, including 0.03 acre of oyster reefs/shell banks, would be removed.	Same as Alternative 1 except approximately 11.79 acres of EFH would be removed.	Same as Alternative 1 except approximately 10.08 acres of EFH would be removed.	• Minor impact on loss of EFH. Approximately 11.61 acres of EFH would be removed. • Minor Potential exists for a small impact to federally managed species during construction; common fishery species (brown and white shrimp) are relatively abundant.	Same as Alternative 5 except approximately 11.45 acres of EFH would be removed.	Same as Alternative 5 except approximately 10.05 acres of EFH would be removed.
Traffic and Transportation	No impacts	• Negligible short-term impact during construction to I-26, I-526, US 17, and at-grade rail crossings; minor short-term adverse impact during construction to North Charleston intersections. • Negligible permanent impact on majority of	Same as Alternative 1 (Proposed Project) except: • Slightly different number of impacted North Charleston intersections; and • Major permanent adverse impact on the opening year 2018 and design year 2038 at-grade crossing operations as the	Same as Alternative 1 (Proposed Project) except for: • Impacts to at-grade rail crossings are similar to Alternative 2 but with different at-grade rail crossing locations and operations.	Same as Alternative 1 (Proposed Project) except for: • Impacts to at-grade rail crossings are similar to Alternative 1 but with different at-grade rail crossing locations and operations.	• Negligible short-term impact during construction to I-26, I-526, US 17, and at-grade rail crossings; minor short-term adverse impact during construction to North Charleston intersections. • Negligible permanent impact on majority of	Same as Alternative 5 except for: • Major permanent adverse impact on the opening year 2018 and design year 2038 at-grade crossing operations as Alternative 5 would increase the frequency and number of train occurrences in North	Same as Alternative 5 except for: • Impacts to at-grade rail crossings are similar to Alternative 5 but with different at-grade rail crossing locations and operations.

Table 2.4-2, cont'd

Resource Area	No Action	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7
		I-26 corridor in the opening year 2018 and design year 2038; beneficial or adverse permanent impact on a few segments due to a LOS change. • Negligible permanent impact on majority of I-526 corridor in the opening year 2018 and design year 2038; beneficial or adverse permanent impact on a few segments due to a LOS change. • Negligible permanent impact on the opening year 2018 and design year 2038 US 17 operations as the Proposed Project would have minimal influence on the US 17 traffic volumes. • Minor permanent adverse impact on the opening year 2018 and design year 2038 North Charleston intersection operations. Traffic patterns would change but slightly more intersections would degrade than improve operations. • Moderate permanent adverse impact on the opening year 2018 and major permanent adverse impact design year 2038 at-grade crossing operations as the Proposed Project would increase the frequency and number of train occurrences in North Charleston. Additionally, one new at-grade crossing would be created.	Proposed Project would increase the frequency and number of train occurrences in North Charleston. Additionally, two new at-grade crossings would be created.			I-26 corridor in the opening year 2018 and design year 2038; beneficial or adverse permanent impact on a few segments due to a LOS change. • Negligible permanent impact on majority of I-526 corridor in the opening year 2018 and design year 2038; beneficial or adverse permanent impact on a few segments due to a LOS change. • Negligible permanent impact on the opening year 2018 and design year 2038 US 17 operations as Alternative 5 would have minimal influence on the US 17 traffic volumes. • Minor permanent adverse impact on the opening year 2018 and design year 2038 North Charleston intersection operations. Traffic patterns would change but slightly more intersections would degrade than improve operations. • Moderate permanent adverse impact on the opening year 2018 and major permanent adverse impact design year 2038 at-grade crossing operations as Alternative 5 would increase the frequency and number of train occurrences in North Charleston. Additionally, one new at-grade crossing would be created.	Charleston. Additionally, two new at-grade crossings would be created.	

Table 2.4-2, cont'd

Resource Area	No Action	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7
Land Use and Infrastructure	• Negligible impact on land use change. No change in land use designation required. • Negligible impact on displacement of structures. No non-Palmetto Railways owned or specially designated structures would have to be displaced or demolished. • Negligible impact on infrastructure and utilities. No impacts as upgrades to service are not anticipated.	• Major permanent impact on land use change. Rezoning of the residential area along the eastern boundary of the ICTF and rezoning of portions of the project site from Institutional future land use. Comprehensive Plan amendment required. • Major permanent impact on displacement of structures. Approximately 100 non-Palmetto Railways owned or specially designated structures would have to be displaced or demolished. Additional off-site roadway and rail improvements would cause the displacement of approximately 50 structures. • Negligible short-term impact on infrastructure and utilities as any interruption of service to local area residents and businesses would be less than 12 hours.	Similar to Alternative 1 (Proposed Project) except additional off-site roadway and rail improvements would cause the displacement of approxi-mately 20 structures.	Similar to Alternative 1 (Proposed Project) except additional off-site roadway and rail improvements would cause the displacement of approximately 40 structures.	Similar to Alternative 1 (Proposed Project)	• Negligible impact on land use change. No change in land use designation required. • Major permanent impact on displacement of structures. Approximately 48 non-Palmetto Railways owned or specially designated structures would have to be displaced or demolished. Additional off-site roadway and rail improvements would cause the displacement of approximately 20 structures. • Negligible short-term impact on infrastructure and utilities as any interruption of service to local area residents and businesses would be less than 12 hours.	Similar to Alternative 5 except additional off-site roadway and rail improvements would cause the displacement of approximately 40 structures.	Similar to Alternative 5.
Cultural Resources	No impacts from vibration, noise, and/or alteration of setting.	• No effect on Charleston Naval Hospital (CNH) Historic District from vibration; adverse effect from demolition of contributing elements of the Historic District, and altered setting of the District. • No effect on Charleston Naval Yard (CNY) Historic District from vibration or other construction/operation	Same as Alternative 1 (Proposed Project) except: • No direct impacts to the CNH Historic District and the USMC Barracks during construction; and • No disruption of the CNH Historic District or the USMC Barracks property during operation.	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	• No effect on Charleston Naval Hospital (CNH) Historic District from vibration; adverse effect from demolition of contributing elements of the Historic District, and altered setting of the Districts. • No effect on Charleston Naval Yard (CNY) Historic District from vibration; adverse effect from	Same as Alternative 5	Same as Alternative 5

Table 2.4-2, cont'd

Resource Area	No Action	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7
		activities. • No effect on Charleston Navy Yard Officer's Quarters (CNYOQ) Historic District from vibration or other construction/ operation activities. • No effect on U.S. Marine Corps (USMC) Barracks from vibration; adverse effect from altered setting. • No effect on other historic properties outside the Charleston Naval Complex (CNC).				demolition of contributing elements of the Historic District, and altered setting of the Districts. • No effect on Charleston Navy Yard Officer's Quarters (CNYOQ) Historic District from vibration; adverse effect from altered settings of the Districts. • Adverse effect on USMC Barracks from demolition of NRHP-listed building and altered settings of the Districts. • No effect on other historic properties outside the Charleston Naval Complex (CNC).		
Visual Resources and Aesthetics	• No impact to scenic views. • Minor adverse impact to scenic resources through the removal of mature trees. • Potential minor beneficial impacts to visual quality and character from redevelopment efforts as vacant parking lots are other areas are replaced with newer built structures and associated landscaping. • No impact from light and glare.	• Minor, permanent adverse impact to scenic views from construction of new rail bridge (adjacent to an existing rail bridge) over Noisette Creek along Noisette Boulevard. • Major, permanent adverse impact to scenic resources from the removal of contributing elements of the CNH Historic District and mature trees, as well as the altered setting of the USMC Barracks. • Moderate, permanent adverse impact to visual quality and character from new vertical elements in the VRSA (wide-span gantry cranes, high mast lighting, Cosgrove-McMillan Overpass).	• Minor, permanent adverse impact to scenic views from construction of a new rail bridge over Noisette Creek along Spruill Avenue. • Minor adverse impact to scenic resources from the removal of mature trees. • Similar impacts to visual quality and character as described under Alternative 1 (Proposed Project), but no impact to CNH historic district and USMC Barracks. Moderate, permanent adverse impact from new vertical elements in the VRSA (wide-span gantry cranes, high mast lighting, and the Cosgrove-McMillan Overpass). • Similar impacts from light and glare as those	• Same impact to scenic views as Alternative 1 (Proposed Project). • Same impacts to scenic resources as Alternative 1 (Proposed Project). • Same impacts to visual quality and character as Alternative 1 (Proposed Project), including the major, permanent adverse impact from the removal of contributing structures to the CNH Historic District and mature trees, as well as the altered setting of the USMC Barracks. • Same impacts from light and glare as those described under Alternative 1 (Proposed Project).	• No impact to scenic views. • Same impacts to scenic resources as Alternative 1 (Proposed Project). • Similar impacts to visual quality and character as described under Alternative 1 (Proposed Project), but no impact to CNH historic district and USMC Barracks. Moderate, permanent adverse impact from new vertical elements in the VRSA (wide-span gantry cranes and high mast lighting). • Minor, permanent adverse impact from light and glare associated with high mast lighting, but negligible effect resulting from nighttime train head lamps due to lack of	• Major, permanent adverse impact on viewer sensitivity to scenic views from construction of new rail bridge (adjacent to an existing rail bridge) near Noisette Boulevard over Noisette Creek and placement of the ICTF adjacent to Noisette Creek. • Major, permanent adverse impact to scenic resources from the removal of contributing elements to the CNH and CNY historic districts, the USMC Barracks, and mature trees, as well as the altered setting associated with the CNH, CNY, and CNYOQ historic district. • The overall impacts to visual quality and character would be	• Same impact to scenic views as Alternative 5, resulting in a major, permanent adverse impact from construction of new rail bridge (adjacent to an existing rail bridge) near Noisette Boulevard over Noisette Creek and placement of the ICTF adjacent to Noisette Creek. • Same impacts to scenic resources as Alternative 5. • The overall impacts to visual quality and character would be similar to Alternative 5. • Similar impact from light and glare as those described under Alternative 5.	• No impact to scenic views. • Same impacts to scenic resources as Alternative 5. • The overall impacts to visual quality and character would be similar to Alternative 5. • Similar impact from light and glare as those described under Alternative 5.

Table 2.4-2, cont'd

Resource Area	No Action	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7
		• Negligible impact to visual quality and character from construction of new built structures on the ICTF. • Major, permanent adverse impact to visual quality and character from demolition of contributing elements of the CNH historic district and altered setting of the USMC Barracks. • Minor, permanent adverse impact to visual quality and character from construction of new rail bridge (adjacent to an existing rail bridge) over Noisette Creek. • Negligible impact to visual quality and character from the arrival/departure tracks to the south of the ICTF. • Negligible impact to visual quality and character from the realignment of Hobson Ave/Bainbridge Ave and construction of the drayage road; minor, permanent adverse impact from the removal of the Viaduct Road Overpass. • Minor, permanent adverse impact to visual quality and character from the construction of the earthen berm adjacent to the Chicora-Cherokee neighborhood. • Minor, permanent	described under Alternative 1 (Proposed Project).		curvatures (and affected residences) on the southern arrival/departure tracks.	similar to Alternative 1 (Proposed Project), including the major, permanent adverse impact to visual quality and character from the demolition of contributing elements of to the CNH and CNY historic districts, demolition of the USMC Barracks, and altered settings of the CNH, CNY, and CNYOQ. • Minor, permanent adverse impact from light and glare associated with high mast lighting, but negligible effect resulting from nighttime train head lamps due to lack of curvatures (and affected residences) on the southern arrival/departure tracks.		

Table 2.4-2, cont'd

Resource Area	No Action	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7
		adverse impact from light and glare associated with the new 85-foot tall mast lighting that will be illuminated from dusk to dawn, and from nighttime train head lamps.						
Noise and Vibration	No impacts	• Negligible traffic noise impacts with negligible beneficial effect for several streets. • Minor to moderate rail noise impact along several segments due to increased rail activity and new track builds. • Negligible rail vibration impact. • Minor to moderate construction noise impact in the vicinity of noise berm. • Minor to Moderate exterior daytime impact and major exterior nighttime impact. 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 traffic noise impacts with minor beneficial effect for several streets • Minor to moderate rail noise impact along several segments due to increased rail activity and new track builds • Negligible rail vibration impact • Major rail noise impact for up to 4 land uses along one future track segment • Construction Impacts – Similar to the Proposed Project (Alternative 1). • Operational Impacts – Similar to the Proposed Project (Alternative 1).	Similar to Proposed Project (Alternative 1)	Similar to Proposed Project (Alternative 1) except • Negligible traffic noise impacts with minor beneficial effect for several streets • Minor to moderate rail noise impact along several segments due to increased rail activity in the southern alignment.	• Negligible traffic noise impacts with a minor to moderate impact along one future road. • Minor to moderate rail noise impact along several segments due to increased rail activity and new track builds • Moderate rail noise impact along one future track segment • Negligible rail vibration impact • Minor to moderate construction noise impact in the vicinity of noise wall • Negligible exterior daytime impact and moderate to major exterior nighttime impact. Refer to subsection 4.12.7.5 for information on exterior to interior noise reduction. Interior noise levels are not anticipated to disrupt sleep.	Similar to Alternative 5 except • Negligible traffic noise impacts with minor to moderate impact along one future road • Minor to moderate rail noise impact along several segments due to increased rail activity and new track builds and moderate rail noise impact along one new build future segment.	Similar to Alternative 5 except • Negligible traffic noise impacts with minor to moderate impact along one future road • Minor to moderate rail noise impact along several segments due to increased rail activity in the southern alignment and moderate rail noise impact along one new build future segment.
Air Quality	• Impacts from construction emissions of criteria pollutant would be minor short-term adverse. • Operational criteria pollutant emissions would be less than one percent of Study Area's criteria pollutant emissions.	• Impacts from construction emissions of criteria pollutants would be minor short-term adverse because emissions would be short-term and spread out over 5 years. • Operational criteria pollutant emissions would be less than one	Similar to Alternative 1	Similar to Alternative 1	Similar to Alternative 1	• Impacts from construction emissions of criteria pollutants would be minor short-term adverse because emissions would be short-term and spread out over five years. • Operational criteria pollutant emissions would be less than one	Similar to Alternative 5	Similar to Alternative 5

Table 2.4-2, cont'd

Resource Area	No Action	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7
	Potential impacts would be minor permanent adverse. • Criteria pollutants emitted, along with the existing and projected criteria pollutants, would not put the Tri-County area into non-attainment for any criteria pollutants and the National Ambient Air Quality Standard (NAAQS) would remain in compliance. Potential impacts would be minor permanent adverse. • Non-diesel particulate matter (DPM) hazardous air pollutant (HAP) emissions from would each equal less than one-tenth of one percent of the total HAPs emitted in the study area. Potential impacts would be acceptable. • Potential excess cancer risk would be within the acceptable range. Impacts from cancer risk would be acceptable. • The maximum noncancer hazard would be below 1. Potential impacts from noncancer hazard would be negligible.	percent of study area's criteria pollutant emissions. Potential impacts would be minor permanent adverse. • Criteria pollutants emitted, along with the existing and projected criteria pollutants, would not put the Tri-County area into non-attainment for any criteria pollutants and the NAAQS would remain in compliance. Potential impacts would be minor permanent adverse. • Non-DPM HAP emissions would each equal less than one-tenth of one percent of the total HAPs emitted in the Study Area. Potential impacts would be minor permanent adverse. • Potential excess cancer risk would fall within the acceptable range. Impacts from cancer risk would be acceptable. • The maximum noncancer hazard would be below 1. Potential impacts from noncancer hazard would be negligible.				percent of study area's criteria pollutant emissions. Potential impacts would be minor permanent adverse. • Criteria pollutants emitted from Alternative 5, along with the existing and projected criteria pollutants, would put the Tri-County area into non-attainment for the NO_2 1 hour NAAQS. Potential impacts would be major adverse. • Non-DPM HAP emissions would each equal less than one-tenth of one percent of the total HAPs emitted in the Study Area. Potential impacts would be minor permanent adverse. • Potential excess cancer risk would fall within the acceptable range. Impacts from cancer risk would be acceptable. • The maximum noncancer hazard would be below 1. Potential impacts from noncancer hazard would be negligible.		
Climate Change	• The No-Action Alternative results in short term construction period greenhouse gas (GHG) emissions and potential short-term impacts would be minor adverse. • Annual Operational	• Because the GHG emissions from the construction phase provide the needed infrastructure for the increased efficiency in the transport of goods, the short-term impacts would be minor adverse.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1	• Because the GHG emissions from the construction phase provide the needed infrastructure for the increased efficiency in the transport of goods, the short-term impacts would be minor adverse.	Same as Alternative 5	Same as Alternative 5

Table 2.4-2, cont'd

Resource Area	No Action	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7
	GHG Emissions Inventory would be 36,060 MT CO_2e. The No Action Alternative would be the least efficient. Long-term effects would be major adverse.	• Annual Operational GHG Emissions Inventory would be 30,948 MT CO_2e. The Proposed Project would be the most efficient. Long-term effects would be minor adverse.				• Annual Operational GHG Emissions Inventory would be 32,208 MT CO2e. Alternative 5 would be more efficient than the No Action Alternative and nearly as efficient as the Proposed Project. Long-term effects would be minor adverse.		
Hazardous, Toxic, and Radioactive Waste	• Potential minor adverse impacts to soil (contamination) from excavation activities (after compliance with the Navy's permitting process, RCRA Permit #SC0 170 022 560 and all applicable laws for testing and disposal of contaminated soils). • Potential minor adverse impacts to groundwater (contamination) from dewatering in excavation areas (after compliance with the Navy's permitting process, RCRA Permit SC0 170 022 560, and all applicable laws for treatment and disposal of dewatering effluent. • Potential minor adverse impact from demolition of structures with asbestos and/or metals-based paints (after survey and applicable abatement measures). • Potential for minor and/or major adverse impacts from accidental spills).	• Approximately 150 buildings requiring demolition/ renovation. • Potential minor adverse impacts to soil (contamination) from excavation activities (after compliance with the Navy's permitting process, RCRA Permit #SC0 170 022 560 and all applicable laws for testing and disposal of contaminated soils). • Potential minor adverse impacts to groundwater (contamination) from dewatering in excavation areas (after compliance with the Navy's permitting process, RCRA Permit SC0 170 022 560, and all applicable laws for treatment and disposal of dewatering effluent. • Potential minor adverse impact from demolition of approximately 150 structures with asbestos and/or metals-based paints (after survey and applicable abatement measures). • Potential for minor and/or major adverse	Similar to Alternative 1 but with: • Approximately 120 buildings requiring demolition/renovation • Impact approximately 30 fewer buildings through demolition of structures with asbestos and/or metals-based paints (after survey and applicable abatement measures).	Similar to Alternative 1 but with: • Approximately 140 buildings requiring demolition/renovation • . • Impact approximately 10 fewer buildings through demolition of structures with asbestos and/or metals-based paints (after survey and applicable abatement measures).	Similar to Alternative 1 but with: • Approximately 150 buildings requiring demolition/renovation	• Approximately 68 buildings requiring demolition/renovation • Impacts to groundwater similar to Alternative 1 (Proposed Project); but fewer areas with existing groundwater contamination and monitoring wells. • Impact from demolition of structures with asbestos and/or metals-based paints (after survey and applicable abatement measures) similar to Alternative 1 (Proposed Project); 82 fewer buildings impacted. • Potential for minor and/or major adverse impacts from accidental spills resulting from use of ASTs (diesel fuel), storage of other minor amounts of solvents on the premises, and from containers containing hazardous materials.	Similar to Alternative 5 but with: • Approximately 58 buildings requiring demolition/ renovation. • Impact 10 fewer buildings through demolition of structures with asbestos and/or metals-based paints (after survey and applicable abatement measures).	Similar to Alternative 5 but with: • Approximately 68 buildings requiring demolition/ renovation.

Table 2.4-2, cont'd

Resource Area	No Action	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7
		impacts from accidental spills resulting from use of above ground storage tanks (ASTs) (diesel fuel), storage of other minor amounts of solvents on the premises, and from containers containing hazardous materials.						
Socioeconomics and Environmental Justice	• Negligible as there are no impacts to economic and business resources. • Minor impact from private developer construction. • Potential for minor adverse impacts from any new at-grade crossings. • Major impact from displacement of Sterett Hall and surrounding arts facilities. • Negligible as there is no physical impact in terms of new barriers to the elderly and handicapped. • Environmental Justice considerations are not applicable (no Federal action).	• Major short-term and long-term benefit to local and regional economy; minor indirect adverse impact to local businesses adjacent to project (access, relocations, and aesthetics). • Minor short-term adverse impacts from construction; minor adverse access impacts for Chicora-Cherokee residents; minor adverse mobility impacts from new at-grade rail crossings and increased delay at intersections and at-grade crossings. • Potential minor adverse emergency response time impacts due to additional delay at at-grade crossings; potential minor safety impacts due to additional conflict points at at-grade crossings. • Negligible impact from displacement of Sterett Hall and surrounding arts facilities as they would be displaced with or without Alternative 1 (Proposed Project). • Major adverse impacts	Similar to Alternative 1 (Proposed Project) except for an additional minor adverse impact from creation of cul-de-sac at St. Johns Avenue and McMillian Avenue, indirect minor adverse impacts (noise, light and glare) to residents and businesses along Spruill Avenue and Bexley Street corridor.	Similar to Alternative 1 except: • Businesses north of Milford Street would be avoided. • Location of Meeting Street at-grade crossing is located at Kingsworth Avenue. • Localized moderate impacts to emergency response. • Additional 8 residential displacements from Union Heights neighborhood.	Similar to Alternative 1 except: • Localized moderate impacts to emergency response.	• Short-term and long-term benefit to local and regional economy; direct adverse impacts to businesses on River Center project site; major direct adverse impacts to businesses relocations along Noisette Boulevard and the Lowcountry Innovation Center; minor adverse impact to properties adjacent to project (truck traffic, noise, aesthetics). • Minor, long-term adverse impact to east-west mobility for residents and businesses within the study area; Closure of McMillan Avenue would result in a minor adverse impact from the disruption of CARTA Route 104. • Potential for minor adverse impact, as a result of limited east-west access to the study area. Potential for minor safety adverse impacts due to additional conflict points at at-grade crossings. • Negligible impact from displacement of Sterett Hall and	Same as Alternative 5 except: • Businesses north of Milford Street would be avoided. • Localized moderate impacts to emergency response. • Additional 8 residential displacements from Union Heights neighborhood.	Same as Alternative 5 except: • Localized moderate impacts to emergency response.

Table 2.4-2, cont'd

Resource Area	No Action	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7
		to Chicora-Cherokee neighborhood from 106 residential displacements; minor to moderate adverse impact from visual and noise impacts. • Minor adverse impacts to Olde North Charleston, Howard Heights, Union Heights, and Windsor neighborhoods from noise. • Negligible impact in terms of new barriers to the elderly and handicapped. • Environmental Justice considerations are applicable: Major adverse impact from displacement of 106 residential units would result in a disproportionately high and adverse impact to Chicora-Cherokee neighborhood.				surrounding arts facilities. • Major adverse impacts to Chicora-Cherokee neighborhood from minor to moderate adverse impact from visual and noise impacts; Major adverse impact to River Center neighborhood from displacement of 62 residential units (includes 60-unit West Yard Lofts). Minor indirect adverse impacts to Olde North Charleston and Union Heights neighborhoods (noise). • Barriers to the elderly and handicapped are the same as Alternative 1 (Proposed Project). • Environmental Justice considerations are applicable: Major adverse impact from displacement of the 60-unit West Yard Lofts low-income housing development would result in a disproportionately high and adverse impact.		
Human Health and Safety	• Negligible impact on worker safety, drinking water quality, hazardous materials. • No impact from noise and vibration. • Minor impact from air quality. • Minor impact for community safety and emergency response times. • No impact from light	• Negligible impact on worker safety, drinking water quality, hazardous materials, traffic noise, ICTF operational noise (nighttime) and vibration. • Minor to moderate impact (several areas) from rail noise, construction noise (short-term), and operational noise	Similar to Alternative 1 (Proposed Project).	Similar to Alternative 1 (Proposed Project) except localized moderate impacts to emergency response.	Similar to Alternative 1 (Proposed Project) except localized moderate impacts to emergency response.	• Negligible impact on worker safety, drinking water quality, hazardous materials, ICTF operational noise (daytime) and vibration. • Minor to moderate impact (several areas) from traffic noise, rail noise, and construction noise (short-term). • Major impact to air	Similar to Alternative 5 except localized moderate impacts to emergency response.	Similar to Alternative 5 except localized moderate impacts to emergency response.

Table 2.4-2, cont'd

Resource Area	No Action	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7
	and glare.	(daytime). • Minor impact to air quality (criteria pollutants and the NAAQS would remain in compliance). • Potential impacts from non-DPM HAP emissions would be acceptable. Potential excess cancer risk and cancer risk would be acceptable. Potential impacts from noncancer hazard would be negligible. • Potential for localized minor adverse impact on emergency response times and minor indirect adverse impact to community safety. • Negligible effect from high mast lighting, minor, permanent adverse impact from light and glare associated with nighttime train head lamps to residential structures along curvatures of the track.				quality (non-attainment for NO_2). • Potential impacts from non-DPM HAP emissions would be acceptable. Potential excess cancer risk and cancer risk would be acceptable. Potential impacts from noncancer hazard would be negligible. • Potential for minor impact to emergency response times and community safety due to additional at-grade rail crossing and limited mobility with construction of River Center site and drayage road. • Negligible effect from high mast lighting, negligible effect from nighttime train head lamps due to lack of curvatures (and affected residences) on the southern arrival/departure tracks.		
Section 4(f)/6(f)	No direct use or constructive use any 4(f) or 6(f) resource.	• Direct uses of Section 4(f) resources: Charleston Naval Hospital (CNH) Historic District and the USMC Barracks from permanent incorporation (demolition of contributing elements of the historic district and placement of arrival/departure tracks within the Parade Ground, respectively)-	No direct use or constructive use any 4(f) or 6(f) resource	Similar to Alternative 1 (Proposed Project)	Similar to Alternative 1 (Proposed Project).	• Direct uses of Section 4(f) resources: Charleston Naval Hospital (CNH) Historic District, Charleston Navy Yard Historic District (CNY), and the USMC Barracks from permanent incorporation (demolition of contributing elements of the historic districts, and demolition of the barracks, respectively)	Similar to Alternative 5.	Similar to Alternative 5.

3.0 AFFECTED ENVIRONMENT

Chapter 3, "Affected Environment," describes the existing environment that would be affected by the Proposed Project and alternatives under consideration in this EIS[27]. Chapter 3 provides the basis for the impact assessment documented in Chapter 4, "Environmental Consequences." This chapter includes detailed discussions of the affected environment for each resource area listed below:

- Geology and Soils (Section 3.1)
- Hydrology (Section 3.2)
- Water Quality (Section 3.3)
- Vegetation and Wildlife (Section 3.4)
- Waters of the U.S. (Section 3.5)
- Protected Species (Section 3.6)
- Essential Fish Habitat (Section 3.7)
- Transportation (Section 3.8)
- Land Use and Infrastructure (Section 3.9)
- Cultural Resources (Section 3.10)
- Visual Resources and Aesthetics (Section 3.11)
- Noise and Vibration (Section 3.12)
- Air Quality (Section 3.13)
- Climate Change (Section 3.14)
- Hazardous, Toxic, and Radioactive Waste (Section 3.15)
- Socioeconomics and Environmental Justice (Section 3.16)
- Human Health and Safety (Section 3.17)
- Section 4(f)/6(f) Resources (Section 3.18)

The discussion of each resource includes the defined study area and the overall existing condition of the resource, including the natural and physical environment. While several resources analyzed in this EIS have a study area that is consistent with the general study area identified on Figure 1.6-1, most resources (e.g., socioeconomics) have a study area that is larger than the general study area because potential effects extend beyond its boundary.

3.1 GEOLOGY AND SOILS

3.1.1 Introduction

The affected environment for geology and soils includes a characterization of the geologic and soil conditions within the study area. The Geology and Soils study area, depicted in Figure 1.6-1, is located within the Lower Atlantic Coastal Plain Physiographic Province in southeastern South Carolina. Geologic units underlying the project site range in age from Late Cretaceous (98 million years ago) to Holocene (8,000 years ago to present) and are composed of stratified gravel, sand, silt, clay, and

[27] The Corps recognizes that Palmetto Railways is conducting voluntary cleanup and site preparation of the project site, and that these activities will be required to redevelop the site regardless of whether the DA Permit is issued. Chapter 3 details existing environmental conditions as of September 2015, which is the date of Palmetto Railway's project proposal (Appendix B).

limestone (Campbell et al. 1996). In the study area, the Coastal Plain sediments extend from land surface to the base of the Middendorf/Cape Fear formation(s) at approximately 3,000 feet in depth. The coastal plain sediments are underlain by Triassic age crystalline basement rocks composed of diabase, basalt, or quartzitic sandstone depending on location (Corps 2006).

In the shallow subsurface of the Charleston area, to depths of approximately 230 feet below land surface, there are 11 sedimentary depositional units that record high stands of sea level during the last 40 million years. These units are bounded by interruptions in the sedimentation process and the processes of erosion resulting from the rise and fall of sea levels and are, for the most part, fossiliferous. The deposits are marine, marginal marine, and fluvial/estuarine in origin, and range in age from Eocene (36 million years ago) to Holocene (8,000 thousand years ago to present). From oldest to youngest, these deposits are the Harleyville, Parker's Ferry, and Ashley Formations of the Cooper Group; the Chandler Bridge, Edisto, and Marks Head Formations; the Goose Creek Limestone, the Daniel Island beds, the Penholoway Formation, the Ten-Mile Hill beds, the Wando Formation, and various late Pleistocene and Holocene alluvium, artificial fill, barrier island sands, and estuarine deposits (Campbell et al. 1996).

The USDA NRCS has mapped the soil distribution for Charleston County (NRCS 2014), and the soil description for the study area is Urban Land: Yauhannah-Yemassee-Ogeechee (NRCS 2014). The parent material of the soil is loamy fluviomarine deposits. The surface soil of the CNC consists of recent and/or Pleistocene sand, silt, and clay, all with relatively high organic content. Where dredged material from the Cooper River and Shipyard Creek have been used as fill, the surface materials are poorly sorted mixtures of sand, silt, and clay. The subsurface geology consists of varying amounts of fill material to depths of approximately 5 feet below land surface (bls). The fill is underlain by undifferentiated Quaternary age (0 to 1.6 million years ago) sand, silt, and clay of the Wando Formation to approximately 20 to 25 feet bls. These deposits contain discontinuous clay layers and lensatic sand, with multiple interbeds of 1 foot or less in thickness. The Quaternary deposits are underlain by undifferentiated Tertiary marine silt. The marine silt is fossiliferous, with significant phosphatic content. This silt is variable in thickness, between approximately 10 and 20 feet. The Ashley Formation (Tertiary) underlies the marine silt, unconformably in some places. Beneath the Ashley Formation is the Eocene-age Santee Limestone of the Cooper Group (CH2M Hill, Inc. [CH2M Hill] 2011).

Field evaluations identified multiple, low-lying areas that have developed hydric inclusions that were too small, or below, the mapping resolution (1:24,000) used by the NRCS for preparing soil maps. These small areas of hydric soils are likely the result of development, stormwater controls, and reworking of the natural drainage patterns.

3.1.2 Seismicity

Seismicity describes the relative frequency and distribution of earthquakes. Despite its intraplate tectonic setting, the Charleston region is a seismically active area (Corps 2006). The historic seismic record of the southeastern United States is dominated by the 1886 Charleston earthquake and its aftershocks. The 1886 event pre-dated instrumentation, but estimates of the magnitude of the earthquake based on Modified Marcalli Intensity (MMI) observations made by Dutton in 1889 range from 6.6 to 6.9 in magnitude; however, others have estimated the 1886 earthquake to have had a magnitude of 6.5 to 7.5. Despite its moderate magnitude, evidence of MMI X ground motion was observed within the 1886 meisoseismal zone (approximately 2,000 square miles), and almost the entire state of South Carolina was subjected to MMI VII ground motion. The 1886 Charleston earthquake had a felt area of approximately two million square miles. The region continues to experience small-magnitude earthquakes, and paleoseismic studies conducted within the area suggest a recurrence rate for moderate-magnitude earthquakes such as the 1886 event every 500 to 600 years.

Instrumental seismic monitoring has been ongoing in Charleston since November 1974, and observed seismic data have indicated that a dense cluster of earthquake epicenters are located in what is known as the Middle Place-Summerville Seismic Zone (MPSSZ). In 2001, 31 seismic events were recorded, which is an especially active year for earthquakes within the MPSSZ. During the period of November 1974 through December 2004, 292 earthquakes were recorded within the MPSSZ, with the largest being a magnitude 3.99 event on August 21, 1992 (Corps 2006).

3.1.3 Sand and Dirt Mines

South Carolina has approximately 540 active mine operating permits. There are an estimated 367 sand and dirt mines, with more than 100 of these mines located near the Charleston metropolitan area. In total, the state's mines make up approximately 10,863 acres. Operators currently have permits to mine an additional 13,000 acres across the state (Corps 2006). There are several operators within the Tri-County region (Berkeley, Dorchester, and Charleston) that can provide material to meet fill requirements of the Navy Base ICTF.

3.2 HYDROLOGY

3.2.1 Introduction

The affected environment for hydrology comprises both surface water and groundwater resources. Components of hydrology reviewed in this section include tides and currents, flows, precipitation, and soil characteristics that affect hydrology, land cover, and floodplains. The study area, depicted in Figure 1.6-1, lies on a peninsula of land formed by the Cooper River and Ashley River. The peninsula is crowned generally along the alignment of U.S. Highway 52 (Meeting Street) and U.S. Highway 78 (King Street Extension). A majority of the study area lies within the Cooper River watersheds, while the remainder lies within the Ashley River watersheds.

3.2.2 Tides and Currents

Natural water fluctuations in an aquatic ecosystem consist of daily, seasonal, and annual flood fluctuations in water level. The Charleston Harbor Estuary is a tidally driven system; as such, tides are the dominant mechanism that controls the movement of water between the Charleston Harbor and the Atlantic Ocean. The Charleston—SC Station (ID: 8665530), located on the Cooper River at the Port of Charleston, has a recorded mean tidal range of 5.22 feet and a diurnal range of 5.76 feet. On the Cooper River, tidal influence extends upstream as far as the Pinopolis Dam at Lake Moultrie. Attenuation of tidal influences begins at the confluence of the East and West Branches of the Cooper River, approximately 20 river miles upstream from the study area.

The Cooper River has been subjected to extensive anthropogenic changes. Historically, the river was a tidal slough with limited freshwater inflow and extensive tidal marshes. In the eighteenth and nineteenth centuries, the construction of extensive dikes in fields along the banks of the Cooper River for rice cultivation altered the marsh hydrology and salinity. In 1941, the construction of the Santee-Cooper Hydro-Electric Project resulted in a major change to the flow regime of the Cooper River. The upstream construction of Lake Marion and Lake Moultrie, diversion of flow from the Santee River, and discharge of flow from the Pinopolis Dam into the west branch of the Cooper River for hydroelectric generation altered the system from a tidal slough with a net discharge of approximately 70 cubic feet per second (ft^3/s) to a riverine system with an annual mean discharge of 15,000 ft^3/s. In 1985, extensive shoaling in the Charleston Harbor estuary attributed to the hydroelectric project was addressed via the Cooper River rediversion project, which redirected approximately 70 percent of the Santee River drainage water back into the Santee River, reducing the mean Cooper River flow to 4,500 ft^3/s. The United States Geological Survey (USGS) maintains a gage on the Cooper River at Filbin Creek near North Charleston (Station 021720677). The gage datum is 0 foot above NGVD29. Average gage height at this station is 10.5 feet, with extreme high and low measures of 15.53 feet and 4.51 feet observed over the period of record (1997 to present).

Average ebb currents measured at 9 NOAA buoy stations for the Cooper River from Filbin Creek to Drum Island range from 12.4 to 1.3 feet per second (fps); flood currents are generally slower. Within a river channel, currents are generally faster near the outside of meander bends. As such, current speeds would tend to be greater near the outlets of Filbin Creek, Noisette Creek, and Shipyard Creek, all of which empty into the Cooper River along the outside of meander bends.

3.2.3 Surface Water and Groundwater Flows

3.2.3.1 Stormwater Flows

The majority of stormwater flows east to the Cooper River, with a minor percentage flowing west to the Ashley River. Stormwater flows are further broken down into seven basins, with six of the basins leading to the Cooper River and one basin sloping toward the Ashley River (Figure 3.2-1). The majority of runoff in the vicinity of the study area finds its way to the Cooper River via overland flow and underground storm sewers. A portion of the runoff in the southernmost two stormwater basins is directed into Shipyard Creek, which then makes its way to the Cooper River.

At the northern portion of the study area, the River Center project site straddles two basins. Stormwater from the southern basin makes its way to the Cooper River via overland flow and underground storm sewers, while the northern basin directs its flow to the Cooper River via Noisette Creek.

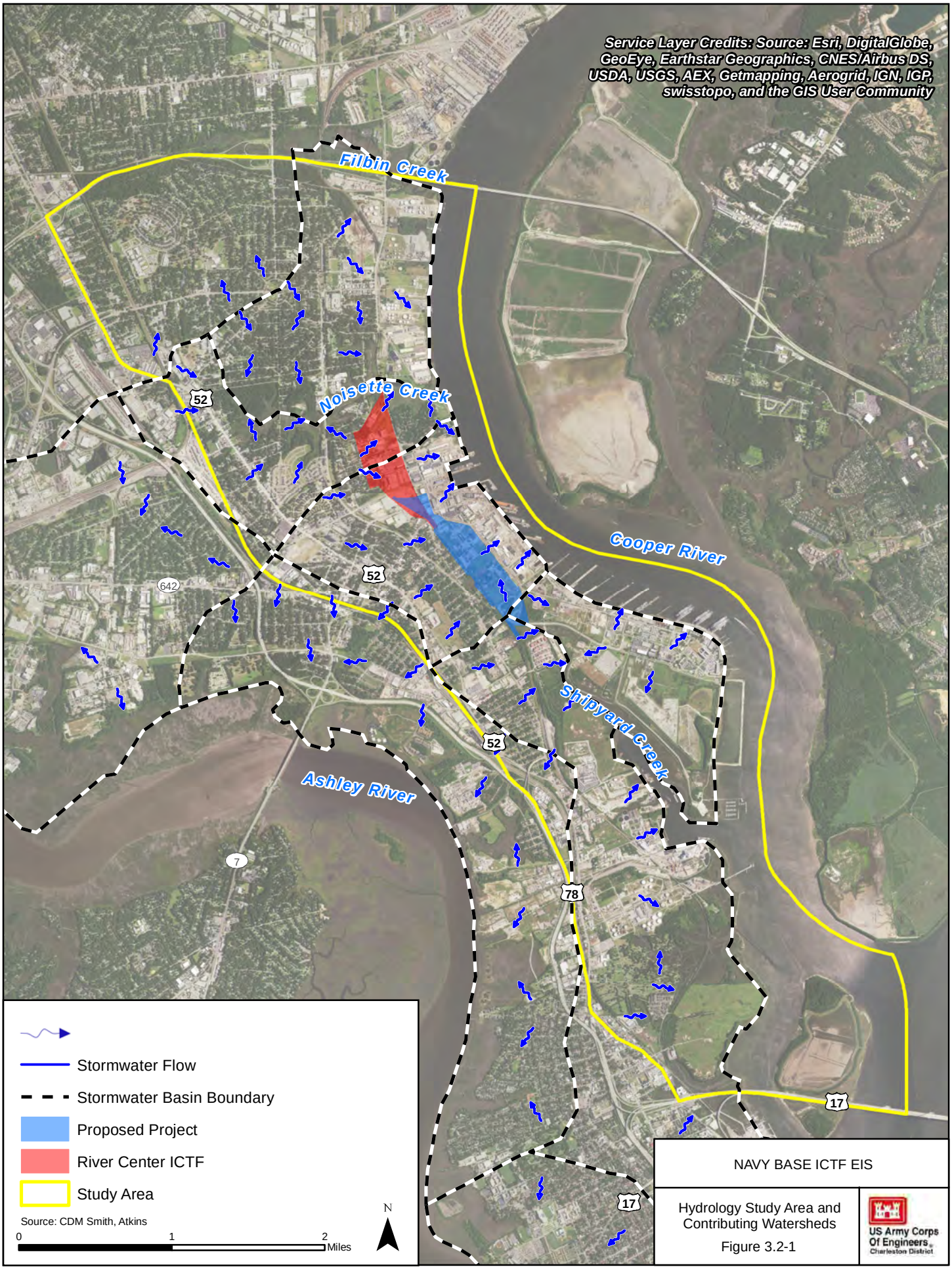
3.2.3.2 Groundwater Flows

Groundwater within the study area occurs in an unconfined aquifer within the Quaternary deposits, with the underlying Ashley Formation acting as a lower bounding unit. The unconfined aquifer varies in total thickness from about 15 to 35 feet. In light of the heterogeneity of the Quaternary deposits, the hydraulic properties of the shallow (surficial) aquifer vary widely, depending on the location. Large variations in hydraulic conductivity result in variable groundwater flow rates and directions. Generally, the shallow groundwater flows toward the Cooper River and, to a lesser extent, toward Shipyard Creek and Noisette Creek (CH2M Hill 2011).

3.2.4 Precipitation

Average rate of precipitation reported by SCDNR for the City of Charleston for the period of record 1948 to 2005 is 45.99 inches annually (SCDNR 2014a). The wettest period of the year is June through September. August has the highest monthly rainfall (6.23 inches). The following Table 3.2-1 provides a monthly breakdown.[28]

[28] As there are no reporting stations within the City of North Charleston, precipitation data was used from stations associated with the City of Charleston.



NAVY BASE ICTF EIS

Hydrology Study Area and Contributing Watersheds

Figure 3.2-1

US Army Corps Of Engineers Charleston District

Table 3.2-1
Average Precipitation Rates

Average Precipi-tation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Total (in.)	2.98	2.79	3.85	2.45	3.09	5.03	6.04	6.23	5.68	3.13	2.07	2.66	45.99
Snowfall (in.)	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Snow Depth (in.)	0	0	0	0	0	0	0	0	0	0	0	0	0

Source: SCDNR 2014a.

3.2.5 Soil Characteristics Affecting Hydrology

According to the NRCS, the soils in the study area are classified as Urban Land (UR) and are comprised of the Yauhannah-Yemassee-Ogeechee association (see Section 3.1 Geology and Soils). Soils are characterized primarily by loamy marine sediments with slopes ranging from 0 to 6 percent. According to the NRCS, slopes within the limits of the study area are expected to occur on terraces and broad flats of the lower Coastal Plain. Available topography indicates elevations for the project site range from elevation 15 to elevation 5 and for the River Center project site from elevation 32 to elevation 5 (USGS 2011). Groundwater depths are close to or above the surface at +1.0 to 2.5 feet. Slow runoff rates, poor to moderately well-drained soils, and soils with moderate permeability, are expected within the study area. The hydrologic soil group is B, with moderate infiltration rates (NRCS 2014a).

Soil characteristics affecting hydrology (by soil series) are presented in Table 3.2-2.

Table 3.2-2
Soil Characteristics That Affect Hydrology

Soil Series	Soil Texture	Slopes	Groundwater depth from soil surface (ft)	Permeability
Ogeechee	Loamy, fluvial, and marine sediments	0 to 2%	+1.0 to 1.0	Slow runoff, poorly drained, moderately permeable
Yauhannah	Loamy marine sediments	0 to 6%	1.5 to 2.5	Slow runoff, moderately well drained
Yemassee	Loamy marine sediments	0 to 2%	1.0 to 1.5	Slow runoff, somewhat poorly drained, moderately permeable

Source: NRCS 2014a.

3.2.6 Land Cover

Existing land cover provides a representation of cover type. For purposes of hydrologic analysis, land cover is presented as average percent of impervious cover and is defined by the major land use types considering vegetated, cleared, and impervious surfaces. Measurements were made by visual interpretation of aerial photography. A review of the City of North Charleston's Zoning Map provided the maximum allowable imperious surface for a particular area.

3.2.6.1 Land Cover as Defined by Municipal Zoning

The zoning map for the City of North Charleston defines the zoning districts for the project site and the River Center project site; however, the zoning guidance did not provide guidelines on percent impervious cover by land use. Utilizing the USDA Urban Hydrology for Small Watersheds, Technical Release 55, June, 1986 (TR-55) guidance, the average percent of maximum allowable impervious cover by land use has been identified for each zoning district. Using a composite for the average percent of maximum allowable impervious cover by zoning district, Table 3.2-3 identifies the maximum allowable impervious cover for the project site and River Center project site.

For the project site, there is a maximum allowable average percent impervious cover of 73 percent, whereas the River Center project site's maximum allowable impervious cover is 82 percent. The River Center project site's impervious cover is higher because the Planned Development District (PDD) allows for a broader range of land uses, including commercial and business use, which have higher rates of impervious cover than industrial.

Table 3.2-3
Maximum Allowable Percent Impervious Cover by Zoning District and Site

Site	Zoning district[1]	% of total site	Percent impervious cover by land use (TR-55)[2]	Average percent impervious cover by site
Proposed Project	M-2—Heavy industrial district	89%	72%	73%
	M-1—Light industrial district	2%	72%	
	PDD—Planned Development District	3%	85%	
	R-1-Single Family Residential district	3%	75%	
	R-2-Multifamily Residential district	3%	85%	
River Center	PDD—Planned Development District	80%	85%	82%
	M-2—Heavy industrial district	20%	72%	

Sources: City of North Charleston 2014 (1); NRCS 1986 (2).

3.2.6.2 Land Cover as Defined by Aerial Photographic Interpretation

A visual interpretation of aerial photography for each of the project sites was used to estimate the existing average percent of impervious cover. At 40%, the project site is significantly below the 73% threshold of maximum allowable percent of impervious cover, while the River Center project site is slightly above the 82% threshold (see Table 3.2-4) with its estimated 85 impervious cover percentage.

Table 3.2-4
Average Percent Impervious Cover by Visual Interpretation

Site	Percent impervious
Proposed Project	40%
River Center	85%

3.2.7 Floodplains

Floodplains are defined as the lowland and relatively flat areas adjoining inland and coastal waters, including flood-prone areas of offshore islands, and at a minimum, those that are subject to a 1 percent or greater chance of flooding in any given year (i.e., the area inundated by a 100-year flood). However, every frequency event has a floodplain and different associated areal extents. Flooding along the floodplains of the Cooper River is primarily from proximity to Charleston Harbor and the Atlantic Ocean. Coastal flooding is caused by extremely high tides and storm surges resulting from hurricanes or intense coastal storms such as nor'easters. The primary factors contributing to coastal flooding within the study area are the openness to Atlantic Ocean storm surges through Charleston Harbor and the wide entrances to the Cooper, Wando, and Ashley Rivers. In addition, the terrain is generally too low to provide an effective barrier to storm surge flooding. Although many segments of the Charleston Harbor are armored to prevent erosion, there are essentially no flood control structures in the low-lying topography surrounding the harbor to defend against major storm surge flooding (Corps 2006).

Riverine flooding in the floodplain of the Cooper River and its tributaries is associated with slow-moving frontal systems, thunderstorms, and tropical storms causing sheetflow, overflow of streams, and ponding. Riverine flooding is prevalent in many areas of Charleston County due to small natural channels, flat stream slopes, wide heavily vegetated floodplains in undeveloped areas, and inland tidal effects. Flooding in urban areas such as the City of Charleston and City of North Charleston typically results from less infiltration, quicker runoff response, and decreased storage (Corps 2006).

The Federal Emergency Management Agency (FEMA) summarizes historical flood events impacting the Charleston area in the current Flood Insurance Study (FIS) for Charleston County (November 7, 2004, pp. 7–10). An example of historical hurricane-related flooding is Hurricane Hugo in 1989,

which caused flood waters to rise more than 5 feet above normal conditions in Charleston Harbor (FEMA 2004a).

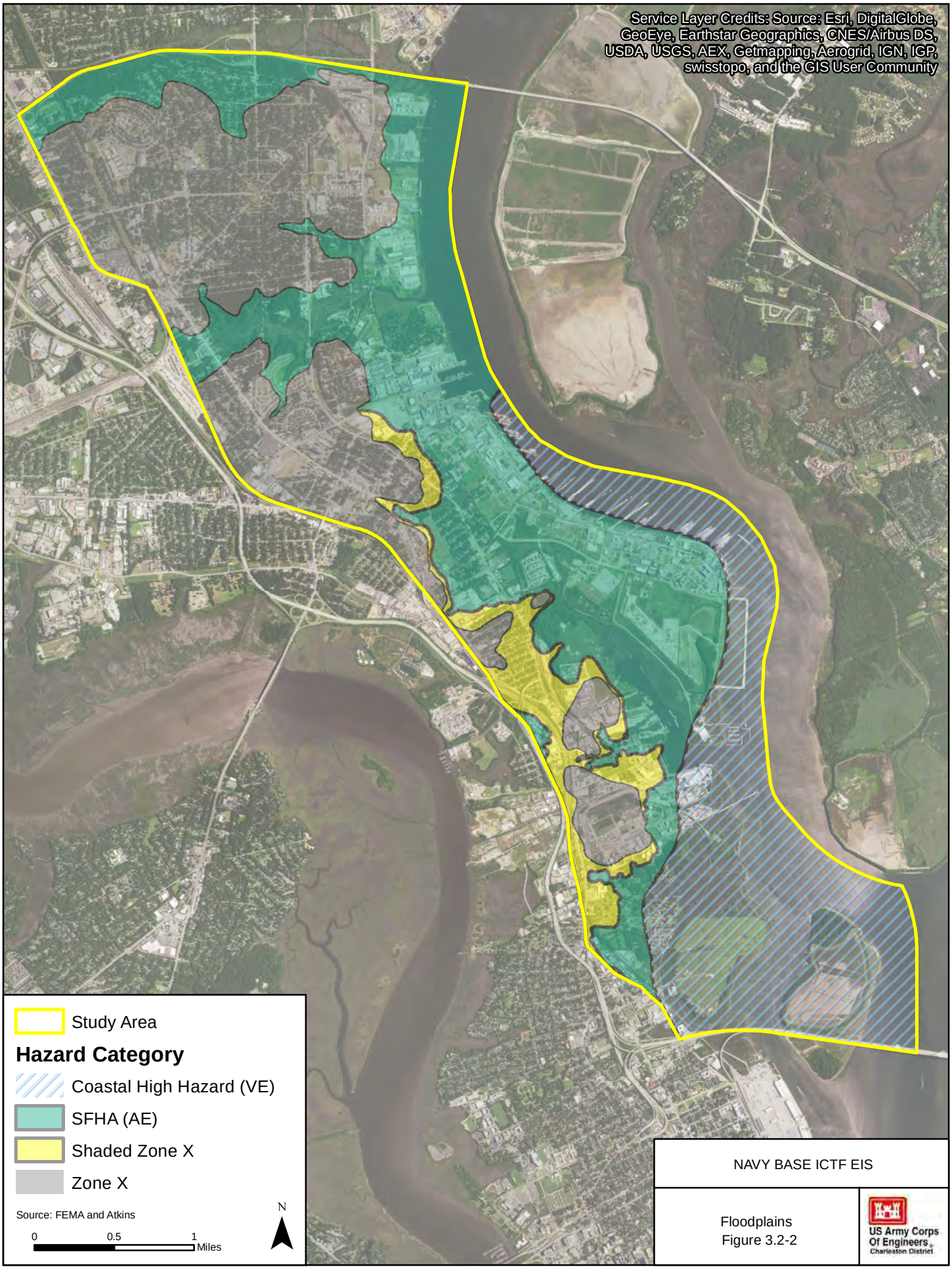
The results of the FIS are presented on a map, referred to as a Flood Insurance Rate Map (FIRM), and presented in the FIS report in a narrative and graphically as flood profiles. The 100-year floodplain is referred to as the Special Flood Hazard Area (SFHA). FEMA determines the SFHA, shown on the FIRMs as A Zones or V Zones, from information obtained through consultation with the community, and from floodplain topographic surveys, detailed hydrologic and hydraulic analyses, and historic records. FEMA uses commonly accepted computer models and engineering methods that estimate hydrologic and hydraulic conditions to determine the 1-percent-annual-chance flood, to determine Base Flood Elevations (BFEs), and to designate flood-risk zones. A BFE is the height of the base flood, usually in feet, in relation to the National Geodetic Vertical Datum of 1929 (NGVD29), the North American Vertical Datum of 1988 (NAVD88), other datum referenced in the FIS report, or average depth of the base flood, usually in feet, above the ground surface (FEMA 2004a).

Along rivers, streams, and lakes within the United States, FEMA computes flood elevations using computer models, statistical techniques, or both. These elevations are a function of the amount of water expected to enter a particular system by means of precipitation and runoff. The SFHAs in riverine areas are primarily identified as "A Zones" on the FIRM (FEMA 2004b).

Along the coast, FEMA determines SFHAs by an analysis of storm surge, wind direction and speed, wave heights, and other factors. FEMA designates these areas along the coast as both V Zones and A Zones on the FIRM. V Zones are the more hazardous coastal flood zones because they are subject to high velocity wave action. FEMA applies the V Zone designation to those areas along the coast where water depth and other conditions would support at least a three-foot wave height. FEMA usually designates A Zones in coastal areas landward of the V Zone. Coastal flood hazard areas mapped as A Zones can be subject to storm surge and damaging waves; however, the waves are less than 3 feet in height (FEMA 2004a).

Figure 3.2-2 shows the regional floodplains in the North Charleston area and within the study area. The floodplain boundaries for the 100- and 500-year storm events were obtained from FEMA Q3 Flood Data for Georgia and South Carolina in digital format, and verified with FIRMs for Berkeley County and Charleston County, and the incorporated towns and cities in the two counties, published by FEMA. Definitions for zones shown in Figure 3.2-2 are as follows:

> **Zone VE**. VE Zones are coastal high-hazard areas where wave action and/or high-velocity water can cause structural damage during the 100-year flood. BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.


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
Study Area
Hazard Category
Coastal High Hazard (VE)
SFHA (AE)
Shaded Zone X
Zone X
Source: FEMA and Atkins
0
0.5
1
Miles
N
NAVY BASE ICTF EIS
Floodplains
Figure 3.2-2
US Army Corps Of Engineers
Charleston District

Zone AE. Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplain that is determined in the FIS by detailed methods, which typically involve the use of engineering models. In most instances, BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone Shaded X. Zone Shaded X corresponds to areas of moderate flood hazard between the limits of the base flood (100-year flood plain) and the 0.2 percent-annual-chance (or 500-year) flood.

Zone X. Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year floodplains. No base flood elevations or depths are shown within this zone.

For the Charleston FIS, water surface elevations for the 100-year flood were computed from numerical models that simulate storm surge coupled with statistical analyses of the probable chance of occurrence. Summaries of the hydraulic analyses conducted for Charleston County are provided in their respective FISs. Final flood zone boundary determinations and delineations are typically rounded to the nearest foot published on the FIRM (FEMA 2004b).

North Charleston has floodplains along the Ashley River, the Cooper River, and the creeks that flow into these rivers. As shown on Figure 3.2-2, the majority of the study area is within the 100-year and 500-year floodplains. Approximately 38.3 percent of the study area is located in flood zone AE with a BFE of 13 feet (NGVD29), 6.0 percent is located in Shaded X, 25.1 percent is located in zone VE, while the remaining 30.6 percent is in an X zone with no BFE (i.e., it is outside/above the 500-year floodplain) (Table 3.2-5). At flows associated with the 100-year flood, the water surface elevation of the Cooper River is estimated to be 12 feet (NGVD29) in the study area, with maximum wave crest elevations between 14 and 16 feet (FEMA 2004b).

Table 3.2-5
FEMA Zone Areas Within the Study Area

FEMA Zones	Base Flood Elevation (ft, NAVD88)	Area (acres)	Percent Area
AE	12–14	3,063.0	38.3%
Shaded X	-	480.1	6.0%
VE	14-17	1,999.6	25.1%
X	-	2,439.6	30.6%

3.3 WATER QUALITY

3.3.1 Introduction

This section characterizes the water quality for existing surface and groundwater resources within the study area depicted in Figure 1.6-1, includes the surface waters of Noisette Creek and Shipyard Creek, the Cooper River between Filbin Creek and US 17, and the underlying groundwater resources. This study area allows for the evaluation of tidal surface waters of both Noisette Creek and Shipyard Creek, and accommodates the evaluation of any potential contamination from onsite activities that could be transported upstream during incoming tide or downstream to the Cooper River. Inclusion of water quality data for Filbin Creek allows for an estimate of existing conditions in the region, in the absence of sampling stations on Noisette Creek. The southern boundary of the study area also allows for an assessment of the potential for an increase in contamination from the nearby Superfund Site on the Macalloy Site, which could be transported down Shipyard Creek to the Cooper River.

3.3.2 Surface Water Quality

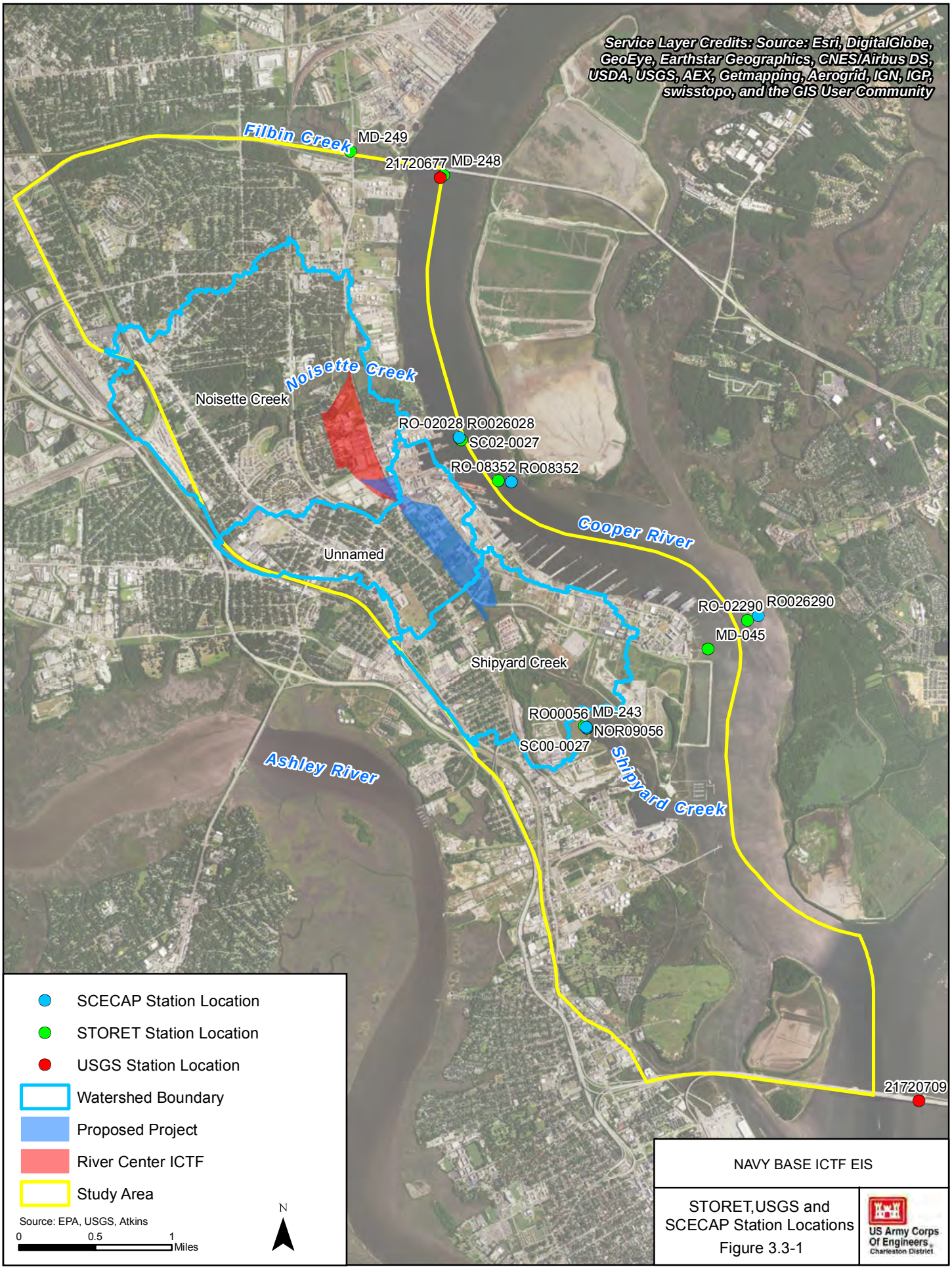
Stormwater runoff in the study area is primarily transported via overland flow and underground storm sewers to Noisette Creek or Shipyard Creek, and then to the Cooper River. Runoff in the undeveloped portions of the study area moves by sheet flow to various swales, waterways, culverts, and outfalls; there are no stormwater treatment ponds within the study area. A high percentage (25 percent) of the study area is classified as "industrial," followed by residential land uses (19 percent) (see Section 3.9, Land Use). Runoff from these land uses typically has higher pollutant loads for constituents such as oil, grease, metals, fecal coliforms, and nutrients.

3.3.2.1 Surface Water Quality Monitoring Stations

Surface water quality data collected from the Cooper River Sub-Basin (12-digit HUC 030502010707) were used to assess current water quality characteristics within the study area. These data were obtained from the USEPA Storage and Retrieval (STORET) Data Warehouse (USEPA 2014a) and the U.S. Geological Survey (USGS 2013) (Figure 3.3-1). Within the STORET database, two stations were sampled by the USEPA National Aquatic Resources Survey and the Environmental Monitoring and Assessment Program and eight stations were sampled by SCDHEC (Table 3.3-1); however, data from one station (RO-11308) were discarded as per STORET instructions and replaced with data from Station MD-045. All data analyzed from the STORET database were collected between 1999 and 2013; data analyzed from the one USGS station were collected between 2007 and 2013.

Table 3.3-1
Existing STORET and USGS water quality stations within the study area

Station	Location	Organization Name
Shipyard Creek		
SC00-0027	Shipyard Creek	USEPA National Aquatic Resources Survey and the Environmental Monitoring and Assessment Program
MD-243	Shipyard Creek between Marker #6 and Macalloy Dock	SCDHEC
Filbin Creek		
MD-249	Filbin Creek at Virginia Avenue	SCDHEC
Cooper River		
SC02-0027	Cooper River, 2,300 feet downstream of Noisette Creek mouth	USEPA National Aquatic Resources Survey and the Environmental Monitoring and Assessment Program
MD-045	Cooper River above mouth of Shipyard Creek at Channel Buoy 49	SCDHEC
MD-248	Cooper River at Mark Clark Bridge (I-526)	SCDHEC
RO-02028	Cooper River within Navy Yard Reach	SCDHEC
RO-02290	Cooper River (1.4 miles northeast of Shipyard Creek mouth)	SCDHEC
RO-08352	Cooper River (1 mile downstream from Noisette Creek in the Navy Yard Reach)	SCDHEC
RO-11308	Cooper River above mouth of Shipyard Creek at Channel Buoy 49 (Use MD-045)	SCDHEC
021720677	Cooper River at Filbin Creek	USGS


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
Filbin Creek
MD-249
21720677
MD-248
Noisette Creek
Noisette Creek
RO-02028
RO026028
SC02-0027
RO-08352
RO08352
Cooper River
Unnamed
RO-02290
RO026290
MD-045
Shipyard Creek
RO00056
MD-243
NOR09056
SC00-0027
Shipyard Creek
Ashley River
21720709
SCECAP Station Location
STORET Station Location
USGS Station Location
Watershed Boundary
Proposed Project
River Center ICTF
Study Area
Source: EPA, USGS, Atkins
0
0.5
1
Miles
N
NAVY BASE ICTF EIS
STORET,USGS and SCECAP Station Locations
Figure 3.3-1
US Army Corps Of Engineers
Charleston District

In addition, water quality data collected between 1999 and 2010 by the South Carolina Department of Natural Resources (SCDNR) and SCDHEC through a collaborative coastal monitoring program entitled the "South Carolina Estuarine and Coastal Assessment Program" (SCECAP) also were summarized. Although this sampling effort included different sampling locations selected each year throughout the state's coastal waters, only data collected from the five stations within the study area are discussed (Table 3.3-2, and Figure 3.3-1). All stations were sampled once during the summer months (mid-June through August). Results for dissolved oxygen (DO), total nitrogen (TN), phosphorus (P), and fecal coliform concentrations are included below. Additional findings from the series of technical reports generated through this program and the data obtained from those surveys can be obtained from the SCECAP website (SCECAP 2014).

Table 3.3-2
SCECAP Water Quality Stations

Survey Year	Station	Station Depth (m)	Location
1999-2000	RO00056	6.4	Cooper River in the turning basin of Shipyard Creek
2001-2002	RO026290	8.2	Cooper River across from NOAA Pier Romeo
2001-2002	RO026028	13.4	Cooper River near old Navy Base
2007-2008	RO08352	9.8	Cooper River at the southwest tip of the Clouter Creek disposal area
2009-2010	NOR09056	5.8	Cooper River in the turning basin of Shipyard Creek

3.3.2.2 Waterbody Classifications

The portion of the Cooper River extending approximately 30 miles upstream from the junction of the Ashley and Cooper Rivers is classified as "SB" (saltwaters) (SCDHEC 2012a). Noisette Creek, Shipyard Creek, and Filbin Creek have not been classified directly by the State of South Carolina; as such, their classification (also "SB") is based on the downstream waters of which they are a tributary (the Cooper River) (SCDHEC 2012a, SCDNR 2009) (see Section 4.3, Water Quality).

Pursuant to Section 303(d) of the Clean Water Act and Federal Regulation 40 CFR 130.7, SCDHEC developed a priority list of waterbodies that do not meet State water quality standards after the required controls for point and nonpoint source pollutants have been applied. Table 3.3-3 provides the most recent (2012) Section 303(d) list of impaired waters in the Cooper River watershed and the study area being evaluated in this EIS (SCDHEC 2012b). Water bodies are reassessed every 2 years for compliance with State water quality standards. The 2012 list of impaired waters includes the Cooper River (one mile downstream from Noisette Creek in the Navy Yard Reach) and Filbin Creek.

Both sites are listed for impairments to recreational uses as a result of elevated fecal coliform concentrations. The locations of both sites are shown in Figure 3.3-1.

Table 3.3-3
303(d) list of impaired waters in the Cooper River Watershed (12 digit HUC 30502010707) in 2012

12 Digit HUC	Location	Station	Use	Cause
030502010707	Cooper River (one mile downstream from Noisette Creek in the Navy Yard Reach)	RO-08352	Recreational	Fecal Coliform
030502010707	Filbin Creek at Virginia Avenue, North Charleston	MD-249	Recreational	Fecal Coliform

3.3.2.3 Surface Water Quality Standards

Total Maximum Daily Loads

Section 303 of the Clean Water Act and USEPA's Water Quality Planning and Management Regulations (40 CFR Part 13) requires that States develop Total Maximum Daily Loads (TMDLs) for water bodies included on the Section 303(d) list of impaired waters as a means of reducing water pollution. All TMDLs include reductions from existing pollution loads needed to meet water quality standards as well as a margin of safety (MOS).

A TMDL for DO was established for the Charleston Harbor, Cooper River, Ashley River, and Wando River in 2013 (SCDHEC 2013a). This TMDL revises and combines the existing 2002 Cooper River-Wando River-Charleston Harbor TMDL (SCDHEC 2002) and the 2003 Ashley River TMDL (SCDHEC 2003). Among other reasons for the revision is a revised DO standard as amended in the South Carolina Pollution Control Act of 2010 (adoption in South Carolina Regulation 61-68 pending) (SCDHEC 2013a). Ambient monitoring stations designated in the TMDL as not supporting aquatic life use due to low DO are located outside of the study area.

The wasteload allocation (WLA) defined in the TMDL is for continuous non-storm water dischargers; modeling efforts indicate that regulated and unregulated stormwater and non-point sources do not contribute to the allowable DO depression on the mainstem segments; however, if additional loading of oxygen demand from Municipal Separate Storm Sewer Systems (MS4s) or other regulated stormwater sources to the TMDL segments is indicated, the TMDL may be revised (SCDHEC 2013a).

A phased approach to achieving the reduction in discharge of oxygen-demanding substances to the system was allowed in the previous TMDLs. The Cooper River TMDL required a reduction from pre-TMDL permitted ultimate oxygen demand (UOD) of 58 percent in Phase I and a final reduction of 69 percent in Phase 2. The revised TMDL is equivalent to an additional 2 percent reduction below the Phase I level for the Cooper River (SCDHEC 2013a).

Fish Consumption Advisories

Fish consumption advisories are issued in areas where fish contaminated with mercury have been identified. This contamination does not make the water unsafe for swimming or boating. Fish consumption advisories were issued throughout the Cooper River watershed in 2014, including the East Fork of the Cooper River, the West Fork of the Cooper River, and the "T" to Bushy Park; there are no restrictions downstream of Bushy Park where the study area is located (SCDHEC 2014a).

3.3.2.4 Summary of Surface Water Quality Variables

The surface water quality for the variables of concern in the Cooper River watershed is described below. The variables of concern include DO, salinity, total suspended solids (TSS), turbidity, nutrients, bacteria, and heavy metals. Sample depths ranged from 0.2 meters (m) to 0.3 m at all sites except Station 021720677, which is the one USGS station included in the dataset. USGS samples at this one station were collected from depths of 1.41 m to 4.73 m. Data for other contaminants of concern in surface waters—including volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), chlorinated pesticides/polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), and dioxins—were not available for the study area.

3.3.2.4.1 Dissolved Oxygen

The amount of oxygen dissolved in water is crucial for the survival of aquatic organisms and is an important indicator of any water body's health. Many of the waters in and around Charleston Harbor have DO levels below the established criteria due to both natural conditions (e.g., organic loading and reduced oxygen levels from wetlands and marshes) and anthropogenic activities (e.g., wastewater dischargers). State standards indicate that DO should not fall below 4.0 milligrams per liter (mg/L) (SCDHEC 2012c). Waters in South Carolina that do not meet this numeric criterion due to natural conditions are covered by antidegradation requirements in South Carolina R.61-68, Section D.4 (SCDHEC 2012c), allowing for an additional lowering of DO by no more than 0.1 mg/L due to point sources and other activities.

The STORET dataset contained 361 DO readings from seven stations collected by the SCDNR (see Figure 3.3-1 for station locations). In addition, the USGS collected 124,206 samples at one station, for a total of 124,567 DO samples within the study area. DO values ranged between 2.4 and 11.31 mg/L at all STORET stations and ranged from 2.5 to 11.5 mg/L at Station 021720677 (see Table 3.3-4) (USEPA 2014a, USGS 2013). The mean DO level was 6.1 mg/L at all STORET stations and 6.8 mg/L at Station 021720677.

All samples collected in the study area were instantaneous. Seven of the 367 DO samples included in the STORET database fell below 4.0 mg/L and were confined to Stations MD-248 and MD-249 (USEPA 2014a). Levels dropped below 4.0 mg/L to 3.84 mg/L only once at Station MD-248 (August 2011). Aquatic life was partially supported at Station MD-249 due to low DO levels (SCDNR 2009, SCDHEC

2005a); however, DO values have remained above 4.0 mg/L since 2007 (USEPA 2014a). These results indicate insufficient DO levels in 2 percent of the total samples analyzed between 0.2 and 0.3 m throughout the study area. One percent of the DO samples collected at Station 021720677 (or 1,389 samples) also demonstrated insufficient DO levels between 1.41 and 4.73 m water depth.

All samples collected through the SCECAP were categorized as "good," meaning they were within State water quality standards (SCECAP 2014).

3.3.2.4.2 Salinity

Large variations in salinity over short time periods can result in stressful conditions for invertebrate and fish species. The STORET dataset includes 369 salinity readings at seven stations (see Figure 3.3-1 for station locations); salinity was not measured at Station 021720677. Salinity values ranged from 0 to 28 parts per thousand (ppt), with an average of 15.4 ppt (see Table 3.3-4) (USEPA 2014a). All samples were collected from between 0.2 and 0.3 m, so the potential for a vertical salinity gradient could not be identified.

Surface salinity values at stations collected through SCECAP ranged from 13.5 to 19.1 ppt; bottom salinities at the same stations ranged from 15.7 to 26.4 ppt (SCECAP 2014). The largest variation between surface and bottom salinities at any station was 8.8 ppt at Station RO026290 in 2002.

3.3.2.4.3 Total Suspended Solids and Turbidity

TSS refers to the weight of organic and inorganic material suspended in the water column. TSS differs from turbidity, which is an optical property that measures the light transmittance through the water column. Sources of particulates within the study area primarily include stormwater runoff from urban land uses and transportation features (i.e., roads, parking lots). Increased impervious features also may cause higher flows, which in turn may result in increased river bank erosion and elevated TSS and turbidity. Long-term elevation in TSS and turbidity can adversely impact the health of a water ecosystem (USEPA 2006a).

The STORET dataset includes 31 TSS samples collected from four sites; twenty-eight of the samples were collected from Station MD-243; TSS was not sampled at Station 021720677. TSS values ranged between 1.6 and 27 mg/L with an average value of 11.1 mg/L (see Table 3.3-4) (USEPA 2014a). There are no explicit State standards for TSS (SCDHEC 2012c). SCDHEC monitoring data from Station MD-243 in Shipyard Creek shows a slight increasing trend in TSS.

Data from 385 turbidity samples, collected from seven stations, were included in the STORET dataset; approximately 74 percent of samples were collected from Stations MD-045 and MD-248. Turbidity values ranged between 1.4 and 76 nephelometric turbidity units (NTU) with an average value of 5.5 NTUs (see Table 3.3-4) (USEPA 2014a). State standards for turbidity establish a limit of 25 NTUs, provided existing uses are maintained (SCDHEC 2012c). Turbidity levels exceeded 25 NTUs twice at

Station MD-045 (in 1999 and 2000) and five times at Station MD-249 (once after 2002). Turbidity was not sampled at Station 021720677.

3.3.2.4.4 Nutrients

Increases in nutrient concentrations (including nitrogen and phosphorus constituents) can lead to algal blooms, reduced water clarity, low DO levels, and potential fish kills (Bricker et al. 2007). Primary sources of nutrient pollution in the study area include point source dischargers, such as the Felix C. Davis wastewater treatment plant (WWTP), and various sources of stormwater runoff that contain pollutants such as fertilizers. Although SCDHEC has not established specific water quality standards for nitrogen or phosphorus, loading of nutrients will be addressed on an individual basis as necessary to ensure compliance with the narrative and numeric criteria (SCDHEC 2012c).

Evaluation of existing nutrient conditions within the study area focus on total nitrogen (TN) and total phosphorus (TP) data. The STORET dataset includes 206 samples from eight stations (see Figure 3.3-1 for station locations) within the study area for TN; approximately 82 percent of the samples were collected from Stations MD-045 and MD-248. TN concentrations ranged from 0.14 mg/L to 2.76 mg/L and averaged 0.44 mg/L (see Table 3.3-4) (USEPA 2014a). For TP, the STORET dataset includes 274 samples from nine stations within the study area; approximately 80 percent of these were collected from Stations MD-045 and MD-248. TP concentrations ranged from 0.02 mg/L to 0.46 mg/L, with an average value of 0.04 mg/L (see Table 3.3-4) (USEPA 2014a). Nutrients were not monitored at Station 021720677.

STORET monitoring data show a decreasing (i.e., improving) trend in TN concentration at Station MD-045 ($R^2 = 0.20$; $p < 0.0001$) and increasing TP concentrations over time ($R^2 = 0.06$; $p < 0.05$) (USEPA 2014a). Both TN and TP concentrations demonstrated relatively little change over time at Station MD-248 ($R^2 = 0.005$; $p = 0.521$ and $R^2 = 0.0003$; $p > 0.05$, respectively) (USEPA 2014a).

All TN and TP samples collected through the SCECAP were categorized as "good," meaning they represent normal values relative to SCDHEC historical data (SCECAP 2014).

3.3.2.4.5 Bacteria

Microbiological indicators of fecal contamination (e.g., fecal coliforms, enterococci, *Escherichia coli*) found in the gastrointestinal tracts of humans and other warm-blooded animals are used to warn of the presence of pathogens in surface waters. Micro-organisms from fecal sources that enter surface waters used by humans can pose a human health risk.

Water quality standards developed by SCDHEC are based on the ability to safely use surface waters (e.g., for drinking water, shellfishing, or recreation) for their designated use. Epidemiological studies conducted by the USEPA have demonstrated that enterococci are the most appropriate indicators predicting the presence of pathogens that cause illness in marine waters (USEPA 2002). SCDHEC uses

enterococci for regulating water quality for recreational use. State standards for enterococci dictate that the geometric mean of at least four samples collected over a 30-day period at one site should not exceed 35 most probable number (MPN)/100 mL, with a maximum single sample limit of 501 MPN/100 mL (SCDHEC 2012c). A fecal coliform criterion not to exceed a geometric mean of 14 MPN/100 mL, with a maximum single sample limit of 43 MPN/100 mL is used for shellfish harvesting waters (SFH) with uses listed in Class SB (SCDHEC 2012c).

The STORET dataset includes 26 enterococci samples from three sites (see Figure 3.3-2 for site locations) within the study area, ranging from 10 colony forming units/milliliter (CFU/mL) to 156 CFU/mL, with an average value of 55 CFU/mL (see Table 3.3-4) (USEPA 2014a). Enterococci were not monitored at Station 021720677.

Seven stations (see Figure 3.3-1 for station locations) also were sampled for fecal coliform. At these stations, samples collected ranged from 2 CFU/100 mL to 1,600 CFU/mL, with an average value of 138 CFU/100 mL (see Table 3.3-4) (USEPA 2014a). Fecal coliforms were not monitored at Station 021720677.

Fecal coliform samples collected through the SCECAP from Stations RO00056, RO08352, and NOR09056 were categorized as "good," meaning samples had ≤43 colonies/100 mL; fecal coliform samples collected from Stations RO026290 and RO026028 had marginal results (44–400 colonies/100 mL, potentially not supporting shellfish harvesting) (SCECAP 2014).

3.3.2.4.6 Heavy Metals

SCDHEC measured concentrations of cadmium, chromium, copper, and zinc at stations within the study area to compare to State standards intended to protect aquatic life and human health (Table 3.3-4; SCDHEC 2012c); lead, mercury, and nickel were not measured. These metals are naturally occurring in the environment and many are necessary for plants and animals in trace concentrations. Elevated levels of heavy metals may enter surface waters from industrial or agricultural land uses as well as atmospheric inputs via rainfall.

Each of the six samples (three samples taken at Station MD-045, two samples at Station MD-249, and one sample at Station MD-248) analyzed for copper exceeded the State standard. One of 18 samples collected at Station MD-045 exceeded the standard for zinc. The monitoring station in Shipyard Creek (MD-243) did not show any standard exceedances for these metals.

Table 3.3-4
Summary of concentrations, water quality criteria, and compliance for parameters of interest
(data presented are from STORET stations only)

Parameter	Unit	Minimum	Maximum	Average	Criteria	Section 303(d) List?
Dissolved Oxygen (instantaneous)	mg/L	2.4	11.31	6.1	4.0	**No**
Salinity	ppt	0	28	15.4	No criteria	
Total Suspended Solids	mg/L	1.6	27	11.1	No criteria	
Total Nitrogen	mg/L	0.14	2.76	0.44	No criteria	
Total Phosphorus	mg/L	0.02	0.46	0.04	No criteria	
Enterococci (single sample maximum)	CFU/mL	10	156	55	501	**No**
Fecal Coliforms (single sample maximum)	CFU/mL	2	1,600	138	43	**Yes**
Cadmium (criterion maximum concentration (CMC))	µg/L	0.14	0.96	0.42	43	**No**
Chromium (CMC)	µg/L	10	17	13.5	1,100	**No**
Copper (CMC)	µg/L	10	10	10	5.8	**No**
Zinc (CMC)	µg/L	10	160	19.7	95	**No**

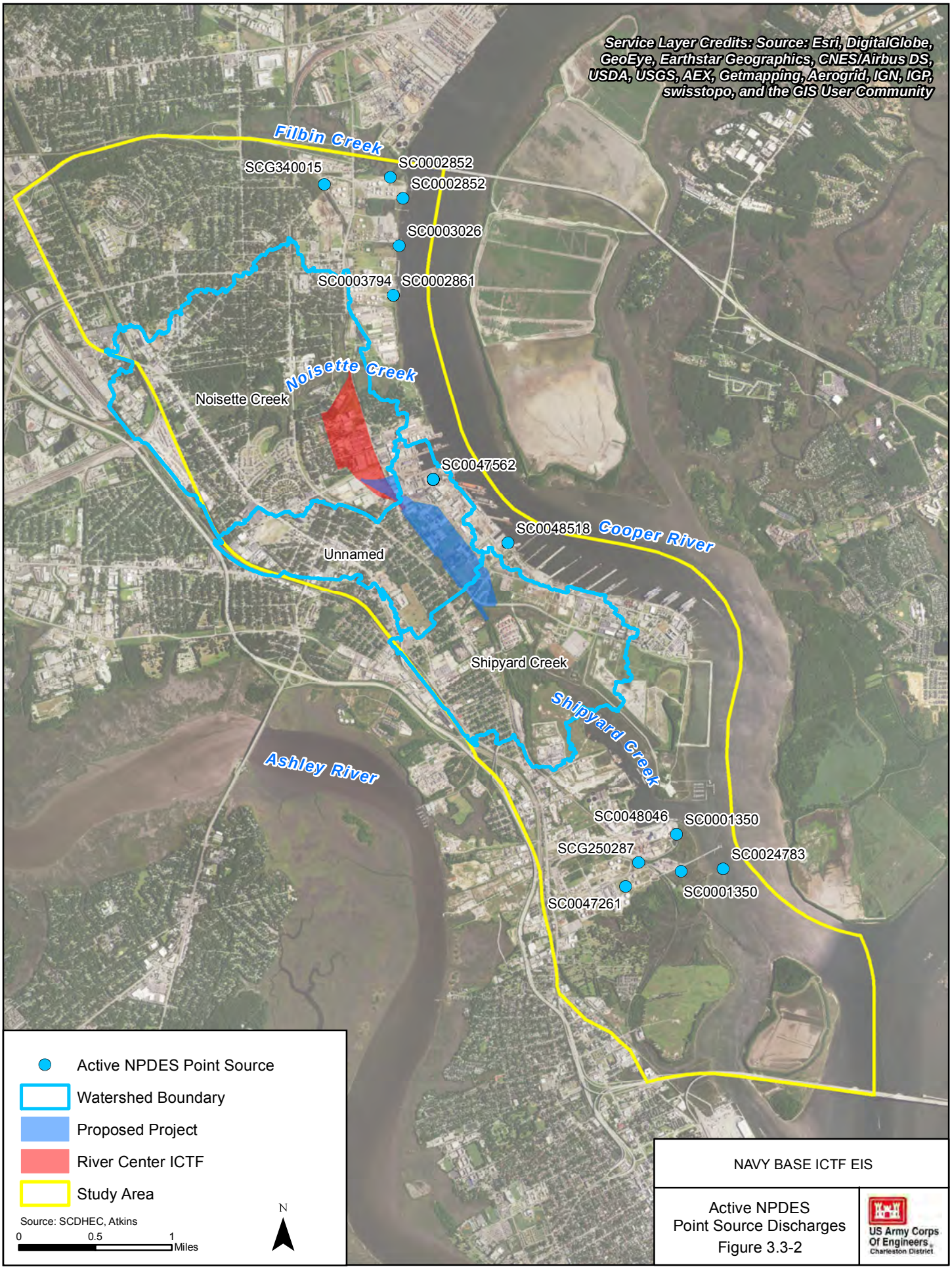
Source: (USEPA 2014a)

3.3.2.5 Point Source and Non-Point Source Surface Water Pollution

Various sources of pollution from point source discharges (e.g., industrial and wastewater treatment plants) and non-point sources (e.g., stormwater, atmospheric deposition) can affect the surface water quality of the Lower Cooper River.

3.3.2.5.1 Point Source Discharges

The National Pollutant Discharge Elimination System (NPDES) Stormwater Program regulates stormwater point source discharges for MS4s, construction activities, and industrial activities. Table 3.3-5 represents all locations with active NPDES permits within the study area. Locations are depicted on Figure 3.3-2.



NAVY BASE ICTF EIS

Active NPDES
Point Source Discharges
Figure 3.3-2

US Army Corps Of Engineers
Charleston District

Table 3.3-5
Active NPDES Permits within the study area

NPDES Permit #	NPDES PIPE #	Permittee	Facility Type	Location Description
SC0001350	SC0001350-001	Kinder Morgan-Shipyard River Terminal	Industrial	Petroleum Bulk Stations and Terminals
SC0001350	SC0001350-002	Kinder Morgan-Shipyard River Terminal	Industrial	Petroleum Bulk Stations and Terminals
SC0002852	SC0002852-001	Amerada Hess/Virginia Av North	Industrial	Petroleum Bulk Stations and Terminals
SC0002861	SC0002861-002	Amerada Hess/Virginia Av South	Industrial	Petroleum Bulk Stations and Terminals
SC0002861	SC0002861-001	Amerada Hess/Virginia Av South	Industrial	Petroleum Bulk Stations and Terminals
SC0002852	SC0002852-002	Amerada Hess/Virginia Av North	Industrial	Petroleum Bulk Stations and Terminals
SC0003026	SC0003026-004	Chevron USA Inc.	Industrial	Lubricating Oils and Greases
SC0024783	SC0024783-001	NCSD/Felix C Davis WWTP	Municipal	Sewerage Systems
SC0047261	SC0047261-001	Petroliance LLC/Charleston	Industrial	Petroleum Bulk Stations and Terminals
SC0047562	SC0047562-001	Detyens Shipyard/Main Yard	Industrial	Ship Building and Repairing
SC0047562	SC0047562-01A	Detyens Shipyard/Main Yard	Industrial	Ship Building and Repairing
SC0047562	SC0047562-01B	Detyens Shipyard/Main Yard	Industrial	Ship Building and Repairing
SC0048518	SC0048518-001	Seacrest Marine Holdings LLC	Industrial	Ship Building and Repairing
SCG250287	Not available	Kinder Morgan Operating LPC Shipyard River Terminal	Industrial	Special Warehousing and Storage
SCG340015	SCG340015-001	Kinder Morgan Bulk Term North	Industrial	Petroleum Bulk Stations and Terminals

Source: SCDHEC 2014b

Non-Point Sources of Pollution

Non-point sources of pollution (both natural and anthropogenic) generally have a larger impact on water quality than point source discharges. Stormwater runoff contributes a large percentage of surface water pollution and can contain pollutants such as sediment, fertilizers, herbicides, insecticides, oil, grease, toxic chemicals, salt, bacteria, and nutrients (USEPA 2012). Natural sources of nutrients and detritus from marshes in the system can produce oxygen demands and effect overall water quality in the study area.

3.3.3 Sediment Quality

In addition to monitoring potentially contaminated sites, as discussed in Section 3.15 (HTRW), sediment quality data collected between 1999 and 2010 through the SCECAP are summarized for levels of contaminants and toxicity. Although this sampling effort included different sampling

locations selected each year throughout the State's coastal waters, only data collected from the five stations (see Figure 3.3-1 for station locations) within the study area are discussed (see Table 3.3-2). Several replicate grab samples were collected from all stations sampled once during the summer months (mid-June through August). Contaminants measured included metals, PAHs, PCBs, polybrominated diphenyl ethers (PBDEs), and pesticides. Toxicity levels at each site, measured using the results of three bioassays employed as indicators of contaminant bioavailability and evidence of probable contaminant effects on benthic species, also are summarized. Findings from the series of technical reports generated through this program and the data obtained from those surveys can be obtained from the SCECAP website (SCECAP 2014).

3.3.3.1 Contaminants

In 2000, Station RO00056, located in the turning basin of Shipyard Creek, was rated as poor due to elevated levels of arsenic, copper, and chromium, plus eight PAHs, which exceeded the concentration of a contaminant that resulted in adverse bioeffects in 10 percent of the studies examined (defined as the Effects Range-Low or ER-L levels) (Long et al. 1998). Stations RO026290, RO026028, RO08352, and NOR09056 were rated as marginal due to moderately elevated contaminant concentrations.

3.3.3.2 Toxicity

Bioassays were used by SCECAP to provide useful evidence of probable contaminant effects in sediments on benthic species. Given the variability in the results from the three bioassays used, a weight of evidence approach was used to define sediment toxicity. No positive tests indicated non-toxic sediments, while only one positive test indicated possible evidence of toxic sediments; two or more positive tests indicated a high probability of toxic sediments; however, after evaluating six years of data, it was determined that the amphipod assay does not perform well in the region and therefore was removed from the methodology. As a result, in 2005 only two assays were used; a positive test result in both assays indicated a high probability of toxic sediments, positive results in only one of the assays indicated possible evidence of toxic sediments, and no positive results indicated non-toxic sediments.

Stations RO00056 (1999-2000 survey period) and NOR09056 (2009-2010 survey period) demonstrated results indicating toxic sediments. Station RO026028 (2001-2002 survey period) suggested possible toxic sediments and Stations RO026290 (2001-2002 survey period) and RO08352 (2007-2008 survey period) showed non-toxic sediments.

3.3.4 Groundwater Quality

The Cooper River sub-basin overlays the Coastal Plain aquifers. Regionally, the Middendorf aquifer is the principal public supply groundwater source in the vicinity of the study area while the Tertiary

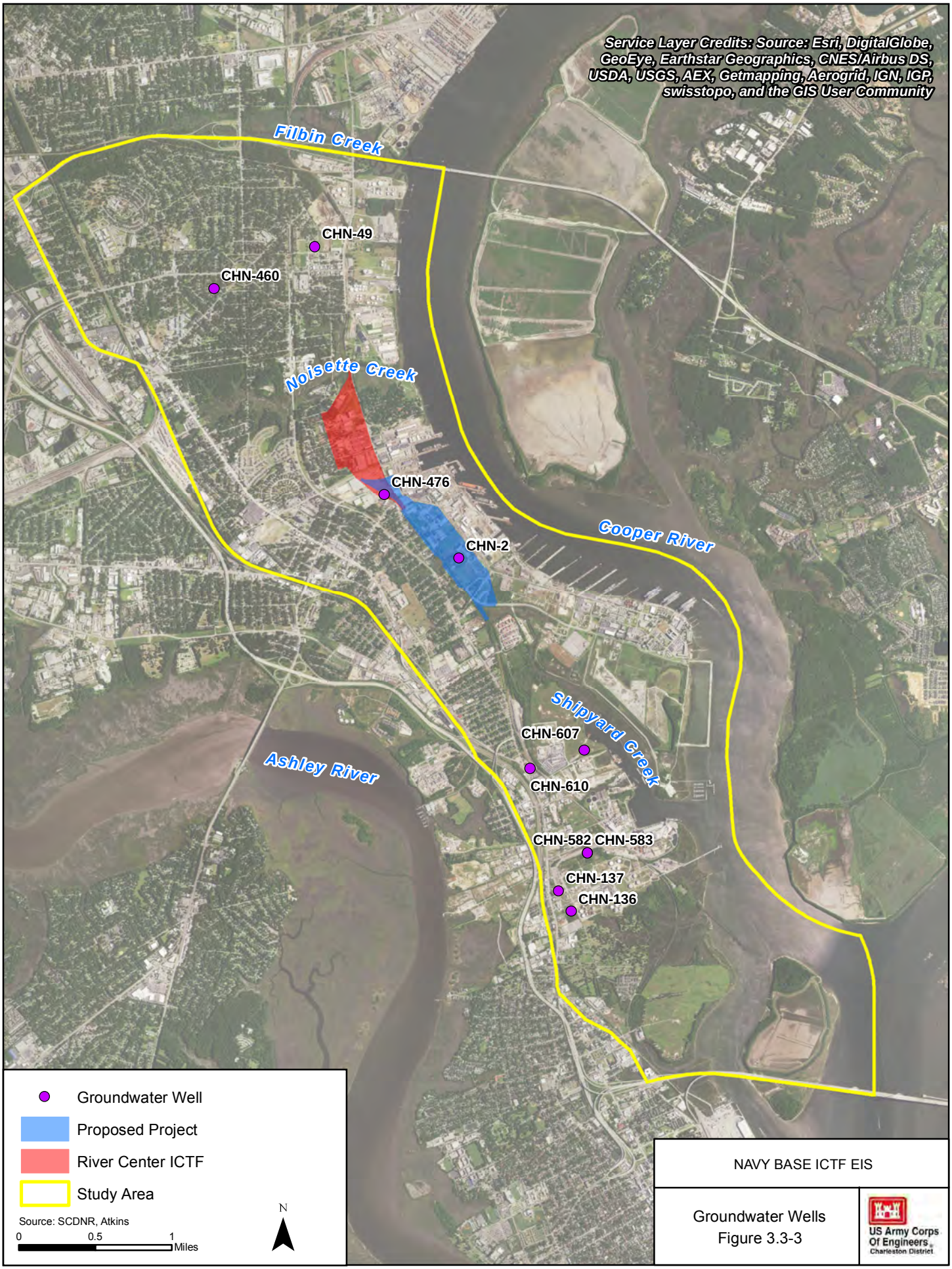
sand and Floridan aquifers are the most commonly used groundwater sources, especially in areas south and west of Charleston (SCDNR 2009).

Mt. Pleasant is the largest user for municipal supply, withdrawing 1,783 million gallons in 2006. Significant cones of depression have developed in both the Middendorf and Floridan aquifers due to the long-term and ever-increasing use of groundwater in this sub-basin (SCDNR 2009). SCDHEC has designated Berkley, Charleston, and Dorchester counties as the Trident Capacity Use Area. Because the study area is located in Charleston County, any production water wells or well fields withdrawing more than three million gallons per day (gpd) must be permitted through SCDHEC.

The SCDNR maintains a record of coastal plain water wells. There are ten wells in the study area (Table 3.3-6; Figure 3.3-3) and two of these are located in the project site. The two wells that are located within the project site, CHN-2 (18CC-r1) and CHN-476 (18CC-q1), are assigned for industrial use and unused, respectively (SCDNR 2007).

Municipal water supplies for the City of North Charleston, where the project site is located, are served by the Charleston Water System. This utility gets their water primarily from Bushy Park Reservoir and secondarily from the Edisto River. The Charleston Water System has no operating groundwater wells in the study area (personal communication, Jane Byrne, Charleston Water System, September 30, 2014).

The Middendorf aquifer is characterized by alkaline, very soft water of a generally sodium bicarbonate type with high levels of total dissolved solids (TDS) and fluoride levels above recommended drinking water limits (SCDNR 2009, Park 1985). Although water quality in the Tertiary sand aquifer is generally good in northern Berkeley and Charleston Counties, it becomes increasingly mineralized to the southeast and with depth. The Tertiary sand aquifer varies from a sodium bicarbonate type in Berkeley County to a sodium chloride type in south-coastal Charleston County (SCDNR 2009). Floridan aquifer groundwater tends to be less mineralized than that from the Tertiary sand aquifer, though interaquifer contamination is common in the sub-basin.



NAVY BASE ICTF EIS

Groundwater Wells
Figure 3.3-3

US Army Corps Of Engineers Charleston District

Table 3.3-6
SCDNR Coastal Plain Water Well Records in the Study Area

Well Number	Elevation (ft)	Owner	Use	Depth (ft)	Year Drilled
CHN-2	12	Charleston Naval Shipyard	Industrial	2026	1943
CHN-49	30	Raybestos-Manhattan	Industrial	440	1951
CHN-136	15	Exxon Co.	Unused	504	1960
CHN-137	15	Exxon Co.	Abandoned	510	1961
CHN-460	30	J. T. Bunn	Unused	325	1965
CHN-476	20	U. S. Naval Shipyard	Unused	315	0
CHN-582	0	W. R. Grace Co.	Industrial	240	0
CHN-583	0	W. R. Grace Co.	Industrial	220	0
CHN-607	12	Macalloy Corp.	Industrial	394	1987
CHN-610	10	Macalloy Corp.	Industrial	399	1987

Source: SCDNR 2007. Disclaimer: The SCDNR does not guarantee the accuracy of this well information. In many cases, our well information comes from old records, and as a result, some of the information, such as the well owner or the well use, may no longer be accurate. This is in no way a complete inventory of all the water wells in the South Carolina Coastal Plain.

Groundwater quality within the shallow aquifer is vulnerable to contamination throughout most of the Santee Basin and varies greatly in the sub-basin. Contaminants from fertilizers, pesticides, and spills or leaks at or near the land surface can move quickly to the water table, especially in areas where sandy soils offer little opportunity for filtration or degradation of pollutants. Under the project site, groundwater quality within the surficial aquifer has been affected by contaminants associated with anthropogenic activities in the area (see Section 3.15, HTRW); however, protection of deeper aquifers is provided by the Cooper Formation, which functions as an effective confining unit, inhibiting downward movement of groundwater (Park 1985).

Statewide ambient groundwater monitoring activities are currently suspended (SCDHEC 2013b, 2014c, 2015a); however, site-specific groundwater monitoring is ongoing at potentially contaminated sites. These efforts are addressed in more detail in Section 4.15 (HTRW).

3.4 VEGETATION AND WILDLIFE

3.4.1 Introduction

The affected environment for vegetation and wildlife includes numerous aquatic and terrestrial land cover classes, vegetation communities, and wildlife species. Species listed as threatened, endangered, or candidate by the USFWS pursuant to the Endangered Species Act (ESA), as well as species associated with Essential Fish Habitat (EFH), are addressed in Sections 3.6 and 3.7, respectively.

The Vegetation and Wildlife study area encompasses the Proposed Project and the six Alternatives, which includes the River Center project site, and covers any related activities and adjacent areas that extend west to Spruill Avenue and I-26 (Figure 3.4-1).

3.4.2 Vegetation

The study area is located entirely in the Sea Islands/Coastal Marsh (Level IV) ecoregion (Griffith et al. 2002). The Sea Islands/Coastal Marsh ecoregion contains the lowest elevations in South Carolina and is a highly dynamic environment affected by ocean wave, wind, and river action. Quaternary unconsolidated sand, silt, and clay have been laid down as beach, dune, barrier beach, saline marsh, terrace, and nearshore marine deposits. Mostly sandy soils are found on the barrier islands, while organic and clayey soils often occur in the freshwater, brackish, and salt marsh areas. Maritime forests of live oak (*Quercus virginiana*), eastern red cedar (*Juniperus virginiana*), slash pine (*Pinus elliottii*), and cabbage palmetto (*Sabal palmetto*) grow on parts of the barrier islands, and various species of cordgrass (*Spartina* spp.), saltgrass (*Distichlis* spp.), and rushes (*Juncus* spp.) are dominant in the marshes. The dunes are dominated by sea oats (*Uniola paniculata*), which play a primary role in stabilizing the dunes. Other dune plants include bayberry (*Myrica* spp.), dogfennel (*Eupatorium capillifolium*), bitter panic grass (*Panicum amarum*), broomsedge (*Andropogon virginicus*), wax myrtle (*Morella cerifera*), and Spanish bayonet (*Yucca aloifolia*) (Griffith et al. 2002).

The island, marsh, and estuary systems of this ecoregion form an interrelated ecological web, with processes and functions valuable to humans, but also sensitive to human alterations and pollution. The coastal marshes, tidal creeks, and estuaries are important nursery areas for fish, crabs, shrimp, and other marine species. Charleston Harbor is one of the largest container ship ports on the East Coast, and it also contains one of the largest commercial shrimp fisheries in the state, raising concerns about the health of the estuary, coastal marshes and associated flora and fauna. The Sea Islands/ Coastal Marsh ecoregion has a long history of human alterations (Griffith et al. 2002).

Four vegetative land cover classes occur in the study area based on the USGS Gap Analysis Program (GAP) Analysis of South Carolina (USGS 2001) (see Table 3.4-1) (Figure 3.4-2). Two of the land cover classes are natural communities and two are land use/non-natural communities that have been modified through the actions of humans. Each class is briefly described below.

Table 3.4-1
Original GAP Land Cover Classes within the Study Area

Class Number	Class Name	Class Description	Acreage within the Study Area
Natural Communities			
2	Marine Water	Salt or estuarine water	15
3	Marsh	High and low marsh, non-forested wetland	106
Land Use/Non-Natural Communities			
24	Urban Development (high intensity)	Industrial development, central business district, large highways	1,044
25	Urban Development (low intensity)	Residential development	131
		TOTAL	**1,296**

3.4.2.1 Vegetation Classes

3.4.2.1.1 Marsh

Brackish Marsh—Brackish marsh is an estuarine plant community that is found on the edges of estuaries, generally upland from adjacent salt marshes; drained by dendritic or sinuous tidal creeks. These communities often are recognized by a nearly dominant growth of blackneedle rush (*Juncus roemerianus*), with a few other predominant species of grasses and sedges. Other species common to this community include big cordgrass (*Spartina cynosuroides*), saltmeadow cordgrass (*S. patens*), saltmeadow bulrush (*Scirpus robustus*), Olney's bulrush (*Scirpus americana*), dwarf spikerush (*Eleocharis parvula*), arrow-grass (*Triglochin striata*), coastal saltgrass (*Distichlis spicata*), annual beard grass (*Polypogon monspeliensis*), seashore dropseed (*Sporobolus virginicus*), annual wildrice (*Zizania aquatica*), water millet (*Ziazniopsis miliacea*), sawgrass (*Cladium jamaicense*), fourangle flatsedge (*Cyperus tetragonus*), narrowleaf cattail (*Typha angustifolia*), tidal-marsh amaranth (*Amaranthus cannabinus*), eastern grasswort (*Lilaeopsis chinensis*), Carolina sealavender (*Limonium carolinianum*), and seaside goldenrod (*Solidago sempervirens*) (Nelson 1986). Brackish marshes are associated upstream from salt marsh, salt shrub thicket, and intertidal mud/sand flats.

Salt Marsh—Salt marsh is an estuarine plant community that occurs on regularly flooded flat areas dominated by salt-tolerant grasses. This community is often totally dominated by cordgrass species such as smooth cordgrass (*S. alterniflora*). Saltmeadow cordgrass and coastal saltgrass are commonly associated with the smooth cordgrass (Nelson 1986). Salt marshes are regularly flooded and are associated downstream from intertidal mud/sand flats and upstream from brackish marshes.

Intertidal Mud/Sand Flat—Intertidal mud/sand flats are marine and estuarine communities that form on unconsolidated mud, sand, sediment, and silt separated from or continuous with permanently immersed land masses. Intertidal mud/sand flats generally are not vegetated, because

there is not enough time during exposure to allow for rooting of seeds and/or vegetative fragments. These areas are often ephemeral sites that are commonly just below the water surface while the tide is in, and are usually subject to some wave action (Nelson 1986). Intertidal mud/sand flats are often at the edges of salt marshes in estuaries.

3.4.2.1.2 Marine Water

Marine water plant community occurs in the subtidal zone and is constantly inundated. No sea-water dilution ever occurs. The bottom is composed of consolidated or unconsolidated sand, mud, sediments, shells, shell fragments, and other non-living detritus. Benthic macrophytes may occur, but at a depth which precludes the development of extensive plant and/or animal colonies (Nelson 1986).

3.4.2.1.3 Urban Development (High Intensity and Low Intensity)

Developed areas are a land use type that lacks natural vegetation communities; these are barren or planted and maintained grass in lawns, golf courses, or industrial sites. Developed lands also include areas of low-intensity residential units, such as single-family house lots, paved roadways, sidewalks, and city parks. Industrial sites include both historical and current operations, such as roads, parking lots, railways, rail yards, overburden stockpiles, shipyards, industrial buildings, and warehouses.

3.4.2.2 Noxious Plants

Noxious plants have been observed within the study area. According to surveys conducted in July 2014 and January 2016, sixteen noxious plants, including two introduced tree species, occur within the study area as listed in Table 3.4-2. Such species can dominate or displace native vegetation and can occur in nearly single-species colonies or stands that present a lowered structural diversity and poor wildlife habitat.

Table 3.4-2
Noxious Plants within the Study Area

Common Name	Scientific Name	State Noxious Status	Threat Category
Trees			
Tree of Heaven	*Ailanthus altissima*	None	Severe Threat[1]
Mimosa	*Albizia julibrissin*	None	Significant Threat[2]
Shrubs			
Chinese privet	*Ligustrum sinense*	None	Severe Threat
Multiflora rose	*Rosa multiflora*	None	Significant Threat
Nandina	*Nandina domestica*	None	Alert[3]
Vines			
English ivy	*Hedera helix*	None	Severe Threat
Japanese honeysuckle	*Lonicera japonica*	None	Severe Threat
Kudzu	*Pueraria montana* var. *lobata*	None	Severe Threat
Chinese wisteria	*Wisteria sinensis*	None	Severe Threat
Common periwinkle	*Vinca minor*	None	Significant Threat
Porcelain berry	*Ampelopsis brevipedunculata*	None	Not designated
Herbs and Grasses			
Chinese lespedeza	*Lespedeza cuneata*	None	Severe Threat
Common reed	*Phragmites australis*	ILAP, PP[4]	Severe Threat
Parrotfeather	*Myriophyllum aquaticum*	None	Not designated
Alligatorweed	*Alternanthera philoxeroides*	ILAP, PP	Not designated
Creeping liriope	*Liriope spicata*	None	Alert

[1] Severe Threat—Invasive exotic plant species that are known to pose a severe threat to the composition, structure, or function of natural areas in the state of South Carolina.

[2] Significant Threat—Invasive exotic plant species that are established in natural areas, spreading independently, and causing significant damage to natural communities; but may not be as widespread or difficult to manage as "Severe Threat" species.

[3] Alert—Exotic plant species known to pose a severe threat to natural areas in adjacent states or in the southeast with a limited distribution in South Carolina or not currently recorded here. More distribution information is needed for most of these species.

[4] ILAP—Invasive aquatic plant; PP—Plant pest

Source: NRCS 2014b.

3.4.3 Wildlife

Many wildlife species occupy the vegetation communities of the study area. Field studies of the Vegetation and Wildlife Resources Study Area have documented the presence of wildlife, both terrestrial and aquatic, that are typical to the Sea Islands/Coastal Marsh ecoregion. This section describes the terrestrial and aquatic wildlife known to occur within the study area for the Proposed Project.

3.4.3.1 Terrestrial

Bird species were observed and recorded during site visits of the study area in July 2014 and January 2016. The dominant species observed were the Carolina wren (*Thryothorus ludovicianus),* laughing gull *(Leucophaeus atricilla)*, and American crow (*Scorvus brachyrhynchos*). The other species observed included the blue jay (*Cyanocitta cristata*), great blue heron (*Ardea herodius*), northern cardinal (*Cardinalis cardinalis*), snowy egret (*Egretta thula*), and white ibis (*Eudocimus albus*), as well as two raptor species: the red-shouldered hawk (*Buteo lineatus*) and the turkey vulture (*Cathartes aura*). No active bird nests were observed during either of the site visits.

In general, diversity and densities of birds tend to be low in newly abandoned, developed land and increase as succession proceeds. Common summer residents to the study area include the northern cardinal, northern mockingbird (*Mimus polyglottos*), mourning dove (*Zenaida macroura*), buntings (*Passerina* spp.), and sparrows (Passeridae). Other species typical to this area include the common yellowthroat (*Geothlypis trichas*), brown thrasher (*Toxostoma rufum*), eastern meadowlark (*Sturnella magna*), red-winged blackbird (*Agelaius phoeniceus*), and common grackle (*Quiscalus quiscula*). Other raptors known to inhabit the study area include the red-tailed hawk (*Buteo jamaicensis*) and barred owl (*Strix varia*), which feed primarily on small animals.

Terrestrial habitats (i.e., urban development) make up the majority of the study area and contain fewer unique niches than the aquatic habitats described below, and therefore, have a less diverse mammalian community. Typical mammals common to the study area include marsupials, insectivores, bats, rabbits, rodents, carnivores, and hooved mammals. Many mammals are widely distributed and can be found in a variety of habitats; however, they often tend to exhibit a preference for a specific habitat. Mammal species were observed and recorded during site visits of the study area in July 2014 and January 2016. The dominant species observed were white-tailed deer (*Odocoileus virginianus*), beaver (*Castor canadensis*), raccoon (*Proycon lotor*), opossum (*Didelphis marsupialis*), eastern gray squirrel (*Sciurus carolinensis*), and eastern cottontail rabbit (*Sylvilagus flordanus*).

Other mammals known to inhabitat the study area include the old field mouse (*Peromyscus polionotus*) and striped skunk (*Mephitis mephitis*). Most of the upland areas have been converted to open fields and/or residential and commercial disturbed land. Areas where cleared fields are interspersed with wooded lots provide habitat for a number of mammalian species, such as eastern

cottontail rabbit, old field mouse, eastern harvest mouse (*Reithrodontomys megalotis*), coyote (*Canis latrans*), red fox (*Vulpes vulpes*), and white-tailed deer.

Typical reptiles that are known to occur within the study area include the eastern box turtle (*Terrapene carolina*), green anoles (*Anole carolinensis*), six-lined racerunner (*Cnemidophorus* [*Aspidoscelis*] *sexlineatus*), black racer (*Coluber constrictor*), and eastern garter snake (*Thamnophis sirtalis*). The reptile species observed in the Vegetation and Wildlife study area during site visits in July 2014 and January 2016 include the yellow-bellied slider (*Trachemys scripta scripta*) and the five-lined skink (*Eumeces* [*Plestiodon*] *fasciatus*).

3.4.3.2 Aquatic

The aquatic ecosystems of the study area (i.e., marshes and marine water) provide habitat to a wide array of aquatic species. Crustaceans are abundant throughout the tidal salt marsh found within the study area. The most abundant crustaceans observed during field surveys include the blue crab (*Callinectes sapidus*), fiddler crab (*Uca pugnax* and *Uca pugilator*), and barnacle (*Chthamalus stellatus*). Other crustaceans known to occur within the study area include stone crab (*Menippe mercenaria*), crayfish species (*Cambarus* spp.) and penaeid shrimp, such as grass shrimp (*Palaemonetes vulgaris*, *P. pugio*), brown shrimp *(Farfantepenaeus aztecus*), and white shrimp (*Litopenaeus setiferus*). The federally managed species, such as brown and white shrimp, that may use EFH within the study area is described further in Section 3.7 (Essential Fish Habitat).

The shrimp fishery is the most commercially important fishery in South Carolina, followed by fisheries for blue crab and oysters. Blue crabs are harvested commercially and recreationally in South Carolina, with crab traps, or pots as the primary method used in their harvesting. Grass shrimp have no commercial or recreational value as food for humans, but the brown and white shrimp are both commercially viable species in South Carolina. A serious threat to the paenid shrimp population is loss of nursery areas due to filling, dredging, and draining of critical marsh habitat. Mollusks, such as the eastern oyster (*Crassostrea virginica*) and hard clams (*Mercenaria mercenaria*), are most abundant in the intertidal brackish waters of the study area. The eastern oyster is also an important commercially viable species to South Carolina.

Although, no amphibians were observed within the study area during site visits in July 2014 and January 2016, numerous amphibian species are common to the Sea Islands/Coastal Marsh ecoregion. The study area contains habitat for several amphibian species including the Southern toad (*Bufo* [*Anaxyrus*] *terrestris*), bullfrog (*Rana* [*Litobates*] *catesbeiana*), and marbled salamander (*Ambystoma opacum*). The only aquatic reptile species known to occur within the study area is the American alligator (*Alligator mississippiensis*).

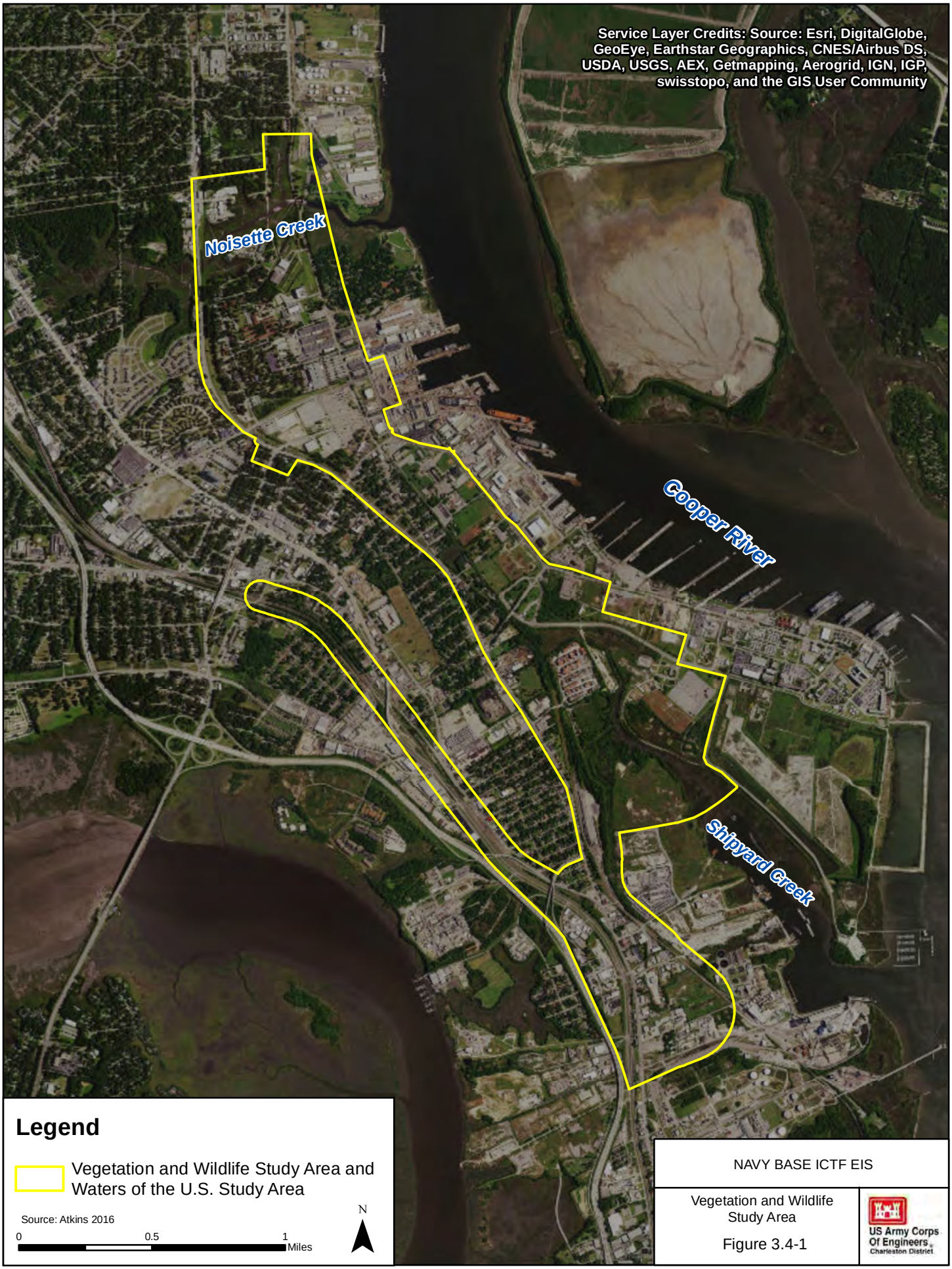
The fish communities of the study area consist of diverse assemblages of estuarine and coastal marine species. Species assemblages are generally associated with physical characteristics in the

aquatic ecosystem, such as salinity, vegetation, and bottom substrate. The anadromous fish community common to the Sea Islands/Coastal Marsh ecoregion include the American shad (*Alosa sapidissima*), hickory shad (*Alosa sapidissima*), blueback herring (*Alosa aestivalis*), striped bass (*Morone saxatilis*), and Atlantic sturgeon (*Acipenser oxyrinchus*). All of these species are transients that travel from the coastal marine environment, through estuaries, to riverine areas during spawning migrations. Juveniles of anadromous species utilize estuaries as nursery grounds, but spend most of their lives in coastal marine waters.

Fish species expected to dominate the subtidal marsh areas of the study area include star drum (*Stellifer lanceolatus*), Atlantic croaker (*Micropogonias undulatus*), spot (*Leiostomus xanthurus*), spotted seatrout (*Cynoscion nebulosus*), striped mullet (*Mugil cephalus*), weakfish (*Cynoscion regalis*), and red drum (*Sciaenops ocellatus*). The bay anchovy (*Anchoa mitchilli*), black cheek tonguefish (*Symphurus plagiusa*), southern flounder (*Paralichthys lethostigma*), white catfish (*Ictalurus catus*), Atlantic bumper (*Chloroscombrus chrysurus*), Atlantic menhaden (*Brevoortia tyrannus*) hogchoker (*Trinectes maculatus*), and spotted hake (*Urophycis regia*) are also common to this habitat type.

The study area contains intertidal salt marsh areas that provide habitat for resident species, such as killfish and gobies, which seek refuge from predators amongst the emergent vegetation during periods of high tide. Most fish species that inhabit the marsh surface are larval or juvenile stages of seasonal transients. Other species such as silver perch (*Bairdiella chrysoura*), southern flounder, spotted sea trout, and striped mullet take advantage of intertidal mud/sand flat areas to gain access to vegetated areas on the more elevated portion of the marsh.

No marine mammals were observed during site visits of the study area in July 2014 and January 2016; however, numerous marine mammal species are known to occur in the Sea Islands/Coastal Marsh ecoregion. Marine mammals include cetaceans (whales and dolphins), pinnipeds (seals), sirenians (manatees) and sea otters, all of which are protected by the Marine Mammal Protection Act. Cetaceans, seals, and manatees all occur periodically in South Carolina waters. The bottlenose dolphin (*Tursiops truncatus*) is the only common inshore mammal, but many species of cetaceans can be found offshore. Manatees and seals are seasonal visitors to South Carolina. Florida manatees expand their range north and west every summer and routinely move into South Carolina waters each year. Seals are usually winter visitors, and thus may or may not show up every year. Most seals in South Carolina waters are harbor seals. The study area contains habitat for several species, such as the bottlenose dolphin and West Indian manatee (*Trichechus manatus*). Dolphins are not threatened or endangered, but are protected under the Marine Mammal Protection Act. The West Indian manatee is currently federally listed as an endangered species for Charleston County, South Carolina and is described in greater detail in Section 3.6 (Protected Species).



NAVY BASE ICTF EIS

Vegetation and Wildlife Study Area

Figure 3.4-1

US Army Corps Of Engineers Charleston District

NAVY BASE ICTF EIS

Land Cover

Figure 3.4-2

US Army Corps Of Engineers Charleston District

3.5 WATERS OF THE U.S.

3.5.1 Introduction

The term "Waters of the U.S." includes streams, creeks, rivers, ponds, lakes, and vegetated wetlands. The Waters of the U.S. study area shares the same boundaries as the Vegetation and Wildlife study area depicted in Figure 3.4-1. This section provides a baseline characterization of water resources within the Waters of the U.S. study area for the Proposed Project, and describes their extent, location, community type, and function. The affected environment includes portions of Noisette Creek, Shipyard Creek, and associated tidal salt marshes.

In accordance with 33 CFR 328.3[2], Waters of the U.S. are defined as:

1. *"All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;*
2. *All interstate waters including interstate wetlands;*
3. *All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters:*

   (i) Which are or could be used by interstate or foreign travelers for recreational or other purposes; or

   (ii) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or

   (iii) Which are used or could be used for industrial purpose by industries in interstate commerce;
4. *All impoundments of waters otherwise defined as waters of the United States under the definition;*
5. *Tributaries of waters identified in paragraphs (a) (1) through (4) of this section;*
6. *The territorial seas;*
7. *Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) (1) through (6) of this section; and*
8. *Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other Federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with EPA."*

Wetlands are further defined as:

> "*Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas (33 CFR 328.3[b][29]).*"[30]

Hereafter, Waters of the U.S., including wetlands, will be referred to collectively as Waters of the U.S.

3.5.2 Existing Conditions

To identify precise boundaries of Waters of the U.S. would require a detailed site review and preparation of a jurisdictional determination for the Proposed Project. The Corps requires that jurisdictional determinations be developed in accordance with criteria specified in the Corps of Engineers Wetland Delineation Manual (1987 Manual) (Corps 1987), the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0) (Regional Supplement) (Corps 2007 and 2010), and the Regulatory Guidance Letter (RGL) 05-05 Ordinary High Water Mark (OHWM) Identification. These criteria include the presence of appropriate hydrology, the presence of hydric soils, and vegetation communities dominated by hydrophytic (water loving) vegetation.

The Waters of the U.S. were estimated using a desktop based methodology (Appendix D) that integrated field data from the study area of the Proposed Project to calibrate the estimations.

The estimation predicted wetland location and extent from LiDAR (SCDNR 2014b), a stream dataset (USGS 2014), and Charleston Harbor buoy data (NOAA 2014a). The study area was evaluated at targeted locations for the three wetland criteria (hydric soils, hydrophytic vegetation, and hydrology) and the predicted wetland model was updated after additional field reconnaissance.

The study area is located in the Cooper River watershed associated with the USGS designated hydrologic unit code (HUC) 03050201 (as shown in Figure 3.5-1). The ecological characteristics of Waters of the U.S. varies due to their landscape, regional geology, and water budget. Therefore, it is important to consider these aspects in an ecoregion context (see Section 3.4.2.1). The following section provides a summary of the Waters of the U.S., as well as their ecological context and regulatory considerations.

---

[29] " Code of Federal Register," http://www.gpo.gov/fdsys/pkg/CFR-2012-title33-vol3/xml/CFR-2012-title33-vol3-sec328-3.xml

[30] The existing definition of Waters of the U.S. as described in the Federal Register (51 FR 41250, November 13, 1986, as amended at 58 FR 45036, Aug. 25, 1993) is used due to the Order of Stay that is in effect nationwide as described in the Sixth Circuit United States Court of Appeals (15a0246p-06). The final rule published on June 29, 2015, as described in 80 FR 37054 is not used until the Order of Stay is resolved.

NAVY BASE ICTF EIS

USGS HUCs

Figure 3.5-1

US Army Corps Of Engineers Charleston District

3.5.3 Summary of Waters of the U.S. in the Study Area

As summarized in Table 3.5-1, a total of 143.93 acres of Waters of the U.S., consisting of wetlands and open waters, and 3,402.72 linear feet of freshwater creeks were identified within the study area. Of the two categories of wetlands that occur, the most prominent wetland feature is tidal salt marsh. In addition to tidal salt marsh, freshwater wetlands occur in small areas associated with natural drainages not affected by lunar or wind tides (see Figure 3.5-2).

Noisette Creek and Shipyard Creek are both considered Section 10 waters by the Corps. For the purposes of Clean Water Act regulations, both Noisette Creek and Shipyard Creek are also considered Traditionally Navigable Waters (TNWs). These tidal open waters connect all of the Waters of the U.S. features present within the study area to the Cooper River. Along with these two named creeks, there are several ditches that are still considered tidal open waters due to their lunar tide flooding.

There is one freshwater creek, characterized as a perennial Relatively Permanent Water (RPW), located near the intersection of Cosgrove Avenue and Cochise Street. This creek flows for a few hundred feet within the study area before entering a pipe that most likely discharges directly to the Cooper River. This perennial RPW contains a sandy loam substrate and has low flow.

The predictive mapping methods indicated the presence of several other freshwater creeks located within the vicinity of the CSX related activity. Field access to this site was not possible due to its proximity to active rail lines. The entire predicted length of these features are included in Table 3.5-1.

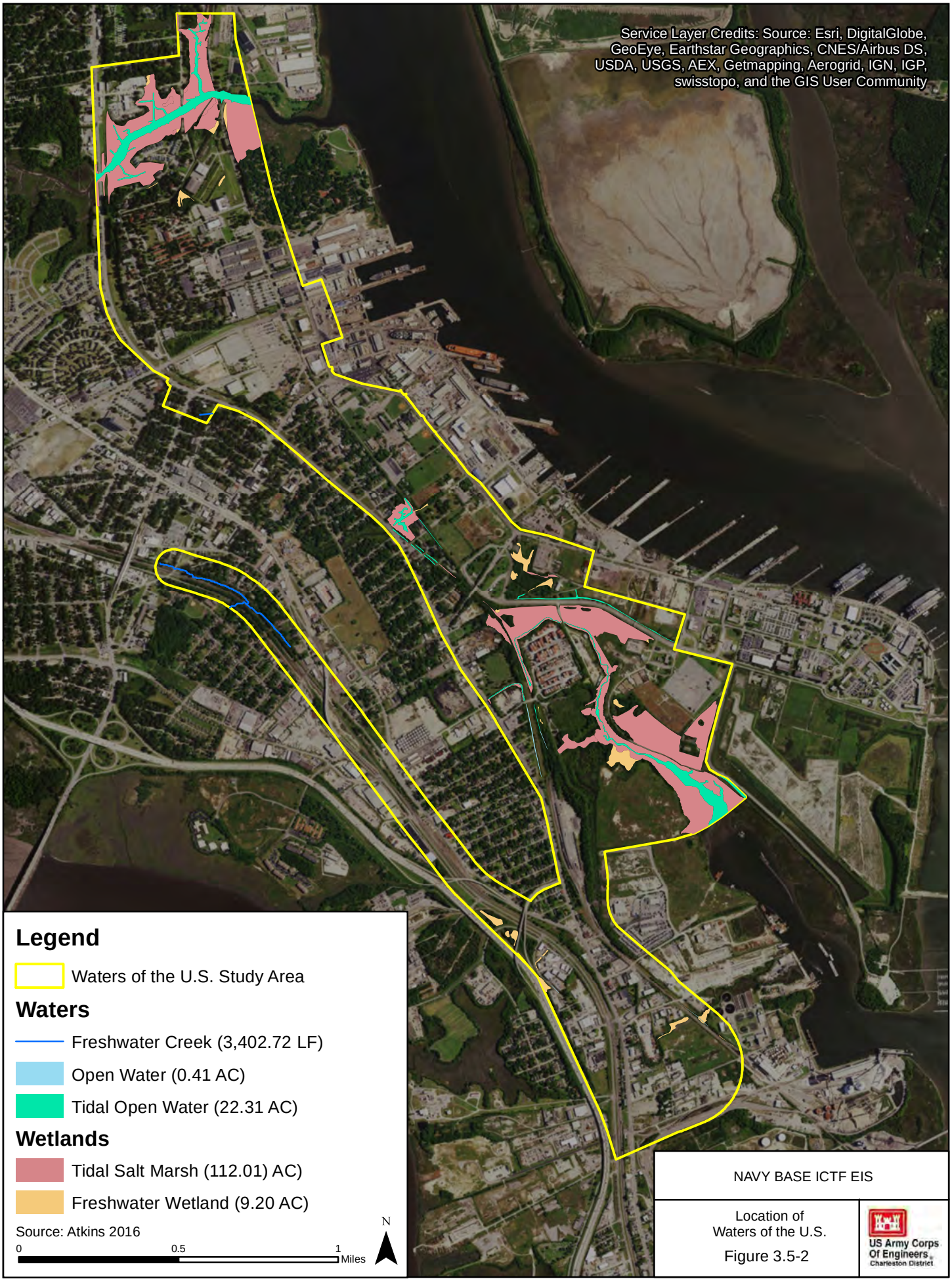
There are also freshwater, open water impoundments located at slightly higher elevations than the tidal open waters in the study area. These features have nearly permanent water, but flow is inconsistent due to tidal fluctuations of the receiving TNWs.

Table 3.5-1
Waters of the U.S. within the Study Area

Summary of Waters of the U.S.	
Wetlands	**Area[1]**
Freshwater Wetland	9.20 AC
Tidal Salt Marsh	112.01 AC
Total Wetlands	**121.21 AC**
Waters	**Length/Area[1]**
Freshwater Creek	3,402.72 LF
Tidal Open Water	22.31 AC
Total Creeks and Tidal Waters	**3,402.72 LF/22.31 AC**
Other	**Area[1]**
Open Water	0.41 AC
Total Waters of the U.S.	**3,402.72 LF/143.93 AC[2]**

[1]AC – acres, LF – Linear Feet

[2]Acreages for Waters of the U.S. were initially identified through GIS desktop analysis of NHD streams and a predicted wetlands layer that was created using a combination of elevation data, Charleston Harbor buoy data, and aerial photo interpretation. The predicted features were verified during field visits to the Waters of the U.S. in the study area for the Proposed Project which took place in June 2014 and January 2016.


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
Waters of the U.S. Study Area
Waters
Freshwater Creek (3,402.72 LF)
Open Water (0.41 AC)
Tidal Open Water (22.31 AC)
Wetlands
Tidal Salt Marsh (112.01) AC)
Freshwater Wetland (9.20 AC)
Source: Atkins 2016
0
0.5
1
Miles
N
NAVY BASE ICTF EIS
Location of
Waters of the U.S.
Figure 3.5-2
US Army Corps
Of Engineers
Charleston District

3.6 PROTECTED SPECIES

3.6.1 Introduction

The affected environment analysis for Protected Species considers all Federal and state-protected threatened, endangered, at-risk, and candidate species with the potential to occur in the Protected Species study area for the Proposed Project. The Protected Species study area includes the physical footprints of the Proposed Project and its alternatives, including the River Center project site, as well as the Cooper River to the east, Shipyard Creek to the south, and adjacent areas of North Charleston to the north of Noisette Creek (Figure 3.6-1). The evaluation area for terrestrial resources encompasses the entire study area above an elevation of 5 feet above Mean Sea Level (MSL), while the evaluation area for aquatic and marine resources encompasses all areas at an elevation below 5 feet MSL, including tidal wetlands, tributaries, and rivers.

This section describes the range and habitat requirements of each species included on the Federal or state lists of threatened or endangered species, as well as any Federal at-risk species and those designated as High Priority and Highest Priority by the SCDNR. There is also a discussion on the presence or absence of critical habitat for these Protected Species. Additional information about available habitats and potential wildlife occurrences is presented in Section 3.4 (Vegetation and Wildlife) and Section 3.7 (Essential Fish Habitat).

3.6.2 Federally Protected Species

The USFWS and NMFS have identified 20 federally listed species that could be present within the Protected Species study area (Table 3.6-1). To ensure that the list of species is comprehensive and up to date, the official species list was reviewed on February 10, 2016 (USFWS 2016). All species' Latin and common names follow USFWS 2016. The actual occurrence of a species in the terrestrial or aquatic portions of the Protected Species study area would depend upon the availability of suitable habitat, which is listed in Table 3.6-2, as well as the season of the year relative to a species' temperature tolerance, migratory habits, and other factors. No federally Protected Species were observed during field visits to the Protected Species study area in July 2014 and January 2016.

NAVY BASE ICTF EIS

Protected Species Study Area

Figure 3.6-1

US Army Corps Of Engineers Charleston District

Table 3.6-1
Federally Protected Species with the Potential to Occur in the Study Area

Species Common Name	Species Scientific Name	Federal Status[1]	State Status
Reptiles			
Green sea turtle	*Chelonia mydas*	Threatened[2]	–
Kemp's ridley sea turtle	*Lepidochelys kempii*	Endangered	–
Leatherback sea turtle	*Dermochelys coriacea*	Endangered	–
Loggerhead sea turtle	*Caretta caretta*	Threatened[2]	Threatened
Marine Mammals			
Fin whale	*Balaenoptera physalus*	Endangered	–
Humpback whale	*Megaptera novaengliae*	Endangered	–
Right whale	*Balaena glacialis*	Endangered	–
West Indian manatee	*Trichechus manatus*	Endangered	–
Fish			
Atlantic sturgeon	*Acipenser oxyrinchus*	Endangered	–
Shortnose sturgeon	*Acipenser brevirostrum*	Endangered	Endangered
Amphibians			
Flatwoods salamander	*Ambystoma cingulatum*	Threatened	Endangered
Birds			
Bachman's warbler	*Vermivora bachmanii*	Endangered	Endangered
Piping plover	*Charadrius melodus*	Threatened	–
Red-cockaded woodpecker	*Picoides borealis*	Endangered	Endangered
Red knot	*Calidris canutus rufa*	Threatened	–
Wood stork	*Mycteria americana*	Threatened	Endangered
Plants			
American chaffseed	*Schwalbea americana*	Endangered	–
Canby's dropwort	*Oxypolis canbyi*	Endangered	–
Pondberry	*Lindera melissifolia*	Endangered	–
Seabeach amaranth	*Amaranthus pumilus*	Endangered	–

Source: USFWS South Carolina List of At-Risk Candidate, Endangered, and Threatened Species for Charleston County, downloaded from USFWS, February 10, 2016.

[1] *Endangered* refers to a taxon "in danger of extinction throughout all or a significant portion of its range." *Threatened* refers to a taxon "likely to become endangered within the foreseeable future throughout all or a significant portion of its range."

[2] Green and loggerhead turtles have distinct population segments, with the Federal listing reflecting the unique threats to recovery of that segment. The listing provided in this table is for the distinct population segment with range that includes Charleston County, South Carolina.

Table 3.6-2
Habitat for Federally Protected Species Within the Study Area

Species Common Name	Species Scientific Name	Federal Status	Potential Habitat Within the Study Area
Reptiles			
Green sea turtle	*Chelonia mydas*	Threatened	Yes
Kemp's ridley sea turtle	*Lepidochelys kempii*	Endangered	Yes
Leatherback sea turtle	*Dermochelys coriacea*	Endangered	No
Loggerhead sea turtle	*Caretta caretta*	Threatened	Yes
Mammals			
Fin whale	*Balaenoptera physalus*	Endangered	No
Humpback whale	*Megaptera novaengliae*	Endangered	No
Right whale	*Balaena glacialis*	Endangered	No
West Indian manatee	*Trichechus manatus*	Endangered	Yes
Fish			
Atlantic sturgeon	*Acipenser oxyrinchus*	Endangered	Yes
Shortnose sturgeon	*Acipenser brevirostrum*	Endangered	Yes
Amphibians			
Flatwoods salamander	*Ambystoma cingulatum*	Threatened, Critical Habitat[1]	No
Birds			
Bachman's warbler	*Vermivora bachmanii*	Endangered	No
Piping plover	*Charadrius melodus*	Threatened, Critical Habitat[1]	No
Red-cockaded woodpecker	*Picoides borealis*	Endangered	No
Red knot	*Calidris canutus rufa*	Threatened	Yes
Wood stork	*Mycteria americana*	Threatened	Yes
Plants			
American chaffseed	*Schwalbea americana*	Endangered	No
Canby's dropwort	*Oxypolis canbyi*	Endangered	No
Pondberry	*Lindera melissifolia*	Endangered	No
Seabeach amaranth	*Amaranthus pumilus*	Endangered	No

[1] Critical habitat refers to a specific geographic area(s) that contains features essential for the conservation of a threatened or endangered species, and that may require special management and protection (a more complete definition can be found in the Endangered Species Act of 1973).

3.6.2.1 Reptiles

There are four federally protected threatened or endangered reptiles known to potentially occur in the Protected Species study area.

Green sea turtle (*Chelonia mydas*)

The green sea turtle is globally distributed and generally found in tropical and subtropical waters along continental coasts and islands between 30° north latitude and 30° south latitude. In the U.S. Atlantic and Gulf of Mexico waters, green turtles are found in inshore and nearshore waters from Texas to Massachusetts, the U.S. Virgin Islands, and Puerto Rico (NOAA 2014b). Green sea turtles primarily use three habitat types: beaches, open ocean convergence zones, and coastal areas for benthic feeding. Adult females migrate from foraging areas to mainland or island nesting beaches and may travel hundreds or thousands of miles each way. After emerging from the nest, hatchlings swim to offshore areas, where they are believed to live for several years, feeding close to the surface on a variety of pelagic plants and animals (NOAA 2014b). When juveniles reach a certain age/size range, they leave the pelagic habitats and travel to nearshore foraging grounds. After they move to these nearshore benthic habitats, adult green sea turtles are almost exclusively herbivores, feeding on sea grasses and algae. Open beaches with a sloping platform and minimal disturbance are required for nesting. Green sea turtles apparently have strong nesting site fidelity and often make long distance migrations between feeding grounds and nesting beaches (Parsons Brinckerhoff 2015). No suitable nesting habitat, such as open beaches, was observed within the Protected Species study area. Additionally, nesting by green sea turtles in South Carolina is infrequent and rare.

Juvenile green sea turtles are the primary sea turtle species that could potentially occur in the project vicinity from April to November (Parsons Brinckerhoff 2015). The tidal open waters of the Protected Species study area may provide marginally suitable foraging habitat for green sea turtles. Nesting and pelagic habitats are not present within the Protected Species study area.

No critical habitat rules have been published for the green sea turtle in South Carolina.

Kemp's ridley sea turtle (*Lepidochelys kempii*)

Kemp's ridley sea turtles are distributed throughout the Gulf of Mexico and U.S. Atlantic seaboard, from Florida to New England. Kemp's Ridley sea turtles are often found in salt marsh habitats. There is only one confirmed Kemp's ridley arribada (a mass nesting behavior unique to Kemp's ridley sea turtle and the Olive ridley sea turtle) in the state of Tamaulipas, Mexico, where nearly 95 percent of worldwide Kemp's ridley nesting occurs. Nesting also occurs in Veracruz, Mexico, and Texas, but on a much smaller scale. Occasional nesting has been documented in North Carolina, South Carolina, and Florida. Adult Kemp's ridleys primarily occupy the neritic zone waters of the continental shelf along the Atlantic Coast. Neritic zones typically contain a muddy or sandy bottom where prey can be found. Their diet consists mainly of crabs, but may also include fish, jellyfish, and an array of mollusks.

Depending on their breeding strategy, male Kemp's ridleys appear to occupy many different areas within the Gulf of Mexico. Some males migrate annually between feeding and breeding grounds, yet others may not migrate at all, mating with females as they are encountered. Female Kemp's ridleys have been tracked migrating to and from nesting beaches in Mexico. Females leave breeding and nesting areas and continue on to foraging zones ranging from the Yucatan Peninsula to southern Florida. Kemp's ridleys rarely venture into waters deeper than 160 feet (NOAA 2014c). The preferred sections of nesting beach are backed up by extensive swamps or large bodies of open water having seasonal narrow ocean connections (Parsons Brinckerhoff 2015). No suitable nesting habitat, such as beaches backed up by swamps or open water, was observed within the Protected Species study area.

Hatchlings, after emerging from the nest, enter the water and must swim quickly to escape predators. Hatchlings remain in currents within the Gulf while others may be swept out of the Gulf, around Florida, and into the Atlantic Ocean. Juveniles have been known to associate with floating sargassum seaweed, utilizing it as an area of refuge, rest, and/or food. The sub-adult turtles return to neritic zones of the Gulf or the Atlantic Ocean to feed and develop until they reach adulthood. The tidal open waters of the Protected Species study area may provide marginally suitable foraging habitat for Kemp's ridley sea turtles; however, nesting and pelagic habitats are not present within the Protected Species study area.

No critical habitat rules have been published for the Kemp's ridley sea turtle in South Carolina.

Leatherback sea turtle (*Dermochelys coriacea*)

The leatherback sea turtle is the most pelagic of the sea turtles. Leatherback turtle nesting grounds are located within tropical regions around the world. Adult leatherbacks are capable of tolerating a wide range of water temperatures and have been sighted along the entire continental East Coast of the United States, as far north as the Gulf of Maine and south to Puerto Rico and the U.S. Virgin Islands, and into the Gulf of Mexico (NOAA 2014d). Adult females require sandy nesting beaches backed with vegetation and sloped sufficiently so the crawl to dry sand is not too far. The preferred beaches have proximity to deep water and generally rough seas (Parsons Brinckerhoff 2015). No suitable nesting habitat, such as beaches backed with vegetation, was observed within the Protected Species study area.

Although leatherbacks are the most pelagic of the sea turtles, they enter coastal waters on a seasonal basis to feed in areas where jellyfish are concentrated. Sightings of leatherback turtles in South Carolina began increasing in the late 1980s. From 1980 to 2003, 141 leatherback carcasses were stranded in South Carolina. Sea turtle nesting season is May 1 through October 1, which is when the majority of sea turtles are in South Carolina waters (Parsons Brinckerhoff 2015). Although, there is no known documentation of sea turtle occurrences in the vicinity of the project, the Protected Species study area may contain foraging habitat for leatherback sea turtle.

No critical habitat rules have been published for the leatherback sea turtle in South Carolina.

Loggerhead turtle (*Caretta caretta*)

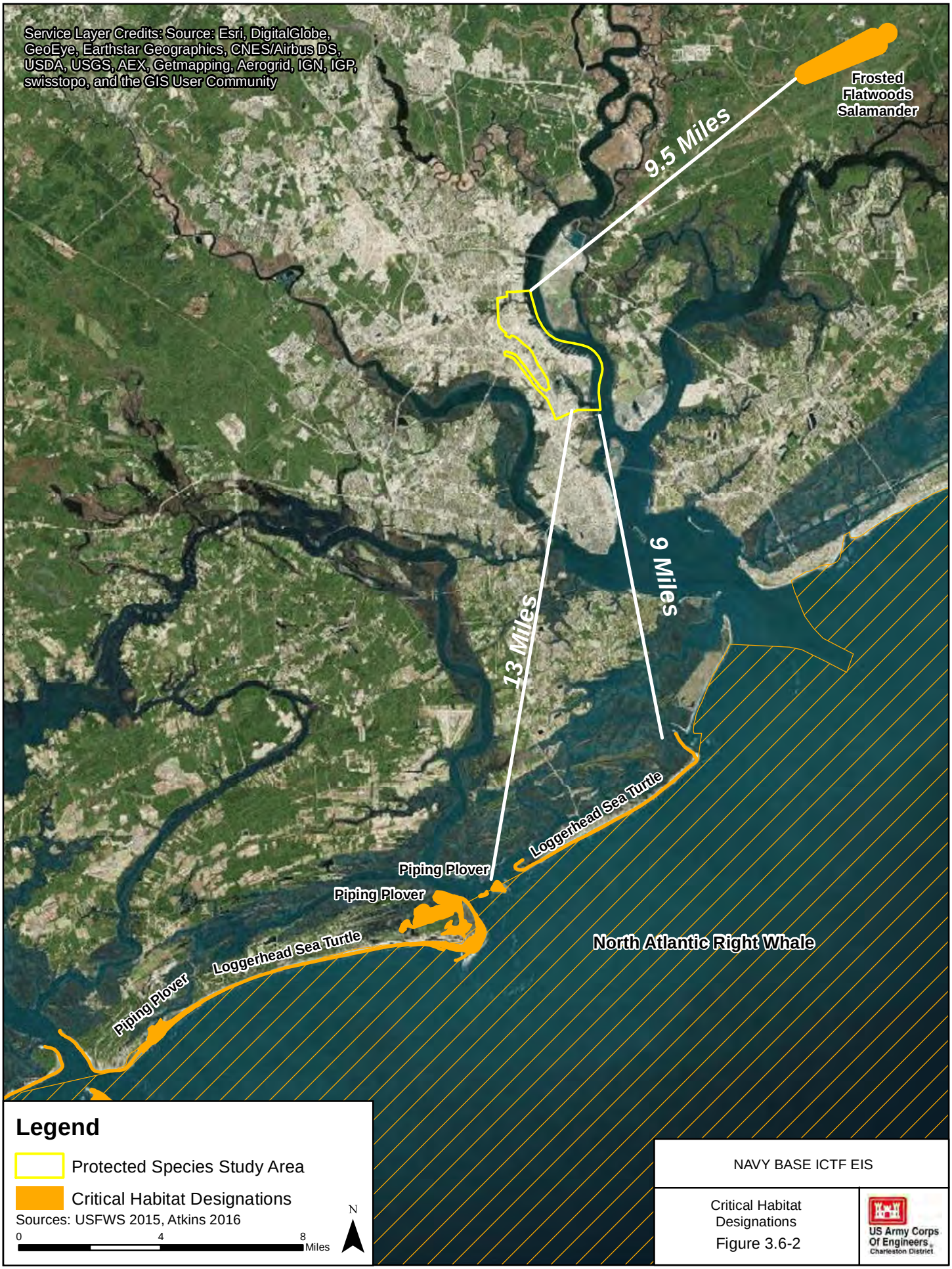
Loggerheads are the most abundant species of sea turtle found in U.S. coastal waters. In the Atlantic, the loggerhead turtles range extends from Newfoundland to as far south as Argentina. During the summer, nesting occurs primarily in the subtropics; although the major nesting concentrations in the U.S. are found from North Carolina through southwest Florida. Adult loggerheads make extensive migrations between foraging areas and nesting beaches. During non-nesting years, adult females from U.S. beaches are distributed in waters off the eastern U.S. and throughout the Gulf of Mexico, Bahamas, Greater Antilles and Yucatan (NOAA 2014e).

Loggerheads occupy three different ecosystems during their lives: beaches (terrestrial zone), water (oceanic zone), and inshore/nearshore coastal areas. In the southeastern U.S., mating occurs in late March to early June and females lay eggs between late April and early September. Loggerheads nest on ocean beaches, generally preferring high energy, relatively narrow, steeply sloped, coarse-grained beaches. Post-hatchling loggerheads take up residence in areas where surface waters converge to form local downwellings. As post-hatchlings, loggerheads may linger for months in waters just off the nesting beach or become transported by ocean currents within the Gulf of Mexico and North Atlantic. Oceanic juveniles migrate between 7 and 12 years of age to nearshore coastal areas and continue maturing until adulthood. The neritic zone provides crucial foraging habitat, inter-nesting habitat, and migratory habitat for adult loggerheads. Bays, sounds, and estuaries along the Atlantic and Gulf coasts of the U.S. are infrequently used by adults. Predominate foraging areas for adult loggerheads are found throughout the relatively shallow continental shelf waters of the U.S., Bahamas, Cuba, and the Yucatan Peninsula (NOAA 2014e).

In South Carolina, the primary nesting beaches are between North Inlet and Prices Inlet (north of Capers Island), but other beaches between Kiawah Island and Hilton Head have moderate nesting densities. Within the Charleston Harbor, primarily only loggerheads nest regularly on the adjacent beaches. The majority of loggerhead sea turtle sightings in South Carolina waters has been from May 1 through October 1 (Parsons Brinckerhoff 2015).

The Protected Species study area may contain suitable foraging habitat for the sub-adult and adult loggerhead sea turtle. In July 2014, the NMFS and the USFWS designated critical habitat for the Northwest Atlantic DPS for loggerhead sea turtles in waters and beach habitat of the Gulf of Mexico and along the coast of the U.S. Atlantic Ocean.[31] The critical habitat designation of nearshore reproductive habitat can be found in Figure 3.6-2. Nearshore reproductive habitat is located 7.5 miles south of the Protected Species study area for the Proposed Project Alternative.

[31] *Federal Register* – https://www.federalregister.gov/articles/2014/07/10/2014-15725/endangered-and-threatened-wildlife-and-plants-designation-of-critical-habitat-for-the-northwest.


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
Frosted Flatwoods Salamander
9.5 Miles
9 Miles
13 Miles
Loggerhead Sea Turtle
Piping Plover
Piping Plover
Loggerhead Sea Turtle
Piping Plover
North Atlantic Right Whale
Legend
Protected Species Study Area
Critical Habitat Designations
Sources: USFWS 2015, Atkins 2016
0
4
8
Miles
N
NAVY BASE ICTF EIS
Critical Habitat Designations
Figure 3.6-2
US Army Corps Of Engineers
Charleston District

3.6.2.2 Mammals

Four federally listed endangered marine mammals have ranges with the potential to occur in the Protected Species study area.

Fin Whale (*Balaenoptera physalus*)

Fin whales are migratory, moving seasonally into and out of high-latitude feeding areas; however, the overall migration pattern for the species is complex. Specific migration routes have not yet been documented. Fin whales are the second-largest species of whale, with a maximum length of about 75 feet in the Northern Hemisphere. Adults can weigh between 40 and 80 tons. Fin whales have a sleek, streamlined body with a V-shaped head. Fin whales can be found in social groups of 2 to 7 whales and in the North Atlantic are often seen feeding in large groups (NOAA 2016a). Fin whales are large, fast swimmers and the killer whale is their only non-human predator. During the summer, fin whales feed on krill, small schooling fish and squid by lunging into schools of prey with their mouth open. Fin whales fast in the winter while they migrate to warmer waters. Physical maturity is attained at approximately 25 years for both sexes. Fin whales can live from 80 to 90 years (NOAA 2016a).

Fin whales are found in deep, offshore waters of all major oceans, primarily in temperate to polar latitudes, and less commonly in the tropics. They occur year-round in a wide range of latitudes and longitudes, but the density of individuals in any one area changes seasonally (NOAA 2016a). The Protected Species study area does not contain suitable habitat for the fin whale due to the lack of foraging or calving habitat.

No critical habitat rules have been published for the fin whale in South Carolina.

Humpback Whale (*Megaptera novaengliae*)

Humpback whales live in all major oceans from the equator to sub-polar latitudes. In the western North Atlantic Ocean, humpback whales feed during spring, summer, and fall over a range that encompasses the eastern coast of the United States and other regions. Humpback whales travel great distances during their seasonal migration (NOAA 2016b). In the summer, humpbacks are found in high latitude feeding grounds. In the winter, they migrate to calving grounds in subtropical or tropical waters of the Caribbean. During migration, humpbacks stay near the surface of the ocean. While feeding and calving, humpbacks prefer shallow waters. During calving, humpbacks are usually found in the warmest waters available at that latitude. Calving grounds are commonly near offshore reefs, islands or continental shores. Humpbacks feeding grounds are in cold, productive coastal waters (NOAA 2016b). The Protected Species study area does not contain suitable habitat for the humpback whale due to the lack of foraging or calving habitat.

No critical habitat rules have been published for the humpback whale in South Carolina.

Right Whale (*Balaena glacialis*)

Right whales inhabit the Atlantic Ocean, particularly between 20° and 60° latitude. The range of a majority of the western North Atlantic distinct population extends from wintering and calving areas in the coastal waters off the southeastern United States to summer feeding and nursery grounds in New England waters. NMFS has identified coastal oceanic waters extending from central Florida to southeastern North Carolina as critical habitat for the right whale, known specifically as the Southeastern U.S. Calving Area (NMFS 2016). Figure 3.6-2 provides the limits of the Southeastern U.S. Calving Area and depicts its proximity to the Protected Species study area. In the coastal waters off Georgia and northern Florida, calving occurs from December through March.

Most known right whale nursery areas are in shallow, coastal waters that make up the neritic zone. Four habitat categories are described for right whale: feeding areas, calving areas, nursery aggregation areas, and breeding locations. Feeding areas can be found in the north Atlantic around the Gulf of Maine and Newfoundland. Calving areas are found within the Southeastern U.S. Calving Area. This area is routinely used for calving, neonatal nursing and nursery aggregation. Breeding locations are where mating behavior occurs, and are not currently described for any population of the right whale. The Protected Species study area does not contain the presence of suitable habitat for the right whale due to the lack of oceanic foraging or calving habitat.

West Indian manatee (*Trichechus manatus*)

The West Indian manatee is found along the coast of Florida and in the Caribbean. Manatees move between freshwater, brackish, and saltwater environments. They prefer large, slow-moving rivers, river mouths, and shallow coastal areas such as coves and bays. The animals may travel great distances as they migrate between winter and summer grounds. During the winter, manatees congregate around warm springs and around power plants that discharge warm water. During the summer months, manatees appear to choose areas based on an adequate food supply, water depth, and proximity to fresh water. Between October and April, Florida manatees migrate to areas of warmer water. For this reason, manatees are only seen in South Carolina in the summer months. According to SCDNR data, there are 32 reported manatee sightings within the Cooper River, Noisette Creek, and Shipyard Creek between 2005 and 2015. Sightings were last reported for Shipyard Creek in 2005 (1) and 2006 (1). In 2014, there were two reported manatee sightings near the Navy Base within the Cooper River, and one reported sighting in Noisette Creek. The most sightings were reported in 2014, with a total of 11, and three sightings were reported in 2015 all within the Cooper River (Parsons Brinckerhoff 2015). The tidal open waters of the Protected Species study area provide suitable estuarine habitat for the West Indian manatee in the Cooper River, Shipyard Creek, and Noisette Creek.

No critical habitat rules have been published for the West Indian manatee in South Carolina.

3.6.2.3 Fish

There are two federally listed endangered fish species, one of which is also state listed as endangered, known to potentially occur in the Protected Species study area.

Atlantic sturgeon (*Acipenser oxyrinchus*)

Historically, Atlantic sturgeon were present in approximately 38 rivers in the United States from St. Croix, Maine, to the Saint Johns River, Florida, of which 35 rivers have been confirmed to have had a historical spawning population. Atlantic sturgeon are currently present in approximately 32 of these rivers, and spawning occurs in at least 20 of them. Atlantic sturgeon adults spawn in freshwater in the spring and early summer and then migrate into estuarine and marine waters where they spend most of their lives. In some southern rivers, a fall spawning migration may also occur. Atlantic sturgeon spawning is believed to occur in flowing water between the fresh/salt water interface and fall line of large rivers, where optimal flows are 46-76 cm/s and depths of 11-27 meters (Parsons Brinckerhoff 2015). Sturgeon eggs are highly adhesive and are deposited on bottom substrate, usually on hard surfaces. It is likely that cold, clean water is important for proper larval development. Once larvae begin migrating downstream, they use benthic structure as refuges. Juveniles usually reside in estuarine waters for months to years.

Sub-adults and adults live in coastal waters and estuaries when not spawning, generally in shallow nearshore areas dominated by gravel and sand substrates. Long distance migrations away from spawning rivers are common. Historically, Atlantic sturgeon were likely present in many South Carolina river/estuary systems, including the Cooper River, but it is not known where spawning occurred. According to the Status Review Team (SRT) for Atlantic sturgeon, the Cooper and Ashley Rivers have been used by Atlantic sturgeon (Parsons Brinckerhoff 2015). The Cooper River is identified by the SRT as currently and historically being used for spawning and as a nursery. SCDNR have been conducting telemetry studies of shortnose and Atlantic sturgeon since 2010, whereby sonic transmitters are inserted into individuals to monitor migration patterns, seasonal habitats, and spawning locations in several coastal systems including the Cooper River. There are approximately 30 monitoring locations within the Cooper River, Charleston Harbor, and Wando River. Based on the telemetry data provided by SCDNR from April 2011 to November 2014 for all 30 monitoring locations, approximately 70% of the detections occurred in the Cooper River (Parsons Brinckerhoff 2015).

The tidal open waters of the Cooper River within the Protected Species study area may provide suitable spawning habitat for adult Atlantic sturgeon due to the presence of flow, salinity, and certain substrates, and may contain feeding and foraging habitat for juveniles, sub-adults, and adults.

No critical habitat rules have been published for the Atlantic sturgeon in South Carolina.

Shortnose sturgeon (*Acipenser brevirostrum*)

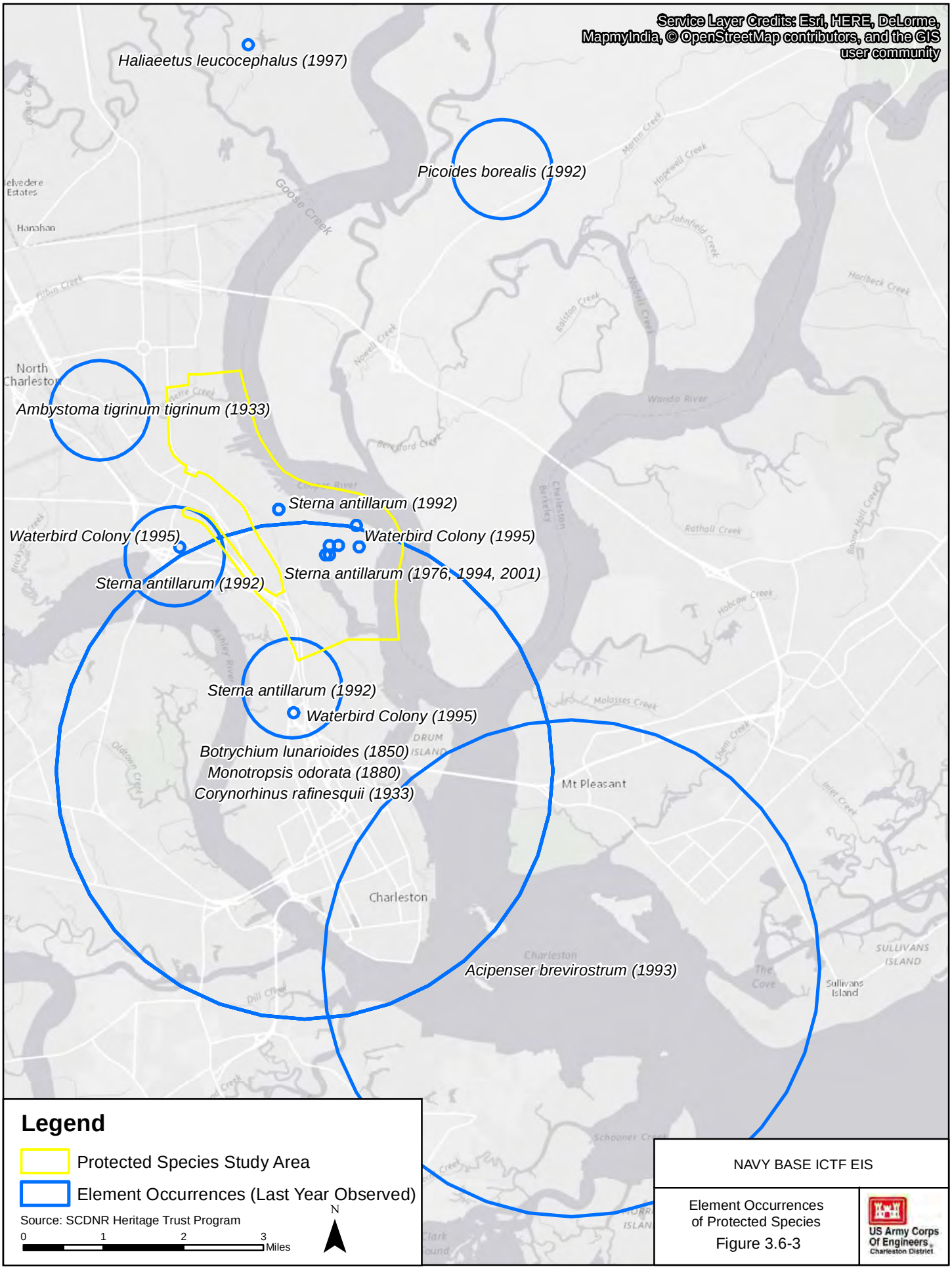
The shortnose sturgeon is anadromous, living mainly in the slower moving riverine waters or nearshore marine waters, and migrating periodically into faster moving fresh water areas to spawn. Shortnose sturgeon inhabit rivers and estuaries. They spawn in the coastal rivers along the east coast of North America. They prefer the nearshore marine, estuarine, and riverine habitat of large river systems. Shortnose sturgeon do not appear to make long-distance, offshore migrations, spending most of their adult life in fresh and brackish water; however, they do venture into the lower coastal reaches and ocean on rare occasions. Shortnose sturgeons are benthic feeders. In South Carolina, shortnose sturgeon are known from the river systems that empty into Winyah Bay and the Santee/Cooper River complex that forms Lake Marion, as well as the Great and Little Pee Dee, Congaree, Wateree, Ashepoo, Edisto, Black, and Waccamaw River systems in South Carolina. One landlocked group may exist in Lake Marion on the Santee River in South Carolina.

In early February to late March, shortnose sturgeon spawn far upstream in freshwater. In most population segments, sturgeon spawn at the uppermost river reaches accessible in channels and curves in gravel, sand, and log substrate. Other suitable substrates include riffles near limestone bluffs with gravel to boulder-sized substrate (Parsons Brinckerhoff 2015). Spawning lasts for about 3 weeks, beginning when water temperatures are at about 8 to 9 ° C, and ending when it reaches approximately 12 to 15 ° C. Optimal flows are between 30 and 76 cm/s. The spent fish migrate downriver from March to May, and spend the summer from June to December in the lower river (Parsons Brinckerhoff 2015).

Adult shortnose sturgeon migrate throughout an individual river system and may also migrate between different river systems, including regional/interstate movement (Parsons Brinckerhoff 2015). In 1999 and 2000, Palmer (2001) monitored adult and juvenile sturgeon in the Savannah River and identified distinct summer and winter habitats in terms of location and water quality. Observations indicate that they seek deep holes upriver for sanctuary where temperatures are warmer and in the winter, they migrate downstream to the estuary during periods of cold (Parsons Brinckerhoff 2015).

The tidal open (estuarine) waters of the Protected Species study area may provide overwintering habitat for adult and juvenile shortnose sturgeon. Since the shortnose sturgeon prefers to spawn in freshwater rivers, the Cooper River is too brackish within the Protected Species study area to provide appropriate spawning habitat. Adult spawning populations of shortnose sturgeon in the Cooper River was 281 fish in the late 1990s according to Mr. Bill Post with SCDNR (Parsons Brinckerhoff 2015). The closest occurrence of this fish is located downstream of the Protected Species study area in Charleston Harbor (Figure 3.6-3).

No critical habitat rules have been published for the shortnose sturgeon in South Carolina.



NAVY BASE ICTF EIS

Element Occurrences of Protected Species

Figure 3.6-3

US Army Corps Of Engineers Charleston District

3.6.2.4 Amphibians

One federally listed threatened amphibian, which is also state listed as endangered, has the potential to occur in the Protected Species study area.

Flatwoods salamander (*Ambystoma cingulatum*)

The flatwoods salamander occurs throughout the Southern Coastal Plain of southern Alabama, Georgia, South Carolina, and northern Florida but is widely scattered in its distribution. It prefers open longleaf pine (*Pinus palustris*) or slash pine (*Pinus elliotti*) flatwoods or savannas with wiregrass (*Aristida stricta*). Typically, the preferred wetland habitats have scattered forest canopies of pond cypress, swamp black gum, and slash pine and an abundance of emergent herbaceous vegetation (Jensen et al. 2008). Temporary fishless wetland depressions also are critical to larvae of this species. Historically, the flatwoods salamander has been found at several sites in the Cainhoy area of the Francis Marion National Forest (SCDNR 2014c). The Protected Species study area does not contain potentially suitable habitat for flatwoods salamanders due to the lack of flatwoods and savannas with a current fire regime.

The closest critical habitat designation is 8.5 miles northeast of the Protected Species study area in Berkeley County (see Figure 3.6-2). The final rule was published in the *Federal Register*[32] on February 10, 2009. As such, critical habitat was established in Berkeley, Charleston, and Jasper counties in South Carolina.

3.6.2.5 Birds

There are five federally listed threatened or endangered birds, three of which are also state listed as endangered, known to potentially occur in the Protected Species study area.

Bachman's warbler (*Vermivora bachmanii*)

Bachman's warbler breeds in the southeastern U.S. and winters in the Caribbean. Historical records indicate the Bachman's warbler may be potentially extirpated. Most authorities agree that if the Bachman's warbler still exists, it is most likely in the I'on Swamp area in Charleston and Berkeley counties, South Carolina. The only confirmed nest observations were recorded during the period from 1897 to 1937. Of these, 26 were from the I'on Swamp area in Francis Marion National Forest. The last confirmed sighting anywhere in the United States was in 1988 (USFWS 1999).

No confirmed breeding records have been reported from the United States since the mid-1960s. Bachman's warbler typically nests in low, wet, forested areas containing variable amounts of water, but usually with some permanent water. Openings in the forest canopy with a ground cover consisting of dense thickets of cane (*Arundinaria gigantea*), palmetto (*Serenoa minor*), blackberry

[32] *Federal Register* on February 10, 2009—http://www.gpo.gov/fdsys/pkg/FR-2009-02-10/pdf/E9-2403.pdf#page=1

(*Rubus cuneifolius*), gallberry (*Ilex glabra*), and other shrubs and vines also are characteristic of nesting habitats. The nests are located near the ground. Migratory habitat preference is unclear; however, they have been known to use a wide range of habitat types during migration, including forest canopy. The Protected Species study area does not contain suitable migratory, winter, or breeding habitat for the Bachman's warbler.

No critical habitat rules have been published for the Bachman's warbler in South Carolina.

Piping plover (*Charadrius melodus*)

The piping plover breeds on the northern Great Plains, in the Great Lakes, and along the Atlantic Coast (Newfoundland to North Carolina); and winters on the Atlantic Coast and Gulf of Mexico Coast from North Carolina to the Caribbean. Piping plovers nest along the sandy beaches of the Atlantic Coast, the gravelly shorelines of the Great Lakes, and on river sandbars and alkali wetlands throughout the Great Plains region. They prefer to nest in sparsely vegetated areas that are slightly raised in elevation (like a beach berm). Piping plover breeding territories generally include a feeding area—such as a dune pond or slough, or near the lakeshore or ocean edge. These birds are primarily coastal during the winter, preferring areas with expansive sand or mudflats (feeding) in close proximity to a sandy beach (roosting). The Protected Species study area does not contain the presence of suitable habitat for the piping plover due to the lack of feeding, niche, nesting, or other critical habitat.

No critical habitat has been proposed or designated for the Atlantic Coast breeding population, but the needs of the breeding population were considered in the 2001 critical habitat designation for wintering piping plovers (USFWS 2001) and in subsequent redesignations (USFWS 2009). Critical habitat for the piping plover is not located in the Protected Species study area, and the closest critical habitat designation is 13 miles southwest of the study area near Kiawah Island in Charleston County (see Figure 3.6-2).

Red knot (*Calidris canutus*)

Red knots winter in the coastal United States from Cape Cod to Mexico and South America and spend the summer on islands in the High Arctic. They over-winter all along the South Carolina coast, primarily on sandy beaches and mud flats. Nests are constructed near water on shallow depressions lined with leaves and lichens. This species feeds on mollusks, marine worms, and horseshoe crab eggs. During migration, red knots gather in huge flocks, stopping along coastal areas to recharge their energy reserves for their flight to wintering grounds in Central and South America. The abundance of horseshoe crab eggs provides ample protein for the migrating knots. The Protected Species study area contains the presence of suitable forging habitat for overwintering or migrating red knots due to the presence of mud flats within the tidal salt marsh and tidal open water vegetation communities.

No critical habitat rules have been published for the red knot in South Carolina, though it is possible that future evaluations may identify critical habitat in the State. Even with additional evaluation, it would be unlikely that critical habitat would be identified within the Protected Species study area.

Red-cockaded woodpecker (*Picoides borealis*)

Red-cockaded woodpeckers were once considered common throughout the longleaf pine ecosystem. The birds inhabited the open pine forests of the southeast from New Jersey, Maryland, and Virginia to Florida, west to Texas and north to portions of Oklahoma, Missouri, Tennessee, and Kentucky.

The red-cockaded woodpecker's habitat includes forests with trees old enough for roosting, generally at least 60 years old and older. They need live, large older pines in which to excavate their cavities; usually preferring longleaf pines (*Pinus palustris*). Foraging habitat is provided in pine and pine hardwood stands 30 years old or older with foraging preference for pine trees 10 inches or larger in diameter (USFWS 1985. Roosting cavities are excavated in living pines, and usually in those infected with a fungus known as red-heart disease. The hardwood midstory needs to be controlled through a routine fire regime. The Protected Species study area does not contain the presence of suitable habitat for red-cockaded woodpeckers due to the lack of mature pine trees and a routine fire regime to control the midstory hardwoods. Several clusters of birds are known to exist in the Francis Marion National Forest. The closest occurrence of the red-cockaded woodpecker is approximately 3 miles northeast of the Protected Species study area in Cainhoy Plantation (see Figure 3.6-3). One colony was discovered with two active cavity trees in 1992 (SCDNR 2014c).

No critical habitat rules have been published for the RCW in South Carolina.

Wood stork (*Mycteria americana*)

Now restricted to Florida, Georgia, and South Carolina, the wood stork may have formerly bred in most of the southeastern United States and Texas. The wood stork breeding population is now estimated at around 8,000 nesting pairs (16,000 breeding adults). Wood storks move northward after breeding, with birds from the southeastern United States moving as far north as North Carolina on the Atlantic Coast and into Alabama and eastern Mississippi along the Gulf Coast (USFWS 1996). Wood storks use freshwater and estuarine wetlands for nesting, feeding, and roosting. They feed in a wide variety of tidal and freshwater ecosystems: freshwater marshes, ponds, hardwood and cypress swamps, narrow tidal creeks or shallow tidal pools, and artificial wetlands—for instance, seasonally flooded roadside and agricultural ditches, impoundments, and large reservoirs. Particularly attractive feeding sites are depressions in marshes or swamps where fish become concentrated during periods of falling water levels. They nest in patches of medium to tall trees, in standing water, or on islands surrounded by expanses of open water. In South Carolina, wood storks nest in four counties; with seven nesting colonies in existence. As of the summer of 1997, the nesting population of wood storks in South Carolina came to more than 950 pairs.

Three historic wood stork rookeries are located near the Protected Species study area: 7.5 miles, 10 miles, and 14 miles (Figure 3.6-4). No wood stork nesting or roosting colonies are known to exist within the Protected Species study area. No wood storks were observed during field observations in July 2014 and January 2016.

The Protected Species study area is located within an Active Core Foraging Area (CFA) for wood storks (USFWS – NFESO undated). Core Foraging Areas for wood storks in South Carolina protect suitable foraging habitat within a 13-mile radius of known rookeries (Figure 3.6-4). The tidal salt marsh and tidal open water vegetation communities all provide suitable foraging habitat for the wood stork.

No critical habitat rules have been published for the wood stork in South Carolina.

3.6.2.6 Plants

There are four federally threatened or endangered plants known to potentially occur in the Protected Species study area.

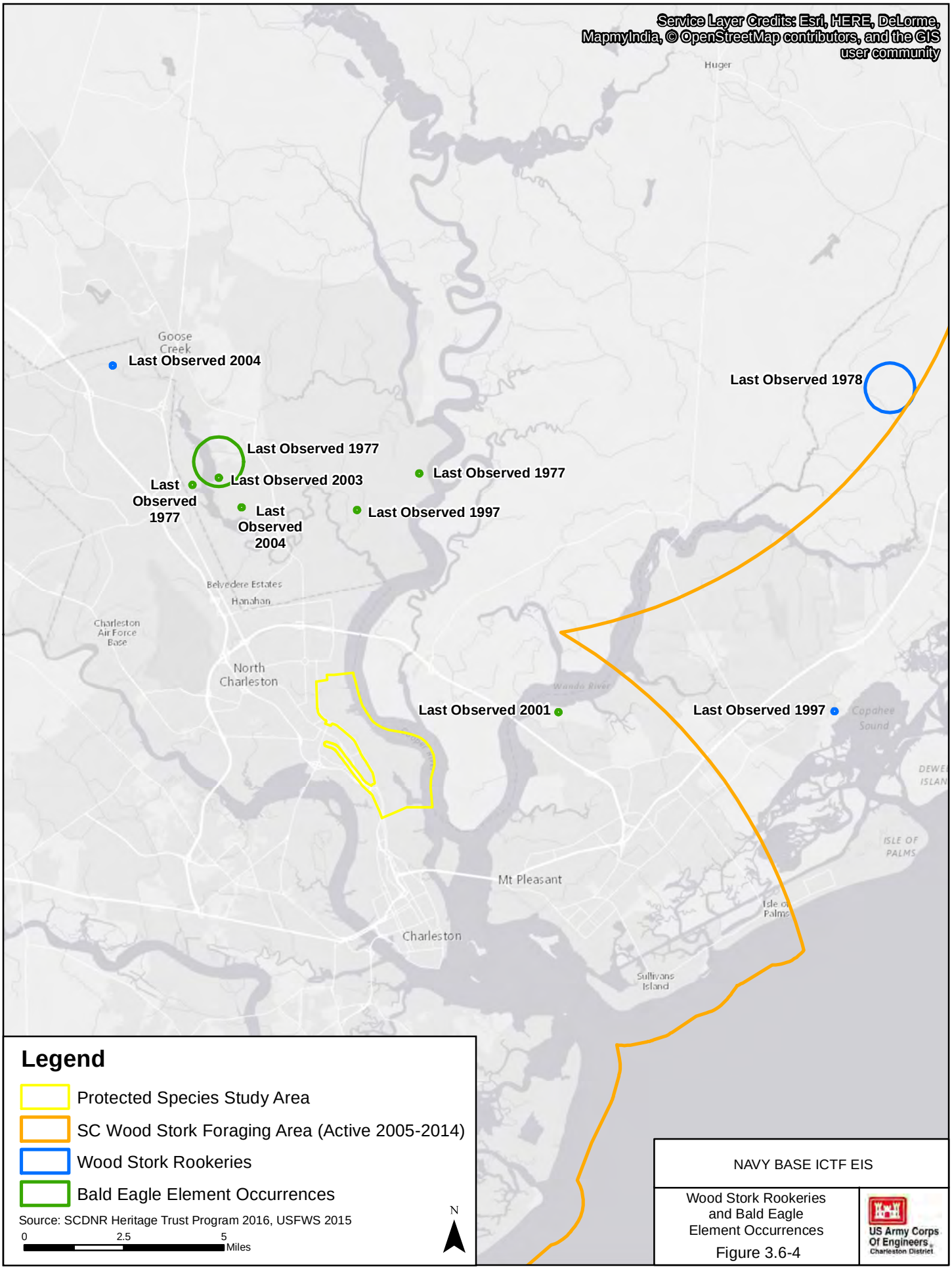
American chaffseed (*Schwalbea americana*)

Currently, American chaffseed—a perennial herb—occurs in New Jersey, North Carolina, South Carolina, Georgia, and Florida. American chaffseed was never considered to be common, but populations have declined and the range has seriously contracted in recent decades. American chaffseed occurs in sandy (sandy peat, sandy loam), acidic, seasonally moist to dry soils. It is generally found in habitats described as open, moist pine flatwoods, fire-maintained savannas, ecotonal areas between peaty wetlands and xeric sandy soils, and other open grass-sedge systems. Chaffseed is dependent on factors such as fire, mowing, or fluctuating water tables to maintain the crucial open to partly open conditions that it requires (USFWS 1994). Known populations of American chaffseed occur in Charleston County; most of which are within the Francis Marion National Forest. The Protected Species study area does not contain suitable habitat for American chaffseed due to the lack of frequently burned longleaf pine sandhills, savannas, or flatwoods that contain moist, grassy ecotones.

No critical habitat rules have been published for the American chaffseed in South Carolina.

Canby's dropwort (*Oxypolis canbyi*)

Canby's dropwort recently occurred in Delaware, Georgia, Maryland, North Carolina, and South Carolina. It is a perennial herb found in a variety of coastal plain habitats, including natural ponds dominated by pond cypress, grass-sedge dominated Carolina bays, wet pine savannas, shallow pineland ponds, and cypress-pine swamps or sloughs. The largest and most vigorous populations



NAVY BASE ICTF EIS

Wood Stork Rookeries and Bald Eagle Element Occurrences

Figure 3.6-4

US Army Corps Of Engineers Charleston District

have been found in open bays or ponds that are wet throughout most of the year but have little or no canopy cover. Soils are sandy loams or acidic peat mucks underlain by clay layers that, along with the slight gradient of the areas, result in the retention of water. The closest known population of Canby's dropwort occurs within the Ashepoo, Combahee and Edisto (ACE) Basin in wetlands within the Colleton County Cowbane Preserve located 80 miles west of the Protected Species study area. The nearest known suitable habitat for the species is located in Frances Marion National Forest. Thus, the Protected Species study area does not contain the presence of suitable habitat for Canby's dropwort due to the lack of open wet plant communities as described above.

No critical habitat rules have been published for the Canby's dropwort in South Carolina.

Pondberry (*Lindera melissifolia*)

Pondberry is found in Arkansas, Missouri, and Mississippi and from North Carolina to Georgia. Pondberry is a deciduous shrub that grows to approximately two meters tall, and is spread vegetatively by stolons (USFWS 1993). Pondberry is associated with wetland habitats, such as bottomland and hardwoods in the interior areas, and the margins of sinks, ponds, and other depressions in the more coastal sites. In South Carolina, pondberry grows along the margins of limestone sinks and shallow depressions. The plant also inhabits pinelands and recently burned open areas. Several populations of pondberry occur in the Francis Marion National Forest in Berkeley County (USDA 2013; USFWS 2014). The Protected Species study area does not contain the presence of suitable habitat for Pondberry due to the lack of depressional wetlands and the suppression of a fire regime.

No critical habitat rules have been published for the Pondberry in South Carolina.

Seabeach amaranth (*Amaranthus pumilus*)

Historically, seabeach amaranth occurred in nine states from Massachusetts to South Carolina. Seabeach amaranth is an annual plant found on the dunes of Atlantic Ocean beaches. It occurs on barrier island beaches (USFWS 2007), where its primary habitat consists of overwash flats at accreting ends of islands and lower foredunes and upper strands of non-eroding beaches (USFWS 2007). It occasionally establishes small temporary populations in other habitats; including sound-side beaches, blowouts in foredunes, and sand and shell material placed as beach replenishment or dredge spoil (USFWS 2007). The Protected Species study area does not contain the presence of suitable habitat for seabeach amaranth due to the lack of barrier island beaches.

No critical habitat rules have been published for the seabeach amaranth in South Carolina.

3.6.3 Federally Protected and At-Risk Species

In 2011, the Southeast Region of the USFWS began working with states, Federal agencies, and other partners (i.e., landowners and non-governmental organizations) to evaluate more than 400 fish, wildlife, and plant species for potential listing under the Federal ESA. The USFWS' Southeast Region has defined "at-risk species" as those that are:

- Proposed for listing under the ESA by USFWS;
- Candidates for listing under the ESA (species that warrant listing but have not been listed, due to higher listing priorities and limited resources);
- Petitioned for listing under the ESA (a citizen or citizen group has requested that the USFWS list them); or
- Species of Greatest Conservation Need (SGCN) as identified by the states.

Table 3.6-3 lists the federally protected and at-risk species that may be present within the Protected Species study area. The actual occurrence of a federally protected or at-risk species in the Protected Species study area would depend upon the availability of suitable habitat, which is listed in Table 3.6-4, as well as the season of the year relative to a species' temperature tolerance, migratory habits, and other factors. Descriptions of these species are included below. During field visits to the Protected Species study area in July 2014 and January 2016, no federally protected or at-risk species were observed.

Table 3.6-3
Federally Protected and At-Risk Species with the Potential to Occur in the Study Area

Species Common Name	Species Scientific Name	Federal Status	State Status
Reptiles			
Eastern diamondback rattlesnake	*Crotalus adamanteus*	ARS	–
Southern hognose snake	*Heterdon simus*	ARS	–
Spotted turtle	*Clemmys guttata*	ARS	Threatened
Mammals			
Rafinesque's big-eared bat	*Corynorhinus rafinesquii*	ARS	Endangered
Tri-colored bat	*Perimyotis subflavus*	ARS	–
Fish			
American eel	*Anguilla rostrata*	ARS	–
Blueback herring	*Alosa aestivalis*	ARS	–
Amphibians			
Gopher frog	*Rana capito*	ARS	Endangered
Insects			
Monarch butterfly	*Danaus plexippus*	ARS	–
Rare skipper	*Problema bulenta*	ARS	–
Birds			
Bald eagle	*Haliaeetus leucocephalus*	Protected	Threatened
Black rail	*Laterallus jamaicensis*	ARS	–
Black-capped petrel	*Pterodroma hasitata*	ARS	–
MacGillivray's seaside sparrow	*Ammodramus maritimus macgillivraii*	ARS	–
Plants			
Boykin's lobelia	*Lobelia boykinii*	ARS	–
Carolina bishopweed	*Ptilimnium ahlesii*	ARS	–
Ciliate-leaf tickseed	*Coreopsis integrifolia*	ARS	–
Godfrey's privet	*Forestiera godfreyi*	ARS	–
Hedge nettle	*Stachys caroliniana*	–	–

Table 3.6-4
Potential Habitat for Federally Protected and At-Risk Species with the Potential to Occur in the Study Area

Species Common Name	Species Scientific Name	Potential Habitat Within the Study Area
Reptiles		
Eastern diamondback rattlesnake	*Crotalus adamanteus*	No
Southern hognose snake	*Heterdon simus*	No
Spotted turtle	*Clemmys guttata*	Marginal
Mammals		
Rafinesque's big-eared bat	*Corynorhinus rafinesquii*	Yes
Tri-colored bat	*Perimyotis subflavus*	Yes
Fish		
American eel	*Anguilla rostrata*	Yes
Blueback herring	*Alosa aestivalis*	Yes
Amphibians		
Gopher frog	*Rana capito*	No
Insects		
Monarch butterfly	*Danaus plexippus*	Yes
Rare skipper	*Problema bulenta*	Yes
Birds		
Bald eagle	*Haliaeetus leucocephalus*	Yes
Black rail	*Laterallus jamaicensis*	Yes
Black-capped petrel	*Pterodroma hasitata*	No
MacGillivray's seaside sparrow	*Ammodramus maritimus macgillivraii*	Yes
Plants		
Boykin's lobelia	*Lobelia boykinii*	No
Carolina bishopweed	*Ptilimnium ahlesii*	No
Ciliate-leaf tickseed	*Coreopsis integrifolia*	No
Godfrey's privet	*Forestiera godfreyi*	No
Hedge-nettle	*Stachys caroliniana*	Yes

Eastern diamondback rattlesnake *(Crotalus adamanteus)*

Diamondback rattlesnakes are restricted to the lower coastal plain of the Southeast, from southern North Carolina to eastern Louisiana, with strongholds centered in Florida and southern Georgia. This species usually inhabits dry sandy areas, palmetto or wiregrass flatwoods, pinewoods, coastal dune habitats, or hardwood hammocks. They generally avoid wet areas, but sometimes live along the edges of swamps. They are accomplished swimmers and even travel through saltwater to and from barrier islands. In many locations, this species relies heavily on gopher tortoise (*Gopherus polyphemus*) burrows during winter months. Diamondbacks spend the winter in stump holes or tortoise burrows but may emerge on warm winter days to bask. Due to the lack of dense vegetation, gopher tortoise burrows, and other upland natural communities, the Protected Species study area does not contain potentially suitable habitat for the eastern diamondback rattlesnake.

Southern hognose snake (*Heterdon simus*)

Southern hognose snakes are currently only found in scattered locations in South Carolina, North Carolina, Georgia, and Florida. Southern hognose snakes are found almost exclusively in sandhill, pine flatwood, and coastal dune habitats and in the sand ridges. Southern hognose snakes are active strictly by day and are often seen on warm mornings in the spring and fall. They are highly fossorial and are most often encountered crossing roads that pass through sandy habitats. Hognose snakes feed almost exclusively on toads, although they will occasionally consume other prey. The Protected Species study area does not contain suitable habitat due to the lack of pine flatwoods and coastal dunes.

Spotted turtle (*Clemmys guttata*)

Spotted turtles are found throughout the coastal plain, including several barrier islands, but are found in spotty populations and are generally uncommon. Favored habitats include shallow aquatic habitats, often with abundant vegetation, including ditches, Carolina bays, bogs, and cypress swamps. These turtles appear to be most common in the early spring when they can be seen basking on logs in wetlands. Data suggest that spotted turtles spend much of the warmer months buried on land (Jensen et al. 2008). The Protected Species study area may contain marginal habitat in freshwater wetland and ditches and nearby terrestrial habitats.

American eel (*Anguilla rostrata*)

American eels occur in rivers of the coastal plain, but rarely can be found in the piedmont. In freshwater, female American eels prefer coastal rivers and reservoirs, where the males congregate close to tidal areas. American eels are diadromous fishes, migrating between fresh and salt waters. Spawning begins when adults leave freshwater and brackish habitats and then migrate to an area in the Atlantic Ocean east of the Bahamas and southwest of Bermuda in the region referred to as the Sargasso Sea. After spawning, eels begin their life as planktonic larva that metamorphose into a glass

eel. The glass eel then metamorphoses into the elver stage where they appear at the mouth of creeks and rivers as they migrate upstream to grow. An elver is a young eel, especially when undergoing mass migration upriver from the sea. Once they are sexually mature, both sexes of eels appear silver and head to the ocean to reproduce. The Protected Species study area may contain the presence of suitable foraging habitat for the American eel.

Blueback herring (*Alosa aestivalis*)

The blueback herring range consists of coastal rivers and streams in the Pee Dee, Santee, and Savannah River drainages and are present in several reservoirs; including lakes Murray, Thurmond, Hartwell, Russell, Jocassee, Marion, and Moultrie. The preferred habitat for blueback herring is the Atlantic Ocean, but migrates up freshwater rivers to spawn in the coastal plain. Blueback herring move into coastal rivers during March and April when the water temperatures reach the mid-50s. Spawning sites can be from the tidal zone to more than 100 miles upstream. The Protected Species study area may contain suitable foraging habitat for the blueback herring.

Gopher frog (*Rana capito*)

The gopher frog occurs throughout the coastal plain and inhabits longleaf pine-wiregrass flatwoods and longleaf pine-turkey oak sandhills. Gopher frogs spend much of their nonbreeding time in gopher tortoise burrows. Of central importance to these frogs is the presence of suitable habitat in the form of temporary wetlands. Most are either treeless or support a scattered canopy of pond cypress and swamp black gum; open-canopy areas with emergent herbaceous vegetation are an important component (Jensen et al. 2008).

Gopher frogs typically migrate to breeding ponds in the fall, winter, and early spring in association with heavy rains. Adults feed on invertebrates and on other anurans, especially toads. The Protected Species study area does not contain potentially suitable nesting and foraging habitat for the gopher frog.

Rare skipper (*Problema bulenta*)

The rare skipper inhabits brackish river marshes and abandoned rice paddies. Isolated populations range along the Atlantic Coast from southern New Jersey and Maryland south to coastal Georgia. The rare skipper has two broods in May and July–September. Adults feed on the nectar from flowers of pickerelweed and swamp milkweed. The Protected Species study area contains suitable forging habitat for the rare skipper due to the presence of tidal salt marsh.

Bald eagle (*Haliaeetus leucocephalus*)

The bald eagle was formerly protected under the ESA until June 2007, when it was determined to have recovered and was delisted. It is, however, still federally protected under the Bald and Golden

Eagle Protection Act (BGEPA), which prohibits any form of taking of both bald and golden eagles except as provided by an incidental take permit. The BGEPA makes it illegal to possess or sell an eagle or any part of an eagle (e.g., feathers, talons, eggs, or nests) or any "taking" of an eagle that includes killing, harassing, disturbing, or poisoning. The bald eagle is the only species within the study area that is protected under a Federal act of this kind.

The bald eagle forages in open fresh, salt or brackish water bodies, including marshes and rivers. Prime habitats have shallow, slow moving water with abundant fish and bird prey. Large manmade reservoirs in South Carolina have provided many acres of new inland eagle foraging habitat, and concentrations of eagles may be found below hydroelectric dams where they forage on injured fish. Impounded marshes managed for waterfowl is also preferred foraging and nesting habitat for the bald eagle.

Potential suitable foraging habitat for the bald eagle occurs within and adjacent to the Protected Species study area along the tidal open waters of the Cooper River, Noisette Creek, and Shipyard Creek (see Table 3.6-4); however, the Protected Species study area does not contain any extensive areas of forest needed for nesting and perching near the river or creeks, or any other open water areas near the Protected Species study area. According to the SCDNR database (SCDNR 2014c), there are no documented bald eagle nest sites in the immediate vicinity of the Protected Species study area. The closest documented occurrence is more than 3 miles north of the Protected Species study area at the Charleston Naval Weapons Station between Goose Creek and Half Hitch Path (Figure 3.6-4).

Black rail (*Laterallus jamaicensis*)

Black rails breed from New York to Florida along the Atlantic Coast and in Florida and Texas along the Gulf Coast. In the winter, black rails spend the winter along the Atlantic coast from New Jersey to Florida and along the Gulf Coast from Florida to Texas. Winter populations of the eastern United States may also winter in Cuba and the West Indies. Black rails occupy the upper zone of tidal salt marshes known as the high marsh. The high marsh is only inundated during extreme high tide events and dominated over most of the Atlantic Coast by plants such as salt meadow hay, saltgrass, and often interspersed with shrubs such as marsh elder or saltbush. The high marsh generally forms as isolated hummocks in elevated portions within the marshes or more frequently along the upland-marsh edge. The ecotone between the upland and marsh can sometimes include stunted pine trees and eastern red cedar. Additional features of black rail habitats can be the presence of salt panes and patches of needlerush. Black rails feed primarily on small invertebrates and seeds found within wet areas. Nests are usually found on the ground. The Protected Species study area contains potentially suitable habitat for the black rail due to the presence of salt marshes and shallow freshwater marshes.

Black-capped petrel (*Pterodroma hasitata*)

This crow-sized seabird nests only in the Caribbean and feeds as far away as Gulf Stream waters off the Mid-Atlantic United States. Black-capped petrels were first reported from South Carolina offshore waters in 1966 and from North Carolina offshore waters in 1972. Although this Caribbean species is generally considered rare off the Atlantic Coast of the United States, it is present off Cape Hatteras during all seasons of the year, being most numerous there during summer and fall. It is usually found along the western edge of the Gulf Stream. The black-capped petrel is rarely reported south of Cape Lookout, because the western edge of the Gulf Stream is generally 70 to 80 miles or more off southeastern South Carolina. As such, the Protected Species study area does not contain potentially suitable habitat for the black-capped petrel due to the distance from the western edge of the Gulf Stream.

MacGillivray's seaside sparrow (*Ammodramus maritimus macgillivraii*)

MacGillivray's seaside sparrow occupies a very narrow strip of salt and brackish marsh along the Outer Coastal Plain tidewater region. Its range consists of coastal wetlands north of St. Johns River in Duval and Nassau counties in Florida to northern North Carolina. This species has also been found nesting in coastal marshes as far inland as the town of Hanahan near Goose Creek, South Carolina. MacGillivray's seaside sparrow is a nonmigratory bird. Nesting occurs from spring through early summer with the time and length of the nesting period dependent on flooding; nesting activities decrease abruptly when marshes flood. MacGillivray's seaside sparrows spend the fall and winter in high-salinity marshes near coastal islands, but move inshore to freshwater or brackish marshes for the nesting season. The seaside sparrow is found exclusively in salt and brackish marshes consisting of cord grasses (*Spartina* spp.), true rushes (*Juncus* spp.), and bulrushes (*Scirpus* spp.). In order to avoid extreme tidal fluctuations, seaside sparrows move up the estuaries to nest. Significant populations occur in black needle-rush marshes at the Tom Yawkey Wildlife Center, Cape Romain National Wildlife Refuge, and other areas featuring extensive coastal marsh. MacGillivray's seaside sparrows are omnivorous but prefer tiny marsh crabs and crustaceans. The Protected Species study area contains potentially suitable habitat for the MacGillivray's seaside sparrow.

Boykin's lobelia (*Lobelia boykinii*)

Boykin's lobelia is a semi-aquatic perennial herb that is critically imperiled throughout its entire range. Boykin's lobelia can be found in wet habitats, primarily in the south central coastal plain and sandhills region. Habitats include cypress–black gum depression ponds, limesink depression ponds, Carolina bays, wet pine savannas and flatwoods, and wet ditches. Boykin's lobelia grows to three feet in swamps and cypress ponds from the southern coastal plain of Delaware to Florida. The stem is hollow, 1.5 to 3 feet tall, and has few if any branches. It produces blue to white flowers from May to July and is the only lobelia that possesses rhizomes. The Protected Species study area does not contain suitable habitat for Boykin's lobelia due to the lack of critical plant community habitat.

Carolina bishopweed (*Ptilimnium ahlesii*)

Carolina bishopweed ranges from the outer coastal plain of southeastern North Carolina through South Carolina to eastern Georgia. This species can be found in herbaceous wetlands in tidal freshwater marshes throughout its range. Three occurrences of Carolina bishopweed are currently known. One occurrence is found in North Carolina in the Cape Fear River marshes, one in Georgia in the Savanna River, and one in South Carolina at the mouth of the Ashley-Cooper rivers near Charleston, South Carolina. The Carolina bishopweed is an erect, branched annual herb with leaves divided into filiform divisions, sometimes appearing undivided and quill-like towards the base of the plant due to loss of leaflets. This species contains fruits, flowers early (May to early June), and contain few mid-stem leaf segments (15-30). Threats to Carolina bishopweed include invasion by Phragmites, dredge spoil deposition, pollution from nearby industries, and saltwater intrusion from river dredging and sea level rise. The Protected Species study area does not contain suitable habitat for Carolina bishopweed due to the lack of freshwater tidal marsh.

Ciliate-leaf tickseed (*Coreopsis integrifolia*)

Ciliate-leaf tickseed ranges from the coastal plain of Florida, Georgia, and South Carolina. Habitat for the ciliate-leaf tickseed includes streambanks and floodplains of blackwater streams. Ciliate-leaf tickseed is a perennial herb, sometimes forming large colonies. Stems grow 16-28 inches tall, can be hairy or smooth, and contain few branches in which each branch is topped by a flower head. Ciliate-leaf tickseed reproduces vegetatively by sprouting from rhizomes or sexually by attracting bees and other pollinators to its brightly colored flower heads. The Protected Species study area does not contain suitable habitat for ciliate-leaf tickseed due to the lack of backwater streams.

Godfrey's wild privet (*Forestiera godfreyi*)

Godfrey's wild privet occurs in northern Florida, Georgia, and South Carolina. Habitat for this species includes coastal maritime forests over shell mounds on barrier islands. It can also be found in upland hardwood forests with limestone at or near the surface, often on slopes above lakes and rivers. Godfrey's wild privet is a deciduous shrub or small tree 8-16 feet tall, with main stems arching and leaning. Flowering occurs in late January to late February, fruits are present through May. The Protected Species study area does not contain suitable habitat for Godfrey's wild privet due to the lack of shell mounds and limestone at or near the surface.

3.6.4 State-Protected Species

SCDNR lists 14 species as occurring in Charleston County that are state endangered or threatened, as shown in Table 3.6-5. Descriptions for species not previously described in Sections 3.6.2 or 3.6.3 follow in subsequent paragraphs.

While several state endangered or threatened species have been recorded by the SCDNR Heritage Trust Database as occurring in Charleston County, seven species from Table 3.6-5 are known to occur or have suitable forging and nesting habitat within the Protected Species study area: loggerhead sea turtle, spotted turtle, shortnose sturgeon, broad-striped dwarf siren, bald eagle, least tern, and Wilson's plover. Potential habitat for state-listed species within the Protected Species study area is documented in Table 3.6-6.

Table 3.6-5
State-Protected Species Potentially Occurring in Charleston County, South Carolina.

Species Common Name	Species Scientific Name	State Status[1]	Federal Status[2]
Reptiles			
Loggerhead sea turtle	*Caretta caretta*	Threatened	Threatened
Spotted turtle	*Clemmys guttata*	Threatened	ARS
Fish			
Shortnose sturgeon	*Acipenser brevirostrum*	Endangered	Endangered
Amphibians			
Flatwoods salamander	*Ambystoma cingulatum*	Endangered	Threatened
Gopher frog	*Rano capito*	Endangered	–
Dwarf siren	*Pseudobranchus striatus*	Threatened	–
Birds			
American swallow-tailed kite	*Elanoides forticatus*	Endangered	Species of Concern
Bachman's warbler	*Vermivora bachmanii*	Endangered	Endangered
Bald eagle	*Haliaeetus leucocephalus*	Threatened	Protected
Least tern	*Sterna antillarum*	Threatened	–
Red-cockaded woodpecker	*Picoides borealis*	Endangered	Endangered
Wilson's plover	*Charadrius wilsonia*	Threatened	–
Wood stork	*Mycteria americana*	Endangered	Threatened
Mammals			
Rafinesque's big-eared bat	*Corynorhinus rafinesquii*	Endangered	–

[1]*Endangered* refers to "any species or subspecies of wildlife whose prospects of survival or recruitment within the State are in jeopardy or are likely within the foreseeable future to become so."
Threatened refers to "a species that is likely to become endangered and in need of management."

[2] *Endangered* refers to a taxon "in danger of extinction throughout all or a significant portion of its range." *Threatened* refers to a taxon "likely to become endangered within the foreseeable future throughout all or a significant portion of its range."

At-Risk Species (ARS) refers to species that the U.S. Fish and Wildlife Service has been petitioned to list and for which a positive 90-day finding has been issued (listing may be warranted); Information is provided only for conservation actions as no Federal protections currently exist.

Table 3.6-6
Potential Habitat for State-Listed Species Within the Study Area

Species Common Name	Species Scientific Name	State Status	Potential Habitat Within the Study Area
Reptiles			
Loggerhead sea turtle	*Caretta caretta*	Threatened	Yes
Spotted turtle	*Clemmys guttata*	Threatened	Marginal
Fish			
Shortnose sturgeon	*Acipenser brevirostrum*	Endangered	Yes
Amphibians			
Flatwoods salamander	*Ambystoma cingulatum*	Endangered	No
Gopher frog	*Rana capito*	Endangered	No
Dwarf siren	*Pseudobranchus striatus*	Threatened	No
Birds			
American swallow-tailed kite	*Elanoides forticatus*	Endangered	No
Bachman's warbler	*Vermivora bachmanii*	Endangered	No
Bald eagle	*Haliaeetus leucocephalus*	Threatened	Yes
Least tern	*Sterna antillarum*	Threatened	Yes
Red-cockaded woodpecker	*Picoides borealis*	Endangered	No
Wilson's plover	*Charadrius wilsonia*	Threatened	Yes
Wood stork	*Mycteria americana*	Endangered	Yes
Mammals			
Rafinesque's big-eared bat	*Corynorhinus rafinesquii*	Endangered	No

Dwarf siren (*Pseudobranchus striatus*)

The dwarf siren is an eel-like salamander that lacks hind limbs and has external gills. It is found throughout Florida and the coastal plain of southern Georgia and South Carolina. Currently, the dwarf siren only occurs in Jasper, Hampton, Orangeburg, and Charleston counties in South Carolina. Extensive surveys for this species have not been conducted throughout its general range. The dwarf siren is a totally aquatic species that retain larval characteristics into adulthood. The dwarf siren has been documented from small coastal plain streams that exhibit little or no flow and have muck bottoms. Such streams are typically too small to have established populations of predatory fish. This species is often associated with water hyacinth and found in shallow, weedy waters of ponds, swamps, and ditches. The Protected Species study area does not contain suitable habitat for the dwarf

siren due to the lack of headwater coastal plain streams or weedy ditches that connect to abundant freshwater resources.

American swallow-tailed kite (*Elandoides forficatus*)

In North America, the swallow-tailed kite breeds at a few scattered locations in the southeastern coastal plain, from extreme east Texas to South Carolina. The greatest breeding densities occur in Florida's peninsula, the only place where their range is continuous. The American swallow-tailed kite can be found in wooded blackwater rivers and wetlands of the southeastern United States. In North America, breeding colonies favor woodlands with trees that rise well above the canopy and with ready access to wet prairies or marshes for food. Mature, forested wetlands dominated by slash pines and Cyprus are typical breeding habitat. River bottom, hard forests are used in South Carolina, where nests are placed in loblolly pines that average 104 feet tall. A mosaic of wetland habitats with various heights is a key characteristic. Most of the population migrates to the tropics in the winter. Due to declining populations, the swallow-tailed kite is listed as endangered by the state of South Carolina and is considered a sensitive species by the U.S. Forest Service. This species is known to nest within the Francis Marion National Forest, outside of the Protected Species study area. Thus, the Protected Species study area does not contain suitable roosting and foraging habitat for the American swallow-tailed kite due to the absence of large trees and lack of diverse wetland habitats.

Least tern (*Sterna antillarum*)

The least tern is the smallest of the North American terns and is currently listed as threatened in South Carolina. The least tern's breeding range includes coastal areas in California and along the eastern seaboard from Maine to Florida, as well as the Mississippi River area. Least terns tend to construct their nests on beaches and low-lying sandbars that are sometimes flooded by very high tides and contain abundant shells and pebbles, with sparse vegetation. Due to habitat loss, least terns and other species with similar nesting requirements, like the black skimmer, are known to nest on graveled rooftops in coastal areas where appropriate natural nesting habitat is not available.

The Protected Species study area contains suitable habitat for the least tern due to the presence of graveled rooftops. Three least tern nesting sites have been previously recorded within the project site as of 1994 (SCDNR 2014c); however, nest surveys in 2014 showed no active nests within the Protected Species study area.

Wilson's plover (*Charadrius wilsonia*)

The Wilson's plover breeds on the Atlantic Coast from Virginia to Florida and on the Gulf Coast from Florida to Texas. It also occurs in coastal areas of the Caribbean Islands, Mexico, eastern and western Central America, and South America. During winter, the Wilson's plover is found along the Atlantic Coast and Gulf Coast from Florida and Texas southward to northern South America. The Wilson's plover is seldom found away from saltwater environments, where it forages for marine invertebrates,

nests and roosts in small groups, and defends its territory with ground and aerial chases. Wilson's plovers are found exclusively on southern beaches and tidal mudflats. They typically live in sparsely vegetated coastal areas, including along beaches, sandbars, salt flats, and lagoons and often inhabit barrier and dredge spoil islands. Nesting birds face disturbance from both natural predators and recreation on heavily populated beaches. The Protected Species study area contains suitable foraging habitat for the Wilson's plover due to presence of mud flats.

Rafinesque's big-eared bat (*Corynorhinus rafinesquii*)

Rafinesque's big-eared bats inhabit the southeastern United States, west to Louisiana, and north to Kentucky and North Carolina. Although widespread in the southeastern United States, Rafinesque's big-eared bat is not abundant, and populations appear to have declined in the past century. In South Carolina, they are permanent residents of the coastal plain and hibernate rather than move south during the winter months. The breeding season for this species extends from late fall to early winter. During this time, both males and females occupy the same roost. For the remainder of the winter and on to early spring, the bats hibernate. In some portions of their range, hibernating bats are found in caves, wells, and other similar habitats. Males are solitary or gather in small groups during summer months, whereas females congregate in maternity colonies of up to 100 individuals. In May to June, females give birth to one hairless young, which can fly at three weeks of age and attains adult size by August or early September.

The bat's range in the southeast most closely approximates the historical range of great cypress swamps, indicating that they may have formed a traditional reliance on these areas as roosting and/or foraging sites. Rafinesque's big-eared bat seem to prefer to roost in tall, live trees with large diameters that are often situated in areas with higher densities of potential tree roosts and surrounded by closed canopies (Trousdale 2011). It has been suggested that the species began using manmade structures in the coastal plain region only after large old hollow trees became scarce. The Protected Species study area contains one historic element occurrence of this species from August 1933; however, currently, the Protected Species study area does not contain suitable habitat for Refinesque's big-eared bat due to the lack of hollowed-out trees.

3.6.5 State Rare Species

South Carolina DNR lists 92 species as occurring in Charleston County (June 11, 2014) that are state-listed rare species (excluding federally and State-listed threatened and endangered species), as shown in Table 3.6-7 (SCDNR 2014c). Two of these species, sweet pinesap and winter grape-fern, were previously found (Historical) near the Protected Species study area. Descriptions for these species follow Table 3.6-7.

Table 3.6-7
Protected Rare Species in Charleston County, South Carolina, and their Habitats

Common Name	Scientific Name	State Rank[1]	Habitat
Reptiles			
Island glass lizard	*Ophisaurus compressus*	S1S2	Sandy coastal areas and islands; pine flatwoods
Eastern coral snake	*Micrurus fulvius*	S2	Longleaf pine forest
Black swamp snake	*Seminatrix pygaea*	SNR	Wetlands
S. hognose snake	*Heterodon simus*	SNR	Open sandy woods, fields, floodplains, longleaf pine forest
Timber rattlesnake	*Crotalus horridus*	SNR	Forest
Marine Mammals			
Harbor seal	*Phoca vitulina*	SNA	Coastal waters
Mammals			
Southeastern bat	*Myotis austroriparius*	S1	Caves and hollow trees near water
Star-nosed mole	*Condylura cristata*	S3?	Moist meadows, woods, swamps
Black bear	*Ursus americanus*	S3?	Forests
Eastern woodrat	*Neotoma floridana*	S3S4	Woodlands
Eastern fox squirrel	*Sciurus niger*	S4	Longleaf pine and bottomlands
Meadow vole	*Microtus pennsylvanicus*	SNR	Fields, grassy marshes
Hoary bat	*Lasiurus cinereus*	SNR	Forest with dead hollow trees
Amphibians			
Eastern tiger salamander	*Ambystoma tigrinum tigrinum*	S2S3	Pine woodlands
Northern cricket frog	*Acris crepitans*	S5	Wetlands and small streams
Birds			
Brown pelican	*Pelecanus occidentalis*	S1S2	Coastal areas
Bachman's sparrow	*Aimophila aestivalis*	S3	Open pine or oak woods, brushy areas
Cooper's hawk	*Accipiter cooperii*	S3?	Woods with water nearby
Barn-owl	*Tyto alba*	S4	Fields, fresh and saltwater marshes
Black-throated green warbler	*Dendroica virens*	S4	Non-alluvial forested wetlands
Mississippi kite	*Ictinia mississippiensis*	S4	Mature bottomland forests
Swainson's warbler	*Limnothlypis swainsonii*	S4	Forest with dense understory
Glossy ibis	*Plegadis falcinellus*	SHB, SNRN	Freshwater marshes, salt marshes, flooded fields

Common Name	Scientific Name	State Rank[1]	Habitat
Red-headed woodpecker	*Melanerpes erythrocephalus*	SNR	Forest
Plants			
Flax leaf false-foxglove	*Agalinis linifolia*	SNR	Moist to wet prairies, savannas, wet pinelands, upper edges or marshes
Incised groovebur	*Agrimonia incisa*	S2	Sandy, dry-mesic upland of CP
Seabeach amaranth	*Amaranthus pumilus*	S1	Barrier island beaches
Blue maiden-cane	*Amphicarpum muehlenbergianum*	S2S3	Wetlands and floodplains of streams and rivers
Purple silkyscale	*Anthaenantia rufa*	S2	Wet pine flatwoods, wet pine savannas, adjacent roadsides
Savannah milkweed	*Asclepias pedicellata*	S2	Pine flatwoods and prairie
Winter grape-fern	*Botrychium lunarioides*	S1	Altered habitats
Bearded grass-pink	*Calopogon barbatus*	S2	Open pinelands, wet prairies, wet roadsides and ditches
Bandana-of-the-everglades	*Canna flaccida*	S2	Swamps and marshes
Cypress-knee sedge	*Carex decomposita*	S2	Sinkhole ponds, forested wetlands and swamps
Elliott's sedge	*Carex elliottii*	S1	Depressions in wet pine savannas, borrow pits, ditches
Shiny spikegrass	*Chasmanthium nitidum*	S1	Stream and river banks, wet woodlands, wet hammocks
Southeastern tickseed	*Coreopsis gladiata*	SNR	Moist to wet, open pinelands
Ciliate-leaf tickseed	*Coreopsis integrifolia*	S1	Streambank and floodplains or blackwater streams
Stiff dogwood	*Cornus racemosa*	S1?	Open woodlands, savannas, and prairies
Piedmont flatsedge	*Cyperus tetragonus*	S2	Open woods, thickets, barrier islands
Venus' fly-trap	*Dionaea muscipula*	S3	Between pine savannas or wet pine flatwoods and pocosins
Three-angle spikerush	*Eleocharis tricostata*	S2?	Flatwood, pine barrens, cypress gum swamps, shores, marshes
Viviparous spike-rush	*Eleocharis vivipara*	S1	Ditches, pond margins, near pine-flatwoods
Ravenel's eryngo	*Eryngium aquaticum* var. *ravenelii*	S1	Pine savannas
Florida thorough-wort	*Eupatorium anomalum*	S1?	Moist savannas

Common Name	Scientific Name	State Rank[1]	Habitat
Hollow Joe-pye weed	*Eupatorium fistulosum*	SNR	Wooded slopes of lakes and river bluffs, high hammocks with limestone
Godfrey's privet	*Forestiera godfreyi*	S1	Wooded slopes of lakes and river bluffs, high hammocks with limestone
Elliott's milkpea	*Galactia elliottii*	S1	Dry flatwoods and hammocks
Southeastern sneezeweed	*Helenium pinnatifidum*	S2	Pine savannas and adjacent ditches
Carolina St. John's-wort	*Hypericum nitidum*	S1	Flatwoods, pond margins, stream banks
Large-stem morning-glory	*Ipomoea macrorhiza*	S1	Disturbed land
Beach morning-glory	*Ipomoea stolonifera*	SNR	Beaches and sand dunes
Walter's iris	*Iris hexagona*	S1	Swamps, ditches, marshes and wet prairies
Southern lepuropetalon	*Lepuropetalon spathulatum*	S2	Sandy soil at sinks and on wet soil
Carolina lilaeopsis	*Lilaeopsis carolinensis*	S2	Marsh, seep stream, tidal marsh, ditches and muddy shores
Southern twayblade	*Listera australis*	S2	Moist woods, marshes and bogs
Pondspice	*Litsea aestivalis*	S3	Margins of swamps, limestone sinks, bay heads, small ponds
Boykin's lobelia	*Lobelia boykinii*	S3	Depressions, wet pine savannas and flatwoods
Lance-leaf seedbox	*Ludwigia lanceolata*	S1	Swamps and brackish marshes
Lance-leaf loosestrife	*Lysimachia hybrida*	S1	Marshes, swamps, wet meadows and stream banks
Sweet pinesap	*Monotropsis odorata*	S2	Moist shaded hardwood forest
Bentgrass	*Muhlenbergia filipes*	S3S4	Sand dunes, freshwater and brackish marshes
One-flowered broomrape	*Orobanche uniflora*	S2	Upland woodlands and
Canby's dropwort	*Oxypolis canbyi*	S2	Cypress ponds, Carolina bays, wet pine savannas
Bead-grass	*Paspalum bifidum*	S2	Dry, open pine-oak forests
Spoon-flower	*Peltandra sagittifolia*	S2	Bogs and pocosins
Slender-leaved dragon-head	*Physostegia leptophylla*	SNR	Wooded river swamps, fresh and brackish marshes, edges of streams and rivers
Climbing fetter-bush	*Pieris phillyreifolia*	S1	Ponds and depressions in flatwoods

Common Name	Scientific Name	State Rank[1]	Habitat
Pineland plantain	*Plantago sparsiflora*	S2	Pine savannas, roadsides
Yellow fringeless orchid	*Platanthera integra*	S1	Wet pine savannas
Whisk fern	*Psilotum nudum*	S1	Rock crevices, trees, on ground
Crestless plume orchid	*Pteroglossaspis ecristata*	S2	Coastal plain habitats
Bluff oak	*Quercus austrina*	S1	River bottoms, wet forest, flatwoods
Awned meadowbeauty	*Rhexia aristosa*	S3	Carolina bays, vernal ponds, wet pinelands, bog, savannas
Short-bristle baldrush	*Rhynchospora breviseta*	S1	Wet sands, bogs, depressions in savannas, open pinelands
Horned beakrush	*Rhynchospora careyana*	S3	Shallow edges of ponds, ditches, marshes, swamps, streams and flatwoods depressions
Beakrush	*Rhynchospora globularis* var. *pinetorum*	S1	Wet pine savannas
Harper beakrush	*Rhynchospora harperi*	S1	Bogs, steam banks, edges of pineland savanna ponds
Drowned hornedrush	*Rhynchospora inundata*	S2?	Peaty-mucky shores, bottoms of small ponds
Tracy beakrush	*Rhynchospora tracyi*	S3	Cypress domes, marshes and swales, ditches and ponds
Tiny-leaved buckthorn	*Sageretia minutiflora*	S3	Shell heaps, limestone outcrops, calcareous sands
Sweet pitcher-plant	*Sarracenia rubra*	S3S4	Marshlands, bogs and wet forest
Chaffseed	*Schwalbea americana*	S2	Pine flatwoods, bogs, pine lowland forest, pine savannas
Baldwin nutrush	*Scleria baldwinii*	S2	Wet pine savannas and pinelands
Lace-lip ladies'-tresses	*Spiranthes laciniata*	S1S2	Pine savannas, swamps, marshes, wet meadows, ditches, wet fields
Carolina fluff grass	*Tridens carolinianus*	S1	Sandy fields and woods
Chapman's redtop	*Tridens chapmanii*	S1	Sandy fields and woods
Nodding pogonia	*Triphora trianthophora*	S2	Mixed deciduous forest
Short-leaved yellow-eyed grass	*Xyris brevifolia*	S1	Wet pine savannas and cleared areas
Florida yellow-eyed grass	*Xyris difformis* var. *floridana*	S2	Wet pine flatwoods, sandy peat bogs, pine savannas, shores
Elliott yellow-eyed grass	*Xyris elliottii*	S2	Sandy flatwoods, sandy shores, swales in pinelands, bog edges, coastal plain

Common Name	Scientific Name	State Rank[1]	Habitat
Pineland yellow-eyed grass	*Xyris stricta*	S1	Depression ponds, wet meadows, ditches, pine savannas, clearings

[1]*SH* refers to *Possibly Extirpated* (Historical) – Species or community occurred historically in the nation or state/province, and there is some possibility that it may be rediscovered.

S1 refers to *Critically Imperiled* – Critically imperiled in the nation or state/province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province.

S2 refers to *Imperiled* – Imperiled in the nation or state/province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factor(s) making it very vulnerable to extirpation from the nation or state/province.

S3 refers to *Vulnerable* – Vulnerable in the nation or state/province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

S4 refers to *Apparently Secure* – Uncommon but not rare; some cause for long-term concern due to declines or other factors.

S5 refers to *Secure* – Common, widespread, and abundant in the nation or state/province.

SNR refers to *Unranked* – Nation or state/province conservation status not yet assessed.

B refers to *Breeding* – Conservation status refers to the breeding population of the species in the nation or state/province.

N refers to *Nonbreeding* – Conservation status refers to the non-breeding population of the species in the nation or state/province.

? refers to *Inexact* or *Uncertain* – Denotes inexact or uncertain numeric rank.

Sweet pinesap (*Monotropsis odorata*)

Sweet pinesap is a monotypic endemic plant species centered in the Appalachian Mountains. The species is found more frequently in North Carolina and Virginia and becomes rare as it reaches the limits of its range, which is from Maryland and West Virginia south to Alabama, Georgia, and possibly Florida. The species has a limited distribution and is rare throughout its range. Habitat destruction is a threat to this species' survival. Sweet pinesap inhabits pine-dominated or mixed-pine hardwood or chestnut oak-dominated forests with dry, acidic soil, often with mountain laurel, rhododendron, and blueberry. The Protected Species study area contains one historic element occurrence of this species, which occurred in 1880; however, currently, the Protected Species study area does not contain suitable habitat for sweet pinesap due to the lack of required forest vegetation.

Winter grape-fern (*Botrychium lunarioides*)

Winter grape-fern occurs throughout the southeast from Arkansas to North Carolina. The winter grape fern is an unusual plant that begins growing in the fall, grows throughout the winter, and then dies in the spring. Habitat includes open grassy places in old fields, pastures, cemeteries, and weedy roadsides. Because of its small size and limited distribution, relatively little is known about its life cycle and natural history. The Protected Species study area contains one historic element occurrence of this species, which occurred in 1850. Currently, the Protected Species study area contains

potentially suitable habitat for winter grape-fern due to the presence of open grassy fields and weedy roadside ditches.

3.6.6 Underwater Noise

Fish are thought to use sound in a number of ways that are important to their survival. For example, sound can be used by fish to understand their surrounding environment, detect predators and prey, orient themselves during migration, and for acoustic communication (USFWS, 2015). Potential direct effects could result from elevated underwater noise from Proposed Project construction activities (e.g., pile driving) resulting in instantaneous death, latent death soon after exposure, or death several days later. Indirect effects could potentially make fish susceptible to predation, disease, starvation, or affect an individual's ability to complete its life cycle. Behavioral changes resulting from underwater noise could cause fish to alter their movement and foraging patterns. If foraging shifts from food-rich to food-poor habitat patches or energy expenditures for foraging increase, overall fitness of the fish may decline (USFWS, 2015).

Underwater noise associated with Proposed Project construction activities may occur from pile installation. Underwater pile driving activities have the potential to produce high intensity sound pressure underwater, which could cause direct impacts to fish (Caltrans 2012; Hastings and Popper, 2005; Popper and Hastings, 2009). High pressure waves from underwater noise can pass through fish, causing the swim bladder to be rapidly squeezed and then rapidly expanded as the sound wave passes through the fish. Other impacts may include the rupture of capillaries in internal organs as indicated by observed blood in the abdominal cavity, and maceration of the kidney tissues (Caltrans 2012).

When a pile driving hammer strikes a pile, a pulse is generated that moves through the pile and radiates sound into the water, the ground, and the air. Sound pressure pulse as a function of time is classified as the waveform. These sounds are described by the peak pressure, the root-mean-square pressure (RMS), and the sound exposure level (SEL). The Fisheries Hydroacoustic Working Group (FHWG), a multi-agency work group, developed criteria for the acoustic levels at which various physiological effects to fish could be expected (FHWG, 2008). The criteria were developed primarily for species on the west coast of the United States; however, the NMFS and USFWS have relied on these criteria for assessing projects on the east coast and the Gulf of Mexico for sound effects analysis (USFWS 2015). The FHWG determined that peak sound pressure waves should be within a single strike threshold of 206 dB, and the cumulative sound exposure level (cSEL) associated with a series of pile strike events should be less than 187 dB cSEL for protected fish species that are larger than 2 grams, and less than 183 dB cSEL for protected fish species that are smaller than 2 grams (FHWG 2008).

3.7 ESSENTIAL FISH HABITAT

Congress enacted amendments to the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) (PL 94-265) in 1996 that established procedures for identifying EFH and required interagency coordination to further the conservation of federally managed fisheries. Rules published by NMFS (50 CFR Sections 600.805–600.930) specify that any Federal agency that authorizes, funds, or undertakes, or proposes to authorize, fund, or undertake, an activity that could adversely affect EFH is subject to the consultation provisions of the MSFCMA and identifies consultation requirements. The NMFS provided initial comments to the Corps in a letter dated April 23, 2014, which identified EFH in the study area for the Proposed Project. This EIS serves to further consultation with NMFS.

EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The definition for EFH may include habitat for an individual species or a group of species, whichever is appropriate within each Fisheries Management Plan (FMP). EFH is separated into estuarine and marine components. The estuarine component is defined as "all estuarine waters and substrates (mud, sand, shell, rock, and associated biological communities); sub-tidal vegetation (seagrasses and algae); and adjacent intertidal vegetation (marshes and mangroves)." The marine component is defined as "all marine waters and substrates (mud, sand, shell, rock, and associated biological communities) from the shoreline to the seaward limit of the Exclusive Economic Zone" (GMFMC 2004).

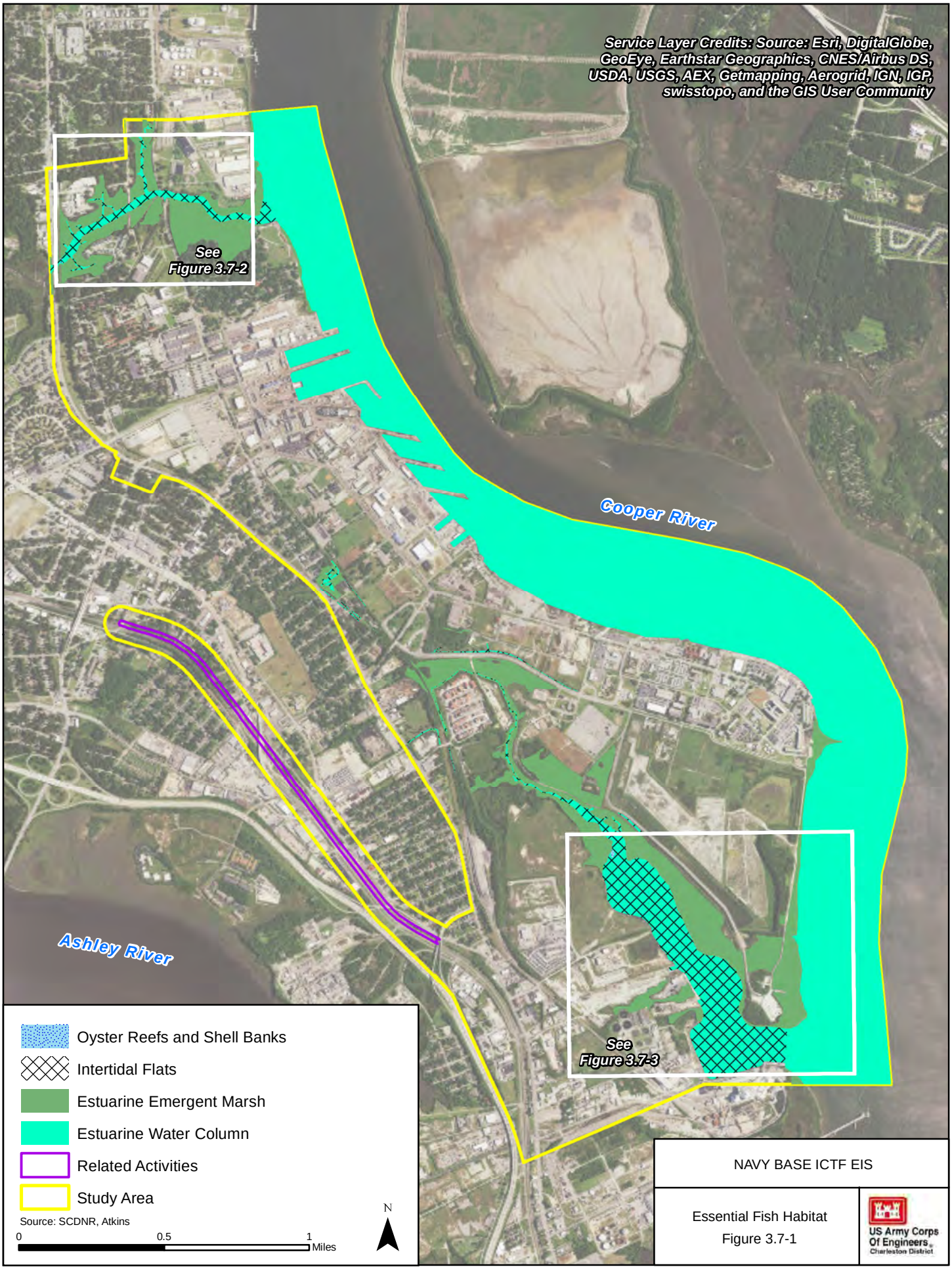
The affected environment for EFH is comprised of four estuarine EFH categories (estuarine emergent marsh, oyster reefs/shell banks, intertidal flats or mudflats, and estuarine water column) within the study area. EFH was identified within the study area based on the review of aerial photography, GIS, literature review, National Wetlands Inventory (NWI) data, and field surveys. The EFH study area includes the aquatic environments of Shipyard Creek and Noisette Creek as depicted in Figure 3.7-1.

Upland habitats, as well as freshwater habitats, that are not connected to tidal waters or are not tidally influenced were not considered as EFH. Federally managed species and their possible life history stages that may use the EFH within the study area are also discussed in this section. A separate EFH Assessment was also prepared and is presented in Appendix E.

3.7.1 EFH Categories Within the Study Area

3.7.1.1 Estuarine Emergent Marsh

Typical estuarine emergent marshes within the study area were intertidal marshlands commonly found within or near river deltas that experience frequent flooding and drainage events from tidal forces with influences from river discharge, wind, rainfall, and lunar cycles. These marshes are



NAVY BASE ICTF EIS

Essential Fish Habitat
Figure 3.7-1

US Army Corps Of Engineers
Charleston District

known to occur in areas of higher elevation and are structured as vast expanses, in narrow fringing bands, or "pocket marshes." Marsh development typically leads to sediments with fine particle-size and high organic matter (South Atlantic Fishery Management Council [SAFMC] 1998).

Within the study area, estuarine emergent marshes are typically recognized by a nearly dominant growth of smooth cordgrass (*Spartina alterniflora*). An additional species known to occur within these habitat types is black needle rush (*Juncus roemerianus*). Estuarine emergent marshes provide habitat for species of concern in two SAFMC management plans: the red drum and shrimp fisheries. These marshes also provide habitat for other fish and invertebrates, as well as export nutrients, detritus, and prey species as ecosystem-supporting species of two additional SAFMC management plans: the coastal migratory pelagic and snapper grouper fisheries. Estuarine emergent marshes prevent erosion to neighboring shorelines (SAFMC 1998). Within the study area, estuarine emergent marshes often are homologous in vegetative composition along edges of estuaries and tidal creeks. There are approximately 208.1 acres of estuarine emergent marsh EFH in the study area.

In a letter to the Corps dated April 23, 2014, NMFS identified that the agency has recently completed restoration of 12 acres of the former Navy Base golf course, and constructed a living shoreline near the mouth of Noisette Creek and along the Cooper River. This restoration project was constructed within the confines of the 135-acre Noisette Creek Nature Preserve, which is located along Noisette Creek (see Figure 3.7-1). Future restoration projects may be undertaken in the future within this nature preserve.

3.7.1.2 Oyster Reefs/Shell Banks

Oyster reefs and shell banks in the South Atlantic typically are observed as natural structures found in the intertidal zone or just below the intertidal zone, and are composed of oyster shell, live oysters, and other organisms. Oyster reefs and shell bank are discrete, contiguous, and clearly distinguishable from scattered oysters in marshes and mudflats. Oysters are predominantly intertidal in South Carolina.

Oyster reefs and shell banks provide important habitat for fish and other invertebrates, as well as microhabitat for smaller species. In addition, oyster reefs provide more areal coverage for attachment of oysters and other sessile organisms than occur on the surrounding intertidal flats or submerged soft bottom habitats. As a result, oyster reefs facilitate more habitat niches for aquatic species, such as sponges, gastropods, polycheate worms, and decapod crustaceans (Livingston 1990). Oyster reefs and shell banks form barriers in areas where vessels, boat traffic, and winds drive waves ashore and facilitate calmer, less-turbid waters shoreward.

The South Carolina Oyster Restoration and Enhancement Program (SCORE) is a SCDNR community-based program focused on oyster habitat restoration and monitoring. The SCORE program restores and enhances oyster habitat by planting recycled oyster shells in intertidal habitat utilizing volunteer

support. The SCORE program provides the South Carolina coastal community with an outlet to understand how oysters improve water quality, control erosion, and provide habitat for other commercially important shellfish and fish species. The SCORE program has planted numerous oyster reef sites and has an interactive website to identify the locations and productivity of the restoration sites[33]. There are no SCORE oyster restoration sites within the study area.

Within the study area, there is approximately 0.3 acre of oyster reefs and shell banks EFH. Small scattered oyster reefs and/or shell banks were observed within a tidal creek channel flowing into Noisette Creek (approximately 1 acre) and in Shipyard Creek (approximately 0.2 acre) as depicted in Figures 3.7-2 and 3.7-3.

3.7.1.3 Intertidal Flats

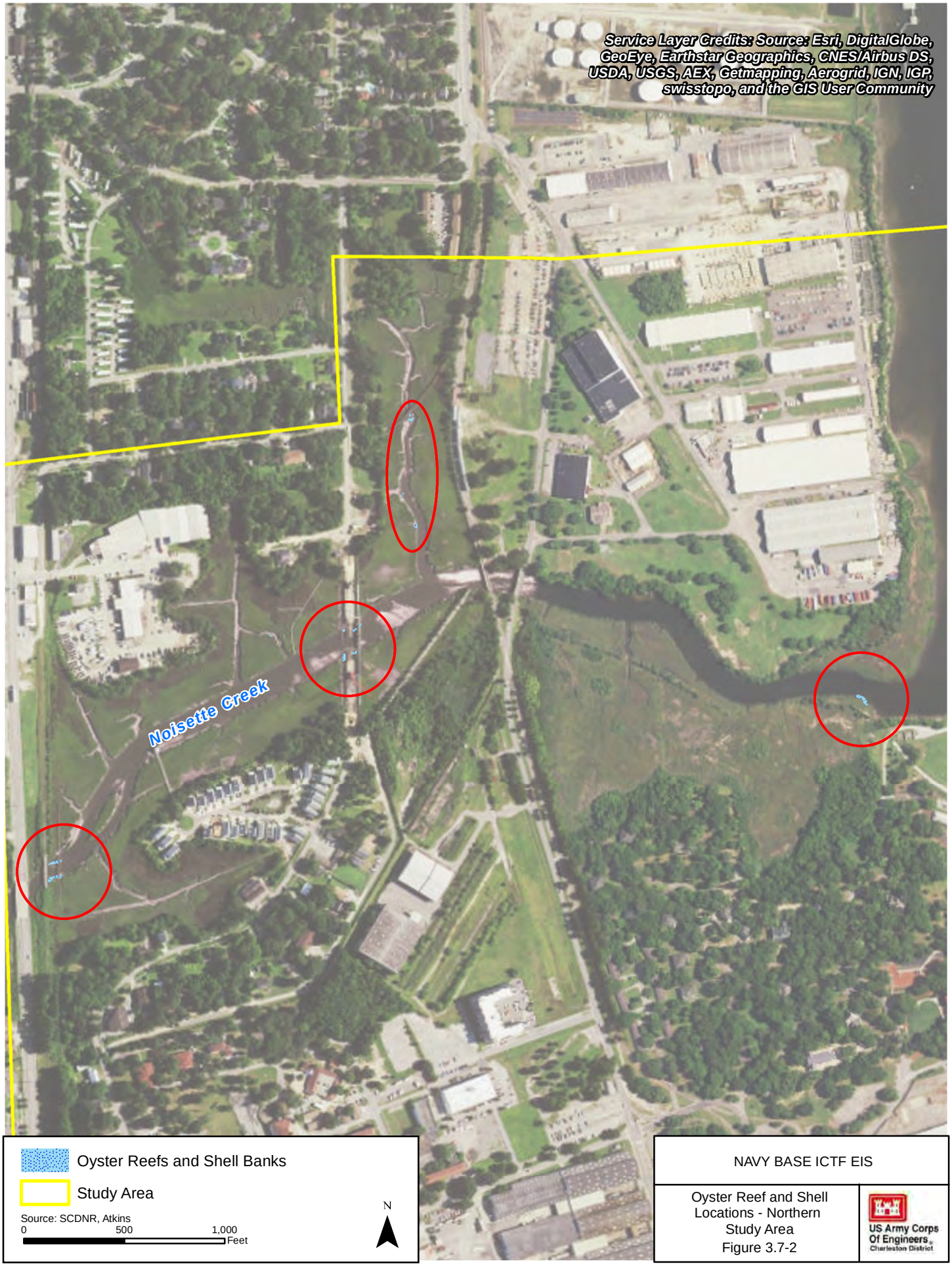
Individual characteristics and distribution of intertidal flats are influenced by tidal ranges, coastal geology, freshwater inflow, and weather patterns. Intertidal flats located in areas with little tidal range are primarily influenced by wind and waves. Those located in areas with large tidal ranges are primarily influenced by tidal action. Intertidal flat substrates become finer and more susceptible to wind fetch influences with increasing distance from an inlet. Intertidal flats serve as feeding grounds, refuge, and nursery areas for many different species life stages. The benthic community of an intertidal flat may include decapods, polychaetes, gastropods, and bivalves. This tidally influenced habitat provides feeding grounds for predators, juvenile, and forage fish species, as well as nursery grounds for estuarine-dependent benthic species (SAFMC 1998). Typically, nursery areas may include unvegetated soft bottom areas surrounded by saline or brackish emergent marsh (Street et al. 2005).

Intertidal flats can provide relatively low energy, shallow water habitat and feeding grounds (with deeper water areas depending on the tidal phase) to support species such as summer flounder (*Paralychthys dentatus*), red drum (*Sciaenops ocellatus*), and striped mullet (*Mugil cephalus*). Intertidal flats within the study area were delineated based on GIS desktop analysis and limited field assessments. There are approximately 120.4 acres of intertidal flats EHF in the study area.

3.7.1.4 Estuarine Water Column

Habitats within the estuarine water column can be defined in terms of gradients and fluctuations in temperature, salinity, dissolved oxygen, turbidity, and nutrient supply. These components of the water column are variable in both time and space due to tidal fluctuations, freshwater inflows, and strong wind events. The estuarine water column serves as EFH by providing habitat for spawning, breeding, feeding, and growth for a wide array of species and life stages within species. Furthermore,

[33]SCORE program website http://score.dnr.sc.gov/index.php



NAVY BASE ICTF EIS

Oyster Reef and Shell Locations - Northern Study Area

Figure 3.7-2

US Army Corps Of Engineers Charleston District

NAVY BASE ICTF EIS

Oyster Reef and Shell Locations - Southern Study Area
Figure 3.7-3

US Army Corps Of Engineers
Charleston District

the estuarine open water column serves as a transport medium for organisms between the ocean, upstream rivers, and freshwater systems where species-specific habitat components are favorable for completing particular life-stages. Zooplankton and phytoplankton are the dominant organisms in this habitat and serve as the foundation of the estuarine and marine food webs. Phytoplankton are major contributors to primary production, which is directly linked to production of biomass (macroinvertebrates and vertebrates). Many zooplankton feed on phytoplankton and are in turn eaten by small ichthyoids. In addition to supplying food for wildlife, phytoplankton plays a central role in nutrient cycling in estuarine and marine ecosystems (SAFMC 1998). There are approximately 867.4 acres of estuarine water column EFH in the study area.

3.7.2 Common Fish and Shellfish Species Known to Use EFH Within the Study Area

The common estuarine fish and shellfish species known to occur within the study area are listed in Table 3.7-1 and may use the various EFH habitat types at different times of the year and/or during different individual life history stages (SAFMC 1998).

Table 3.7-1
Common Fish and Shellfish Species Known to Use Estuarine EFH within the Study Area

Common Name	Scientific Name	Function	Life Stage(s)
Atlantic menhaden	*Brevoortia tyrannus*	R	J
Bay anchovy	*Anchoa mitchilli*	R	J, A
Weakfish	*Cynoscion regalis*		J
Spot	*Leiostomus xanthurus*	N, R, F	J, A
Red drum	*Sciaenops ocellatus*	N, R, F	PL, J, A
Atlantic croaker	*Micropogonias undulatus*	N, R, F	PL, J, A
Summer flounder	*Paralichthys dentatus*	N, R, F	PL, J, A
Southern flounder	*Paralichthys lethostigma*	N, R, F	PL, J, A
White shrimp	*Litopenaeus setiferus*	N, R, F	PL, J, A
Brown shrimp	*Farfantepenaeus duorarum*	N, R, F	PL, J, A
Pink shrimp	*Panadalus borealis*	N, R, F	PL, J
Blue crab	*Callinectes sapidus*	N, R, F	J, A
American Oyster	*Crassostrea virginica*	N, F	PL, J, A

Letter codes for function use are N = benthic nursery function, R = refuge function, and F = feeding ground function. Life stage codes are PL = post-larval, J = juvenile, and A = adult.

Source: AFMC 1998.

3.7.3 Federally Managed Species that may Use EFH Within the Study Area

Numerous federally managed species and their life history stages may use the EFH within the study area (Table 3.7-2). This section identifies and discusses the preferred habitat, life history stages, and relative abundance of each of these species based on information provided by the South Atlantic Fisheries Management Plan (SAFMP 1998). Additional descriptive information on these species is presented in Appendix E – Essential Fish Habitat Assessment.

3.7.3.1 Penaeid Shrimp

Penaeid shrimp associated with EFH in the study area include white, brown, and pink shrimp. These species are managed by the SAFMC via the SAFMP (SAFMC 2004). The most common South Carolina shrimp species is white shrimp, which are regionally referred to as green shrimp, green-tailed shrimp, or southern shrimp. Brown shrimp are commonly referred to as green lake shrimp, red-tail shrimp, or summer shrimp. Pink shrimp are commonly referred to as northern shrimp or deepwater prawn. Each penaeid shrimp species is described in more detail below. Shrimp EFH within the study area would include estuarine emergent marsh, intertidal mudflats, and the estuarine water column.

Brown Shrimp

Brown shrimp occur from Massachusetts to the Florida Keys and west into the Gulf of Mexico. They support an important commercial fishery along the South Atlantic coast, but primarily in North Carolina and South Carolina. Brown shrimp are omnivores, and although they prefer mud and peat bottoms, they can be observed on sand, silt, or clay mixed shell hash bottoms (SAFMC 2004; NCDENR 2006). Adults can reach maturity in offshore waters within the first year of life, growing to 5.5 to 5.7 inches and have a maximum life span of 18 months (NOAA 2014f).

White Shrimp

White shrimp are found along the Atlantic Coast from New York to Florida and spawn along the South Atlantic Coast from March to November, with May and June reported as peak months. Being benthic omnivores, they consume fecal pellets, detritus, chitin, bryozoans, sponges, corals, algae, and annelids; feeding primarily at night. Sexually mature adults emigrate to offshore waters when body size, age, and environmental conditions allow. It has been documented that a decrease in water temperature in estuaries triggers emigration in the South Atlantic (Muncy 1984). The south-migrating white shrimp provide a valuable fishery in southern North Carolina, South Carolina, and Georgia. The life span of white shrimp usually does not extend beyond 1 year (NOAA 2014g).

Table 3.7-2
Federally Managed Species That May Use EFH within the Study Area

Common Name[1]	Scientific Name	Management Plan Agency[2]	Fishery Management Plan (FMP)[4]	Life History Stage in Study Area[3]
Penaeid Shrimp				
Brown shrimp[5]	*Farfantepenaeus aztecus*	SAFMC	Shrimp	P, J, A
White shrimp[5]	*Litopenaeus setiferus*	SAFMC	Shrimp	P, J, S
Pink shrimp[5]	*Farfantepenaeus duorarum*	SAFMC	Shrimp	P, J, S
Coastal Migratory Pelagics				
Cobia	*Rachycentron canadum*	SAFMC	CMP	L, P, J, A
Spanish mackerel	*Scomberomorus maculatus*	SAFMC	CMP	J
Highly Migratory Species				
Atlantic sharpnose shark	*Rhizoprionodon terraenovae*	NMFS	HMS	J
Blacknose shark	*Carcharhinus acronotus*	NMFS	HMS	J
Bonnethead shark	*Sphyrnaa tiburo*	NMFS	HMS	J
Bull shark	*Carcharhinus leucas*	NMFS	HMS	J
Dusky shark	*Carcharhinus obscurus*	NMFS	HMS	J
Finetooth shark	*Carcharhinus isodon*	NMFS	HMS	J, A
Lemon shark	*Negaprion brevirostris*	NMFS	HMS	J, A
Sandbar shark	*Carcharhinus plumbeus*	NMFS	HMS	J
Sand tiger shark	*Odontaspis taurus*	NMFS	HMS	N
Scalloped hammerhead	*Sphyrna lewini*	NMFS	HMS	J
Spinner shark	*Carcharhinus brevipinna*	NMFS	HMS	J, A
Other Managed Fish Species				
Bluefish	*Pomatomus saltatrix*	MAFMC	Bluefish	J, A
Summer flounder	*Paralichthys dentatus*	MAFMC	Summer Flounder	L, J, A

Notes:

[1] Based on species lists from SAFMC 1998.

[2] Fishery Management Plan (FMP) Agencies: SAFMC = South Atlantic Fishery Management Council; MAFMC = Mid-Atlantic Fishery Management Council; NMFS = National Marine Fisheries Service.

[3] Life stages include: E = Eggs; L = Larvae; N = Neonate; P = Post-Larvae; J = Juveniles; S = Sub-Adults; A = Adults.

[4] Fishery Management Plans: CMP = Coastal Migratory Pelagics; HMS = Highly Migratory Species.

[5] Habitat areas of particular concern for shrimps includes tidal inlets, state-designated nursery, and overwintering habitats

Pink Shrimp

Pink shrimp have a less common occurrence in South Carolina, but do occur along the Atlantic Coast from the Chesapeake Bay south to the Florida Keys. They are most abundant in water depths of 33 to 111 feet. Pink shrimp reach sexual maturity at about 3.35 inches total length. They spawn during the early part of the summer months at depths of approximately 12 to 52 feet.

3.7.3.2 Coastal Migratory Pelagics

Cobia

Cobia inhabit tropical and subtropical coastal waters in the estuarine and continental shelf waters, depending on their life stage (University of Florida 2014). Cobia are typically fished by recreational boaters through charter boats and recreational harvest from piers and jetties. Cobia are managed by the SAFMC (SAFMC 1998; NMFS 2008).

Cobia larvae, post-larvae, juvenile, and adult life stages use the estuarine water column and estuarine emergent vegetation within the study area for transport, refuge, and feeding grounds, as well as developmental areas.

Spanish Mackerel

The Spanish mackerel is a commercially and recreationally important species, and is managed by the Atlantic States Marine Fisheries Commission (ASFMC) and the SAFMC. Spanish mackerel are found along the coastal waters of the eastern United States and the Gulf of Mexico. Spanish mackerel seasonally migrate northward along the western Atlantic Coast initiated from Florida to Rhode Island between late February and July (Collette and Nauen 1983). Adult Spanish mackerel spend most of their life in the open ocean, whereas juveniles depend on estuarine EFH for foraging and refuge similar to what is found within the study area, including the estuarine water column and emergent marsh habitat.

3.7.3.3 Highly Migratory Species

Highly migratory species include billfishes, tunas, and sharks. Of these species, sharks are the most likely to use the EFH in the study area, specifically the Atlantic sharpnose, blacknose, bonnethead, bull, dusky, finetooth, lemon, sandbar, sand tiger, scalloped hammerhead, and spinner shark species. The Florida Museum of Natural History (FLMNH), a leading data source for Atlantic shark species, maintains an interactive website with information on the biological profiles for these highly migratory/managed shark species (FLMNH 2014). Sharks will use the inshore and estuarine habitats for foraging when inlet water temperatures are warmer than those offshore, and some may use the estuaries as nursery grounds. Juvenile life history stage is mostly found within the study area. Sharks

will forage in the benthic areas and mid and upper water column. These species are highly migratory, moving north in the spring and south in the fall along the Atlantic Coast.

These shark species may use any of the specific EFHs in the study area; however, their occurrence in the study area is likely limited based on individual size and tidally influenced water depths.

3.7.3.4 Other Managed Species

Bluefish

Bluefish are an important recreational species along the Atlantic Coast. The Bluefish Fishery Management Plan was the first management plan developed jointly by an interstate commission and a regional fishery management council (ASMFC 2014a). Bluefish are a migratory pelagic species found along the coast from Maine to Cape Hatteras in the summer and from Cape Hatteras to Florida in winter months (ASMFC 2014a). Bluefish have a summer and winter spawning event that results in two distinct size groups that mix during the year making a single genetic stock (Mid-Atlantic Fishery Management Council [MAFMC] 2009; Northeast Fisheries Science Center [NEFSC] 2014; ASMFC 2014a]. Temperature and photoperiod are limiting factors affecting the migration and distribution of adult bluefish. Tides, weather, seasons, and prey may dictate local migrations into inlets and sounds (MAFMC 2009).

Migratory pelagic species such as bluefish depend on the estuarine systems during juvenile and adult stages. The estuarine water column and emergent marsh EFH within the study area provide transport, refuge, and feeding/developmental areas for the bluefish.

Summer Flounder

The recreational and commercially important summer flounder are managed under the Summer Flounder, Scup, and Black Sea Bass Fishery Management Plan directed by the MAFMC (NMFS 2008). The summer flounder ranges from the shallow estuarine and outer continental shelf waters from Nova Scotia to Florida to the northern Gulf of Mexico (NEFSC 1999). Summer flounder exhibit seasonal inshore/offshore migration patterns from late spring through early fall in estuaries and sounds, and migrate offshore on the outer continental shelf during the winter (NEFSC 1999; ASMFC 2014b).

The adults primarily inhabit sandy substrates but can also be found in seagrass beds, marsh creeks, and sand flats. They are quick predators, ambushing their prey and making full use of their camouflage and bottom positioning for efficient predation on small fish and squid. Crustaceans make up a large percentage of their diet (ASMFC 2014b; NEFSC 1999). The EFH habitats within the study area support the larval, juvenile, and adult developmental life stages of the summer flounder (NMFS 2008; ASMFC 2014b).

3.8 TRAFFIC AND TRANSPORTATION

This section describes the infrastructure of the existing transportation system within the Transportation Study Area (TSA). The section is broken down into the following sections: Roadways, Railroad, Port of Charleston, Pedestrian and Bicycle, and Transit.

The TSA, as shown in Figure 3.8-1, covers a greater area than the general study area due the need to analyze the impacts to the surrounding transportation network as a result of the Navy Base ICTF, two existing rail-truck intermodal facilities (CSX's Bennet Yard and NS's 7-Mile Yard), and three Port facilities that handle containerized cargo (Future HLT, Wando Welch, and North Charleston port facilities). As shown in Figure 3.8-1, the TSA includes the entire I-526 corridor from US 17 in West Ashley to US 17 in Mount Pleasant and the portion of the I-26 corridor from Aviation Avenue (Exit 211A) to US 17 (Exit 220B). The TSA also includes 48 analyzed existing roadway intersections and eleven analyzed existing roadway at-grade rail crossing locations generally bounded by I-526 to the north, the Cooper River to the east, Stromboli Avenue to the south, and I-26 to the West in North Charleston. Impacts to pedestrian, bicycle, and transit facilities and from historical roadway crash data are limited to the study area.

3.8.1 Roadways

This section describes the characteristics and operations of the roadways within the TSA that are likely to be impacted by building the Navy Base ICTF. The section is broken down into two sub-sections; North Charleston Surface Streets and Controlled Access Facilities. The North Charleston Surface Streets section includes the roadways and intersections in and around the study area. The Controlled Access Facilities section includes I-26, I-526 and US 17.

The operations analysis is documented in the *Transportation Analysis Technical Memorandum* (Appendix F). Individual freeway segments and intersections were evaluated for level of service (LOS) based on methodologies from the *Highway Capacity Manual 2010* (Transportation Research Board). Year 2013 volumes from the project traffic forecasts (Appendix F) for both morning and evening peak hours were evaluated. The freeway analysis was conducted using the *Highway Capacity Software (HCS) 2010* (Build 6.41) (McTrans) while the intersection analysis was conducted using *Synchro* (Version 9, Build 900, Revision 46) (Trafficware 2014).

The LOS is a qualitative measure describing the flow of traffic. The LOS is defined with letter designations from A to F that can be applied to both roadway segments and intersections. LOS A represents the best operating conditions and LOS F represents the worst. LOS A to C are considered Good, LOS D is considered Fair, and LOS E or F are considered Poor.

Although LOS A to LOS F can be used to describe best to worst operating conditions for both freeway segments and intersections, the specific descriptions of each LOS for freeway segments and intersections are not the same. Table 3.8-1 describes the traffic conditions experienced under each LOS designation for roadway segments. Table 3.8-2 describes the traffic conditions experienced under each LOS designation for signalized and stop-controlled intersections.

The LOS is a qualitative measure describing the flow of traffic. The LOS is defined with letter designations from A to F that can be applied to both roadway segments and intersections.

Table 3.8-1
Definitions of Levels of Service for Freeway Segments

LOS	Description	Threshold Values	
		Basic Freeway (Density in pc/mi/ln)[1]	Merge, Diverge, and Weave (Density in pc/mi/ln)[1]
A	Free flow. Individuals are unaffected by others in traffic stream. Freedom to select speed and maneuver is extremely high.	≤11	≤10
B	Free flow, but the presence of other vehicles begins to be noticeable. Slight decline in freedom to maneuver.	>11-18	>10-20
C	Stable flow, but the beginning of the range in which the influence of traffic density on operations becomes marked. Maneuvering requires substantial vigilance. Average travel speeds may begin to show some reduction.	>18-26	>20-28
D	High density flow in which ability to maneuver is severely restricted by increasing volumes. Only minor traffic disruptions can be absorbed without effect.	>26-35	>28-35
E	Flow at or near capacity. Unstable. Most traffic disruptions will cause queues to form and service to deteriorate.	>35-45	>35
F	Breakdown flow. Traffic exceeds capacity. Queues form behind such locations, which are characterized by extremely unstable stop-and-go waves.	>45 v/c > 1[2]	v/c > 1[2]

1. Threshold values for density are in passenger cars per mile per lane (pc/mi/ln).

2. Volume to Capacity ratio. Values greater that one indicate the volume is greater than the capacity of the roadway.

Source: *2010 Highway Capacity Manual*, Transportation Research Board, 2010.

Table 3.8-2
Definitions of Levels of Service for Intersections

LOS	Description[1]	Threshold Values	
		Signalized (Delay in sec/veh)[2]	Stop-Controlled (Delay in sec/veh)[2]
A	Short cycle length or outstanding progression. Most vehicles travel through intersection without stopping.	≤10	≤10
B	Short cycle length or very good progression. More vehicles stop than LOS A.	>10-20	>10-15
C	Short cycle length or good progression. Few individual cycle failures may occur. A number of vehicles stop but some do not.	>20-35	>15-25
D	Long cycle length or poor progression. Many vehicles stop and noticeable amount of individual cycle failures.	>35-55	>25-35
E	Long cycle length and poor progression. Frequent individual cycle failures.	>55-80	>35-55
F	Long cycle length and very poor progression. Intersection queue does not clear during most signal cycles.	>80 v/c > 1[2]	>50 v/c > 1[2]

1. The LOS description is only applicable to signalized intersections. For stop-controlled intersections, the delay represents how long the average stop- or yield-controlled vehicle will have to wait.

2. Threshold values for delay are in seconds per vehicle s (sec/veh).

3. Volume to Capacity ratio. Values greater that one indicate the volume is greater than the capacity of the roadway.

Source: *2010 Highway Capacity Manual*, Transportation Research Board, 2010.

3.8.1.1 Controlled Access Facilities

Interstate 26

I-26 is designated as an east-west facility, although it runs in a primarily southeast-northwest direction between its termini in Kingsport, TN and Charleston, SC. I-26 intersects with I-77 and I-20 in Columbia, SC approximately 100 miles from the projectsite. Additionally, I-26 intersects with I-95, the major north-south shipping facility on the east coast, approximately 50 miles from the project site.

Within the TSA, I-26 is an urban freeway with a concrete barrier median. The highway is an eight-lane facility from the west end of the TSA to I-526 where it becomes a six-lane facility. The speed limit is 60 mph through North Charleston but drops down to 50 mph west of the Rutledge Avenue ramps until it terminates at US 17 in downtown Charleston. I-26 includes 13 interchanges within the TSA including a system interchange with I-526.

Year 2013 average daily volumes along I-26 vary within the TSA. West of I-526, the interstate serves as much as 140,000 vehicles per day. Between the I-526 and Rutledge Avenue interchanges daily

volumes are approximately 90,000. East of Rutledge Avenue, daily volumes drop to around 61,000 approaching US 17.

Under existing conditions, consistent with commuter traffic patterns into and out of Charleston, most of the congestion occurs in the eastbound direction in the morning and westbound in the evening. Approximately 4 percent of the total analyzed segments currently operate at Poor LOS and 23 percent operate at Fair LOS, which is nearing unstable traffic flow. A summary of the I-26 freeway segment LOS by direction and peak hour is shown in Table 3.8-3.

Table 3.8-3
I-26 Existing Operations

LOS	Eastbound		Westbound	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Good	19 Segments (46%)	38 Segments (93%)	36 Segments (97%)	20 Segments (54%)
Fair	19 Segments (46%)	2 Segments (5%)	1 Segment (3%)	14 Segments (38%)
Poor	3 Segments (8%)	1 Segment (2%)	0 Segments (0%)	3 Segments (8%)

Note: Segments include basic freeway, weave, and ramp merge and diverge locations, which may vary in number between eastbound and westbound I-26.

Source: Appendix F.

Interstate 526

I-526, also referred to as the Mark Clark Expressway, forms a partial loop around the east, north and west portion of the greater Charleston area. The approximate 19-mile freeway runs from US 17 in West Ashley to US 17 in Mount Pleasant connecting with I-26 to provide a bypass of downtown Charleston. I-526 is signed eastbound and westbound.

I-526 is a four-lane urban freeway facility with either a depressed median or constructed on a raised viaduct. The speed limit is 60 mph from the west end of the freeway to International Boulevard, 55 mph from International Boulevard to Rhett Avenue, 60 mph from Rhett Avenue to Daniel Island, 65 mph from Daniel Island to Long Point Road, and 55 mph from Long Point Road to the east end of the freeway. I-526 consists of 14 interchanges including a system interchange with I-26.

The year 2013 daily volumes range from approximately 74,000 to 84,000 vehicles on the section of I-526 serving North Charleston from Leeds Avenue to Virginia Avenue. West of Leeds Avenue the daily volumes remain around 74,000 vehicles to Paul Cantrell Boulevard where the volume drops down 37,000 vehicles per day. East of Virginia Avenue, daily volumes drop to approximately 66,000 vehicles, then range from 49,000 to 59,000 vehicles between Clements Ferry Road and Hungryneck Boulevard.

Under existing conditions, the majority of the congestion occurs between International Boulevard and Clements Ferry Road. Approximately 9 percent of the total analyzed segments currently operate at Poor LOS and 39 percent operate at Fair LOS, which is nearing unstable traffic flow. A summary of the I-526 freeway segment LOS by direction and peak hour is shown in Table 3.8-4.

Table 3.8-4
I-526 Existing Operations

LOS	Eastbound		Westbound	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Good	22 Segments (49%)	22 Segments (49%)	20 Segments (47%)	28 Segments (65%)
Fair	16 Segments (36%)	20 Segments (44%)	18 Segments (42%)	14 Segments (33%)
Poor	7 Segments (16%)	3 Segments (7%)	5 Segments (12%)	1 Segment (2%)

Note: Segments include basic freeway, weave, and ramp merge and diverge locations, which may vary in number between eastbound and westbound I-526.

Source: Appendix F.

U.S. Highway 17

US 17 is a north-south highway that runs from Florida to Virginia. In Charleston, US 17 serves as a major connection between downtown Charleston and the commercial and residential areas of the West Ashley section of Charleston to the west and Town of Mount Pleasant to the east.

Within the TSA, US 17 is an eight-lane expressway between I-26 and Coleman Boulevard with a speed limit of 55 mph. This section of US 17 includes the Arthur Ravenel Jr. Bridge over the Cooper River. East of Coleman Boulevard to I-526, US 17 is a six-lane median divided expressway with a speed limit of 45 mph. Access to this portion of US 17 is limited to the five signalized intersections and two interchanges at Bowman Road and I-526.

The year 2013 average daily traffic on US 17 between I-26 and Coleman Boulevard is 82,600 vehicles. From Coleman Boulevard east to I-526, the daily volumes range from 43,400 to 47,400 vehicles.

Under existing conditions, the freeway elements of US 17 within the TSA experience little congestion. All the freeway segments operate at Good LOS except for during the AM peak hour at two locations that operate at Fair LOS. A summary of the US 17 freeway segment LOS by direction and peak hour is shown in Table 3.8-5. Of the five signalized intersections along US 17, four (80 percent) operate at Good LOS, one operates at Fair LOS (20 percent), and none operate at Poor LOS in both the AM and PM peak hours. A summary of the US 17 signalized intersection operations is shown in Table 3.8-6. The worst of the AM and PM peak hour LOS for the existing intersections is shown in Figure 3.8-2.

Table 3.8-5
US 17 Existing Freeway Operations

LOS	Northbound		Southbound	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Good	10 Segments (100%)	11 Segments (100%)	8 Segments (80%)	11 Segments (100%)
Fair	0 Segments (0%)	0 Segments (0%)	2 Segments (20%)	0 Segments (0%)
Poor	0 Segments (0%)	0 Segments (0%)	0 Segments (0%)	0 Segments (0%)

Note: Segments include basic freeway, weave, and ramp merge and diverge locations, which may vary in number between northbound and southbound US 17.

Source: Appendix F.

Table 3.8-6
US 17 Existing Intersection Operations

LOS	AM Peak Hour	PM Peak Hour
Good	4 Intersections (80%)	4 Intersections (80%)
Fair	1 Intersection (20%)	1 Intersection (20%)
Poor	0 Intersections (0%)	0 Intersections (0%)

Source: Appendix F.

3.8.1.2 North Charleston Surface Streets

U.S. Highway 52/U.S. Highway 78 (Rivers Avenue/Carner Avenue)

In North Charleston, US 52 and US 78 run on the same alignment from Carner Avenue to University Boulevard/Goose Creek Road. US 52 and US 78 serve as an alternate route to I-26 from Charleston to Goose Creek and Summerville, respectively. Within the TSA, US 52/78 between Aviation Avenue and Piggly Wiggly Drive is a six-lane urban principal arterial with a depressed median and a speed limit of 45 mph. East of Piggly Wiggly Drive the highway transitions to a five-lane principal arterial including a two-way left-turn lane and has a speed limit of 35 mph. US 52 continues onto Carner Avenue which is a two-lane principal arterial with a 35 mph speed limit. The year 2013 average daily traffic on US 52/78 steadily drops from Aviation Avenue to Hampton Avenue. US 52/78 serves 44,700 vehicles west of Remount Road, 34,500 vehicle per day from Remount Road to I-526, 25,600 vehicles per day from I-526 to Piggly Wiggly Drive, 16,700 vehicles per day from Piggly Wiggly Drive to Dorchester Road, 8,500 vehicles per day from Dorchester Road to Carner Avenue, and drops down to 4,200 vehicles per day on the Carner Avenue segment.

Within the TSA, US 52/78 has 13 signalized intersections and two unsignalized intersections that were included in the capacity analysis.

SC Highway 7 (Cosgrove Avenue)

SC-7 connects the West Ashley area of Charleston to North Charleston and I-26 and serves as an alternate route to I-526. The TSA includes the portion of SC-7, known as Cosgrove Avenue, between I-26 and Spruill Avenue. Cosgrove Avenue is a four-lane principal arterial with a speed limit of 45 mph from I-26 to Azalea Drive, which decreases to 35 mph from Azalea Drive to Spruill Avenue.

In the year 2013, Cosgrove Avenue carried approximately 15,000 vehicles per day from I-26 to US 52 and 6,700 vehicles per day from US 52 to Spruill Avenue.

Within the TSA, Cosgrove Avenue has three signalized intersections that were included in the capacity analysis.

SC Highway 642 (Dorchester Road)

SC-642 (Dorchester Road) runs from US 17 Alternate in Summerville, SC to US 52 in North Charleston, providing an alternate route to I-26. The TSA includes Dorchester Road between I-26 and US 52. Between I-26 and Meeting Street, Dorchester Road is a four-lane principal arterial with a striped out median transitioning to a two-lane principal arterial between Meeting Street and US 52. The speed limit along this portion of Dorchester Road is 35 mph.

The segment of Dorchester Road within the TSA serves approximately 6,700 vehicles per day.

Within the TSA, Dorchester Road has four signalized intersections that were included in the capacity analysis.

Spruill Avenue (S-32)

Spruill Avenue, located completely within the TSA, runs from US 52 to Montague Avenue providing a crossing over Noisette Creek. Spruill Avenue is a three-lane facility that includes a two-way left-turn lane. The functional classification of Spruill Avenue between Burton Lane and McMillan Avenue is a principal arterial, which changes to a minor arterial north and south of this segment. The speed limit is 35 mph south of Reynolds Avenue and 40 mph north of Reynolds Avenue.

The year 2013 average daily traffic on Spruill Avenue between Montague Avenue and McMillan Avenue is 8,300 vehicles, increasing to approximately 9,300 vehicles south of McMillan Avenue.

Spruill Avenue has six signalized intersections and one stop-controlled intersection that were included in the capacity analysis.

Montague Avenue (S-62)

Montague Avenue runs from Dorchester Road to Virginia Avenue, part of which forms the primary east-west roadway through the North Charleston business district. Within the TSA Montague Avenue is a minor arterial except for the section from Spruill Avenue to Virginia Avenue, which is a collector. The roadway cross section also varies along Montague Avenue within the TSA. From I-26 to Mall Drive, Montague Avenue is a six-lane median divided facility, four-lane median divided from Mall Drive to Piedmont Avenue, five-lane painted median from Piedmont Avenue to Park Circle, two-lane median divided from Park Circle to Jenkins Avenue, and two-lane undivided with angled on-street parking from Jenkins Avenue to Virginia Avenue.

From west to east within the TSA, the year 2013 average daily traffic volume on Montague Avenue decreases. From I-26 to Mall Drive, the year 2013 average daily traffic volume is 27,600 vehicles, 14,100 vehicles between Mall Drive and Piedmont Avenue, 6,800 vehicles from Piedmont Avenue to Park Circle, and 3,400 vehicles from Park Circle to Virginia Avenue.

Within the TSA, Montague Avenue has four signalized intersections and two unsignalized intersections, including the unsignalized I-26 Eastbound Ramp Terminal intersection that were included in the capacity analysis.

McMillan Avenue (S-48)

McMillan Avenue, located completely within the TSA, runs from Meeting Street to North Hobson Avenue, connecting Spruill Avenue and US 52 to the former Charleston Naval Base. West of Spruill Avenue, McMillan Avenue is a four-lane undivided local road with a speed limit of 35 mph. East of Spruill Avenue, McMillan Avenue is a four-lane divided principal arterial with a speed limit of 30 mph.

The year 2013 average daily traffic on McMillan Avenue is 8,400 vehicles.

McMillan Avenue has two signalized intersections and three unsignalized intersections that were included in the capacity analysis.

Virginia Avenue (S-58)

Virginia Avenue runs from Buist Avenue to Remount Road, with a partial interchange (to and from the west) at I-526. The road is a major truck route to and from the North Charleston Port Terminal and industrial land uses along the Cooper River. Virginia Avenue from Buist Avenue to I-526 is a five lane collector road that includes a two-way left-turn lane with a speed limit of 45 mph.

The year 2013 average daily traffic on Virginia between I-526 and Buist Avenue is 6,600 vehicles.

Within the TSA, Virginia Avenue has four unsignalized intersections that were included in the capacity analysis.

North Rhett Avenue/South Rhett Avenue (S-60)

North Rhett Avenue/South Rhett Avenue runs from Liberty Hall Road in Goose Creek, SC to Helm Avenue in North Charleston providing an alternative route to I-26. Park Circle in North Charleston is the transition point between North Rhett Avenue and South Rhett Avenue. Within the TSA, North Rhett Avenue between I-526 and Park Circle is a four-lane minor arterial with a painted median and a speed limit of 40 mph.

The year 2013 average daily traffic on North Rhett Avenue between I-526 and Park Circle is 31,000 vehicles.

Within the TSA, North Rhett Avenue has two signalized intersections that were included in the capacity analysis.

Clement Avenue/Burton Lane/Naval Base Road/Viaduct Road (S-22/S-145/S-86)

This road, which changes names from Clement Avenue to Burton Lane to Naval Base Road to Viaduct Road within the TSA, serves as a connection between Spruill Avenue and Carner Avenue and the old Charleston Naval Base. The road is a two-lane local road between Meeting Street and Spruill Avenue with a speed limit of 25 mph. Between Spruill Avenue and Hobson Avenue, Viaduct Road is a principal arterial with two eastbound lanes and one westbound lane and has a speed limit of 30 mph.

The year 2013 average daily traffic is 3,400 vehicles west of Spruill Avenue and 6,900 vehicles east of Spruill Avenue.

Within the TSA, this road has two signalized intersections, one unsignalized intersection, and an interchange with Bainbridge Avenue that were included in the capacity analysis.

North Charleston Intersection Operations

Within North Charleston, the majority of the intersections operate with little delay. The year 2013 existing scenario included 28 signalized intersections and 15 stop-controlled intersections within North Charleston. During the AM peak hour, all 28 signalized intersections and 14 stop-controlled intersections currently operate at Good LOS (98 percent of total intersections), one stop-controlled intersection operates at Fair LOS (2 percent of total intersections), and none operate at Poor LOS (0 percent of total intersections). During the PM peak hour, 27 signalized intersections and 14 stop-controlled intersections currently operate at Good LOS (95 percent of total intersections), one signalized intersection and one stop-controlled intersection operate at Fair LOS (5 percent of total intersections), and none operate at Poor LOS (0 percent of total intersections). The worst of the AM and PM peak hour LOS for the existing intersections is shown in Figure 3.8-2. A summary of the North Charleston intersection operations is shown in Table 3.8-7.

Table 3.8-7
North Charleston Existing Intersection Operations

LOS	AM Peak Hour		PM Peak Hour	
	Signalized	Stop-Controlled	Signalized	Stop-Controlled
Good	28 of 28 Intersections	14 of 15 Intersections	27 of 28 Intersections	14 of 15 Intersections
Fair	0 of 28 Intersections	1 of 15 Intersections	1 of 28 Intersections	1 of 15 Intersections
Poor	0 of 28 Intersections	0 of 15 Intersections	0 of 28 Intersections	0 of 15 Intersections

Source: Appendix F.

The I-26 ramp terminal intersections at Cosgrove Avenue and I-26 Eastbound ramp terminal intersection at Montague Avenue are neither signalized nor stop-controlled. The ramp terminal intersections act as merge, diverge or weave elements along Cosgrove Avenue and Montague Avenue. All 10 of the elements operate at Good LOS during both the AM and PM peak hours.

Roadway Crash Data

This section provides a summary of historical crash data for major roadway within the TSA, as shown in Figure 3.8-1. The data were provided from the SCDOT. Data were collected between January 1, 2011, and October 31, 2014, a period of approximately 3.8 years. A summary of the number of total crashes, fatal crashes, and injury crashes by corridor is provided in Table 3.8-8. The Cosgrove Avenue corridor had the highest number of crashes with the majority of the crashes occurring between the I-26 ramps and Azalea Drive.

Table 3.8-8
Number of Crashes by Corridor

Corridor	Boundaries	Length (miles)	Total Crashes	Fatal Crashes	Injury Crashes
Spruill Avenue	Meeting Street to Montague Avenue	3.9	76	1	31
Rivers Avenue	McMillan Avenue to Carner Avenue	0.8	102	1	45
Carner Avenue	Rivers Avenue to Meeting Street/ Stromboli Avenue	0.7	7	0	4
Noisette Boulevard	Avenue B to McMillan Avenue	1.0	6	0	1
N. Hobson Avenue	Noisette Boulevard to Viaduct Road	0.8	4	0	2
McMillan Avenue	Meeting Street to N. Hobson Avenue	0.5	32	0	14
Cosgrove Avenue	I-26 Ramps to Avenue E	1.1	111	0	37
Viaduct Road/ Naval Base Road/ Burton Lane	Carner Avenue to N. Hobson Avenue	0.6	4	0	2

Source: SCDOT Crash Reports contained in Appendix F.

3.8.2 Railroads

The Charleston region is serviced by two freight rail operators, CSX and NS, and Amtrak for passenger service. This section discusses the existing intermodal facilities, at-grade rail crossing crash history and impact to the operations of the roadway network, and passenger rail service in the TSA. A map showing the railways by operator, intermodal facilities, and the analyzed at-grade rail crossing locations is included as Figure 3.8-3.

3.8.2.1 Intermodal Facilities

Within the TSA, there are two existing intermodal facilities: CSX's Ashley Junction and NS's 7-Mile. The reported combined capacity of the two intermodal facilities is approximately 498,800 annual TEUs (see Appendix B), which is a standard volume unit for describing a facility's cargo handling capability.

CSX Ashley Junction Intermodal Facility

The CSX Ashley Junction intermodal facility is located between I-26 and Meeting Street, about halfway between East Montague Avenue and Dorchester Road. Truck traffic enters and exits through the access on Meeting Street located directly across from Macon Avenue. Ashley Junction includes four working tracks with grounded trackside storage, as well as storage for chassis and containers on chassis.

Norfolk Southern 7-Mile Intermodal Facility

The NS 7-Mile intermodal facility is located between I-26 and Rivers Avenue/Piggly Wiggly Drive, just south of East Montague Avenue. Truck traffic enters and exits through an access at the end of Goer Drive, which connects to East Montague Avenue. The 7-Mile yard has a single loading track and both grounded and wheeled storage for containers and chassis.

3.8.2.2 At-Grade Rail Crossings

The at-grade rail crossing analysis includes 11 locations in the North Charleston area, which are shown in Figure 3.8-3. The 11 locations include a total of 14 rail line crossings, meaning some locations cross multiple tracks. Although other at-grade rail crossings are located within the TSA, only rail crossings along the path of the intermodal trains between the Navy Base ICTF and existing CSX and NS intermodal yards in the build alternatives were considered in the analysis. The exception is the CSX rail crossings of Tuxbury Lane and Cherry Hill Lane east of Meeting Street. These two locations were not analyzed due to low volume on the roadways and lack of connectivity due to the Cooper River. The impact associated with intermodal trains from the Navy Base ICTF would be similar to or less than the analyzed rail crossing of Pittsburgh Avenue. The impacts at the Tuxbury Lane and Cherry Hill Lane rail crossings are discussed qualitatively in Section 4.8.

3.8.2.2.1 Crash History

The project includes a safety summary of thirteen existing at-grade rail crossing locations (the eleven crossings that were analyzed plus CSX crossings of Tuxbury Lane and Cherry Hill Lane that were only qualitatively evaluated as described in Section 3.8.2.2). Crash data was obtained for these locations going back to 1975, which is the first year data was available from the FRA website (FRA 2016). From 1975 to 2013 there were 44 crashes involving vehicles and trains, none of which were fatal but injuries were reported for eight of the crashes. Slow train and vehicle speeds are likely to have contributed to there being zero fatalities and the low percentage of injury crashes. The average train speed in the accidents was 7.5 mph with the train traveling 10 mph or less in 84% of the crashes. The vehicle speed in 82% of the crashes was 20 mph or less.

The data shows that the addition of at-grade crossing safety equipment around 1990 reduced the number of crashes as over half of the total crashes occurred in the 15 years prior to 1990. The most common driver action listed as the cause of the crash was "Did not stop." Crossing gates appear to be effective preventing crashes as only one of the 44 crashes occurred at a location with gates present.

3.8.2.2.2 Operations

The rail crossing locations were analyzed during the AM peak hour, PM peak hour, and an off-peak hour to determine delays to the surrounding road network as a result of train crossings. The operations analysis was performed using VISSIM (Version 5.40) as documented in Appendix F. The existing conditions analysis was first performed assuming zero train crossings at each location to determine the average vehicle delay resulting from the roadway network intersections and vehicular traffic. The same network was then analyzed with a train occurrence to determine how much additional delay is added as a result of the train occurrence. The difference in total network delay in hours between these two scenarios is the delay attributed to the at-grade rail crossing. The delay represents the total time all vehicles would wait in hours over the course of a day due to train occurrences at the rail crossing.

The delay represents the total time all vehicles would wait in hours over the course of a day due to train occurrences at the rail crossing.

The number of daily train occurrences and average crossing time was determined from a rail simulation model provided by Palmetto Railways. The daily delay to the at-grade rail crossings was determined by multiplying the daily train occurrences by the delay from the peak hours and off-peak hour analyses. If the number of daily train occurrences was less than or equal to three per day then the occurrences were distributed evenly between the three analyzed hours. If the number of train occurrences was greater than three then the one occurrence was assumed in each the AM and PM peak hours and the remaining occurrences were assumed to be in the off-peak hour.

The analysis was also used to determine the queuing on roadways due to the at-grade rail crossings. Queue is defined as the distance in feet that vehicles back up. In addition to the queuing at the at-grade crossings, the analysis also examined if the at-grade crossing impacted queueing on any of the interstate off-ramps in the TSA.

Queue is defined as the distance in feet that vehicles back up.

The year 2013 existing at-grade rail crossing analysis results are shown in Table 3.8-9. The two locations with highest delay are Avenue B east of Virginia Avenue and Virginia Avenue north of Empire Avenue. Although both of these locations only have around one train occurrence per day, the duration of the train crossing is approximately a half hour. The location with next highest delay is North Rhett Avenue south of I-526. The network has fairly high daily volumes, approximately 15,000 vehicles per day, and has around five train occurrences per day.

Table 3.8-9
Year 2013 Existing At-Grade Rail Crossings Analysis Results

Map ID[1]	Roadway Segment at Rail Crossing	Daily Volume	Daily Other Commodity Trains		Total Delay to Roadway Network (hours)	Max Queue (feet)	Impact to Interstate Mainline
			Number of Train Crossings	Average Duration of Crossing (min:sec)			
1	Rivers Avenue (US 78)	31,100	2.2	03:53	61.0	2,125	No
2	Attaway Street	4,200	4.9	03:09	5.0	475	No
3	North Rhett Avenue	14,700	4.9	06:39	74.6	4,400	No
4	Virginia Avenue	8,100	1.1	25:51	99.8	3,675	No
5	Avenue B	6,600	1.1	34:23	141.1	>5,280	No
6	Dorchester Road (SC 642)	16,100	5.3	03:43	37.1	1,325	No
7	Accabee Road	3,000	5.3	02:38	2.4	200	No
8	Misroon Street	400	5.3	02:53	0.5	25	No
9	Hackemann Avenue	1,500	3.1	03:45	4.7	1,500	No
10	Discher Street	3,100	5.3	02:53	8.5	1,150	No
11	Pittsburgh Avenue	2,000	0.0	00:00	0.0	0	No

1. Analyzed at-grade crossing locations are shown in Figure 3.8-3.

Source: Appendix F.

3.8.2.3 Passenger Rail

An Amtrak passenger station is located in North Charleston off of Gaynor Street, north of the Durant Avenue intersection with Rivers Avenue. The North Charleston station is served by the Silver Service/Palmetto route, which runs from Miami, FL up the coast to New York City, NY. Four trains

servicing this route make stops at the station daily, two southbound and two northbound (Amtrak 2016).

3.8.3 Port of Charleston

The Port of Charleston consists of five port facilities: Wando Welch, North Charleston, Columbus Street, Union Pier, and Veterans. Of the five port facilities, only Wando Welch and North Charleston handle intermodal containerized cargo. The Columbus Street port facility was recently converted from a container handling facility to a roll-on/roll-off, breakbulk, and project cargo facility. The HLT is currently being constructed to also handle containerized cargo. The locations of the Wando Welch, North Charleston, and future HLT port facilities are shown in Figure 3.8-1. The two existing port facilities that handle containers are described below.

Wando Welch

The Wando Welch port facility is located along the Wando River in Mount Pleasant. The site contains a total of 689 acres, which includes 28,768 grounded container slots and 4,707 wheeled container slots. Truck access is provided via Long Point Drive, which accesses I-526 less than 1 mile from Wando Welch. The Wando Welch port facility is near-dock rail served (rail service located in proximity to the marine cargo facility), approximately 14 miles from the CSX Ashley Junction and 13 miles from the Norfolk Southern 7-Mile intermodal yards by road (South Carolina Port Guide 2015).

North Charleston

The North Charleston port facility is located along the Cooper River in North Charleston. The site is a total of 201 acres, which includes 19,650 grounded container slots and 2,319 wheeled container slots. Truck access is provided via Remount Road. The port facility is located approximately 1.5 miles from I-526 via Remount Road and North Rhett Avenue, and is on-dock rail served (rail service located within marine cargo terminal) and near-dock rail served with approximate distances via road to the CSX Ashley Junction and Norfolk Southern 7-Mile intermodal yards 6 miles and 5.5 miles, respectively (South Carolina Port Guide 2015).

3.8.4 Pedestrian and Bicycle Facilities

Spruill Avenue Bicycle Lane

The sidewalk system is extensive throughout the TSA, and sidewalks were observed on most streets. There are no existing bike paths or trails in the TSA but dedicated bike lanes are located along Spruill Avenue. The *Bicycle and Pedestrian Facilities Map* from the City of North Charleston's 2008 Comprehensive Plan (Appendix F) shows existing sidewalk facilities in and around the study area.

The Safe Routes to School (SRTS) program utilizes Federal funding to implement programs that incorporate events, programs, and infrastructure improvement projects to encourage students to walk and bike to school. The Chicora Elementary School is currently a SRTS partner school (SCDOT 2016). Chicora Elementary School is presently located in a temporary facility at 3795 Spruill Avenue while a new facility is being constructed next to the Military Magnet Academy located at 2950 Carner Avenue. The boundary for this school attendance zone includes the study area south of McMillan Avenue. North Charleston Elementary School is also a SRTS school. The school is located at 4921 Durant Avenue, outside the study area, but the boundary for this school attendance zone includes the study area north of McMillan Avenue.

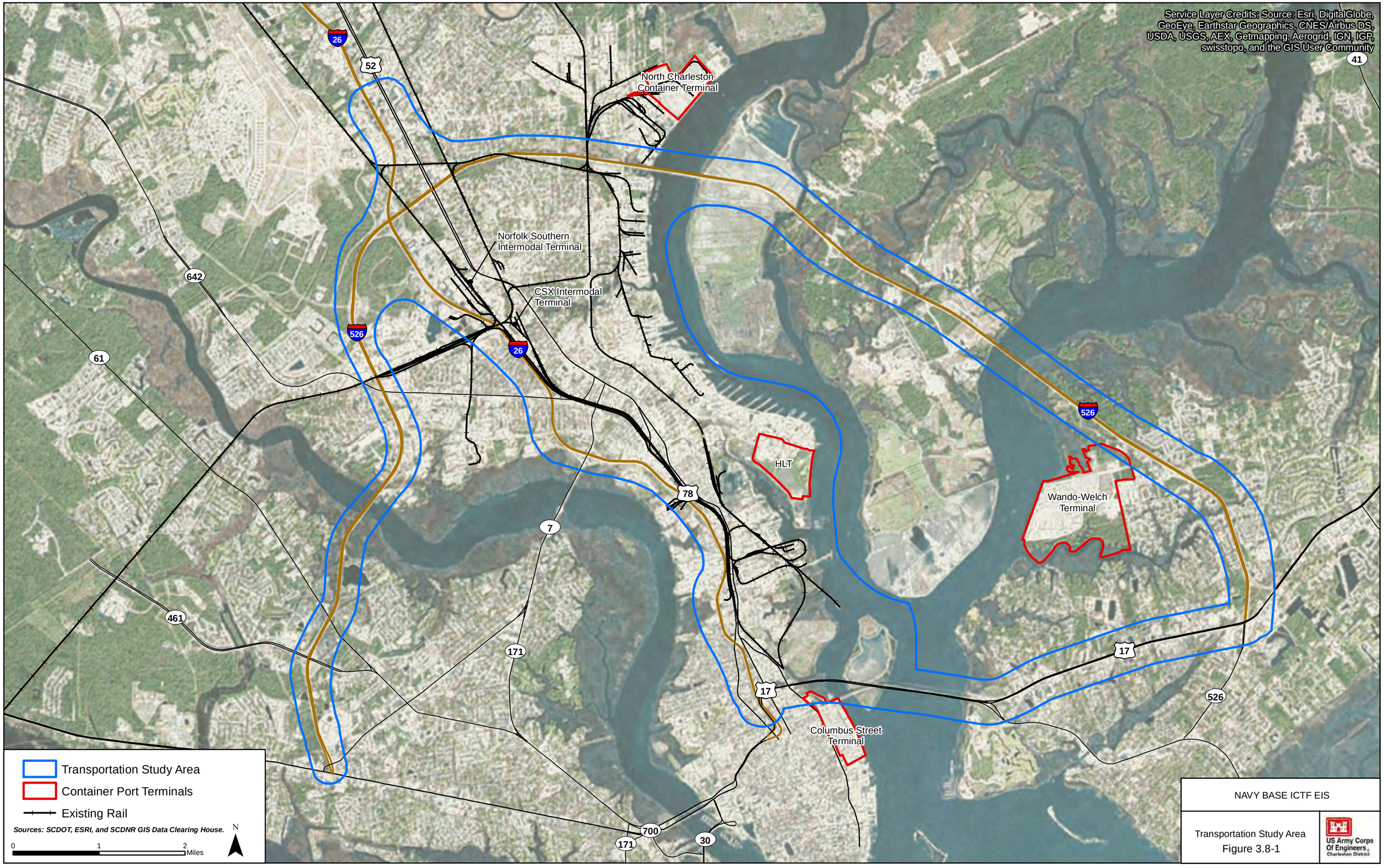
3.8.5 Transit

The Charleston Area Regional Transportation Authority (CARTA) operates several bus routes through the study area. Every stop in the study area connects to the SuperStop located at the intersection of Rivers Avenue at Cosgrove Avenue. The following route information was obtained from the CARTA 2016 and is listed numerically by route number.

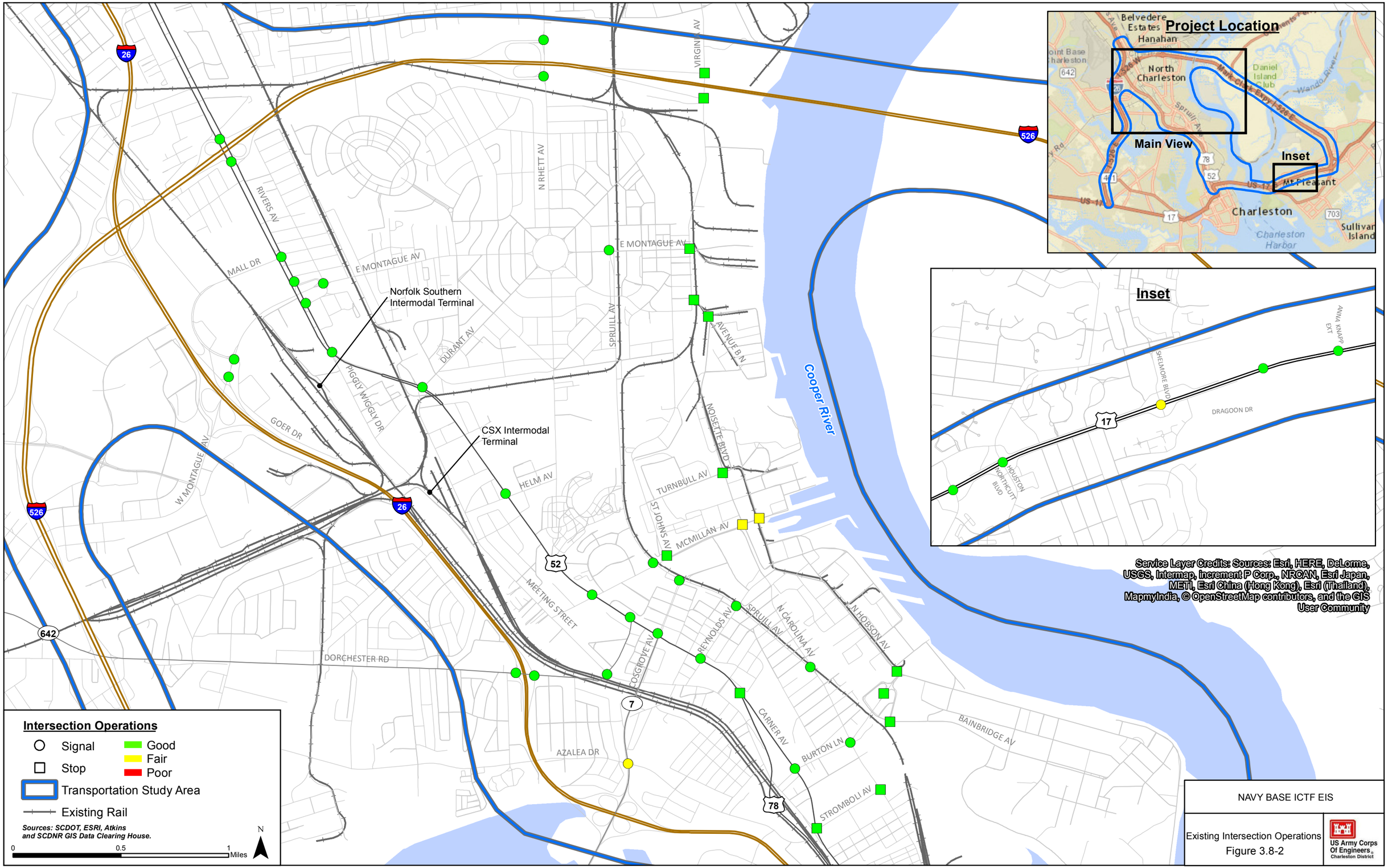
- Route 10 – Rivers Avenue. This route runs along Rivers Avenue to the west of the study area. This route operates weekdays with 20 to 30-minute headways, Saturdays with 30-minute headways, and Sundays with one-hour headways.
- Route 11 – Dorchester /Airport. This route runs through the study area along Spruill Avenue to Dorchester Road. Daily service is provided with approximate one-hour headways.
- Route 13 – Remount Road. This route connects the central study area with service along Spruill Avenue, McMillan Avenue, and Rivers Avenue to the North Charleston City Hall located to the north of the study area. This route operates Monday through Saturday with approximate one-hour headways.

- Route 102 – North Neck. This route provides service between the CARTA SuperStop and downtown Charleston along Spruill Avenue, Rivers Avenue and King Street. Service is provided Monday through Saturday with one-hour headways.
- Route 103 – Leeds Avenue. This route has a short connection along Spruill Avenue in the central section of the study area. Service is provided Monday through Saturday with one-hour headways.
- Route 104 – Montague Avenue. This route runs along Spruill Avenue in the central section of the study area, north to Montague Avenue. Service is provided Monday through Saturday with one-hour headways.

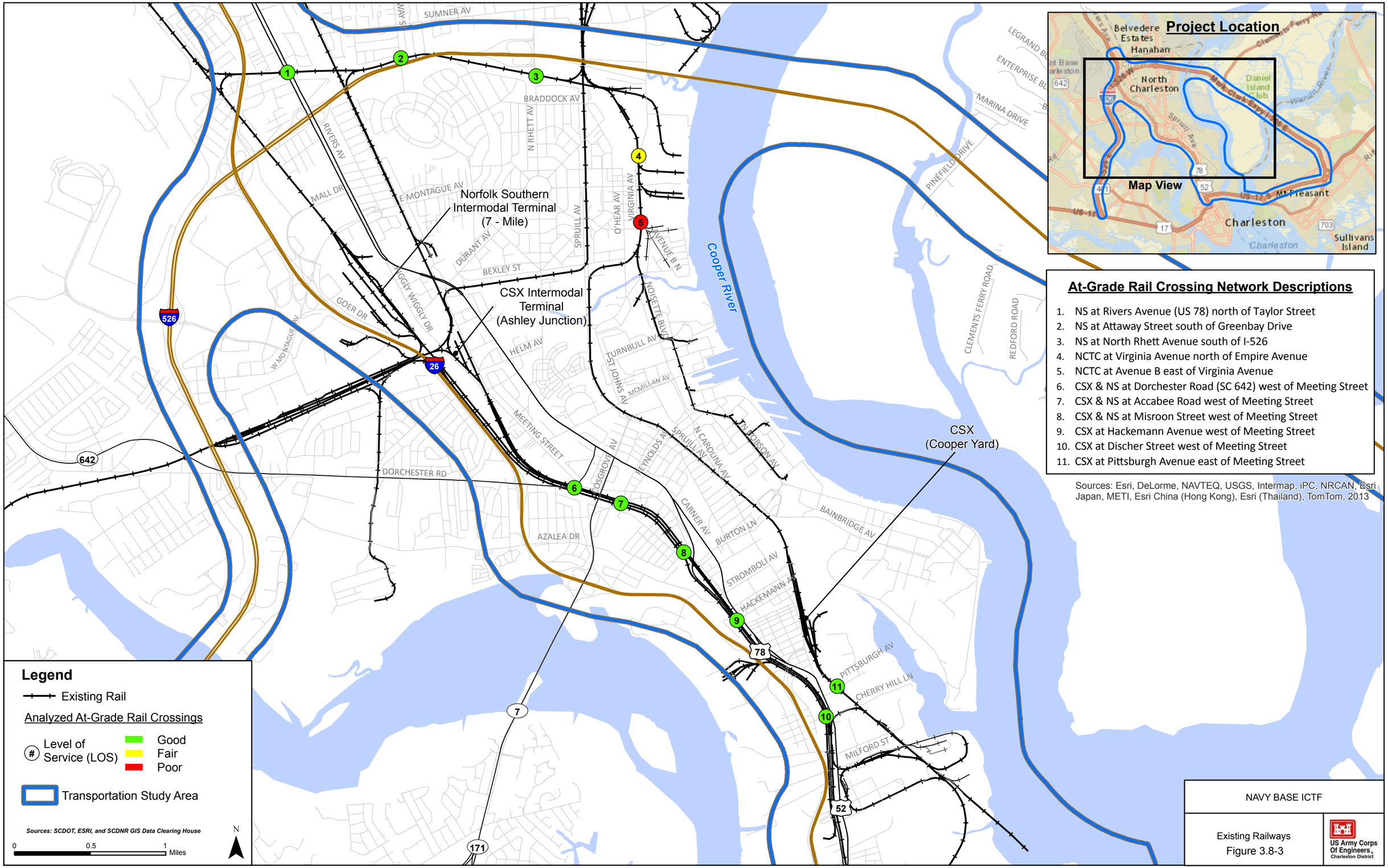
This page intentionally left blank.



POC_Traffic_EIS_TransStudyArea_Pack.mxd JNL 04.04.2016



POC_Traffic_EIS_ExistingIntersections_Pack.mxd JNL 04.04.2016



Existing Railways
Figure 3.8-3

POC_Traffic_TechMemo_ExistingRailwaysBasemap_rev3.ai JNL/AKB 04.07.2016

3.9 LAND USE AND INFRASTRUCTURE

3.9.1 Land Use and Zoning

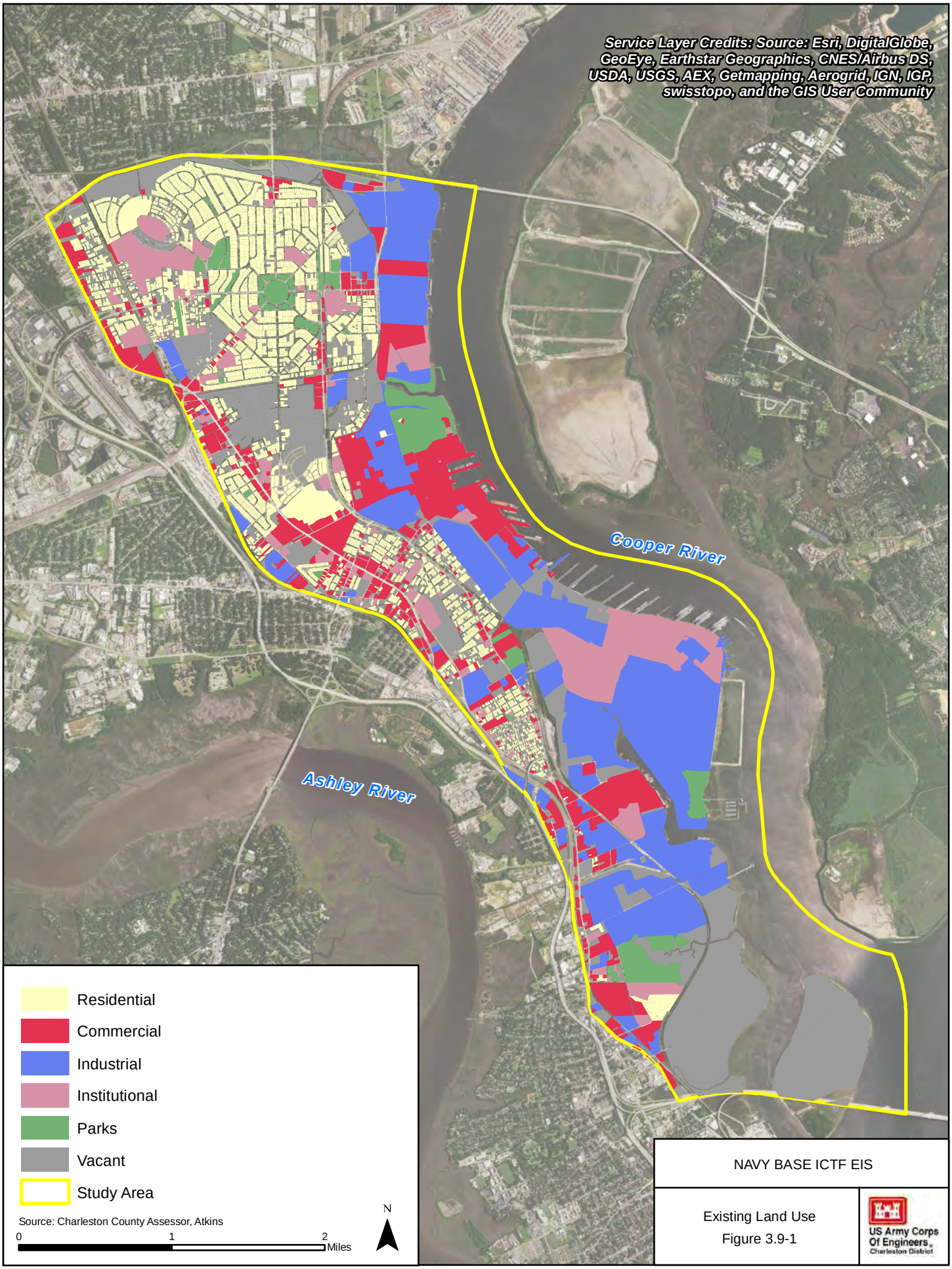
3.9.1.1 Land Use

The study area for Land Use and Infrastructure, depicted on Figure 1.6-1, occupies 5,389 acres of classified land and includes the CNC and adjacent mixed residential and commercial land uses within portions of both the City of North Charleston and the City of Charleston. Land uses were determined using parcel data from the Charleston County Assessor's Office and are classified into the following categories: residential, commercial, industrial, government and institutional, parks and open space, and vacant. Land uses within the study area are mapped in Figure 3.9-1 and listed (with acres) in Table 3.9-1. The dominant land use (aside from vacant parcels) at the former Naval Base and the Port of Charleston is Industrial, comprising 1,371 acres or 25% of the study area. Residential land use, comprising 1,030 acres or 19% of the study area includes traditional neighborhoods with a mix of single and multi-family housing units. Numerous named neighborhoods are located within the study area such as, Park Circle, Oak Park, Palmetto Gardens, Cameron Terrace, Liberty Hill, Olde North Charleston, Mixon Avenue, Whipper Barony, Chicora Place, Cherokee Place, Nafair, Windsor and Union Heights. Three parks, 1 recreation center, approximately 15 churches, 2 private schools and 3 public schools are also located within the study area. Small offices, businesses, and non-profit organizations are scattered throughout the study area with the largest offices located on the northern portion of the former CNC (north of McMillan Avenue). New residential neighborhoods, developed as part of the City of North Charleston's community redevelopment program, also occupy these residential districts. These neighborhoods include River Place, The Villages of Noisette, West Yard Lofts, and Hunley Waters.

There are numerous opportunities for redevelopment or adaptive reuse of properties in the study area. There are many neglected or vacant residential and commercial properties, especially in the central and southern portions of the study area. Several community organizations have taken an interest in promoting the redevelopment and revitalization of these areas.

3.9.1.2 Zoning

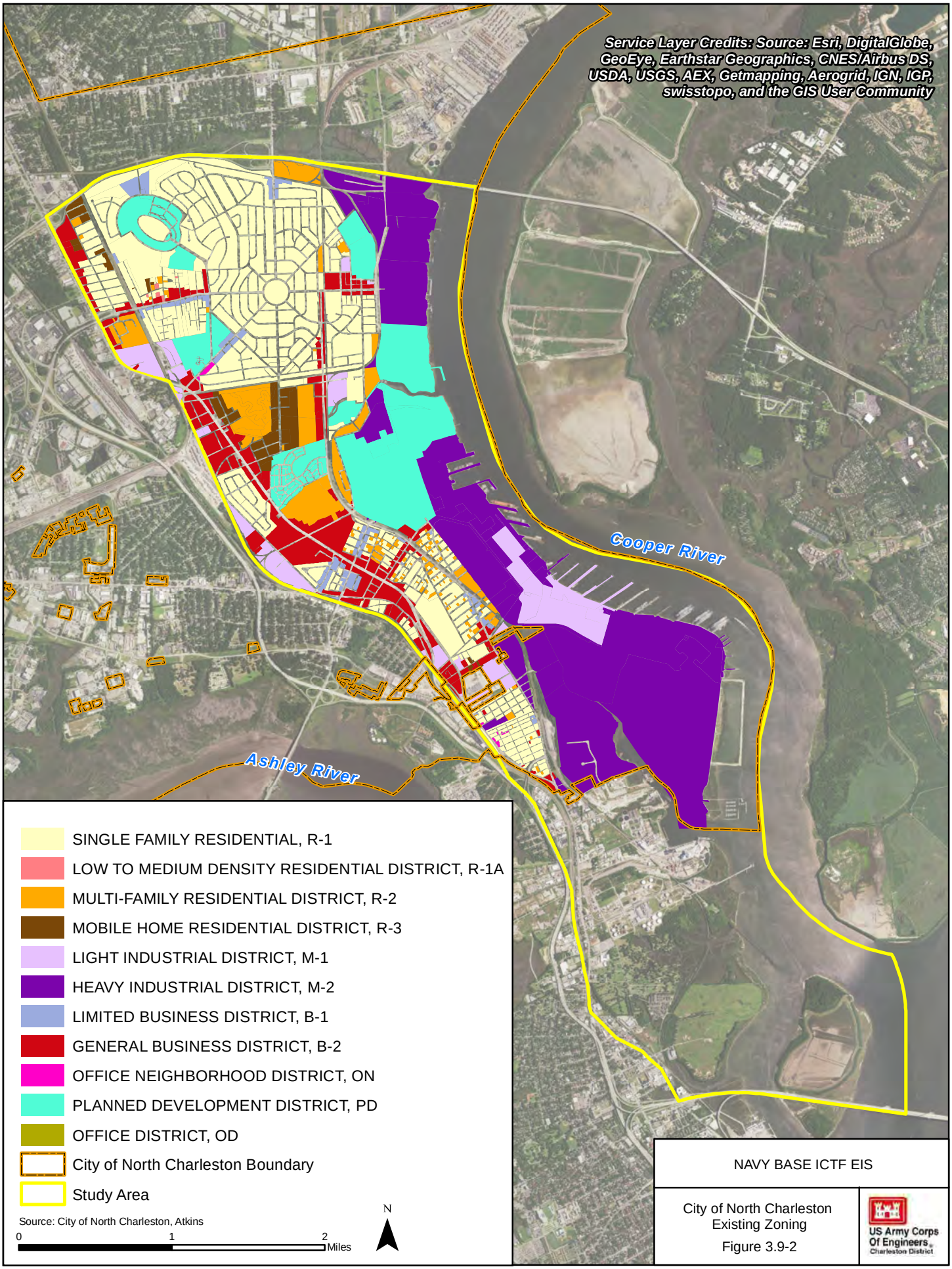
The study area is under the zoning jurisdiction of two municipalities. The majority of the study area is within the City of North Charleston while a portion of the study area to the south is within the City of Charleston. Existing zoning for the City of North Charleston is shown in Figure 3.9-2 and for the City of Charleston in Figure 3.9-3

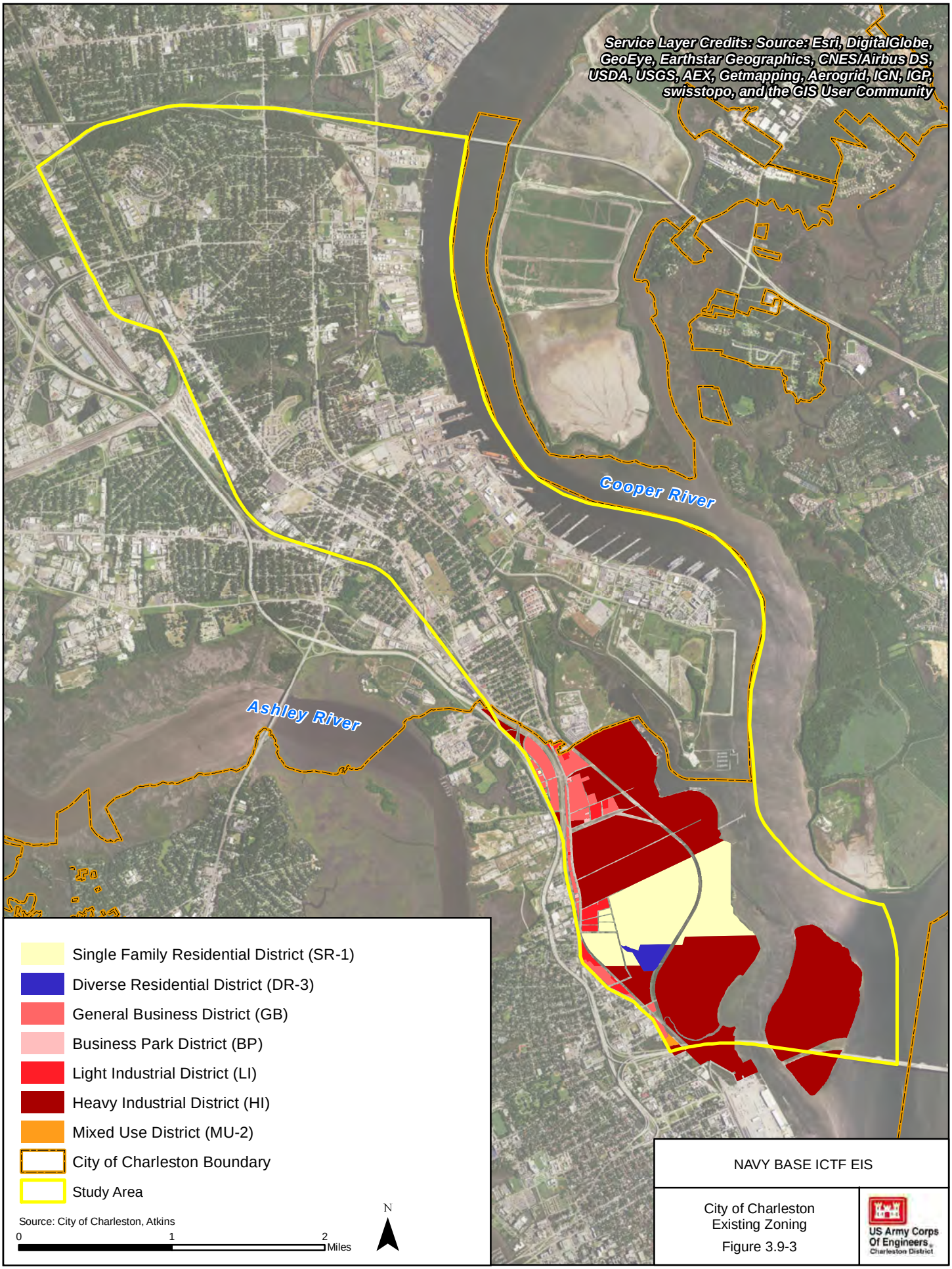


NAVY BASE ICTF EIS

Existing Land Use
Figure 3.9-1

US Army Corps Of Engineers
Charleston District


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
Cooper River
Ashley River
SINGLE FAMILY RESIDENTIAL, R-1
LOW TO MEDIUM DENSITY RESIDENTIAL DISTRICT, R-1A
MULTI-FAMILY RESIDENTIAL DISTRICT, R-2
MOBILE HOME RESIDENTIAL DISTRICT, R-3
LIGHT INDUSTRIAL DISTRICT, M-1
HEAVY INDUSTRIAL DISTRICT, M-2
LIMITED BUSINESS DISTRICT, B-1
GENERAL BUSINESS DISTRICT, B-2
OFFICE NEIGHBORHOOD DISTRICT, ON
PLANNED DEVELOPMENT DISTRICT, PD
OFFICE DISTRICT, OD
City of North Charleston Boundary
Study Area
Source: City of North Charleston, Atkins
0
1
2
Miles
N
NAVY BASE ICTF EIS
City of North Charleston
Existing Zoning
Figure 3.9-2
US Army Corps
Of Engineers
Charleston District



NAVY BASE ICTF EIS

City of Charleston
Existing Zoning

Figure 3.9-3

US Army Corps Of Engineers
Charleston District

Table 3.9-1
Study Area Land Uses

Existing Land Use	Study Area	
	Acres	Percentage
Residential	1,030	19.11%
Commercial	741	13.75%
Industrial	1,371	25.44%
Institutional	490	9.10%
Parks	264	4.90%
Vacant	1,492	27.70%
Total	5,389	100.00%

Source: Charleston County Assessor's Office 2016.

City of North Charleston Zoning

The City of North Charleston maintains maps delineating various residential, commercial, and industrial zoning districts. The Navy Base ICTF is subject to the District Use Classification (Article V) of the Zoning Regulations within the City of North Charleston Code of Ordinances (2016). Descriptions of existing zoning classifications for the City of North Charleston within the study area, as well as the corresponding section under the Code of Ordinances, are as follows:

-R-1, Single Family Residential District (Section 5-1)

> The regulations which apply within this district are designed to encourage the formation and continuance of a stable, healthy environment for one-family dwellings and to discourage any encroachment by commercial, industrial, or other use capable of adversely affecting the residential character of the district.

-R-1A, Low to Medium Density Residential District (Section 5-1.1)

> The R-1A zoning district is established to provide for low to medium density single-family residential uses, including mobile homes, provided that the city council, after public notice and hearing, determines that a proposed area or neighborhood would be suitable for designation as an R-1A district and the permitted uses, therein, will not substantially injure the actual or permitted uses of the neighboring or nearby properties.

-R-2, Multi-Family Residential District (Section 5-2)

> The regulations which apply within this district are designed to encourage the formation and continuance of a stable, healthy environment for single and multi-family dwellings and to discourage any encroachment of commercial, industrial or other uses capable of adversely affecting the residential character of the district.

-R-3, Mobile Home Residential District (Section 5-2.1)

> The R-3 zoning district is established and reserved for medium density residential purposes. The regulations which apply within this district are designed to encourage the formation and continuance of a stable and healthy environment for single-family dwellings and mobile

homes and to discourage any encroachment of commercial, industrial, multi-family or other uses capable of adversely affecting the single-family residential character of the district. The term mobile home shall include trailers, mobile homes and manufactured homes.

-ON, Neighborhood Office District (Section (Section 5-3)

This ON zoning district provides for the uses of business and professional offices such as lawyers, accountants, engineers, architects, advertising agencies, real estate agents, physicians, dentists and hair stylists as well as all uses permitted in R-1 zoning districts.

-B-1, Limited Business District (Section 5-3.1)

The intent of the B-1 zoning district to encourage the formation and continuance of a quiet and uncongested environment for compatible professional business offices together with certain residential and neighborhood commercial uses which will not adversely affect adjacent residential areas.

-B-2, General Business District (Section 5-4)

The regulations that apply within this district are designed to encourage the formation and continuance of a compatible and economically healthy environment for business, financial, and professional service uses which benefit from being in close proximity to each other

-M-1, Light Industrial District (Section 5-5)

It is the intent of the M-1 zoning district to provide areas for commercial, warehousing, transportation, and certain light manufacturing activities within the city.

-M-2, Heavy Industrial District (Section 5-6)

It is the intent of the M-2 zoning district to provide areas for commercial, manufacturing, storage, and transportation-related activities within the city.

-PDD, Planned Development Districts (Section 5-7)

The Planned Development District is a special district established by a certain procedure and designated on the official zoning map by boundaries and symbols. Use, area, bulk, height, and other requirements shall be determined by the procedures set forth in this section. It is the intent of this section to encourage flexibility in the development of land in order to promote its most appropriate use; to improve the design, character, and quality of new development; to facilitate the adequate and economical provision of streets and utilities; and to preserve the natural and scenic features of open areas.

City of Charleston Zoning

As mentioned previously, the southern portion of the study area is within the City of Charleston. As such, this portion of the Proposed Project falls under the zoning jurisdiction of the City of Charleston. Descriptions of base zoning districts that are within the study area as set forth in Article 2 of the City of Charleston Zoning Ordinance (2016) are as follows:

-SR-1, Single-Family Residential District

The Single-family Residential (SR) districts (including the SR-1, SR-2, SR-3, SR-4, SR-5, SR-6, SR-7 and SR-8 Districts) allow for one-family detached dwellings with maximum densities of 4.8, 7.3, 7.3, 10.9, 17.4, and 8.7 units per acre respectively, with varying setback, height and lot occupancy requirements.

-DR-3, Diverse Residential District

The DR-3 district is intended to promote acceptable living environments for occupants of mobile home parks as well as occupants of mobile homes, and manufactured homes and non-mobile home residential dwellings on single lots outside of mobile home parks. Uses allowed in SR and DR districts are also allowed in the DR-3 district. The minimum lot size for a mobile home or manufactured home on its own lot is 1 acre.

-GB, General Business District

The GB district is intended to provide for a broad range of commercial uses and activities. It is the most intensive commercial zoning district. Prohibited uses include junk and salvage yards, storage yards (except for vehicles and boats), and warehouses including self-storage mini-warehouses. Automotive repair shops, veterinary clinics, and stables are permitted only as special exceptions subject to the approval of the Board of Zoning Appeals.

-BP, Business Park District

The BP district is intended to accommodate service type commercial, wholesale, storage, and light manufacturing uses with relatively limited external effects in a high quality environment. Uses which fit into this category are characterized by being low traffic generators, having no external environmental effects across property lines, and having all outdoor storage screened from adjoining rights-of-ways and properties by a minimum six-foot tall solid fence or wall and landscape buffer, if required. Automotive repair shops and veterinary clinics are permitted only as special exceptions subject to the approval of the Board of Zoning Appeals.

-MU-2, Mixed Use District

The MU-2 district is intended to permit high density residential uses along with a broad range of commercial uses and activities in urban areas of the city.

-LI, Light Industrial District

The LI district is intended to permit most commercial uses and low impact industrial uses which are compatible with surrounding commercial districts. More intensive industrial and manufacturing uses are permitted as conditional uses if the uses satisfy specific performance standards. Storage yards are permitted only as special exceptions subject to the approval of the Board of Zoning Appeals.

-HI, Heavy Industrial District

The HI district is intended to provide for a broad range of industrial uses. It is the least restrictive industrial zoning district. Junk yards and storage yards permitted only as special exceptions subject to the approval of the Board of Zoning Appeals.

3.9.1.3 Comprehensive Plans

Under South Carolina law (SC Code of Laws Title 6 Chapter 29), the local planning commission must develop and maintain a planning process which will result in the systematic preparation and continual re-evaluation and updating of those elements considered critical, necessary, and desirable to guide the development and redevelopment of its area of jurisdiction. This planning process includes the development and maintenance of the comprehensive plan.

A local comprehensive plan must include, but not be limited to, the following planning elements:

(1) A population element which considers historic trends and projections, household numbers and sizes, educational levels, and income characteristics;

(2) An economic development element which considers labor force and labor force characteristics, employment by place of work and residence, and analysis of the economic base;

(3) A natural resources element which considers coastal resources, slope characteristics, prime agricultural and forest land, plant and animal habitats, parks and recreation areas, scenic views and sites, wetlands, and soil types. Where a separate board exists pursuant to this chapter, this element is the responsibility of the existing board;

(4) A cultural resources element which considers historic buildings and structures, commercial districts, residential districts, unique, natural, or scenic resources, archaeological, and other cultural resources. Where a separate board exists pursuant to this chapter, this element is the responsibility of the existing board;

(5) A community facilities element which considers water supply, treatment, and distribution; sewage system and wastewater treatment; solid waste collection and disposal, fire protection, emergency medical services, and general government facilities; education facilities; and libraries and other cultural facilities;

(6) A housing element which considers location, types, age, and condition of housing, owner and renter occupancy, and affordability of housing. This element includes an analysis to ascertain nonessential housing regulatory requirements, as defined in this chapter, that add to the cost of developing affordable housing but are not necessary to protect the public health, safety, or welfare and an analysis of market-based incentives that may be made available to encourage development of affordable housing, which incentives may include density bonuses, design flexibility, and streamlined permitting processes;

(7) A land use element which considers existing and future land use by categories, including residential, commercial, industrial, agricultural, forestry, mining, public and quasi-public, recreation, parks, open space, and vacant or undeveloped;

(8) A transportation element that considers transportation facilities, including major road improvements, new road construction, transit projects, pedestrian and bicycle projects, and other elements of a transportation network. This element must be developed in coordination with the land use element, to ensure transportation efficiency for existing and planned development;

(9) A priority investment element that analyzes the likely federal, state, and local funds available for public infrastructure and facilities during the next 10 years, and recommends the projects for expenditure of those funds during the next 10 years for needed public infrastructure and facilities such as water, sewer, roads, and schools. The recommendation of those projects for public expenditure must be done through coordination with adjacent and relevant jurisdictions and agencies. For the purposes of this item, "adjacent and relevant jurisdictions and agencies" means those counties, municipalities, public service districts, school districts, public and private utilities, transportation agencies, and other public entities that are affected by or have planning authority over the public project. For the purposes of this item, "coordination" means written notification by the local planning commission or its staff to adjacent and relevant jurisdictions and agencies of the Proposed Projects and the opportunity for adjacent and relevant jurisdictions and agencies to provide comment to the planning commission or its staff concerning the Proposed Projects. Failure of the planning commission or its staff to identify or notify an adjacent or relevant jurisdiction or agency does not invalidate the local comprehensive plan and does not give rise to a civil cause of action.

(E) All planning elements must be an expression of the planning commission recommendations to the appropriate governing bodies with regard to the wise and efficient use of public funds, the future growth, development, and redevelopment of its area of jurisdiction, and consideration of the fiscal impact on property owners. The planning elements whether done as a package or in separate increments together comprise the comprehensive plan for the jurisdiction at any one point in time. The local planning commission shall review the comprehensive plan or elements of it as often as necessary, but not less than once every five years, to determine whether changes in the amount, kind, or direction of development of the area or other reasons make it desirable to make additions or amendments to the plan. The comprehensive plan, including all elements of it, must be updated at least every ten years.

Both the City of North Charleston (2008a) and the City of Charleston (2010) have comprehensive plans last updated in 2008 and 2010, respectively.

3.9.1.4 Other Local Plans

City of North Charleston Noisette Community Master Plan – The New American City

The Noisette Community Master Plan was released for approximately 3,000 acres that included the City of North Charleston's historic core and the north end of the former CNC (The Noisette Company 2003). The master plan set guidelines to develop a diverse, interconnected network of neighborhoods, businesses, parks, retail centers, and environmentally friendly entrepreneurial businesses, integrating new development with adjacent communities. In keeping with this plan, a row of former Navy warehouses and buildings between Noisette Boulevard and Hobson Avenue have been successfully converted into new offices, art studios, restaurants, and workshops. In addition, a low-income housing complex, West Yard Lofts, was developed in the northern portion of the former CNC, along with the Lowcountry Innovation Center and Riverfront Park.

Charleston Neck Plan

In 2000, the Charleston City Council adopted an Economic Development Plan for the Enterprise Community. The plan was drafted by the Civic Design Center – City of Charleston (2003) and included four parts. One of those parts made general recommendations for physical development in the Enterprise Community and also recommended that physical development issues by studied in more detail to ensure that the community leads quality development in the area. The Charleston Neck plan identified the next step in the physical development planning process. The purpose of the Charleston Neck plan was to provide a framework for physical development in the Charleston Neck area. The Neck Plan included three key sections: the Urban Plan, a Zoning Strategy, and an Implementation Strategy.

3.9.2 Infrastructure and Utilities

Infrastructure and utilities currently available in the study area include electricity, potable water, sanitary sewer, natural gas, telecommunication, and solid waste collection. Utility services within the study area are regional systems with infrastructure networks and design capacity to serve the needs of the greater Charleston area. Service providers for each of these services are identified on Table 3.9-2 and described further below.

Table 3.9-2
Utility Providers in Study Area

Utility Providers in Study Area	
Service	**Provider**
Electricity	South Carolina Electric &Gas (SCE&G) and Santee-Cooper
Natural Gas	SCE&G
Telecommunications	SCANA Communications
Potable Water	Charleston Water System
Sanitary Waste	North Charleston Sewer District
Solid Waste Collection Solid Waste Disposal	North Charleston Sanitation Division or private waste management firm Spring Grove Sanitary Landfill

Electricity

Electricity to the project site is provided by the South Carolina Electric and Gas Company (SCE&G), a primary subsidiary of SCANA's. SCE&G is a regulated public utility engaged in the generation, transmission, distribution, and sale of electricity to retail and wholesale customers across a 22,000-square-mile service territory in central, southern, and western South Carolina (SCE&G 2014). Industrial-scale power distribution infrastructure is currently in place within the study area (Table 3.9-3).

Table 3.9-3
SCE&G Power Generation Capacity

Power Plants	Power Generation
Nuclear*	966 MW
4 Coal Plants	1,975 MW
2 Natural Gas Plants	1,525 MW
5 Hydro Electric Plants	820 MW
Total power Generation Capacity	**5,286 MW**

*Additional nuclear capacity currently being developed under partnership with Santee-Cooper.

Natural Gas

SCE&G also provides natural gas to retail customers through its extended transportation network in the Charleston Area.

Communications

SCANA Communications provides communication services to clients throughout North Carolina, South Carolina, and Georgia, including telecom service providers such as local exchange carriers, Internet Service Providers, and wireless carriers (SCANA 2014). SCANA Communications provides fiber optic telecommunications, Ethernet, and data center facilities to the study area.

Potable Water

Potable water service within the study area is administered by the Charleston Water System. The Water System's water comes from two surface water sources, including Bushy Park Reservoir in Berkeley County (primary source) and the Edisto River in Dorchester County. Deep tunnels carry water from these sources to the Hanahan Water Treatment Plant. Together, these sources supply water, even during a severe drought.

After treatment, the clean water is pumped into the water distribution system, a network of nearly 2,000 miles of underground pipes ranging in size from 1 inch to 4 feet in diameter. The distribution system includes dozens of pumps, four storages tanks, and some 8,700 fire hydrants. All of this must be monitored and maintained to provide high quality water at the right pressure to the 110,000 homes and businesses served by the Charleston Water System (Charleston Water System 2014). The potable water distribution system is currently in place and currently serves the study area.

Wastewater

North Charleston Sewer District provides sanitary sewer service and industrial pretreatment programs to the residential and commercial customers of the Sewer District. It operates a 27-million-

gallons-per-day (MGD) wastewater treatment facility with 480 miles of sewer transportation lines and 60 pump stations throughout the 59.3 square mile service area (North Charleston Sewer District 2014).

Wastewater collection and treatment services within the study area are provided by the North Charleston Sewer District. Currently, two pump stations exist on the project site. Wastewater flows from these stations are accommodated by a 30-inch gravity pipeline and a 20-inch force main that extend along North Hobson Avenue. Wastewater treatment is performed at the Felix Davis Wastewater Treatment Facility (WWTF). This facility has a 27-MGD design capacity and currently operates at an average of 15 MGD, leaving a 12-MGD capacity for peak day loads and growth.

Solid Waste

North Charleston Sanitation Division is responsible for solid waste and yard trash removal for all areas within the City of North Charleston city limits and the North Charleston District. The City of North Charleston does not pick up waste from commercial or industrial establishments (Pers. comm. with Eric Sears, Landfill Manager, July 24, 2014). Solid waste collection and disposal within portions of the study area is provided by the North Charleston Sanitation Division. The Charleston Environmental Management Department also serves the City of Charleston, including the study area. Scheduled collections are performed weekly at curb side and dumpster sites by both of these departments. Waste disposal for the study area will be accommodated primarily at the Spring Grove Landfill. Current disposal capacity at the Spring Grove Landfill is estimated at 125 years (Pers. comm. with Eric Sears, Landfill Manager, July 24, 2014).

3.10 CULTURAL RESOURCES

3.10.1 Introduction

The affected environment for cultural resources consists of numerous historic properties, which are sites, buildings, structures, objects, districts, or traditional cultural properties that are listed on or eligible for the National Register of Historic Places (NRHP). A cultural resource is a historic property (per 36 CFR 60.4) when it is at least 50 years old, it meets one or more of the following NRHP criteria, and it retains sufficient integrity with respect to location, design, setting, materials, workmanship, feeling, and association to convey or reflect these associations (Savage and Pope 1998):

- associated with events that have made a significant contribution to the broad pattern of history;
- associated with the lives of persons significant in the past;
- embodies the distinctive characteristics of a type, period, or method of construction, or represents the work of a master, possesses high artistic value, or represents a significant and distinguishable entity whose components may lack individual distinction; and
- has yielded, or is likely to yield, information important to history or prehistory.

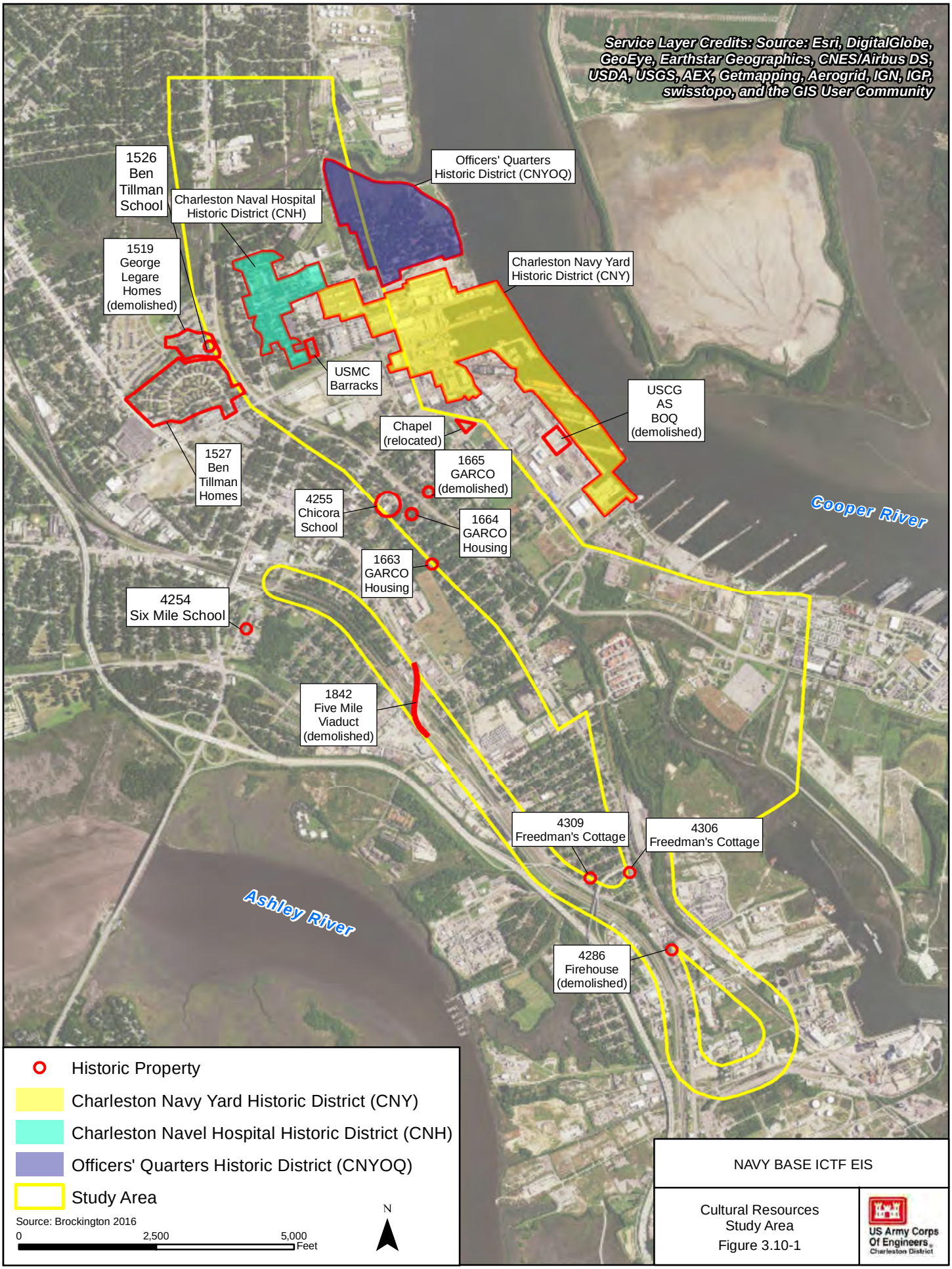
Resources less than 50 years of age also may be eligible if they meet one of the above criteria and are associated with an exceptionally significant aspect of our recent history.

The study area for cultural resources includes the physical footprints of the Navy Base ICTF at the project site and the River Center project site, as well as adjacent areas within approximately 300 feet of the physical footprints of the seven alternatives (Figure 3.10-1).

This section provides a brief description of the historical setting for the CNC and study area, and describes the historic properties that are present within them. Previous cultural resources investigations that have been conducted in the study area, including recent efforts that have been conducted in support of this EIS, are also discussed. All historic properties identified to date within or immediately adjacent to the study area are buildings, structures, and collections of buildings and structures that form historic districts.

3.10.2 Historical Setting

The narrow area between the Ashley River and Cooper River, commonly referred to as the Charleston Neck, witnessed limited development during the late seventeenth and eighteenth centuries. Poor soils and salty marshes limited the agricultural potential of this area and its use and occupation. During the early nineteenth century, plantations developed with settlements and facilities focused along the Cooper River. Settlement remained sparse compared to other reaches of the coastal rivers. After the Civil War, the Charleston Neck witnessed expansive industrial growth with the


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
1526 Ben Tillman School
Charleston Naval Hospital Historic District (CNH)
Officers' Quarters Historic District (CNYOQ)
1519 George Legare Homes (demolished)
Charleston Navy Yard Historic District (CNY)
USMC Barracks
USCG AS BOQ (demolished)
Chapel (relocated)
1665 GARCO (demolished)
1527 Ben Tillman Homes
4255 Chicora School
1664 GARCO Housing
1663 GARCO Housing
Cooper River
4254 Six Mile School
1842 Five Mile Viaduct (demolished)
4309 Freedman's Cottage
4306 Freedman's Cottage
Ashley River
4286 Firehouse (demolished)
Historic Property
Charleston Navy Yard Historic District (CNY)
Charleston Navel Hospital Historic District (CNH)
Officers' Quarters Historic District (CNYOQ)
Study Area
Source: Brockington 2016
0
2,500
5,000
Feet
N
NAVY BASE ICTF EIS
Cultural Resources Study Area
Figure 3.10-1
US Army Corps Of Engineers
Charleston District

establishment of phosphate processing mills and plants along both the Ashley River and Cooper River to the west and south of the study area. In the 1890s, the City of Charleston acquired much of the land within the study area for the anticipated growth of the City. The City of Charleston planned Chicora Park, designed by the Olmstead Brothers, as a rural retreat for City residents. In 1901, the U.S. Navy (USN) purchased the nascent Chicora Park and much of the surrounding land to create what would later become Navy Base Charleston.

Development of a USN installation on the Cooper River began in 1901. A portion of the landscaping that was started in Chicora Park was retained in the northern end of the navy base, where the quarters for senior officers were constructed. Rail connections with the Atlantic Coast Line and Seaboard Air Line tracks to the west (both completed in 1889 along the route of the original Charleston-to-Hamburg rail line—the oldest rail line in the United States) were quickly established to provide ready access for the materials needed to repair and outfit USN vessels. With the construction of the Charleston Navy Yard, repair services for USN vessels along the southeast Atlantic Seaboard were initially provided. By 1910, the USN was expanding its shipbuilding capabilities, and the Charleston Navy Yard experienced growth associated with this expansion. By the entry of the United States into World War I (WWI), the navy yard also based a torpedo boat squadron, training facilities and specialist schools, and support naval factories. Shipbuilding expanded during WWI with the Charleston yard producing small warships (eight submarine chasers, one destroyer, and one gunboat) and service vessels (two tugs, two coal barges, and one ammunition lighter); however, the Charleston yard was not designed to build battleships or cruisers, the largest warships of the USN. The factories established in the Charleston region also expanded their operations to accommodate the growth of the USN during the nation's involvement in a world war. The end of WWI saw a drastic reduction in the presence of the U.S. military, and operations, at the Charleston Navy Yard. As a result, many of the factories, schools, and training facilities closed (some even dismantled), and ship repair and construction were minimal.

The early 1930s witnessed a return to naval expansion as the United States began to compete with the growing powers of Europe and the Far East. The Charleston Navy Yard began its greatest period of growth over the late 1930s and the early 1940s as the United States prepared for and entered World War II (WWII). The Charleston Navy Yard focused on the repair and construction of destroyers and destroyer escorts, and a plethora of small service, support, and specialty vessels. Over 25,000 workers were employed at the shipyard in 1943, with four dry-docks in operation. This period witnessed the expansion of the facility to its southern limits, with massive dredging and filling operations necessary to create the land needed to support the shipbuilding and repair activities along the Cooper River. In addition to building and repair, the yard also was the home of antisubmarine activities using both fixed wing and lighter-than-air machines (blimps). The air station supporting these activities was closed at the end of WWII.

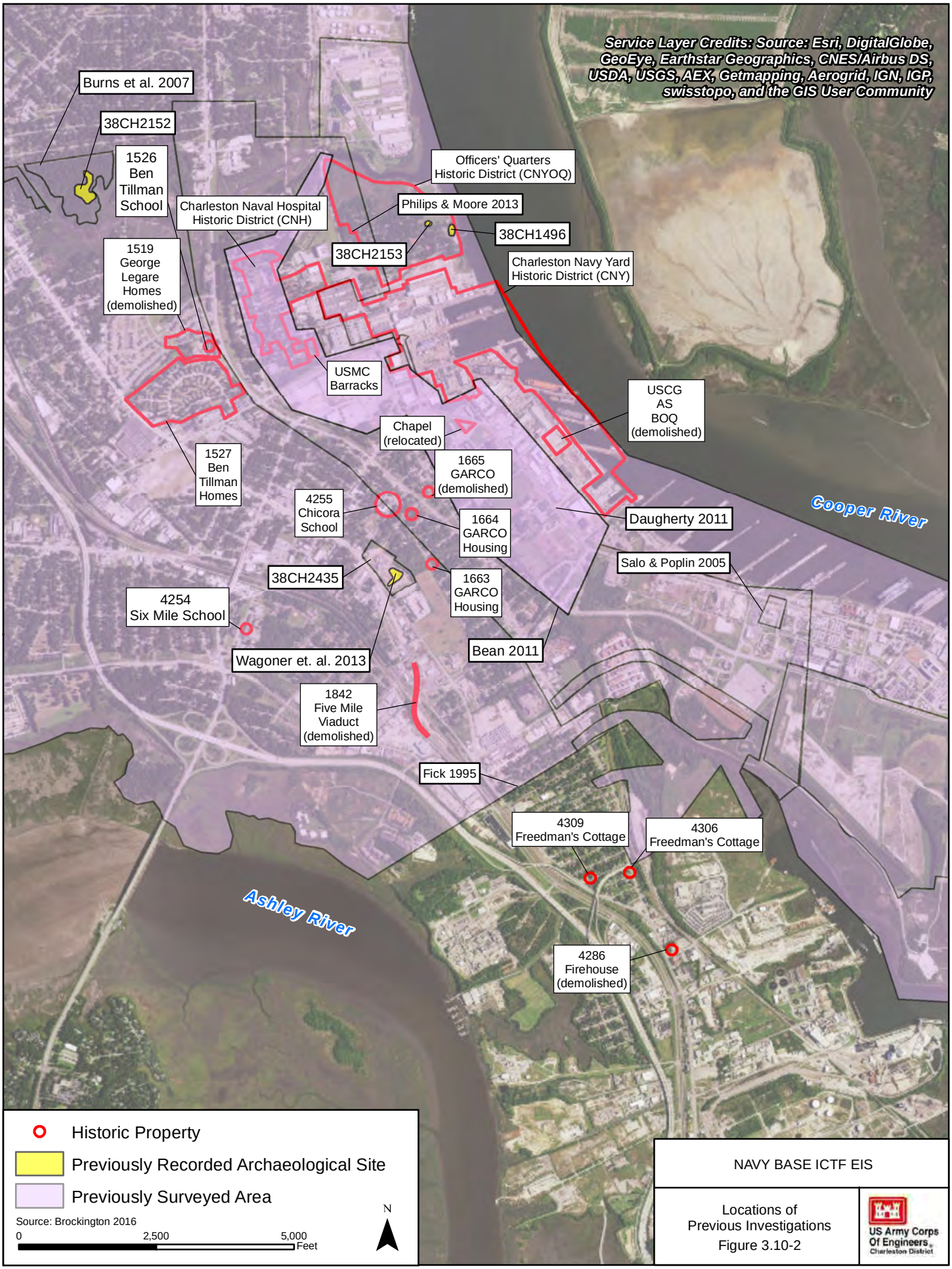
Although the end of WWII witnessed another drop in activity, the Charleston Navy Yard became Navy Base Charleston and received the headquarters of the Fleet Mineforce. As the USN changed its vessels during the 1950s and 1960s, the Naval Shipyard began the construction and maintenance of nuclear-powered vessels, with a fifth dry-dock built in the 1960s to accommodate nuclear-powered Polaris missile submarines that were home-berthed at Charleston. Navy Base Charleston replenished the nuclear missile submarines (including their ballistic missiles and nuclear warheads) that patrolled the Atlantic Ocean throughout the Cold War era. All of these facilities remained in operation until 1996, when the USN closed Navy Base Charleston. As the USN activities expanded during the early and mid-twentieth century, so too did the residential and commercial neighborhoods adjacent to the installation. Residences were needed for the thousands of workers who came to the shipyard for employment. Commercial enterprises sprang up to support these workers and the growing naval population on the base itself. Eventually, this growth contributed to the establishment of the City of North Charleston around the navy base. When the base closed in 1996, growth diminished in the surrounding neighborhoods, although the residential districts continue to be highly occupied. No ships are currently being built at the CNC.

The USN entered a Programmatic Agreement (PA) with the South Carolina State Historic Preservation Office (SHPO) in May 1995 to satisfy the Navy's obligations under the National Historic Preservation Act (NHPA). The Redevelopment Authority (RDA- current managers of the CNC) was created to manage the conversion of the CNC into a non-military commercial/industrial complex within these parameters. The RDA continues this function today and must abide by the PA implemented by the USN and the SHPO when the base was closed. The PA requires that all owners/lessees of historic properties must follow its guidance concerning the maintenance, adaptive re-use, and treatment of these historic buildings and structures. Palmetto Railways currently owns a number of the historic properties within the CNC and would have to follow the stipulations of the PA and its associated covenants when dealing with these buildings and structures.

More comprehensive histories may be found in Bean (2011), Fick (1995), and Goodwin (1995).

3.10.3 Cultural Resources Investigations

Over the last 20 years, 14 cultural resources investigations of this portion of North Charleston have been conducted, and each has inventoried historic properties (NRHP eligible) and other historic resources (survey eligible sites, buildings, structures, etc., that are greater than 50 years of age but are not eligible for the NRHP) within and near the Cultural Resources study area. These efforts include the recent architectural survey investigations undertaken by Owens et.al (2015) and Owens and Poplin (2016) in support of this EIS, which are documented in Appendix G. Table 3.10-1 lists the cultural resource investigations within and near the study area, while Figure 3.10-2 shows their locations in relation to the study area.


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
Burns et al. 2007
38CH2152
1526 Ben Tillman School
Charleston Naval Hospital Historic District (CNH)
Officers' Quarters Historic District (CNYOQ)
Philips & Moore 2013
38CH1496
38CH2153
Charleston Navy Yard Historic District (CNY)
1519 George Legare Homes (demolished)
USMC Barracks
USCG AS BOQ (demolished)
Chapel (relocated)
1665 GARCO (demolished)
1527 Ben Tillman Homes
4255 Chicora School
1664 GARCO Housing
Daugherty 2011
Cooper River
Salo & Poplin 2005
38CH2435
1663 GARCO Housing
4254 Six Mile School
Bean 2011
Wagoner et. al. 2013
1842 Five Mile Viaduct (demolished)
Fick 1995
4309 Freedman's Cottage
4306 Freedman's Cottage
Ashley River
4286 Firehouse (demolished)
Historic Property
Previously Recorded Archaeological Site
Previously Surveyed Area
Source: Brockington 2016
0
2,500
5,000
Feet
N
NAVY BASE ICTF EIS
Locations of Previous Investigations
Figure 3.10-2
US Army Corps Of Engineers
Charleston District

As part of recent architectural survey investigations, Owens et al. 2015 and Owens and Poplin (2016) focused on those portions of the study area that had not been inventoried within the last 20 years in an effort to document any resources built between 1945 (the terminal date for the major architectural surveys of North Charleston and the CNC) and 1971 (date of publication of the previous edition of the USGS *North Charleston, SC* quadrangle) that may now be eligible for the NRHP. Owens et al. 2015 also evaluated the NRHP eligibility of specific resources recommended as potential Cold War era resources in a 1995 study of the military installations in South Carolina and their role during the Cold War (University of South Carolina Legacy Project 1995). Survey results and recommendations of eligibility for individual resources were reviewed by and received concurrence from the SHPO.

The locations of known historic resources, identified during previous cultural resources investigations in the study area (Adams and Hughes 2009; Bean 2011; Burns et.al. 2007; Daugherty 2011; Fick 1995; Goodwin 1995; Poplin and Salo 2005; Poplin et al. 2006; USC Legacy Project 1995; Wagoner et.al 2013), were obtained from the online database of cultural resources information (ArchSite) maintained by the SHPO and the University of South Carolina Institute of Archaeology and Anthropology. Figure 3.10-2 shows the locations of the previous investigations with relation to the study area, and the presence of nearby archaeological sites and historic properties.

3.10.4 Archaeological Features or Deposits within and near the Study Area

Development of the CNC (originally Navy Base Charleston) and the surrounding neighborhoods throughout the twentieth and twenty-first centuries has disturbed much of the original ground surface, thereby significantly reducing the potential for encountering intact archaeological features or deposits in most of the study area. Made and filled lands constitute much of the study area south of Viaduct Road. In such areas, there is a very low potential for archaeological deposits. Shmookler's (1995) assessment of archaeological potential within the CNC found that there was a very limited potential for intact archaeological deposits to be present within any portion of the installation. Recent archaeological investigations within the study area (e.g., Daugherty 2011; Philips and Moore 2013) discovered one to six feet of fill in almost all areas that were sampled, and recovered no artifacts or only found a few fragments that likely were redeposited with the fills brought in to build up and shape the landscape within the CNC.

Adams and Hughes (2009), Burns et al. (2007) and Wagoner et al. (2013) identified archaeological sites in undeveloped tracts within and near the study area, not including underwater archaeological sites in the Cooper River. Both of these investigations discovered sites that were diffuse scatters of prehistoric and/or eighteenth- to twentieth-century artifacts determined not eligible for the NRHP. One archaeological site (38CH2435) lies within the study area; site 38CH2435 is not eligible for the NRHP. Ten archaeological sites are located near the study area (38CH0702, 38CH1496, 38CH2152, 38CH2153, 38CH2297, 38CH2298, 38CH2299, 38CH2300, 38CH2301, and 38CH2302). Two sites

near the study area that lie in the central and eastern portion of the Charleston Navy Yard Officers' Quarters NRHP District (38CH1496 and 38CH2153) displayed extensive disturbances, including 1 to 2 feet of fill in some areas. Neither of these sites has been evaluated for NRHP eligibility. The other eight sites outside of the study area are not eligible for the NRHP.

3.10.5 Historic Properties within and near the Study Area

Historic properties within and near the study area currently indicated in ArchSite include 3 historic districts (all associated with the CNC), 2 planned communities of houses and apartments (in the residential areas west of the CNC), 13 individual buildings (3 within the CNC that are not associated with the districts, and 10 in the adjoining residential neighborhoods), and 1 structure. All 3 historic districts have been listed in the NRHP, 4 of the individual buildings and the structure have been demolished or moved recently, and 1 of the planned communities of houses has been rebuilt. The SHPO determined that these rebuilt, demolished, and relocated historic properties no longer meet the criteria for NRHP eligibility (see Appendix G, SHPO comments on Owens et al. 2014). Thus, there are 11 historic properties within the study area (3 historic districts, 1 planned residential community, and 8 individual buildings; 1 property contains 2 buildings). Documentation of the SHPO review and concurrence with the major recent investigations (the PA regarding the disposal of Navy Base Charleston; SHPO concurrence on mitigation of Structure 1842; Five Mile Viaduct prior to demolition; review and comment on Bean 2011 and Daugherty 2011; review and comment on Owens et al. 2014 and Owens and Poplin 2016) is included in Appendix G. Table 3.10-2 lists the historic properties within or adjacent to the study area, and indicates their presence/absence in the footprints of Alternatives 1–7.

3.10.5.1 Historic Districts

The Charleston Navy Yard Historic District

The Charleston Navy Yard Historic District (CNY) lies both within and outside the study area; however, most of the district is outside the study area. The CNY primarily extends along the Cooper River, east of the study area and mostly east of North Hobson Avenue. Only the northwestern elements of the district extend into the study area. The CNY was listed in the NRHP in 2006 and contains 86 buildings, structures, and objects that are a cohesive representative example of permanent naval industrial construction that reflect the major trends in United States naval development between 1900 and 1945. Fifty-seven of the 86 buildings/structures/objects contribute to the NRHP eligibility of the District; the remaining 29 do not contribute. The portion of the CNY located within the study area is approximately 10 percent of the overall historic district and includes eight contributing historic buildings/structures and one non-contributing element.

Table 3.10-1
Cultural Resources Investigations

Author(s)	Date	Title
Fick	1995	City of North Charleston Historical and Architectural Survey
Goodwin	1995	Inventory, Evaluation, and Nomination of Military Installations: Naval Base Charleston
USC Legacy Project	1995	The Cold War in South Carolina, 1945-1991: An Inventory of Department of Defense Cold War Era Cultural and Historical Resources in the State of South Carolina
Shmookler	1995	Archaeological Sensitivity Assessment for the Disposal and Reuse of Charleston Naval Base, North Charleston, South Carolina
Poplin and Salo	2005	Historic Properties Assessment, Proposed Marine Container Terminal, Charleston Harbor, South Carolina
Poplin, Salo and Ellerbee	2006	Cultural Resources Survey of the Proposed Access Road Alternate Alignments, South Carolina State Ports Authority's Charleston Naval Center Marine Container Terminal Project, Charleston County, South Carolina
Burns, Salo and Philips	2007	Cultural Resources Survey of the South Rhett Tract, North Charleston, Charleston County, South Carolina
Adams and Hughes	2009	Phase I Cultural Resources Survey of the Proposed SC 7 Bridge over SCL and Southern Railroad and S-39 Expansion, Charleston County, South Carolina
Bean	2011	Architectural Survey for the Intermodal Container Transfer Facility at the Charleston Naval Base, North Charleston, South Carolina
Daugherty	2011	Phase I Archaeological Survey of the Intermodal Yard at the former Charleston Naval Base, North Charleston, South Carolina
Philips and Moore	2013	Ground Penetrating Radar Investigations of a Possible Cemetery, Old Navy Base, Charleston County, South Carolina
Wagoner, Philips and Fletcher	2013	Cultural Resources Survey of the Chicora Elementary School Replacement Tract, Charleston County, South Carolina
Owens, Bragg and Poplin	2015	Architectural Survey in Support of South Carolina Public Railways' Proposed Intermodal Container Transfer Facility, Charleston County, South Carolina
Owens and Poplin	2016	Additional Architectural Survey in Support of South Carolina Public Railways' Proposed Navy Base Intermodal Container Transfer Facility, Charleston County, South Carolina

Table 3.10-2
Historic Properties

Historic Property		Alternative						
Resource #	Name	1	2	3	4	5	6	7
NA	Charleston Navy Yard Historic District (CNY- 89 elements / 57 contributing)[1]	No	No	Yes	No	Yes	Yes	Yes
NA	Charleston Naval Hospital Historic District (CNH- 35 elements / 32 contributing)[1]	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NA	Charleston Navy Yard Officers' Quarters Historic District (CHYOQ- 40 elements / 28 contributing)[1]	No	No	No	No	No	No	No
NA	USMC Barracks (CNC Building M17)[1]	Yes	No	Yes	Yes	Yes	Yes	Yes
1526	Ben Tillman Graded School (McNair Elementary School)	No	No	No	No	No	No	No
1527	Ben Tillman Homes	No	No	No	No	No	No	No
1663	GARCO Employee Housing (two residences)	No	No	No	No	No	No	No
1664	GARCO Employee Housing residence	No	No	No	No	No	No	No
4254	Six Mile Elementary School (Mary Ford Elementary School)	No	No	No	No	No	No	No
4255	Chicora Elementary School	No	No	No	No	No	No	No
4306	Charleston freedman's cottage	No	No	No	No	No	No	No
4309	Charleston freedman's cottage	No	No	No	No	No	No	No

Notes:

1. Some District elements/historic property currently owned by Palmetto Railway.

NA – Not applicable.

Functions of the CNY included industrial facilities, administrative facilities, support facilities, and storage facilities. The elements of the district reflect four periods of construction/architectural styles. These are:

- 1901 to 1910: Neo-classical style
- 1910s to end of World War I (WWI): Modern industrial style
- Post-WWI to late 1930s: Modern Federal style
- Late 1930s to 1945: Utilitarian style

Defining architectural characteristics of the buildings and structures within the district are their large scale and high density. Naval industrial processes required large spaces. These kinds of buildings provide that space; compact masses create efficiency when combining various elements of the

industrial processes to create larger objects, such as ships. Smaller buildings and structures scattered throughout the industrial facility elements generally are support and administration facilities. Some of the buildings and structures—particularly those built during the early periods of development—have ornate architectural elements. The later constructions tend to be more utilitarian, partly an effect of the acceleration of shipbuilding activities as the United States approached entry into WWII. Although different types of vessels were constructed throughout the life of the shipyard, most buildings and structures retained their original functions until the shipyard and base closed in 1996. Since then, some of the buildings have been sold or leased to private, commercial industrial facilities, engineering laboratories, Clemson University, and Palmetto Railways. Several of the dry docks continue to be used to maintain and repair ships, including USN vessels, with contractors leasing the facilities and carrying out the necessary repairs and refittings.

The Charleston Naval Hospital Historic District

The Charleston Naval Hospital Historic District (CNH) lies in the northern portion of the CNC, completely within the study area. This District was listed in the NRHP in 2010 and includes 35 buildings and structures; 32 buildings contribute to the NRHP eligibility of the district. The buildings and structures in the district reflect the growth and development of the USN in the lead-up to and during WWII. All possess the same architectural style, Spanish Colonial or Mission Revival. This theme was common for military buildings throughout the 1920s and 1930s. Although one building in the district was built during WWI, most of the buildings were constructed during the late 1930s and 1940s as the USN and Navy Base Charleston grew rapidly. There are three groups of buildings in the District:

- Treatment facilities (the central core of the district)
- Service-related buildings and structures (to the east of the hospital treatment facilities)
- Hospital staff residences (to the west, south, and north of the hospital treatment facilities)

These hospital facilities served Navy Base Charleston until 1972, when a new hospital facility was built to the south and west outside the study area. Many of the CNH buildings were refitted by the USN over the next two decades for other purposes, although the external configurations and layout of the hospital complex remained basically intact, despite the loss of several buildings and structures. This is especially true for the central treatment facilities. Since the closure of the base in 1996, other CNH buildings, particularly the former staff residences, have been refitted once again for new private commercial purposes. Despite these changes in use with internal alterations to fit the new functions, the CNH remains a designed landscape or configuration of buildings that retain a high level of integrity with respect to their setting, materials, and associations. Palmetto Railways currently owns all of the CNH.

The Charleston Navy Yard Officers' Quarters Historic District

The Charleston Navy Yard Officers' Quarters Historic District (CNYOQ) lies in the northern portion of the study area but is primarily outside of the study area. This District was listed in the NRHP in 2007 and includes 40 buildings, structures, objects, and sites; 28 of these contribute to the eligibility of the district. Approximately 20 percent (8 buildings) of the district lies within the study area; all 8 buildings are contributing elements of the district. These residences were built at the northern edge of the CNC in the central core of the former Chicora Park. They include a variety of styles, depending on when they were constructed. Streets wind through the district rather than follow the grid network of the streets in the other portions of the base. Today, large trees are present throughout the district, creating a very pleasant residential neighborhood. Larger houses lie closer to the water and to the north of the district, where the base golf course was located. Senior officers occupied the larger residences, with junior officers living in smaller houses, some of which are multi-family units. Since 1996, the Redevelopment Authority employs one of these buildings for their headquarters. Others have been sold as private residences and restaurants. Many remain unoccupied. A group of these houses also served as sets for television and movie productions. Palmetto Railways owns seven of the eight buildings within the study area that contribute to the CNYOQ and all but one of the contributing buildings outside the study area.

3.10.5.2 Historic Buildings within the CNC

There is one extant historic building within the study area: the former U.S. Marine Corps (USMC) Barracks. Prior to March 2015, the Chapel of the Eternal Father of the Sea (a WWII-era historic building) stood within the study area; this building was moved by the RDA to a location outside the current study area within the CNYOQ. Similarly, the WWII-era U.S. Coast Guard Air Station Bachelor Officers' Quarters was demolished prior to March 2014. Owens et al. (2015) evaluated specific CNC resources recommended as potential Cold War-era resources within the study area; the SHPO concurred that none possess significant associations with Cold War-era events that would make them eligible for the NRHP.

The Former U.S. Marine Corps Barracks

The former USMC Barracks (CNC Building M17) on the CNC stands north of a grassed lawn on Marine Street within the study area. The lawn served as a parade ground when the barracks was occupied. Building M17 was built in 1910 and served as the residence of USMC enlisted personnel throughout the operation of Navy Base Charleston. This two-story E-shaped building is a concrete structure with large columns on the south façade that frame and support ground-level and upper-level porticos. Five dormers pierce the hipped roof. The building is currently unoccupied. Palmetto Railways owns CNC Building M17.

3.10.5.3 Historic Properties outside the CNC

Historic properties outside the CNC but within or nearby the study area include three schools, five residences (two are on the same parcel), and one planned community of residences. All stand on the west side of Spruill Avenue or streets to the west of Spruill Avenue.

Chicora Elementary School

Chicora Elementary School (Resource 4255), located at 1912 Success Street, near the western edge of the study area, was built in 1920 to serve the children of local white families that moved into the neighborhoods adjacent to Navy Base Charleston. As a component of South Carolina's Equalization Program (an effort to maintain the state's segregated school system), additions were added to the school in 1955. It operated as an elementary school until 2011, when it was determined not to meet current earthquake-resistance standards. Replacement of the school on an adjoining tract is planned for the near future.

The Ben Tillman Graded School

The Ben Tillman Graded School (Resource 1526), located at 3975 Spruill Avenue, was renamed the Ronald E. McNair Elementary School, and is now named as the Chicora School of Communications. It was built in 1942 to accommodate the growing populace associated with the expanding Navy Base Charleston. It remains in operation today. This school stands on the west side of Spruill Avenue within the study area.

Six Mile Elementary School

Six Mile Elementary School (Resource 4254) stands at 3180 Thomasina McPherson Boulevard, near the northern end of the study area associated with the existing rail lines southwest of the CNC. This school was constructed in 1955 as part of South Carolina's Equalization Program, an effort to maintain the state's segregated school system by providing new schools for African American students. It is one of a few African American schools that has a two-story building similar to white schools in the area, reflecting efforts of the equalization program to create equivalent facilities for African American and white children (Dobrasko 2005:31). The school remains in operation today as Mary Ford Elementary School.

GARCO Residences Resources 1663 and 1664

Three residences within the study area were built to house employees of the General Asbestos and Rubber Company (GARCO). One residence (Resource 1664) stands on Carlton Street near the western edge of the study area. Two additional GARCO residences (Resource 1663) stand at 3008 and 3012 Chicora Avenue at the western edge of the study area. Hundreds of houses were constructed in the area on company land to support GARCO's new plant that was built in the North

Charleston area between 1913 and 1916. Housing construction began in 1916. By 1941, there were 245 houses supporting the GARCO plant. In the 1970s to 1980s, GARCO sold most of the houses and many were moved to areas off the company's lands.

Charleston Freedman's Cottages (Resources 4306 and 4309)

Resources 4306 and 4309 are residences located at 1985 Joppa Street and 2028 Irving Avenue, respectively, near the southern edge of the study area. These residences are freedman's cottages, a vernacular style that developed in the City of Charleston after the Civil War when newly freed African Americans obtained land and built homes. This style is not very common outside of Charleston so the presence of these types of dwellings in North Charleston contributes to their NRHP eligibility. Both were likely built in the 1940s.

The Ben Tillman Homes

The Ben Tillman Homes (Resource 1527) lie on the west side of Spruill Avenue, to the south of the former Ben Tillman School and adjacent to the study area. These collections of residential buildings were built on land obtained by the City of Charleston Housing Authority and leased to the USN for the construction of housing to support the expanding Navy Base Charleston during WWII. After the war, these neighborhoods returned to the control of the Charleston Housing Authority, which operated them as affordable housing. In 1984, Charleston Housing Authority passed control to the City of North Charleston Housing Authority. North Charleston Housing Authority sold the Ben Tillman Homes to a private owner in 1987. It still remains as a residential complex. These masonry multi-family residences or apartment blocks were constructed on a spacious campus, with clusters of buildings around parking areas and grassy parks, and with short, narrow alleys and curving perimeter roads connecting the clusters. Neighboring George Legare Homes (Resource 1519) were rebuilt in the late 2000s, but all of the buildings remain on the original footprints of their 1940s predecessors. This replacement compromised the NRHP eligibility of this resource (see SHPO comments on Owen et al. 2015 in Appendix G).

3.10.6 Agency Consultation

In June 2014, reports of architectural and archaeological surveys undertaken for Palmetto Railways in 2011 were submitted to the SHPO for review with respect to the adequacy of the survey coverage and the identification of historic properties (included in Appendix G). These reports offered assessments of effect with respect to the project site configured at that time. On July 24, 2014, the SHPO concurred with the findings of the reports with respect to the identification of historic properties and the adequacy of the coverage of the areas examined. This coordination resulted in a determination of areas within the study area that required additional inventory to identify historic properties. Additional surveys within the study area and an assessment of NRHP eligibility of potential Cold War-era resources within the CNC was completed in September 2014 and sent to the

SHPO for review. On December 3, 2014, the SHPO concurred with the survey results and recommendations of eligibility for individual resources. As a result of Palmetto Railways' September 2015 revised proposal, an additional architectural survey was submitted to the SHPO for review in February 2016 (Appendix G).

3.11 VISUAL RESOURCES AND AESTHETICS

3.11.1 Introduction

The affected environment considers the location of both the visual resources and the viewers (i.e., in relatively close proximity to the project footprint) within the study area. For the purposes of this analysis, the Visual study area (VRSA) has been defined as within one-half mile of the boundaries of the project site (Figure 3.11-1). As the project site is flat, this prescribed VRSA is spatially sufficient to address the potential visual impacts that may result from the construction and operation of the Proposed Project or one of the alternatives. This section identifies and discusses the visual setting within the VRSA and includes a discussion of viewer sensitivity.

Visual resources are those visible natural or manmade elements that are particularly valued by a community and are afforded protection from alteration or obstruction through an adopted policy or regulation. Examples are water or land formations, trees, parks, buildings or clusters of buildings, or other distinctive manmade elements. The visual character of a resource is defined by its form, line, color, and texture. For example, building height and bulk, the density of vegetation, and distinct architectural styles would contribute to the visual character of a structure.

Viewer sensitivity is the degree to which viewers are sensitive to changes in the visual character of visual resources in the VRSA.

3.11.2 Visual Setting

Visual setting includes scenic views, natural features, built features, and existing light and glare. A landscape has two primary components: natural features, such as topography and vegetation, and built features, such as roads, buildings, and fences. In combination, natural and built features create the form, line, height, colors, and textures of an area—the visual setting of the landscape. Slightly more than 20 percent of land use in the City of North Charleston is industrial, 10.5 percent is single-family residential, and 22.1 percent is multi-family residential. The largest land use in the City of North Charleston is vacant, at nearly 29 percent (City of North Charleston 2008a).

The project site is located within the CNC and is adjacent to mixed residential and commercial land uses within portions of both the City of North Charleston and the City of Charleston. The River Center project site is located north and slightly west of the Proposed Project, north of McMillan Avenue, and would be located between Noisette Boulevard and St. Johns Avenue. It would occupy former navy base housing sites as well as the abandoned naval hospital property fronting Noisette Boulevard.

Visual setting **includes:**
- **scenic views**
- **natural features**
- **built features**
- **existing light and glare**

3.11.2.1 Scenic Views

Scenic views can be either panoramic (over a broad expanse) or focal (viewable only close to the visual resource). Because of the flat topography and mature trees in the study area, scenic views are limited, and include the scenic overlook at Riverfront Park, the banks of Noisette Creek, and views of the Cooper River looking east from near the water's edge (i.e., beyond the existing and adjacent Port facilities east of the site). There are no long- or middle-distance views of Noisette Creek, the marshlands, Riverfront Park, or the Cooper River from viewpoints south of Noisette Creek; these natural features are only visible to a viewer in the immediate vicinity. North of Noisette Creek, the residential uses at the southern end of the Olde North Charleston neighborhood have views of Noisette Creek facing south, as well as Riverfront Park across the Creek. A portion of the Cooper River may also be viewed from this location. Down the view corridors of the north-south streets of St. Johns Avenue, Noisette Boulevard, and North Hobson Avenue, narrow and very limited views of the project site exist. Similarly, the northern portion of the project site may be narrowly viewed facing east from McMillan and Reynolds Avenues. The historic resources in Riverfront Park are only visible from close in to the resource. Ben Tillman School, Ben Tillman Homes, and Chicora School are visible from motorists on Spruill Avenue as well as residential uses in the immediate vicinity of the resource. Spruill Avenue is not a designated state scenic highway.

Scenic views **can be either panoramic (over a broad expanse) or focal (viewable only close to the visual resource).**

3.11.2.2 Natural Features

Natural features consist of vegetation, landforms, and water-courses. The topography of the area is flat coastal plain, with no hills, mountains, or rock outcroppings. The dominant natural features within the study area are the Cooper River to the east, Noisette Creek to the north, and Shipyard Creek to the south of the project sites. Mature vegetation exists throughout the western and northern portions of the VRSA. Trees are 20 to 50 feet in height. Residential neighborhoods include native vegetation and mature trees. There are residual marsh floodplains containing wetland vegetation along Noisette Creek and

Natural features **consist of vegetation, landforms, and watercourses**

more extensive native plants and trees within two of the former naval base housing areas located east of Noisette Boulevard and St. Johns Avenue.

Noisette Creek retains a primarily natural visual appearance and is used for recreational purposes, primarily by kayakers. Shipyard Creek is used for recreational purposes, while the Cooper River is used for recreational purposes and shipping operations.

Aerial of the project site facing north.

Aerial of River Center project site facing west (Riverfront Park lower right foreground)

3.11.2.3 Built Features

Built features are any man-made structures, roads, fencing, and railroad tracks. The Cooper River is dredged for commercial shipping; Noisette and Shipyard Creeks are currently crossed by a number of bridges/trestles and pipelines.

Built features **are any man-made structures, roads, fencing and railroad tracks.**

The main north-south road in the VRSA is Spruill Avenue (SR 10-32), which runs just west of both project sites. Other north-south roadways include Noisette Boulevard and North Hobson Avenue. East-west roads include numerous small neighborhood streets as well as larger roads with access to the Port, such as McMillan Avenue, which runs between the project site and the River Center project site, and Reynolds Avenue, which is farther south and directly accesses the project site. Viaduct Road accesses the project site at its southern boundary. There is no designated scenic highway in the VRSA (SCDOT 2014).

Example of railroad tracks in the VRSA.

The VRSA contains numerous rail tracks, some of which are not in operation. The railroad ROW paralleling Spruill Avenue is currently not in use. This ROW south of English Street is lined with large trees that mostly obscure views of the tracks, with the tree cover thinning with southern progression along the ROW. North of English Street, the ROW parallels Spruill Avenue and is visible from residential uses west of Spruill Avenue. The line of mature trees along the ROW is approximately 35 to 40 feet in height and obscures views of the industrial areas to the east except for limited views along east-west roads, such as along McMillan Avenue and Reynolds Avenue. The project site is not visible from the residential uses to the west due to mature vegetation and structures except for down view corridors such as McMillan Avenue and Reynolds Avenue, which are further discussed below. The River Center project site is also not visible from residential areas north of Noisette Creek. The River Center project site is visible from residential uses along St. Johns Avenue east of the ROW.

Operational rail tracks farther east traverse the VRSA, including several freight rail lines servicing the existing CSX and Norfolk Southern intermodal facilities and Port of Charleston. There is an at-grade rail crossing at Spruill Avenue and Bexley Street. The VRSA also contains numerous one- to two-story industrial buildings, residential neighborhoods, telephone poles, and electrical lines.

The VRSA west of the Spruill Avenue is predominantly residential, with newer developments north of McMillan Avenue and older, single-family residential areas south of McMillan Avenue. Commercial uses are more prevalent in the northern portion of this area, but there are smaller, neighborhood commercial uses intermittently along Spruill Avenue. The commercial uses along Spruill Avenue are primarily community-scale barbershops, convenience stores, delis, social clubs, and small auto mechanic shops.

Visual evidence of the former naval base exists throughout the eastern portion of the VRSA (east of Spruill Avenue), where base buildings remain, either vacant or having been adapted to industrial or commercial uses, and roads and parking lots remain vacant and show varying degrees of wear and tear. The vacant naval hospital buildings remain west of Noisette Boulevard in the upper portion of this area, part of the River Center project site. The study area also contains numerous one- to two-story industrial buildings, neighborhood commercial uses, residential neighborhoods, telephone poles, and electrical lines.

Example of commercial buildings in the VRSA. On Baxter Street looking southeast at Spruill Avenue.

East of Spruill Avenue north of Shipbuilding Way lies Riverfront Park, located on the banks of the Cooper River within the former naval base officer housing area. Mature trees abound in the park, which is a memorial to the base and the military and civilian personnel who served there when the base was in operation. Today, the park includes active and passive recreational activities along with historical memorial exhibits of the U.S. Navy and the Charleston naval base. The park facilities include a scenic overlook on the Cooper River, fishing pier, recreational trails, and naval memorial exhibits. Open space within the park serves numerous community purposes for festivals, displays, and exhibits.

In Riverfront Park looking east at Cooper River.

There are small mixed-use neighborhoods on both sides of St. Johns Avenue and North Hobson Avenue (the site of former naval officer quarters) that form a visual sub-unit due to similar land uses and visual characteristics within the east visual unit. There are many examples of Revival Period architecture in this area (Pennsylvania Historic & Museum Commission 2014). There is mature vegetation in this sub-unit, consisting of trees and native shrubs.

Former Navy Base housing.

South of Riverfront Park are large-scale, active waterfront commercial/industrial uses. Industrial-scale infrastructure, including wharves, dry docks, railroad lines, and cranes, are evident within the industrial area. The eastern portion of the VRSA has been used for marine support facilities both before and during the use of the land for the naval base.

Example view of port activities.

Overall, while the VRSA is in an urban context, the western portion of the area, west of the ROW, gives the appearance of a country-like setting, with large lots, mostly single-story housing, local businesses along the major access roads, and grassy open spaces and mature trees.

Residential areas in the VRSA include the neighborhoods of Chicora-Cherokee, River Place, Horizon Village, Olde North Charleston, Windsor, and Union Heights. Another residential neighborhood to the north is Park Circle, but this neighborhood is outside of the VRSA.

Chicora-Cherokee—The Chicora-Cherokee residential neighborhood lies on both sides of Spruill Avenue and is bisected by North Carolina Avenue. The portion of the neighborhood east of North Carolina Avenue is the closest land use to the project site, with the neighborhood streets and the first row of housing terminating within the Proposed Project boundary. This neighborhood is situated on two-lane streets accessed from North Carolina Avenue, each terminating within the project site boundary. A large portion of this neighborhood lies southwest of North Carolina Avenue and across Spruill Avenue.

Chicora-Cherokee Neighborhood on Orvid Street looking east at Proposed Project Site.

The visual character of this neighborhood is urban residential, with sidewalks, overhead power lines, and landscaping. The neighborhood landscape includes an empty school, boarded-up homes, and shuttered businesses. The homes are primarily one and two stories, consisting of stucco and wood siding and shingle roofs. The homes present a relatively cohesive ranch architectural style. There are scattered multi-family residential units that have an architectural style dissimilar to the single-family homes. There is a recently dedicated 2,300-square-foot playground adjacent to the Chicora Place Community Garden, where residents volunteer time and grow fresh produce and vegetables. This garden is one block from the project boundary. This neighborhood includes Sterett Hall, a community recreation center. Storefronts and churches line Reynolds Avenue as it cuts through the Chicora-Cherokee Neighborhood between Rivers Avenue and Spruill Avenue.

Chicora-Cherokee Neighborhood – on Leland Street looking east at Proposed Project Site.

River Place and Horizon Village—Both River Place and Horizon Village are urban redevelopment areas with single- and multi-family residential and mixed community and recreational facilities within. River Place contains single-family homes with a modern architectural style that is cohesive throughout the development. Horizon Village consists of urban townhomes, also of a cohesive, modern architecture, with community commercial uses along Spruill Avenue. These neighborhoods include private recreational facilities such as playgrounds, ball fields, swimming pools, and community centers. The current views facing east from River Place and Horizon Village are of Spruill Avenue, an urban arterial, and the abandoned railroad ROW to the east of this arterial roadway.

Olde North Charleston—Residential land uses in Old North Charleston, between Spruill Avenue and O'Hear Avenue, include single- and multi-family dwelling units that back up to the currently inactive railroad ROW. Only the southernmost portion of this neighborhood is within the VRSA. There are no sidewalks in this area, and overhead power and telephone lines are highly visible. Similar to some of the other residential neighborhoods in the VRSA, the area consists of single-family ranch-style homes on medium to large lots, with community commercial uses located along collector roads. Mature trees are prevalent. Trains currently traverse along Spruill Avenue and Noisette Boulevard in close proximity to this residential area. Neither of the project sites is visible from these residential uses due to intervening vegetation.

Hunley Waters neighborhood

Windsor and Union Heights —Located in the southern portion of the VRSA, residential housing in these neighborhoods is concentrated between Meeting Street/Carner Avenue and Spruill Avenue. The Windsor Neighborhood is located directly north of Union Heights. The visual character of these neighborhoods are similar to the Chicora-Cherokee Neighborhood, with sidewalks, overhead power lines, and landscaping. The homes are primarily one and two stories, consisting of stucco and wood siding and shingle roofs. The homes present a relatively cohesive ranch architectural style. There are scattered multi-family residential units that have an architectural style dissimilar to the single-family homes. A variety of local businesses are concentrated along the neighborhood boundaries. Churches are scattered throughout the neighborhoods.

3.11.2.4 Existing Light and Glare

The existing lighting levels in the shipyard are low, as there are no nighttime port activities. Lighting is limited to crane and security lighting, which does not produce a substantial level of sky glow; however, views of the night sky are somewhat obscured because of existing urban development. Lights on gantry cranes as well as for other port activities are visible to the St. Johns neighborhood, recreational users on Noisette Creek and residents in the southern part of Olde North Charleston due to the height of the infrastructure. There is negligible night glow from port operations visible from the residential uses. Light from truck headlights is visible along the existing port haul routes to SR 52 and I-26. Minimal lighting exists at Riverfront Park. The mixed uses along St. Johns Avenue have lighting typical of residential neighborhoods and small neighborhood commercial, and there is some street lighting. Lighting levels in the western portion of the VRSA are also low, typical of residential neighborhoods. There is some street lighting, and light from commercial uses along Spruill Avenue, Reynolds Avenue, and McMillan Avenue. The lighting levels increase slightly north of McMillan Avenue due to the more dense residential development at River Place and Horizon Village, but overall lighting levels would be considered low. Vehicle headlights also provide a source of night lighting, particularly for the residents closest to Spruill Avenue, McMillan Avenue, and Reynolds Avenue. Train headlights are visible to the residents of Olde North Charleston, the residents in the St. Johns Avenue area and recreational users of Noisette Creek and Riverfront Park, but are otherwise not visible in the VRSA due to screening vegetation.

3.11.3 Visual Conditions on the Proposed Project Site

Existing visual conditions at the project site include transportation infrastructure, expanses of vacant parking lots, open grassy spaces, two baseball fields, chain link fencing, and overhead power and telephone lines.

From south to north, the Proposed Project includes the Viaduct Road overpass, open fields (previously occupied by storage tanks and storage structures), baseball fields, vacant buildings, and the Sterett Hall Recreation Center.

Facing east from the project site, cranes from shipyard operations, ships, and shipyard buildings are highly visible.

There is no lighting currently on the project site. There are no nighttime port activities, and minimal lighting on cranes and for security. Light levels on the project site would be considered low.

Looking west at the project site.
Existing port activities in the foreground.

Looking south-southeast from McMillan Avenue at the project site.

There is some vegetation in the form of trees, but overall the vegetation is not dense enough to screen views of and from the project site.

Looking west along western boundary of the project site.

Sterett Hall is a community recreation center operated by the City of North Charleston.

Sterett Hall

3.11.4 Visual Conditions on Alternative 2: River Center Project Site

The River Center project site contains areas of vacant naval housing, as well as the vacant naval hospital. A variety of architecture can be seen to the west in the St. Johns Avenue area that provides visual interest. Vacated streets and mature trees dominate the majority of the site.

Sample view of vacant housing on River Center project site.

The eastern portion of the River Center project site, south of the abandoned hospital property, consists of industrial uses associated with the shipyard. The U.S. Department of Defense operates out of a large light industrial building accessed from Truxton Avenue.

Overhead power and telephone lines are visible throughout the site. This site contains more mature trees than the project site, and views to the east include the forested, historic Officer's Quarters, and to the north, Noisette Creek.

Vacant Navy Base Hospital.

Views to the south and southeast from the River Center project site are of industrial and shipyard operations. The River Center project site is subject to low levels of nighttime lighting where structures are occupied, as well as from street lighting and vehicular traffic on area streets. Overall, the light levels on the River Center project site would be considered to be low.

Example of vacant street in the River Center project site.

The River Center project site includes the recently constructed West Yard Lofts (built 2010) at 2375 Noisette Boulevard.

Looking southwest from Noistte Boulevard at West Yard Lofts.

Adaptive reuse of several buildings on the River Center project site includes the Lowcountry Innovation Center at 1535 Hobby Street.

Lowcountry Innovation Center

3.11.5 Viewer Sensitivity at Selected Viewpoints

Locations that would represent the range of visual impacts throughout the VRSA were identified through desktop research and field assessment. The field assessment considered potential viewer locations, existing vegetative conditions, area features, and topography. Photographs and visual characteristics of selected viewpoints in relation to the Proposed Project were collected.

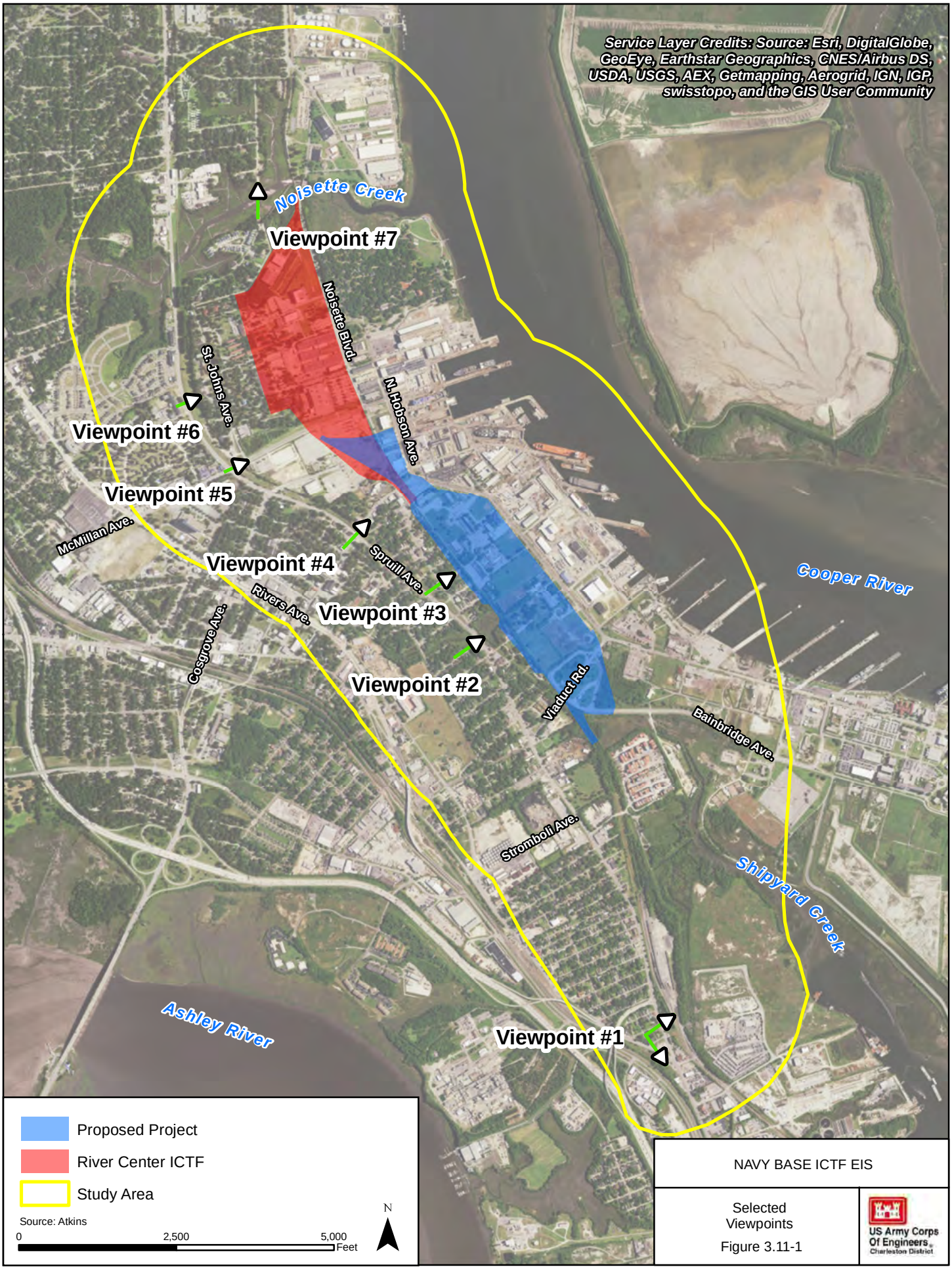
Selected viewpoints were identified as locations where the greatest amount of change would occur that could affect viewer sensitivity. Seven select viewpoints were identified based on viewer sensitivity to or from a select location and where the greatest amount of change could occur (Figure 3.11-1) (e.g., adjacent to the project sites where tall structures and lighting would be highly visible). No viewpoints were identified east of the project site along the Cooper River facing west from the industrial area comprising the shipyard operations, as there is low viewer sensitivity from these existing industrial uses. From south to north, the selected viewpoints include:

Selected viewpoints were identified as locations where the greatest amount of change would occur that could affect viewer sensitivity.

Viewpoint #1: Southern boundary of Union Heights Neighborhood

The southern boundary of the Union Heights Neighborhood was selected as Viewpoint #1 because the Proposed Project would increase the length and number of trains entering and exiting the area immediately to the south and east of the neighborhood. This area includes existing rail lines east of Spruill Avenue with some commercial buildings located between the railines and Spruill Avenue and single family residential properties west of Spruill. Potential visual changes include a new at-grade crossing and increased train activity on inactive or under-utilized railtracks.

View from Little Avenue looking south along Spruill Avenue at intersection with Meeting Street and Tuxbury Lane.



NAVY BASE ICTF EIS

Selected Viewpoints

Figure 3.11-1

US Army Corps Of Engineers Charleston District

Viewpoint #2: Intersection of Baxter Street and Spruill Avenue

Views from intersection of Baxter Street/Spruill Avenue toward project site. Quitman's Marsh is located behind the trees.

This intersection was chosen as a viewpoint because the project boundary is adjacent to a relatively large area of open space with views from Baxter Street facing east as well as from Spruill Avenue. This area consists of open grassy fields, mature trees, and a few small commercial businesses. There are no sidewalks except along the west side of Spruill Avenue north of Baxter Street. Overhead power and telephone lines are highly visible. The visual character of this area is of moderate quality given the view of open space and mature trees dominating the view. Currently, there is no view of the project site from this location due to a large stand of mature trees. There are no views from this location of the River Center project site. Potential changes to this view would result from the construction of new vertical elements that include gantry cranes and lighting poles on the project site behind the stand of trees. These new vertical elements would also be sources of light and glare.

Viewpoint #3: Chicora-Cherokee residential neighborhood east of Spruill Avenue

View east from Chicora-Cherokee neighborhood to project site boundary.

The project site includes the line of trees and vegetation at the end of this view as well as the first row of houses adjacent to the line of vegetation and trees. The existing views along these residential streets toward the majority of the project site are buffered with remnant narrow bands of native vegetation, including stands of mature trees and security fencing. The majority of the project site is not visible currently from this neighborhood due to this visual buffer. The River Center project site is not visible from this neighborhood due to intervening structures and vegetation. Potential changes to this view from the Proposed Project include the removal of existing

homes and the existing visual buffer of the site to construct an earthen berm and security fence. The earthen berm would assist in the reduction of potential noise from the project site. New vertical elements would be visible in the background and include gantry cranes and lighting poles. These new vertical elements would be sources of light and glare.

Viewpoint #4: Chicora-Cherokee residential neighborhood west of Spruill Avenue

Current views to the east are primarily of mature trees and grassy areas, as well as the abandoned railroad ROW. There are no long-range views from this area due to mature vegetation around the railroad ROW. The project site is not currently visible from this area except for narrow corridor views facing east down area streets such as Reynolds Avenue. The southern portion of the River Center project site is partially visible from the homes fronting Spruill Avenue in the immediate vicinity of the intersection, although mostly obstructed by intervening structures and trees. The view down the corridor is long range of the Port activities in the background. Potential changes to this viewpoint include closure of Reynolds Avenue from increased rail activity and the construction of an earthen berm and security fencing blocking views of shipyard activities. New vertical elements would include gantry cranes and lighting poles. These new vertical elements would be sources of light and glare.

View east from Chicora-Cherokee neighborhood west of Spruill Avenue down Reynolds Ave

Viewpoint #5: Intersection of McMillan Avenue and Spruill Avenue

Looking east on McMillan Avenue from intersection with St. Johns Avenue.

While the majority of the project site and the River Center project site are not currently visible from this intersection, removal of the mature trees along the ROW would allow both project sites to be visible. Viewer sensitivity from the River Place and Chicora-Cherokee neighborhoods west of Spruill Avenue near this intersection would have views of the project site, including the new flyover. Facing eastward down McMillan Avenue, there are views of vacant industrial uses and parking lots along the edges of the street. Beyond, at the far end of this view corridor, one can see the tall cranes and long-distance views of shipyard activities. Potential changes to this viewpoint would occur from the construction of the Cogrove Avenue overpass to McMillan Avenue blocking views of shipyard activities in the background. Construction of either project site (Proposed Project to the right and River Center to the left) would increase the visibility of new vertical elements that include gantry cranes and lighting poles. These new vertical elements would be sources of light and glare.

Viewpoint #6: River Place and Horizon Village facing east across Spruill Avenue

View toward River Center project site from River Place and Horizon Village

As noted for the intersection of McMillan Avenue and Spruill Avenue, residents at the far south end of River Place and north end of Chicora-Cherokee west of Spruill Avenue do not currently have views of the project sites due to intervening mature vegetation. The current views facing east from River Place and Noisette Village are of Spruill Avenue and a wide railroad ROW lined with mature trees to the east of this roadway. Currently, inactive rail remains in

the ROW. Potential changes to this view include increased rail activity on the inactive railtracks and the introduction of new vertical elements, which would include gantry cranes and lighting poles in the background. These new vertical elements would be sources of light and glare.

Viewpoint #7: Riverfront Park and Noisette Creek east of Spruill Avenue

The project site and River Center project site are not visible from this vantage point, as it is substantially screened by intervening vegetation; however, pedestrians, bicyclists, residents, and motorists traveling along O'Hear Avenue, Spruill Avenue, and Noisette Boulevard would have views of most or all of the River Center project site, depending on the location of the viewer. In addition, recreational users on Noisette Creek have a clear view of the River Center project site. Potential changes to the scenic views along Noisette Creek include new rail bridges over the creek and marshland.

Looking north on O'Hear Avenue over Noisette Creek at built structures.

3.12 NOISE AND VIBRATION

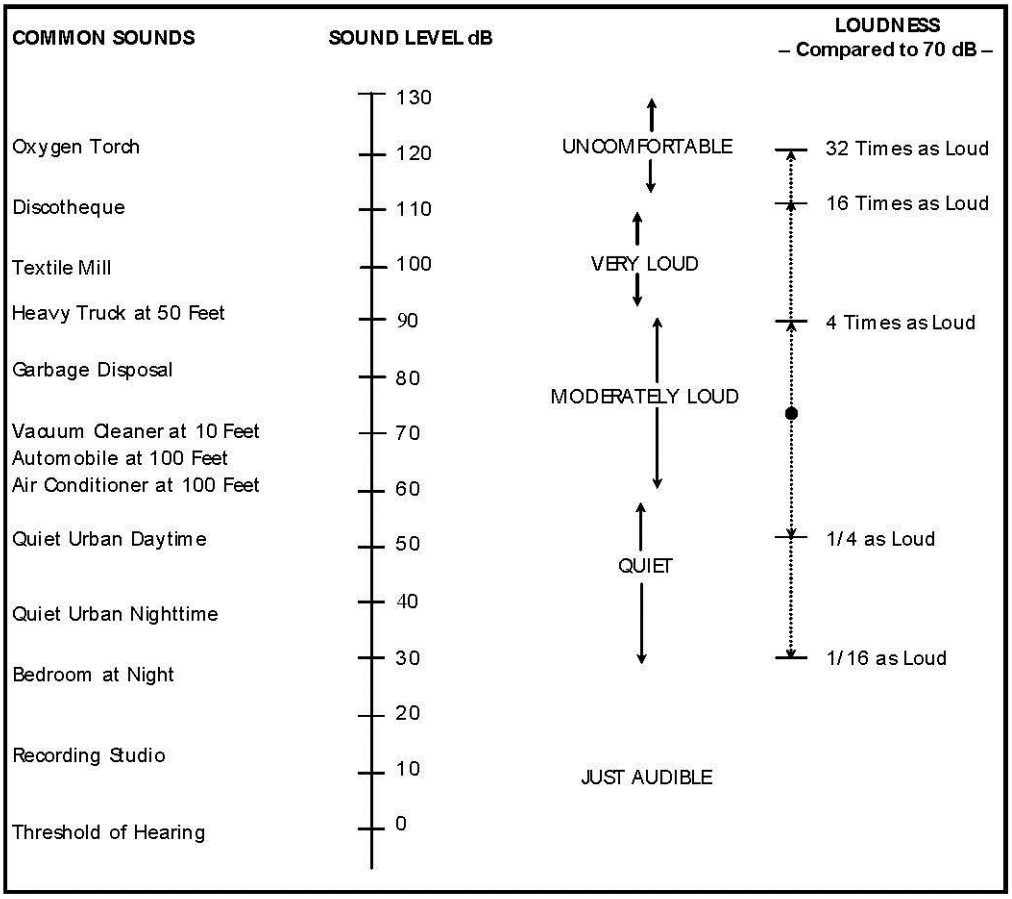
The purpose of this section is to characterize existing noise levels at various locations within the project study area identified in Figure 1.6-1, where they may be affected by the Navy Base ICTF. This section includes a general discussion of the metrics that are used to quantify noise and vibration effects on the environment, and the findings of a noise monitoring program that was undertaken to establish the existing noise levels in the study area. It also contains limited data collected specifically for the noise and ground vibration related to railroad operations in the study area. More detailed findings of existing noise and vibration levels in the study area are included in Appendix H.

3.12.1 Noise Characteristics

Noise is defined as unwanted sound. Sound is all around us; sound becomes noise when it interferes with normal activities, such as sleep or conversation. The sound waves generated by various sources, such as a passing train, vehicular traffic, or construction equipment, constitute noise to people and can disrupt normal activities when they reach a certain level.

The human ear is responsive to sounds having an extremely wide range of intensity. For this reason, sound levels are expressed using a logarithmic unit of decibel (dB). The normal human ear can detect sounds that range in frequency from about 20 Hz to about 15,000 Hz. All sounds in this wide range of frequencies, however, are not heard equally by the human ear, which is most sensitive to frequencies in the 1,000 to 4,000 Hz range. Weighting curves have been developed to correspond to the sensitivity and perception of different types of sound. A-weighting accounts for frequency dependence by adjusting the very high and very low frequencies (below approximately 500 Hz and above approximately 10,000 Hz) to approximate the human ear's lower sensitivities to those frequencies. Sound pressure levels measured on the A-scale of a sound level meter are abbreviated dB(A). The A-weighted sound levels in dB(A) are used in environmental noise studies for transportation noise sources, such as aircraft flyovers, road traffic or railroads.

Figure 3.12-1 is a chart of A-weighted sound levels of typical sounds. Some noise sources (air conditioner, vacuum cleaner) are continuous sounds which levels are constant for some time. Some (automobile, heavy truck) are the maximum sound during a vehicle pass-by. Some (urban daytime, urban nighttime) are averages over extended periods. Several noise metrics have been developed to describe noise over different time periods, as discussed below.



Source: *Handbook of Noise Control*, C.M. Harris, Editor, McGraw-Hill Book Co., 1979, and FICAN 1992.

Figure 3.12-1. Typical A-weighted Sound Levels of Common Sounds

Noise levels fluctuate with time. A common descriptor of environmental noise is the equivalent (energy average) sound level (L_{eq}). The equivalent sound level is the steady state, aggregate sound level that contains the same amount of acoustic energy as the actual time varying, A-weighted sound level over a specified period of time. If the time period is one hour, the descriptor is the *Hourly Equivalent Sound Level*, ($L_{eq(h)}$). This metric is typically specified for evaluating traffic noise, as well as rail noise when evaluating land uses with primarily daytime and evening use. The L_{eq} is used in this section for describing the existing noise conditions in the study area and in Section 4.12 for evaluating noise from traffic, construction activities, and operations of the Navy Base ICTF facility.

The *Day-Night Average Sound Level* (DNL) describes the aggregate noise exposure from all events over a full 24-hour period, with events occurring between 10 pm and 7 am increased by 10 dB to account for greater nighttime sensitivity to noise. The DNL metric is specified for description of community noise impacts of various sources, such as aircraft flyovers or industrial facilities. The DNL is used in Section 4.12 for evaluating rail noise for sensitive land uses based on the modeling results. Field measurements of DNL are typically very limited as accurate data collection requires long monitoring times (from weeks up to several months) due to time variability.

Ambient noise is the all-encompassing noise associated with a given environment at a specified time, being usually a composite of sounds from many sources at many directions, both near and far, that provide a relatively stable noise exposure with no particular dominant sound (Harris 1991).

Community environmental noise refers to outdoor noise in the vicinity of inhabited areas. It varies greatly in magnitude and character among locations – from quiet suburban areas to downtown city streets. It generally varies with time of day, being relatively quiet at night when activities are at a minimum and noisier in morning and afternoons during peak traffic periods. Even within a small area, the noise environment may vary significantly depending on proximity to local noise sources (e.g., near airports or major roadways).

3.12.2 Vibration Characteristics

In contrast to airborne noise, ground-borne vibration is not a common environmental problem. It is unusual for vibration from sources such as buses and trucks to be perceptible, even in locations close to major roads. Some common sources of ground-borne vibration are trains, buses on rough roads, and construction activities such as blasting, pile-driving and operating heavy earth-moving equipment. Ground-borne vibration can be annoying to nearby neighbors of a railway or maintenance facility, causing buildings to shake and rumbling sounds to be heard.

The effects of ground-borne vibration include feelable movement of the building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. In extreme cases, the vibration can cause damage to buildings. Building damage is not a factor for normal transportation projects, with the occasional exception of blasting and pile-driving during

construction. Annoyance from vibration often occurs when the vibration exceeds the threshold of perception by only a small margin. A vibration level that causes annoyance will be well below the damage threshold for normal buildings.

The ground-borne vibration is characterized in terms of the root mean square (RMS) *Vibration Velocity Level* (L_v) in units of VdB (with the reference velocity of 1 micro inch per second).

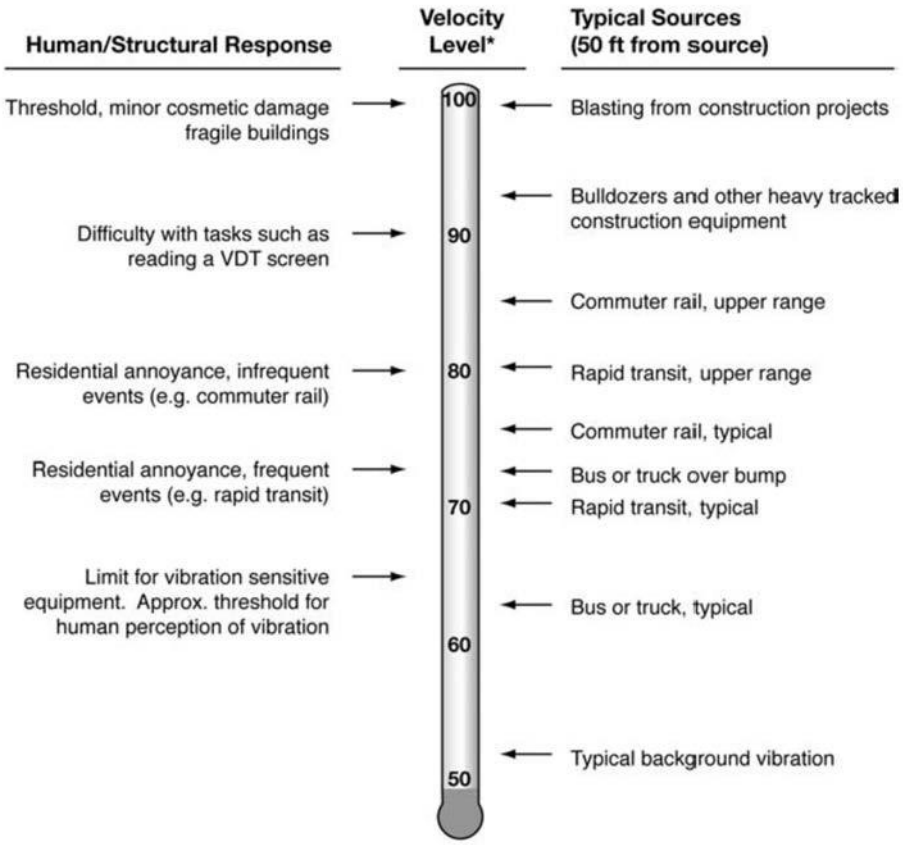
Figure 3.12-2 (FTA 2006) illustrates common vibration sources and the human and structural response to ground-borne vibration. The range of interest is from approximately 50 VdB to 100 VdB. Background vibration is usually well below the threshold of human perception and is of concern only when the vibration affects very sensitive manufacturing or research equipment. The background vibration velocity level in residential areas is usually 50 VdB or lower, well below the threshold of perception for humans which is around 65 VdB. Most perceptible indoor vibration is caused by sources within buildings such as operation of mechanical equipment, movement of people or slamming of doors. Typical outdoor sources of perceptible ground-borne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If the roadway is smooth, the vibration from traffic is rarely perceptible.

For vibrations generated by railroad train activities, the ground-borne vibration is caused by the interaction of the steel wheels and rails, which causes vibration in the ground beneath the track. The vibration spreads through the ground. When the ground waves reach nearby buildings, the interaction with the building structure creates vibration within the building.

Pile driving can also result in varying degrees of ground vibration that spread through the ground and diminish in strength with distance. The vibration velocity level L_v generated by typical impact pile drivers is approximately 104 VdB at a distance of 25 feet, with the upper range reaching 112 VdB (FTA 2006). Buildings in proximity to pile driving operations respond to these vibrations with varying results ranging from no perceptible effects at the lowest levels, rumbling sounds and perceptible vibrations at moderate levels, and slight damage at the highest levels.

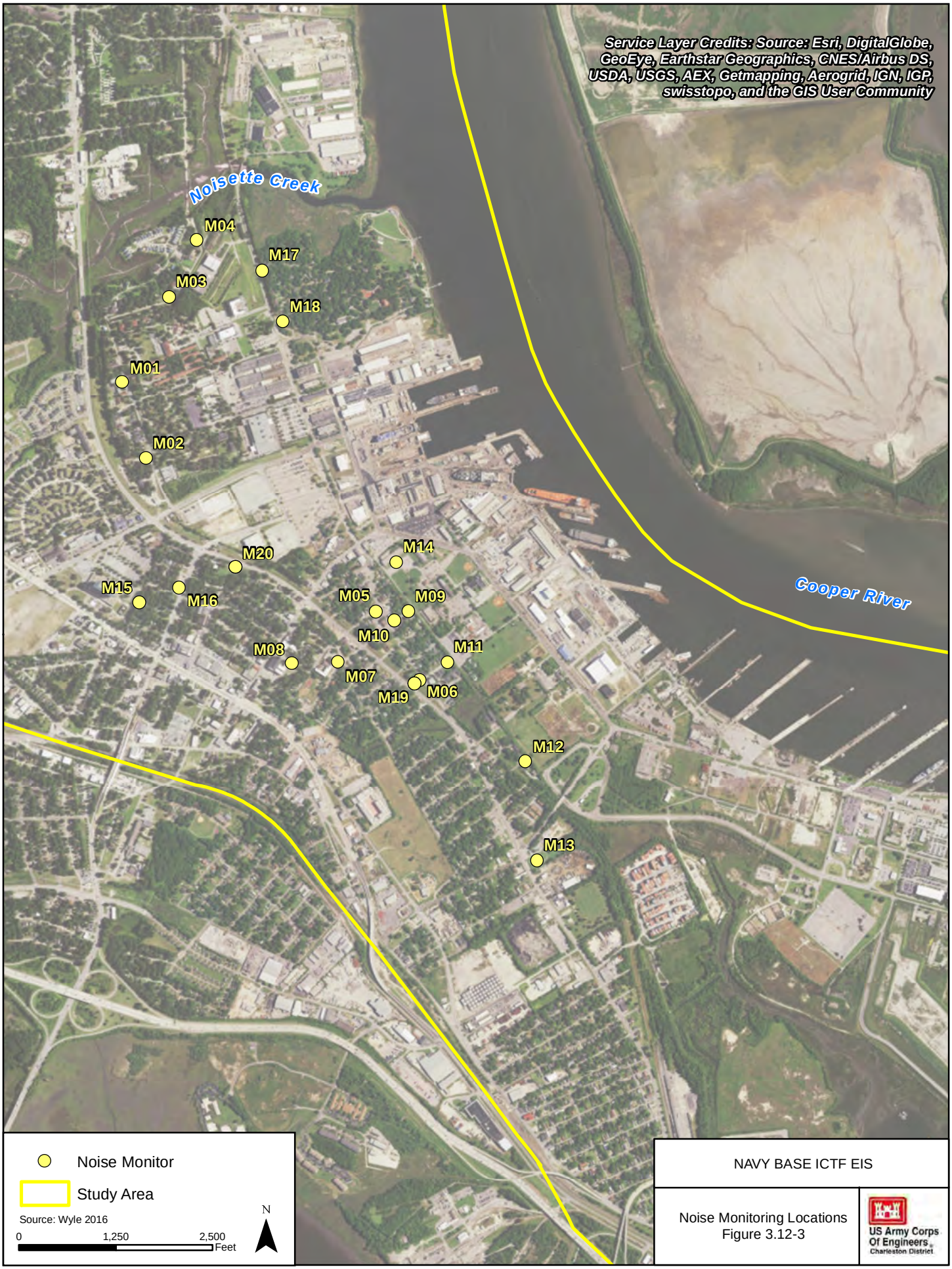
3.12.3 Existing Noise Conditions

The initial step in a noise analysis involves determining the existing baseline noise conditions in the vicinity of the project site. A noise survey was conducted in the Navy Base ICTF study area in July and August 2014. The survey included noise monitoring in 20 locations, which were selected in proximity to the Proposed Project and project alternative sites where potential noise effects are anticipated, i.e. relatively close (within 1,000 feet) to the ICTF footprint. A mix of land uses was monitored including residential, institutional, public and recreational areas. The noise monitoring locations are shown in Figure 3.12-3.



(Source: FTA 2006)

Figure 3.12-2. Typical Levels of Ground-Borne Vibration



NAVY BASE ICTF EIS

Noise Monitoring Locations
Figure 3.12-3

US Army Corps Of Engineers
Charleston District

In each noise monitoring location, short-term L_{eq} measurements (15-minute data samples) were collected during the noise survey. Table 3.12-1 provides a summary of the ambient noise levels recorded.

Table 3.12-1
Existing Noise Levels

Location	Description	Land Use	Date	Time (hours)	15-min L_{eq} dB(A)
M1	St. Johns Church and School	Institutional	7/28/14	1212-1227	56.3
M2	Reddin Rd. and St. Johns Av.	Residential	7/28/14	1302-1317	51.2
M3	Hunter St. and St. Johns Av.	Residential	7/28/14	1505-1520	50.1
M4	4171 St. Johns Av.	Residential	7/28/14	1545-1600	48.8
M5	Washington United Methodist Church	Institutional	7/29/14	0730-0745	56.5
M6	Community Garden (N. Carolina Av. and Calvert St.)	Recreational	7/29/14	0802-0817	57.5
M7	Chicora Elementary School (closed)	Institutional	7/29/14	1544-1559	55.3
M8	St. Matthew Baptist Church	Institutional	7/29/14	1612-1627	55.3
M9	1801 Success St.	Residential	7/30/14	0817-0832	48.6
M10	Success St. next to 3200 Leland St.	Residential	7/30/14	0836-0851	52.6
M11	1800 Calvert St.	Residential	7/30/14	0903-0918	50.5
M12	1801-1 English St.	Residential	7/30/14	0932-0947	50.8
M13	Cemetery (next to K-Con Inc)	Public	7/30/14	1000-1015	60.6
M14	1530 Calumet St. Community Center/Gym	Recreational	7/30/14	1038-1053	51.8
M15	3447 Apache St. (next to Naval Hospital)	Residential	7/30/14	1248-1303	51.0
M16	1922-D Cosgrove Av.	Business	7/30/14	1320-1335	62.8
M17	1527 Manley Av.	Residential	7/30/14	1404-0419	52.6
M18	1415-1421 Manley Av.	Residential	7/30/14	1433-1448	58.6
M19	Spruill Av. and Calvert St.	Traffic counts	8/1/14	1525-1540	58.9
M20	Spruill Av. and Cosgrove Av.	Traffic counts	8/1/14	1550-1605	62.5

The noise monitoring locations M5 through M12 were selected within the community immediately adjacent to the project site (e.g., Chicora-Cherokee neighborhoods). It can be seen from Table 3.12-1 that the measured noise levels in these locations varied in the range from approximately 49 to 58 dB(A), as they were affected at times by local vehicular traffic, aircraft overflights, lawn mowing, running air conditioning units, etc. The noise levels measured in locations M14 (1530 Calumet Street, Community Center/Gym located within the Proposed Project footprint) and M15 (3447 Apache

Street, next to the Naval Hospital) also fall within this range; however, the noise levels measured at locations M13 (cemetery) and M16 (1922-D Cosgrove Avenue) were higher, in the 61 to 63 dB(A) range, affected by higher traffic volumes on the adjacent streets.

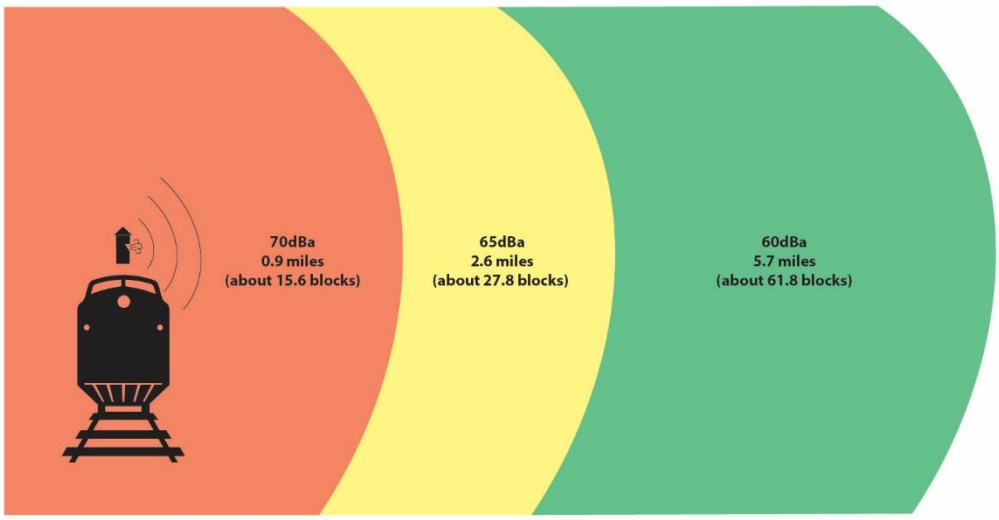
In the noise monitoring locations M1 through M4, M17, and M18 (selected in the immediate vicinity of the River Center project site), the measured noise levels varied in the range from 49 dB(A) to 59 dB(A), which is similar to that discussed above for the locations near the project site. The two sites thus have comparable existing noise environments.

The noise monitoring locations M19 and M20 were selected along Spruill Avenue at distances of 78 feet and 46 feet from the centerline, respectively. Traffic counts were conducted in these locations concurrently with the noise measurements. The data collected was used for validating a noise model that was constructed to predict future traffic noise levels at the site for the Proposed Project, project alternatives, and No-Action Alternative, as described in Section 4.12.

3.12.4 Train Noise and Vibration

The project study area incorporates several freight rail lines servicing the existing CSX and NS intermodal facilities and the Port of Charleston. Train operations on the existing tracks generate noise and ground-borne vibration which can be of concern for nearby neighbors. Ground-borne vibration of high amplitude may cause buildings to shake and rumbling sounds to be heard. In contrast to airborne noise, ground-borne vibration is not a common environmental problem. It is unusual for vibration from sources such as trucks and buses to be perceptible, even in locations close to major roads. It is not uncommon for freight trains to be the source of intrusive ground-borne vibration.

Locomotive horn soundings are also part of railroad operations. Under the Train Horn Rule (49 CFR Part 222), locomotive engineers must begin to sound train warning horns from 15 to 20 seconds in advance of all public grade crossings. In many geographic locations, and during much of the year, motor vehicles operate with windows rolled up and air conditioning and radios in use. Therefore, audible warning signals must be sufficiently loud to be perceived. Federal regulations require the train horn to be at least 96 dBA 100 feet in front of the train in its direction of travel (49 CFR 229). Unfortunately, the locomotive horn can substantially disturb those living or working near highway-rail grade crossings. Noise levels experienced as a result of a locomotive horn sounding are shown in Figure 3.12-4.



Notes: Under the Train Horn Rule (49 CFR Part 222), a locomotive horn shall begin to be sounded at least 15 seconds, but no more than 20 seconds, before the locomotive enters a crossing.
1" = 0.67 miles' but locomotive is not drawn to scale
Based on average of 16.5 city blocks per mile

Figure 3.12-4. Train Horn Noise

Five at-grade crossings in the study area currently defined as 24-hour quiet zones by the U.S. Department of Transportation (DOT) and listed below by street name and corresponding DOT identification number (Figure 3.12-5) are as follows:

- Rivers Ave. (631985M)
- S. Rhett Ave. (631986U)
- Spruill Ave. at Bexley Ave. (918388D)
- Montague St. (632153Y)
- Meeting St. (631984F)

In a quiet zone, railroads have been directed to cease the routine sounding of horns when approaching public highway-rail grade crossings.

Train wheels rolling on rails create oscillatory motion energy that is transmitted through the track support system into the ground and propagates through the soil to the foundations of nearby buildings. Locomotives and rail cars with wheel flats are the sources of the highest vibration levels. The vibration propagates from the foundation throughout the remainder of the building structure, generating movements of the building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. The rumble is the noise radiated from the motion of the room surfaces. Building damage is not a factor for normal transportation projects. Annoyance from vibration often occurs when the vibration exceeds the threshold of perception by a small margin. A vibration level that causes annoyance is much below the damage threshold for normal buildings.

NAVY BASE ICTF EIS

Quiet Zones

Figure 3.12-5

US Army Corps Of Engineers Charleston District

In order to estimate the existing rail noise and vibration conditions in the study area, a freight train pass by event was monitored near the CSX at-grade Crossing 10 (a single track) at the intersection of Spruill Avenue and Bexley Street[34]. Figure 3.12-6 shows the noise and vibration monitor locations, both at a distance of 50 feet from the track centerline.

Prior to the train pass by, the ambient noise level was measured at the site for 3 minutes. A freight train with two diesel engine locomotives and 32 rail cars passed the noise monitor in about 4 minutes. The train speed is estimated to be below 10 mph. Table 3.12-2 presents a summary of the noise levels recorded for the ambient condition and train pass by.

Table 3.12-2
Noise Levels Measured at Rail Crossing 10

Location	Operation	Date	Time (hr:min)	Duration (min)	L_{eq} dB(A)
Rail Crossing at Spruill Av. and Bexley St. (50 ft from curved track centerline)	Ambient (no train)	7/30/14	15:43	3	61.5
Same	Train pass by	7/30/14	16:42	4	89.2

It can be seen from Table 3.12-2 that the train noise measured during the pass by markedly exceeded the ambient noise near the grade crossing. Loud squeal noise generated by wheels on the curved track was evident during the pass by. No locomotive horn sounding was produced near the crossing with a designated 24-hour quiet zone.

Results of the vibration measurements (in the vertical direction) near the crossing are summarized in Table 3.12-3.

Table 3.12.3
Ground-Borne Vibration Levels Measured at Rail Crossing 10

Location	Operation	Date	Time (hr:min)	Duration (min)	L_v VdB
Rail Crossing at Spruill Av. and Bexley St. (50 ft from curved track centerline)	Ambient (no train)	7/30/14	15:29	2	81
Same	Train pass by	7/30/14	16:41	3	103

[34]A very low number (one or two per day) and irregular schedule of freight operations in the study area precluded additional train monitoring within the time frame allocated for the measurements. The future rail noise and vibration assessments in Section 4.12 are based on the modeling results and do not require measurements. Further noise measurement of train activities in a rail yard setting was conducted and used for the assessment of the project operational noise as described in sub-section 4.12.1.6.

NAVY BASE ICTF EIS

Train Passby
Noise and Vibration
Measurement Locations
Figure 3.12-6

US Army Corps Of Engineers
Charleston District

The measured average ambient vibration level of 81 VdB with no train present on the track noticeably exceeded the typical background vibration levels in the range from 50 to 60 VdB (FTA 2006). At the time of this measurement, the at-grade crossing was open to street traffic, and the vehicles passing the rail crossing apparently generated considerable ground vibration.

The average L_v of 103 VdB measured during the train pass by (with no street traffic moving) markedly exceeded the ambient vibration level at the site. The measurement is also considerably higher than what would be expected for a straight-line track due to the rail curvature in the vicinity of the measurement location.

This single monitoring event is not sufficient to determine a general baseline condition in proximity to the freight rail tracks, but demonstrates the worst case scenario due to the measurement location near a curved track where the highest noise and vibration levels are generated. The rail noise and vibration impact analyses described in Section 4.12 are based on the modeling rather than measurement results and are not affected by the limited monitoring data.

3.13 AIR QUALITY

3.13.1 Existing Conditions

Air quality impacts have the potential to affect both the local area as well as having a regional impact. Due to pollution, transport areas outside of the immediate vicinity of the project site could be negatively affected by any proposed project. The regional study area for air quality is represented by the Tri-County area of South Carolina, which consists of Charleston, Berkeley, and Dorchester counties (Figure 3.13-1). This area is located in the southeastern area of South Carolina and is bordered by the Atlantic Ocean on its southeastern side.

3.13.1.1 Air Resources

Air quality in a given location is described as the concentration of various pollutants in the atmosphere. Air quality is determined by several factors; including the type and amount of pollutants emitted into the atmosphere, the size and topography of the air basin, and the prevailing meteorological conditions.

This section describes existing air quality conditions. Topics discussed in this section include climatology, air resource management, National and State Ambient Air Quality Standards, and local air quality of the project site. More detailed discussions of existing air quality conditions are included in Appendix I.

3.13.1.2 Climatology

The regional study area is low in elevation and has many rivers and streams that feed into the Atlantic Ocean through Charleston Harbor. The project site is in North Charleston, on a peninsula between the Ashley and Cooper Rivers.

The climate is humid subtropical, characterized by mild winters and hot, humid summers. January usually demonstrates the lowest annual temperatures, with an average minimum temperature of 36.4 degrees Fahrenheit (°F) and an average temperature of 47.7°F. On average, the warmest month is July, with highs of 90.9°F and an average of 80.5°F. The summer months have the most precipitation, with August on average being the wettest month. Average precipitation in August is 5.88 inches and winters have mild precipitation varying around 3 inches each month (NOAA 2016c). Snowfall is rare, occurring every few years with an average of less than 1 inch annually (SERCC 2012).

Wind patterns in South Carolina are largely influenced by the Atlantic Ocean to the east and the Appalachian and Blue Ridge Mountains to the west. Average surface wind speeds range between 6 and 10 miles per hour. Wind direction varies seasonally. In the winter months, as cyclones move around the mountains, the winds are from the southwest. As they move over the Atlantic, the wind

NAVY BASE ICTF EIS

Air Quality Regional Study Area

Figure 3.13-1

US Army Corps Of Engineers Charleston District

direction shifts to northeast. Winds in the spring are southwest on average. In the summer months, air flows from the Gulf of Mexico yielding south and southwestern winds. In autumn, a continental high pressure pattern fosters northeast winds (SCDNR 2010).

3.13.2 Air Pollutants and Criteria

Presented below is a description of each of the criteria air pollutants for which an NAAQS has been established, and their known health effects. The South Carolina Ambient Air Quality Standards (SCAAQS) are the same as the NAAQS; therefore, any standard that is met for the NAAQS will also meet the SCAAQS (Table 3.13-1). All references to ambient air quality standards hereafter in this document will be to the NAAQS. In addition, diesel particulate matter (DPM) is described, which is a Hazardous Air Pollutant (HAP) anticipated to be emitted from the Proposed Project activities.

Ozone (O_3) is one of a number of substances called photochemical oxidants that are formed when volatile organic compounds (VOC) and nitrogen oxide (NO_X), react with sunlight and are by-products of the internal combustion engine. The damaging effects of photochemical smog are generally related to the concentrations of ozone. Ozone may pose a health threat to those who already suffer from respiratory diseases as well as to healthy individuals. Breathing ozone can trigger a variety of health problems, including chest pain, coughing, throat irritation, and congestion. It can worsen bronchitis, emphysema, and asthma. Additionally, ozone has been tied to crop damage, typically in the form of stunted growth and premature death. Ozone can also act as a corrosive, resulting in property damage such as the embitterment of rubber products (USEPA 2015a).

Carbon Monoxide (CO) is a colorless, odorless gas produced by the incomplete combustion of fuels. Because CO is emitted directly from internal combustion engines, unlike ozone, motor vehicles operating at slow speeds are the primary source of CO in North Charleston. Therefore the highest ambient CO concentrations are generally found near congested transportation corridors and intersections. The primary adverse health effect associated with CO is the interference of normal oxygen transfer to the blood, which may result in tissue oxygen deprivation (USEPA 2015b).

Respirable Particulate Matter (PM_{10}) and **Fine Particulate Matter ($PM_{2.5}$)** consist of extremely small, suspended particles or droplets 10 microns and 2.5 microns or smaller in diameter, respectively. Some sources of particulate matter, like pollen and windstorms, are naturally occurring; however, in populated areas, most particulate matter is caused by road dust, diesel soot, and combustion products, abrasion of tires and brakes, and construction activities. Both PM_{10} and $PM_{2.5}$ may adversely affect the human respiratory system, especially in those people who are naturally sensitive or susceptible to breathing problems (USEPA 2015c).

Table 3.13-1
National Ambient Air Quality Standards

Pollutant		Primary/ Secondary	Average Time	Level	Form
Carbon Monoxide		Primary	8-hour	9 ppm	Not to be exceeded more than once per year
			1-hour	35 ppm	
Lead		Primary and Secondary	Rolling 3 month average	0.15 µg/m^3	Not to be exceeded
Nitrogen Dioxide		Primary	1-hour	100 ppb	98th percentile, averaged over 3 years
		Primary and Secondary	Annual	53 ppb	Annual Mean
Ozone		Primary and Secondary	8-hour	0.070 ppm	Annual fourth-highest daily max 8-hour concentration, averaged over 3 years
Particle Pollution	***$PM_{2.5}$***	Primary	Annual	12 µg/m^3	Annual mean, averaged over 3 years
		Secondary	Annual	15 µg/m^3	Annual mean, averaged over 3 years
		Primary and Secondary	24-hour	35 µg/m^3	98th percentile, averaged over 3 years
	PM_{10}	Primary and Secondary	24-hour	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide		Primary	1-hour	75 ppb	99th percentile of 1-hour daily max concentrations, averaged over 3 years
		Secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

Source: USEPA 2016.
µg/m^3 = micrograms per cubic meter
ppm = parts per million
ppb = parts per billion

Nitrogen Dioxide (NO_2) is a by-product of fuel combustion. The principal form of NO_2 produced by combustion is nitrogen oxide (NO). NO reacts with oxygen in the air to form NO_2, creating the mixture of NO and NO_2 commonly called NO_X. Other oxides of nitrogen, including nitrous acid and nitric acid, are part of the nitrogen oxide family. While USEPA's NAAQS covers this entire family, NO_2 is the component of greatest interest and the indicator for the larger group of nitrogen oxides. Current scientific evidence links short-term NO_2 exposures, ranging from 30 minutes to 24 hours, with adverse respiratory effects, including airway inflammation in healthy people and increased respiratory symptoms in people with asthma. Also, studies show a connection between breathing

elevated short-term NO_2 concentrations and increased visits to emergency departments and hospital admissions for respiratory issues, especially asthma (USEPA 2015d).

Sulfur dioxide (SO_2) is a colorless, pungent gas. At levels greater than 0.5 parts per million (ppm), the gas has a strong odor, similar to rotten eggs. It enters the atmosphere as a pollutant mainly as a result of burning high sulfur content fuel oils and coal, and from chemical processes occurring at chemical plants and refineries. Sulfuric acid is formed from SO_2, which is an aerosol particle component that may lead to acid deposition. Acid rain deposition into water, vegetation, soil, or other materials can harm natural resources and materials. Sulfur oxides (SO_X) include SO_2 and sulfur trioxide (SO_3). Although SO_2 concentrations have been reduced to levels well below state and national standards, further reductions are desirable because SO_2 is a precursor to sulfates. Sulfates are a particulate formed through the photochemical oxidation of SO_2. Long-term exposure to high levels of SO_2 can cause irritation of existing cardiovascular disease, respiratory illness, and changes in the defenses in the lungs. When people with asthma are exposed to high levels of SO_2 for short periods of time during moderate activity, effects may include wheezing, chest tightness, or shortness of breath (USEPA 2015e).

Lead (Pb) occurs in the atmosphere as particulate matter. The major sources of lead emissions have historically been from the combustion of leaded gasoline in on-road motor vehicles and from industrial sources. The use of leaded gasoline is no longer permitted for on-road motor vehicles and airborne lead has significantly declined. Other sources of lead include the manufacturing and recycling of batteries, paint, ink, ceramics, ammunition, and secondary lead smelters. Lead accumulates in bones, soft tissue, and blood, and can affect the kidneys, liver, and nervous system. The more serious effects of lead poisoning include behavior disorders, mental retardation, and neurological impairment. Low levels of lead in fetuses and young children can result in nervous system damage, which can cause learning deficiencies and low intelligence quotients. Lead may also contribute to high blood pressure and heart disease (USEPA 2015f). The Proposed Project will not emit lead; therefore, lead is eliminated from further review in this analysis.

Volatile Organic Compounds (VOCs) are defined as any compound of carbon, excluding CO, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, which participates in atmospheric photochemical reactions. Common sources of VOCs are on-road motor vehicles and solvent evaporation. Although health-based standards have not been established for VOCs, health effects can occur from exposures to high concentrations because of interference with oxygen uptake. In general, higher concentrations of VOCs are suspected to cause eye, nose, and throat irritation; headaches; loss of coordination; nausea; and damage to the liver, kidneys, and central nervous system (USEPA 1999a). It should be noted that there are no NAAQS for VOCs because they are not classified as criteria pollutants. They are included in this analysis, however, because a reduction in VOC emissions reduces certain chemical reactions that contribute to the formulation of O_3.

Hazardous Air Pollutants, also known as toxic air pollutants or air toxics, are those pollutants that cause or may cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental and ecological effects. The USEPA is required to control 187 hazardous air pollutants. Examples of HAPs include benzene, which is found in gasoline; perchlorethlyene, which is emitted from some dry cleaning facilities; and methylene chloride, which is used as a solvent and paint stripper by a number of industries. The HAP anticipated to result from the implementation of the Proposed Project is diesel particulate matter (DPM) (USEPA 2015g).

DPM is a mixture of particles that is a component of diesel exhaust (DE). The USEPA lists DE as a mobile source air toxic, or HAP, due to the cancer and noncancer health effects associated with exposure to whole DE. Chronic inhalation exposure is likely to pose a lung cancer hazard, as well as damage the lung in other ways depending on exposure, and short-term exposures can cause irritation and inflammatory symptoms of a transient nature (USEPA 2002). DPM (expressed as grams of DPM/m^3) has historically been used as a surrogate measure of exposure for whole DE. Although uncertainty exists as to whether DPM is the most appropriate parameter to correlate with human health effects, it is considered a reasonable choice until more definitive information about the mechanisms of toxicity or mode(s) of action of DE becomes available (USEPA 2015h).

3.13.2.1 Emission Sources

Ambient air quality is affected by stationary, mobile, and natural sources. Stationary sources can be divided into two major subcategories: point and area sources. Point sources occur at an identified location and are usually associated with manufacturing and industry. Examples are boilers or combustion equipment that produce electricity or generate heat. Area sources are widely distributed and produce many small emissions. Examples of area sources include residential and commercial water heaters, painting operations, portable generators, lawn mowers, agricultural fields, landfills, and consumer products such as barbeque lighter fluid and hair spray. Construction activities that create fugitive dust such as excavation and grading also contribute to area source emissions.

Mobile sources refer to emissions from on- and off-road motor vehicles, including tailpipe and evaporative emissions. On-road sources may be legally operated on roadways and highways. Off-road mobile sources include aircraft, trains, and construction equipment. Natural sources refer to emissions from naturally occurring sources or event in nature, such as wildfires and volcanic eruptions (USEPA 2015i).

3.13.2.2 Local Air Quality

North Charleston and the Tri-County area are highly industrialized and have many mobile sources contributing to air pollution, including trucks, cars, trains, and OGVs (ocean going vessels) from the Port of Charleston and other port facilities. Ozone levels in North Charleston are relatively high due to the industrial and mobile sources of the area. The primary source of CO is motor vehicles operating

at slow speeds. The primary source of particulate matter is mobile sources. Fuel combustion is the primary source of nitrogen dioxide. The primary source of sulfur dioxide is from OGVs in the ports (SCPA 2013).

South Carolina has many air monitors placed throughout the state to measure and record the existing conditions of the local air quality. For each criteria pollutant, the ambient air quality monitored nearest to the project site is reported in Table 3.13-2. The nearest monitoring station is the Jenkins Avenue station, which is 1.6 miles from the project site, and monitors lead, NO_2, PM_{10}, and SO_2. The Cape Romain station is the nearest monitoring station that monitors CO and is approximately 30 miles from the project site. The Bushy Park station is the nearest monitoring station that monitors O_3 and is approximately 9 miles from the project site. The nearest monitoring station that monitors $PM_{2.5}$ is the Charleston Public Works (CPW) station and is approximately 4 miles from the project site. Areas that meet the NAAQS are classified as "attainment" areas, while areas that do not meet these standards are classified as "non-attainment" areas. The severity of the classifications for non-attainment range in magnitude from: marginal, moderate, serious, severe, and extreme. All criteria pollutants for Berkeley, Charleston, and Dorchester Counties are in attainment of the NAAQS and the SCAAQS (USEPA 2015j).

DPM is not directly measured by the USEPA or state monitoring sites; however, the size of diesel particulates that are of greatest health concern are those that are in the categories of fine, and ultra-fine particles (USEPA 2015c). Fine particles, also known as $PM_{2.5}$, are a criteria pollutant and measured in the area. $PM_{2.5}$ measurements are used to assess the DPM emissions near the project site. Ultrafine particles are a subset of $PM_{2.5}$ emissions and therefore are included as part of the monitored $PM_{2.5}$ data.

Table 3.13-2
Local Air Quality Monitoring for 2013

Pollutant		Primary/ Secondary	Average Time	Level (Standard)	SCDHEC Monitoring Station	Level (Monitored)
Carbon Monoxide *(1)*		Primary	8-hour	9 ppm	Cape Romain	0.3 ppm
			1-hour	35 ppm	Cape Romain	0.6 ppm
Lead *(2)*		Primary and Secondary	Rolling 3 month average	0.15 µg/m^3	Jenkins Ave	0.01 µg/m^3
Nitrogen Dioxide		Primary	1-hour	100 ppb	Jenkins Ave	36 ppb
		Primary and Secondary	Annual	53 ppb	Jenkins Ave	6.66 ppb
Ozone		Primary and Secondary	8-hour	0.070 ppm	Bushy Park	0.061 ppm
Particle Pollution	***$PM_{2.5}$***	Primary	Annual	12 µg/m^3	CPW	8.2 µg/m^3
		Secondary	Annual	15 µg/m^3	CPW	8.2 µg/m^3
		Primary and Secondary	24-hour	35 µg/m^3	CPW	20 µg/m^3
	PM_{10}	Primary and Secondary	24-hour	150 µg/m^3	Jenkins Ave	42 µg/m^3
Sulfur Dioxide *(3)*		Primary	1-hour	75 ppb	Jenkins Ave	16 ppb
		Secondary	3-hour	0.5 ppm	Jenkins Ave	0.016 ppm

Source: SCDHEC 2015a, b

µg/m^3 = micrograms per cubic meter

ppm =parts per million

ppb = parts per billion

(1) CO values for 2013 are not available. The values shown here are those taken in 2010, the most recent year CO was monitored in South Carolina.

(2) Lead values were not available for 2013. 2012 data, recorded as a 3-year maximum, was used as a proxy from SCDHEC's Ambient Air Quality Summary for 2012, downQ2ed from http://www.scdhec.gov/HomeAndEnvironment/Air/AmbientAir/.

(3) 3-hour SO_2 values were not available for 2013. 2012 data was used as a proxy from SCDHEC's Ambient Air Quality Summary for 2012, downloaded from http://www.scdhec.gov/HomeAndEnvironment/Air/AmbientAir/.

3.14 CLIMATE CHANGE

3.14.1 Existing Conditions

Global Climate Change refers to any significant change in the measures of climate lasting for an extended period of time. Climate Change includes major changes in temperature, precipitation, or wind patterns, among other effects, that occur over several decades or longer. Some gases, such as carbon dioxide and methane, trap heat in the atmosphere and transform the light of the sun into heat, similar to the glass walls of a greenhouse; these are known as greenhouse gases (GHG).

Earth's average temperature is predicted to change between 1.1°C to 6.4°C from the year 1990 to 2100 (IPCC 2007). Human-generated GHG emissions significantly contribute to the changes in the global climate, which have a number of physical and environmental effects. Effects associated with Global Climate Change include sea level rise, flooding, and impacts to ecosystem and biodiversity. Therefore, while impacts may be seen locally, Climate Change has a global study area.

3.14.1.1 Climate Change

Over time, the Earth's climate has undergone periodic ice ages and warming periods, as observed in fossil isotopes, ice core samples, and through other measurement techniques. Recent Climate Change studies use the historical record to predict future climate variations and the level of fluctuation that might be considered statistically normal given historical trends.

Temperature records from the Industrial Age (ranging from the late eighteenth century to the present) deviate from normal predictions in both rate and magnitude. Most modern climatologists predict an unprecedented warming period during the next century and beyond, a trend that is increasingly attributed to human-generated greenhouse gas emissions resulting from the industrial processes, transportation, solid waste generation, and land use patterns of the twentieth and twenty-first centuries. Increased greenhouse gas emissions are largely the result of increasing fuel consumption, particularly the incineration of fossil fuels. According to the United Nations Intergovernmental Panel on Climate Change (IPCC), greenhouse gas emissions associated with human activities have grown since pre-industrial times, increasing by 70 percent between 1970 and 2004, and further predicts that the range of global mean temperature change from year 1990 to 2100 could be anywhere from 1.1°C to 6.4°C (IPCC 2007).

The greenhouse gas emissions from an individual project, even a very large development project, would not individually generate sufficient greenhouse gas emissions to measurably influence Global Climate Change (AEP 2007); however, Climate Change is an irreversible, significant cumulative impact on a global scale. Consideration of a project's impact to Climate Change, therefore, is essentially an analysis of a project's contribution to a cumulatively significant global impact through its emission of GHG.

3.14.1.2 Climatology

See Section 3.13.1.2.

3.14.2 Greenhouse Gases

Gases that trap heat in the atmosphere are called GHG because they transform the light of the sun into heat, similar to the glass walls of a greenhouse. Common GHG included in the analysis are carbon dioxide, methane, and nitrous oxides.

Carbon dioxide (CO_2) is an odorless, colorless gas, which has both natural and anthropogenic sources. Natural sources include decomposition of dead organic matter; respiration of bacteria, plants, animals, and fungus; evaporation from oceans; and volcanic outgassing. Anthropogenic sources of carbon dioxide are from burning coal, oil, natural gas, and wood. CO_2 emissions in South Carolina are mainly associated with fossil fuel combustion in in-state power plants.

Methane (CH_4) is a flammable gas and is the main component of natural gas. A natural source of methane is the anaerobic decay of organic matter. Geological deposits, known as natural gas fields, also contain methane, which is extracted for fuel. Other sources include the exhaust from the combustion of fossil fuels, landfills, fermentation of manure, and cattle.

Nitrous oxide (N_2O), also known as laughing gas, is produced naturally by microbial processes in soil and water. Anthropogenic sources of nitrous oxide include agricultural sources, industrial processing, fossil fuel-fired power plants, and vehicle emissions. Nitrous oxide also is used as an aerosol spray propellant and has medical applications (USEPA 2015k).

3.14.2.1 Existing levels of GHGs

Global

Worldwide anthropogenic emissions of CO_2, CH_4, and N_2O in 2010 were approximately 45,000 MMT CO_2e (million metric tons of carbon dioxide equivalence), including ongoing emissions from land use and forestry. Carbon dioxide emissions account for about 34,000 MMT CO_2e of the total emissions of 45,000 MMT CO_2e. Methane emissions account for about 7,000 MMT CO_2e and nitrous oxide emissions for about 4,000 MMT CO_2e (USEPA 2014c).

United States

The USEPA publication, *Inventory of U.S. GHG Emissions and Sinks: 1990-2013,* provides a comprehensive emissions inventory of the nation's primary anthropogenic sources and sinks of GHG. Emissions of CO_2, CH_4, and N_2O in 2012 in the United States totaled 6,673 MMT CO_2e. Of the total, CO_2 accounted for 82 percent, CH_4 accounted for 10 percent, and N_2O accounted for 5 percent. Overall, U.S. emissions increased by 2.0 percent from 2012 to 2013. Recent trends can be attributed to

multiple factors, including increased emissions from electricity generation, an increase in miles traveled by on-road vehicles, an increase in industrial production and emissions in multiple sectors, and year-to-year changes in the prevailing weather. Additionally, GHG emissions in 2013 were 9 percent below 2005 levels (USEPA 2015l).

South Carolina

In 2005, activities in South Carolina accounted for approximately 93 MMT of CO_2e emissions. South Carolina's gross GHG emissions increased 39% from 1990 to 2005, while national emissions rose by 16% from 1990 to 2005. Principal sources of South Carolina's GHG emissions are electricity consumption and transportation, accounting for 35% and 34% of South Carolina's gross GHG emissions in 2005, respectively. The next largest contributor is the residential, commercial, and industrial fuel use sector, accounting for about 19% of gross GHG emissions in 2005. The waste management and agriculture sectors each contribute 3% and industrial process emissions comprised 4% of State GHG emissions in 2005 (CCS 2008).

3.14.3 Predicted Effects of Climate Change

Climate Change could have a number of adverse effects. Although these effects would have global consequences, in most cases they would not disproportionately affect any one site or activity. In other words, many of the effects of Climate Change are not site-specific. Emission of GHG would contribute to the changes in the global climate, which would in turn, have a number of physical and environmental effects. A number of general effects that may occur are discussed below.

Sea Level: Increase in atmospheric temperature in turn increases ocean temperature. The warming of seawater causes it to increase its volume through a process called thermal expansion. Climate Change also causes ice to melt. Thus, sea levels rise due to thermal expansion and the input of more water from snow and ice melt. Sea level rise is classified into two categories: global and relative. Absolute sea level rise is the net increase in sea level averaged over the globe. Relative sea level rise is specific to locations and takes land changes into account, such as the subsidence and rising of land. From 1993 to 2014, absolute sea level rose approximately 0.11 to 0.14 inch per year. From 1960-2014, the absolute sea level rose about 4 inches; however, the relative sea level rise along the South Carolina coast rose between 6 and 8 inches from 1960-2013 (USEPA 2015m). Of South Carolina's 851 miles of coastline, about 327 miles are at moderate vulnerability to further relative sea level rise, nearly 240 miles are highly vulnerable, and over 218 miles are very highly vulnerable (NOAA 2011).

Increased Frequency and Intensity of Storm Events: A predicted result of Climate Change is the increase in storm events and their intensity, causing greater water inputs in shorter periods of time, affecting flood frequency and duration. The Climate Change phenomena of increasing land, surface water, sea surface and atmospheric temperatures in addition to rising sea level have the potential to cause more severe flood events, increased coastal flooding, and increased storm surge flooding

(SCDNR 2013). The City of North Charleston is subject to flooding from Atlantic Ocean hurricanes and other storms. The City has experienced many hurricanes resulting in local property damaged being caused by high winds and flood. The most recent events were Hurricane Hugo in 1989 and Hurricane Floyd in 1999 (City of North Charleston 2016).

Ecosystems and Biodiversity: Climate Change is expected to have effects on diverse types of ecosystems, from alpine to deep sea habitat. As temperatures and precipitation change, seasonal shifts in vegetation will occur; this could affect the distribution of associated flora and fauna species. As the range of species shifts, habitat fragmentation could occur, with acute impacts on the distribution of certain sensitive species. The IPCC states that "20 percent to 30 percent of species assessed may be at risk of extinction from Climate Change impacts within this century if global mean temperatures exceed 2 to 3°C (3.6 to 5.4°F) relative to pre-industrial levels." Shifts in existing biomes could also make ecosystems vulnerable to invasive species encroachment. Wildfires, which are an important control mechanism in many ecosystems, may become more severe and more frequent, making it difficult for native plant species to repeatedly re-germinate. In general terms, Climate Change is expected to put a number of stressors on ecosystems, with potentially catastrophic effects on biodiversity. Warmer air and water temperatures, hurricanes, increased storm surges, and sea level rise are expected to alter the Southeast's local ecosystems and agricultural productivity. Declining freshwater availability, saltwater intrusion, land loss, drought, and increasing temperatures are expected to stress agricultural crops and decrease yields. Some croplands may be lost entirely to inundation this century while production of crops that need chilling periods, such as many fruits, may need to shift northward with warming temperatures. High temperatures also cause heat stress for dairy cows and livestock and reduce production yields, potentially leading to relocation of these industries, or shifts to more heat-tolerant breeds. Sea level rise will increase the salinity of estuaries, coastal wetlands, tidal rivers, and swamps. Rapid sea level rise could also eliminate some barrier islands that currently protect inland habitats, while reduction of wetlands increases the potential for loss of important fishery habitat. Ocean warming could affect seafood harvest in the Southeast by changing the species in the region, altering migration patterns and timing of fish presence, or affecting fish growth rates (USEPA 2015n).

3.15 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE

3.15.1 Introduction

This section provides a brief description of any contaminated sites located within the study area, including the severity of any remaining contamination and the ongoing and planned monitoring activities. This section also describes (in a qualitative fashion) the potential for the project site and alternatives to contain buildings or structures impacted by Asbestos-Containing Materials (ACMs) and metals-based paints.

The affected environment for the Hazardous, Toxic, and Radioactive Waste (HTRW) resource consists of the known contaminated (and potentially contaminated) soil and groundwater areas within the study area. The study area is depicted in Figure 3.15-1, and includes a 1-mile radius adjacent to the Navy Base ICTF and the alternative River Center project site. This study area boundary is a result of compliance with the distance requirement (1-mile) associated with HTRW investigations when conducting a Phase 1 Environmental Site Assessment (ESA). While a majority of the HTRW study area had been investigated through the completion of Phase I ESAs, certain areas in the northern-most and southern-most portions of the HTRW study area have not been addressed by Phase I ESAs. Therefore, a review and evaluation of the available public information relating to the hazardous materials issues within these two additional areas was conducted. The additional areas are referred to as the "Northern Alternatives Area" and the "Southern Alternatives Area." The assessment consisted of a review of recent and historic aerial photographs, other historical information sources, and regulatory agency database information (Environmental Data Resources Inc. [EDR] 2016a–i). A site reconnaissance was not conducted in this assessment to verify the status and location of sites referenced in the regulatory database search or to locate any additional unreported hazardous materials sites. As a Phase 1 ESA was not conducted for these two areas, the assessment does not relate HTRW findings to specific "parcel" numbers as is done for those areas where a Phase 1 ESA was completed.

The Phase 1 ESA assessments that have been completed for the study area included an evaluation of potential Recognized Environmental Conditions (RECs) up to 1 mile away as part of the ASTM Practice E 1527-05 process. Certain off-site RECs were identified including the MacAlloy Superfund site, former Montenay incinerator, the nearby ConGlobal facility, and a former landfill. In light of the former land uses on the CNC, the project site and the alternative River Center project site both contain a number of contaminated properties as identified in Phase 1 ESAs (S&ME Inc. 2013a–c). Within the project site are multiple Solid Waste Management Units (SWMUs), Areas of Concern (AOCs), and Fuel Distribution Systems (FDSs). The River Center project site also contains parcels impacted by the former CNC operations.

NAVY BASE ICTF EIS

Hazardous, Toxic, and Radioactive Waste Study Area

Figure 3.15-1

US Army Corps Of Engineers Charleston District

3.15.2 Navy Base ICTF

3.15.2.1 ICTF Facility

The majority of the 130-acre project site is contained within Palmetto Railways Parcels 11, 12, 13, 13A, and 13B (see Figure 3.15-2). Phase I ESAs were completed for each of these parcels during 2013.

3.15.2.1.1 Parcel 11

Parcel 11 consists of 69.96 acres of the CNC and comprises the bulk of the northern and central sections of the project site. The overall CNC was used for military and heavy industrial uses from 1902 until 1996, and this parcel continues to be used for similar purposes. Parcel 11 was part of the Navy's FDS, which included underground piping and above-ground storage tanks (ASTs) that are currently present. SWMUs 3 and 24 are located within Parcel 11. These SWMUs and similar contaminated sites have been investigated by the Navy since the 1990s. SWMU 3 was a pesticide-handling and mixing area, which is undergoing long-term monitoring. Monitoring of the groundwater at SWMU 3 is conducted periodically. SWMU 24 is a former fuel reclamation facility that consisted of two large ASTs. Soil contaminated by Benzo(a)pyrene equivalents (BEQs) was identified at SWMU 24.

As with similar sites on the CNC where soil and groundwater impacts remain present, the following Land Use Controls (LUCs) have been implemented at SWMUs 3 and 24:

- **Groundwater Restrictions**—No use of groundwater for drinking or irrigation purposes, and foundation construction requires Resource Conservation and Recovery Act (RCRA) Permittee (i.e., the Navy) approval
- **Restrictive Covenants Designation**—Only industrial and commercial uses allowed
- **Limits on Soil Disturbing Activities**—Excavations require approval of the RCRA Permittee

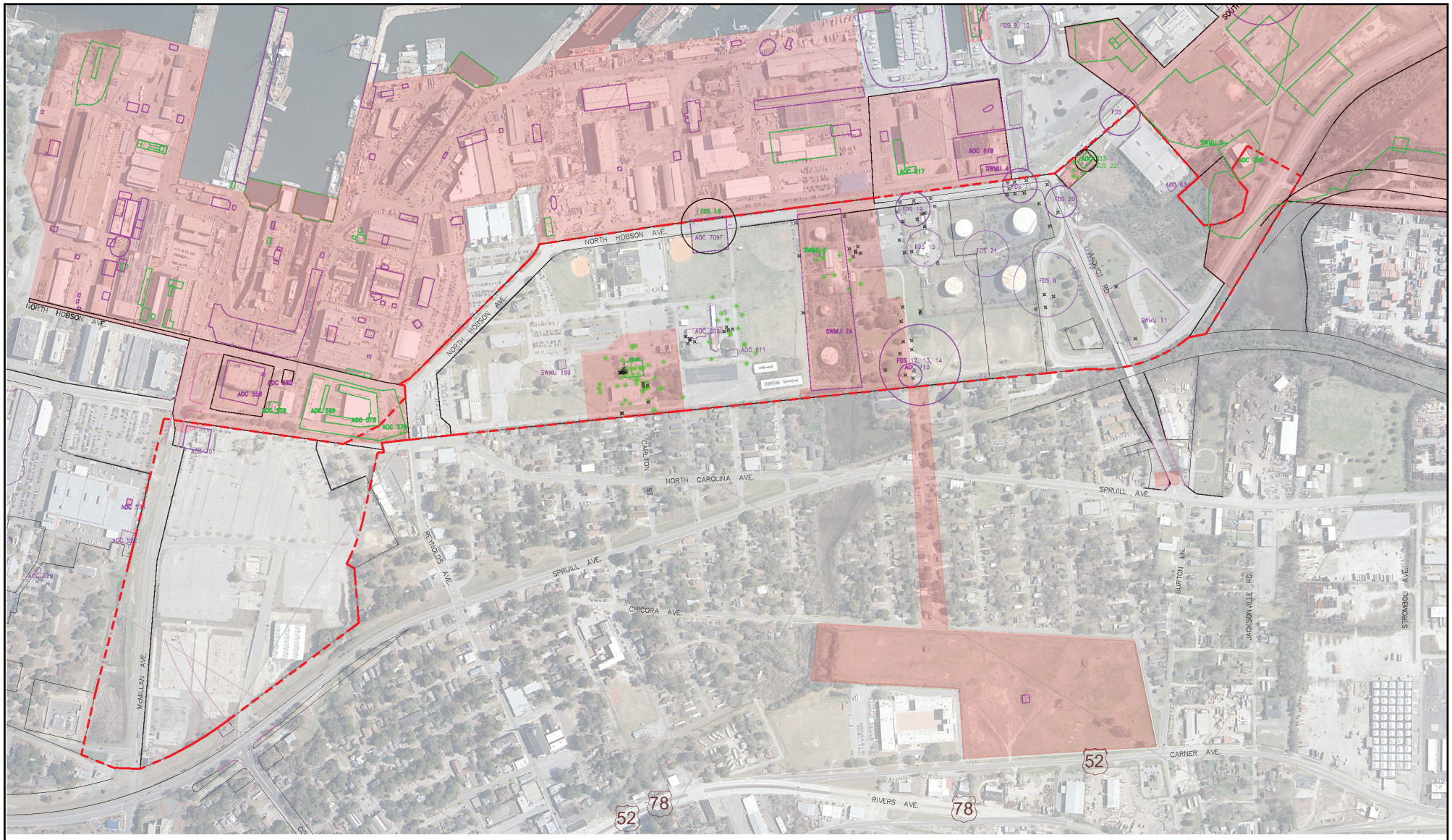
Much of the area in Parcel 11 is subject to these LUCs. Palmetto Railways, as a non-responsible party, and the SCDHEC have entered into a Voluntary Cleanup Contract (VCC) with respect to Parcels 11, 12, 13A, and 14B. As part of the VCC, Palmetto Railways is required to comply with the Navy's permitting requirements for areas to be developed as part of the Proposed Project. Figure 3.15-3 shows the areas currently under LUCs in the vicinity of the Navy Base ICTF.

NAVY BASE ICTF EIS

Parcels Investigated through Phase 1 ESAs
Alternative 1 (Proposed Project)

Figure 3.15-2

US Army Corps Of Engineers Charleston District



LEGEND

- PROJECT SITE
- AOC/SWMU/FDS AREA–ACTIVE
- AOC/SWMU/FDS AREA–INACTIVE
- LAND USE CONTROL AREA
- ACTIVE MONITORING WELL
- ABANDONED MONITORING WELL

400 200 0 400 800
SCALE IN FEET

S&ME
ENGINEERING · TESTING
ENVIRONMENTAL SERVICES

PROJECT SITE
DPR ITCF
CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

SCALE: AS SHOWN	DRAWN BY: LAJ	CHECKED BY:
PROJECT NO: 1134-11-233	DATE: 6-06-2013	FIGURE NO: 1

Parcel 11 also includes AOCs 607 and 728. AOC 607 is a former dry cleaning facility, which has soil and groundwater impacted by metals, organic chemicals, and solvents. Remedial actions have been conducted at this site, and the groundwater at AOC 607 continues to be monitored periodically. The same LUCs applicable to SWMUs 3 and 24 also apply to AOC 607. AOC 728 is a regulated petroleum site with groundwater impacted by multiple petroleum compounds. Groundwater monitoring is ongoing. The Phase I ESA for Parcel 11 also identified a petroleum-impacted area in Building 98 and an abandoned oil-water separator in Building 1654. Parcel 11 also contains SWMUs 107, 117, 199, AOCs 609, 611, 622, 623, 624, 625, 626, 710, and FDS Areas 12, 13, 14, 15, 19, and 21. All of these areas were investigated by the Navy, and were granted No Further Action (NFA) status by the SCDHEC. FDS Area 16 was recommended for NFA, but had not yet been granted that status.

3.15.2.1.2 Parcel 12

Parcel 12 is a 10-acre property located immediately south of Parcel 11 and comprises a portion of the southern section of the project site. This parcel contains three very large (2,350,000-gallon to 4,200,000-gallon) former waste oil or diesel fuel ASTs, which are no longer in service. This parcel contains all or portions of FDS Areas 8, 11, 20, and 21. All of these FDS Areas have been granted NFA status by the SCDHEC.

3.15.2.1.3 Parcel 13 (13A and 13B)

Parcel 13, which has two components 13A and 13B, is a 7.90-acre property that consists of the North Hobson Avenue right of way along the east and northeast side of the project site. Although the Proposed Project does not appear to involve realignment of North Hobson Avenue, there would be impacts to the roadway, and additional infrastructure would likely be needed (i.e., utilities, etc.). Parcel 13 lies adjacent to many of the contaminated sites discussed above for Parcels 11 and 12. There are also multiple SWMUs, AOCs, and FDS Areas located on the adjacent properties to the east and northeast of Parcel 13, as reported in the Phase I ESA for Parcel 13. AOC 737 is a recently discovered area of petroleum-stained soil along North Hobson Avenue, west of Building 69. The Navy reported that the contaminated soil was removed and a pipe was patched. AOC 737 has been remediated to Industrial/Commercial standards. Under the current agreement between SCDHEC and Department of Navy, Land Use Controls are the remediation status for the AOC. The property may only be developed for Industrial/Commercial standards. Parcel 13 was once associated with a former air field and was a major thoroughfare for CNC operations since the 1940s. Adjacent properties have LUCs, and LUCs extend into Parcel 13 near the North Charleston Fire Department (relocated in January 2016) and near Supply Street.

Parcel 13A is a 1.5-acre property that includes a portion of the northern section of the project site. It was formerly a coal storage yard. The VCC with SCDHEC applies to this property, and the adjacent properties to the north, south, and east have LUCs implemented on them. The Phase I ESA for Parcel 13A also identified a suspected underground storage tank (UST) and underground piping near

Buildings 186 and 245. AOCs 569, 570, and 578 are located adjacent to this parcel. Contaminants associated with these AOCs may include petroleum compounds and solvents.

Parcel 13B is a 6.4-acre property that includes a portion of the southern section of the project site. The parcel is located south of Parcel 12, primarily between Bainbridge Avenue and Viaduct Road. This parcel is subject to the VCC and may have been part of the FDS that supported the CNC activities. SWMUs 6, 7, 8, and Combined SWMU 9, which have been investigated by the Navy, are located to the east of Parcel 13B and are subject to LUCs. Properties to the north and south of Parcel 13A, which include FDS Area 22 and AOC 633, have also been investigated by the Navy and are restricted by LUCs.

3.15.2.2 Navy Base ICTF Roadway and Rail Improvements

The parcels described above comprise the main portion of the Navy Base ICTF; however, there are multiple parcels that include the nearby roadway and railway improvements leading into the Navy Base ICTF from the northwest and from the south or southeast. These adjacent roadway- and railway-impacted parcels include Parcels 14A, 14B, 15, 16, and a very small portion of Parcel 17. Additional areas to the south of Parcel 16, as far south as Milford Street, would also include proposed railway improvements (e.g., the Southern Alternatives Area).

3.15.2.2.1 Parcels 14A and 14B

Parcels 14A and 14B are part of the VCC entered into between Palmetto Railways and SCDHEC, and LUCs could affect both parcels. Parcel 14A is a 21.66-acre property that is planned for construction of rail lines and roadways (including the proposed drayage road) leading southeast from the project site. In addition to being part of the larger CNC, Parcel 14A is located immediately south of FDS Area 22 and AOC 633. Groundwater impacted by petroleum products may be encroaching upon Parcel 14A from the north, and AOC 633 is under LUCs. AOC 736 is a recently discovered solvent-impacted area along South Hobson Avenue immediately adjacent to Parcel 14A. AOC 736 is currently undergoing investigation by the Navy. Impacts from AOC 737 (discussed above for Parcel 13) also may have impacts at Parcel 14A. The Phase I ESA for Parcel 14A also identified four ASTs on that parcel and noted that there are currently investigations into the quality of the sediments in the nearby areas that were formerly the Shipyard Creek watershed (known as Zone J), which may have been impacted by CNC activities.

Parcel 14B is a 0.51-acre property that is also located in the southern railway and roadway transit areas of the project (and adjacent to Parcels 13B and 14A). The same contaminated (or potentially contaminated) sites discussed above for Parcel 14A have the potential to impact Parcel 14B.

3.15.2.2.2 Parcel 15

Parcel 15 is a 5.5-acre property that is located south of Parcel 14A and west of Parcel 17. The proposed drayage road is planned to transit along the east side of this parcel, while additional rail lines are planned for the western portion of the parcel. No contaminated areas were identified within Parcel 15; however, multiple potentially contaminated nearby properties were identified in the Phase I ESA, including the CNC, Combined SWMU 9 and SWMU 196, and the impacts to the Shipyard Creek watershed (discussed above for Parcel 14A).

3.15.2.2.3 Parcel 16

Parcel 16 is a 2.11-acre property located immediately south of Parcel 15 and located immediately west of the main railroad right of way serving the area south of the project site. This parcel is planned for construction of additional rail lines parallel to the main line. The Phase I ESA for this site noted that the area of Parcel 16 was likely formerly occupied by a landfill that had been operated as recently as 1975. The Phase I ESA did not indicate specifically the portions (if any) of the property that contained buried solid waste. The Phase I ESA also indicated the potential for impacts to Parcel 16 from the nearby former Montenay incinerator (to the south) and the adjacent ConGlobal facility to the east. Parcel 16 may also be impacted by the same sites discussed for Parcels 14A and Parcel 15.

3.15.2.2.4 Southern Alternatives Area

All of the alternatives include improvements to existing railroad rights-of-way or construction of new rail lines to the south of Parcel 16. In addition, all of the alternatives except Alternatives 3 and 6 would include railway improvements along or near Spruill Avenue and/or Meeting Street to locations as far south as Milford Road. The rail improvements to the south of Parcel 16 for Alternatives 3 and 6 would be located primarily in the Spruill Avenue vicinity. Additional data was reviewed for the southern-most area that could be affected by the Navy Base ICTF, an area where no Phase I ESAs had been completed by Palmetto Railways (see Appendix J). The findings for the "Southern Alternatives Area" are detailed in Appendix J and are summarized in this section. The location of the "Southern Alternatives Area" is shown on Figure 3.15-4.

The Southern Alternatives Area contains numerous commercial and industrial businesses, and is located immediately adjacent to large industrial operations, such as petroleum storage facilities, chemical storage facilities, and a former fertilizer plant. Approximately 34 addresses (or sites) with the potential for contamination involvement or having actual records of contamination involvement were identified within the Southern Alternatives Area. Of the 34 sites identified, 14 sites were considered to have a high risk of contamination involvement, while the remaining 20 sites were considered to have minimal risk of contamination involvement.

NAVY BASE ICTF EIS

Southern Alternatives Area

Figure 3.15-4

US Army Corps Of Engineers Charleston District

The Southern Alternatives Area is bordered on the west and east sides by properties that have documented contamination issues. A large Mobil Chemical Company terminal facility is located immediately northwest of the Southern Alternatives Area. The Koppers, Inc. (Charleston Plant) National Priorities List site is located immediately southwest of the Southern Alternatives Area. The Montenay Incinerator Site is located along the northeast side of the Southern Alternatives Area, while the MacAlloy Corporation Superfund Site is located along the east side of the area (see Section 3.15.5).

3.15.2.2.5 Nearby Parcels and Contaminated Sites

At the southern end of the Navy Base ICTF, roadway and rail improvements would cross the westernmost section of Parcel 17. Potentially contaminated sites associated with this area have been discussed above for Parcels 14A and 14B. Roadway and rail improvements to the north of the Navy Base ICTF would pass through or adjacent to AOCs 569, 570, 578, and 701. This area is immediately north of Parcel 13A, and it should be noted that these areas are located adjacent to Alternative 5. AOCs 569, 570, and 578 are located in the area of Buildings 25 and 30. These areas included former coal storage yard sites. Contaminants associated with these AOCs included possible petroleum compounds and solvents in the groundwater. The area of AOCs 569, 570, and 578 are under LUCs, which include engineering controls, such as maintenance of fences and controlled access, as well as prohibition of installation of wells in the surficial aquifer. The Navy is currently conducting periodic groundwater monitoring at AOCs 569, 570, and 578.

AOC 701 is the location of a former gas station that was operational between 1941 and 1979. The site was investigated by the Navy for a petroleum release and subsequently received approval of NFA status from SCDHEC in 2002; however, the document entitled "Environmental Information for Future CNC Construction Permit Requests" did not confirm or refute whether the site's USTs remained onsite or had been removed or abandoned-in-place.

It should also be noted that railroad lines, in general, frequently exhibit soils contaminated by arsenic (as a result of herbicide application) and BEQs (as the result of leaching of treated cross-tie timbers). Rebuilding or excavating in railroad rights-of-way would be expected to involve impacts from these constituents. The primary contamination impacts associated with the proposed re-use of railroad lines in the Related Activity areas of the project would be the involvement of soils contaminated with arsenic and BEQs.

3.15.3 River Center Project Site

The River Center project site is located to the northwest of the project site, and is centered on McMillan Avenue in the Noisette Boulevard area in North Charleston, South Carolina. A 90.21-acre tract of land is located within the southern portion of the River Center project site. Palmetto Railways completed a Phase I ESA for the 90.21-acre tract, which included evaluation of potentially contaminated sites within that tract and on surrounding properties. Palmetto Railways also

completed Phase I ESAs for the 14.45-acre Charleston Marine Container, Inc. (CMCI) property, located in the north-central portion of the River Center project site, and the 21.06-acre former Naval Hospital Property, located in the northwestern portion of the River Center project site. Figure 3.15-5 shows the Phase I ESA parcels that make up the River Center project site.

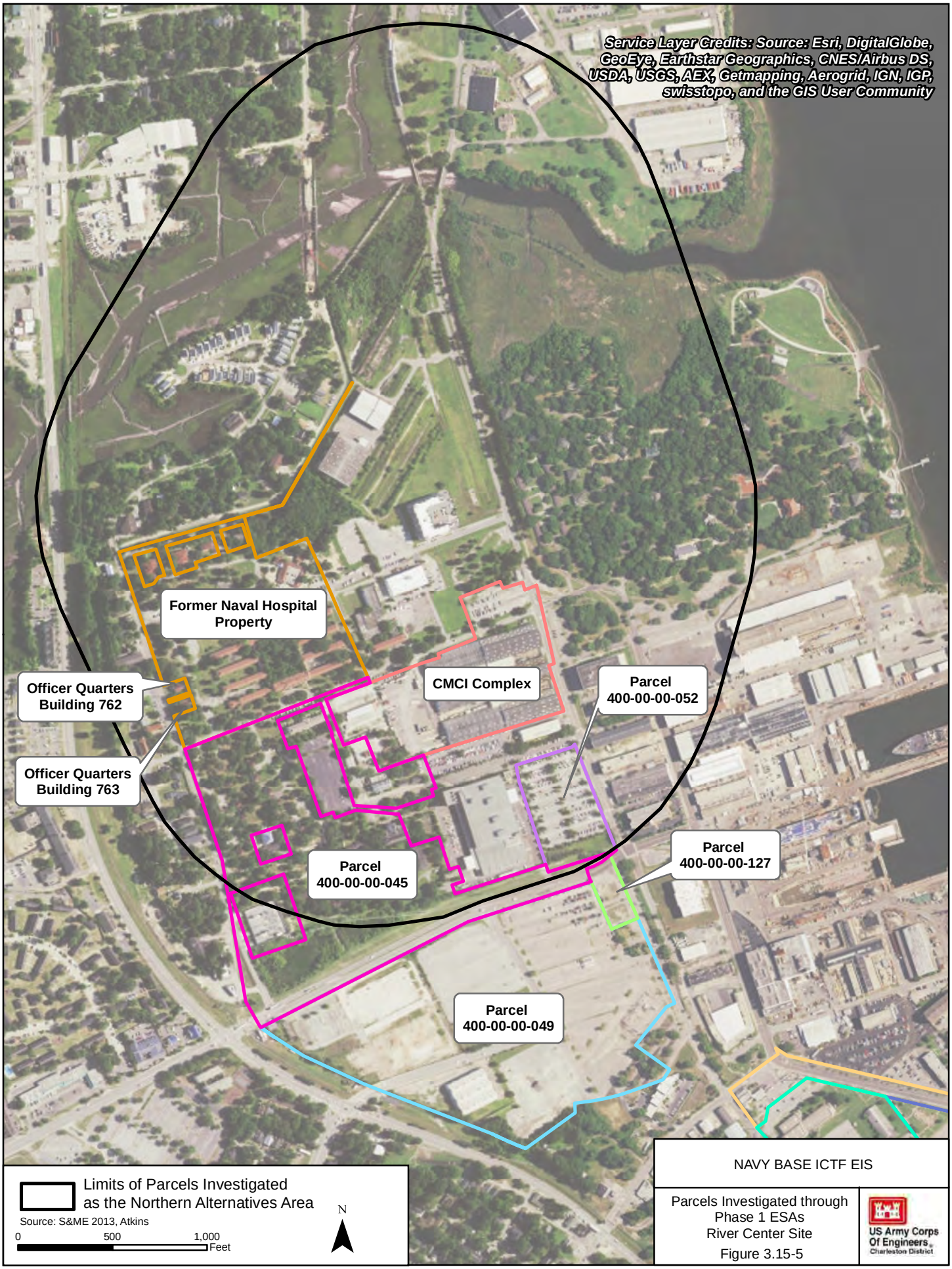
The 90.211-acre tract is currently developed with multiple commercial facilities, parking lots, paved roads, and relatively old Navy housing structures. Historical research indicated that the tract had been used as part of the CNC since the 1910s. Historical uses of the tract have included residential, office, and heavy industrial uses over the past approximately 100 years. The Navy has remediated soil and groundwater impacted by petroleum and other contaminants as the Responsible Party under its RCRA Post Closure Permit. The site was then designated as a Brownfield under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). According to the Phase I ESA, there are no open/active SWMUs, AOCs, FDS Areas, or petroleum storage tank cleanup activities on this tract. LUCs are in effect on this tract, and properties immediately to the east and northeast also have LUCs in place.

The Phase I ESA for the 90.211-acre tract identified one potentially contaminated site. Building M-192 is an active firing range for the North Charleston Police Department. The Phase I ESA did not recommend any investigations as long as the firing range remained active. If the use of that building changes in the future, sampling was recommended to determine any impacts from the firing range.

The Phase I ESA for the 90.211-acre tract included an evaluation to identify properties within 500 feet of the tract that may represent sources of contamination that could impact the tract. No such potentially contaminated sites were identified and no off-site RECs were noted. Inactive AOC 701 (discussed above) is located in the southern portion of River Center project site.

The Phase I ESA for the 14.45-Acre CMCI property identified the property as having been part of the CNC since at least 1922. The CMCI property was a former burning dump and wooded lot associated with the former Marine Reservation, and the adjacent properties to the north, south, and east had been associated with CNC operations from the World War I and World War II eras. SWMU 47 and AOCs 515, 516, and 518 are located on the CMCI property. These sites have been assessed and received NFA status from the SCDHEC. The Phase I ESA indicated that containers of petroleum compounds and solvents were observed on the property, but were in good condition and were not considered a concern.

SWMUs 48, 49, and 186, and AOCs 513, 514, 517, 519, 520, 521, and 522 are located on properties adjacent to the CMCI property. These formerly regulated sites have also received NFA status from the SCDHEC. The Phase I ESA for the CMCI property also identified a gas station that operated to the south of the property from 1958-1962. The gas station was demolished and a building was constructed on top of it. The status of the gas station's former UST was unknown. The potential former UST is known as AOC 523 and is currently being investigated.


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
Former Naval Hospital Property
Officer Quarters Building 762
Officer Quarters Building 763
CMCI Complex
Parcel 400-00-00-052
Parcel 400-00-00-045
Parcel 400-00-00-127
Parcel 400-00-00-049
Limits of Parcels Investigated as the Northern Alternatives Area
Source: S&ME 2013, Atkins
0
500
1,000
Feet
N
NAVY BASE ICTF EIS
Parcels Investigated through Phase 1 ESAs
River Center Site
Figure 3.15-5
US Army Corps Of Engineers
Charleston District

The Phase I ESA for the 21.06-acres former Naval Hospital Property identified that property as a Navy-associated hospital facility developed prior to 1919. Structures of various uses were added and/or demolished at the site from the 1920s through the 1940s. SWMUs 45 and 46, AOCs 508, 510, and 511, and a former UST (known as Site 29) are located on the former Naval Hospital Property. These sites were investigated and received NFA status from the SCDHEC.

The Phase I ESA for the former Naval Hospital Property identified four closed USTs at Building NH46 (known as Site 30) associated with the fuel oil system. The USTs released petroleum into a groundwater plume that extends approximately 100 feet east of the building. Remediation and monitoring of this UST site are on-going. Currently, five closed USTs (with their approximate locations known) may be present at Building NH46 and its vicinity, and it is not known if they were removed or closed-in-place.

SWMUs 44, 47, 48, 49, and 186, and AOCs 504, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, and 522 are located on properties adjacent to the former Naval Hospital Property. These sites were investigated and received NFA status from the SCDHEC. AOC 523 (discussed above) is also located to the southeast of the former Naval Hospital Property.

In contrast to the findings of the Phase I ESAs, the 2012 Basewide Groundwater and Performance Monitoring Report for the CNC identified two small active SWMUs/AOCs in the southern portion of the River Center project site and one moderate-sized SWMU in the northern portion of the River Center project site. This area of the River Center project site is known as Zone C of the CNC. The two smaller SWMUs/AOCs did not appear to have any active monitoring ongoing; however, the northern site, immediately south of Noisette Creek, was investigated as part of the assessment of SWMU 39, located to the northeast of the River Center project site. Monitoring wells to the south of Noisette Creek were sampled for solvent-related parameters, and elevated concentrations of vinyl chloride were detected in these wells during 2012.

Additional data was reviewed for the northern-most portion of the River Center project site, an area where no Phase I ESAs had been completed by Palmetto Railways (see Appendix J). The detailed findings for the "Northern Alternatives Area" are provided in Appendix J and are summarized in this section. The area was identified as part of the CNC, although no SWMUs or AOCs were identified on the property. Land use history included a storage area associated with railroad access along the eastern and northern sections of the property, with some railroad lines later removed from the property. The area now contains several commercial buildings.

Three potentially contaminated sites were identified within 1,000 feet of the Northern Alternatives Area. Two of the sites were the CMCI Property (discussed above) and the main CNC facility, which is located to the southeast of (and downgradient from) the property. The other site was a facility that no longer generates hazardous waste and had no history of hazardous waste violations. As a result,

no RECs appeared to be associated with the Northern Alternatives Area, other than the presence of railroad lines and its former inclusion within the CNC.

3.15.4 Buildings with Potential ACMs and Metals-Based Paints

During preparations for the closure and transfer of the CNC, the Navy performed a preliminary assessment of the buildings on the CNC property, as described in the Final Environmental Impact Statement (FEIS), Proposed Marine Container Terminal at the Charleston Naval Complex. During the assessment, an Environmental Baseline Survey for Transfer (EBST) was prepared to document the physical condition of the property and the potential for the presence of hazardous materials and petroleum products. The property/building assessments evaluated incident records and personnel interviews to determine the presence of ACMs, metals-based paints, PCBs, and radon gas.

During the study for the Proposed Marine Container Terminal FEIS, 53 percent of the buildings were determined to have "probable" remaining ACMs, while 11 percent had been tested and confirmed to contain ACMs. The remaining buildings (36 percent) were unlikely to have ACMs, or the ACMs had been removed. Similarly, 73 percent of the buildings were considered "probable" or "likely" to contain metals-based paints, while the remaining 27 percent of buildings were considered unlikely to contain such paints. Only 9 percent of the buildings listed were considered to contain "possible" or "confirmed" impacts from PCBs. The information regarding the possible presence of radon was very limited, but it suggested that radon was generally not a concern for CNC buildings. Since the CNC facilities in the study area for the Navy Base Marine Container Terminal FEIS have a similar operational history to those in the study area for the Proposed Project, the relative percentages of buildings with ACM, metals-based paints, and PCBs are expected to be similar to those determined during the EBST. If these materials are expected to be encountered in buildings that are planned for demolition as part of the project, they are required to be properly surveyed, tested, and abated prior to the demolition activities.

The number of buildings on the main area of the project site is estimated to be 43 buildings. An additional approximately 57 buildings are located on the western portion of the project site in the area of the proposed noise berm. The total number (100) comprises a mixture of residential and commercial structures that were mostly constructed prior to 1980, which could be expected to contain ACMs or metals-based paints.

Depending upon the exact areas required for the railway improvements (and the need to demolish specific structures), the number of buildings that would need to be removed for the railway improvements in the Southern Alternatives Area would be approximately 20 additional structures; however, for Alternatives 3 and 6, the number of additional structures required for removal in these areas would be approximately 10 because these alternatives have much smaller footprints. Due to the age of most of the structures in the Southern Alternatives Area, all of these structures could be expected to contain ACMs and metals-based paints.

The River Center project site is estimated to contain approximately 48 structures, most of which were constructed prior to 1980 and could be expected to contain ACMs and metals-based paints. According to the Phase I ESA for the 90.211-acre tract, the majority of the structures on that tract are likely to have potential ACMs and metals-based paints. Friable ACMs in poor condition were abated from Buildings AA through LL (residential structures) and Buildings M5 to M9 (residential and offices) between 2001 and 2012. Similarly, metals-based paints were abated from these buildings after 1996. According to SCDHEC Regulation 61-86.1, an asbestos survey is required by a licensed asbestos inspector to determine the presence or absence of ACMs prior to renovation or demolition of buildings. Metals-based paints also have special removal requirements.

It should be noted that none of documents reviewed, including all of the Phase I ESAs conducted for the project site and the River Center project site, identified radioactive materials as being present within the project site or presenting a concern in any of the CNC facilities and associated locations of the study area.

3.15.5 RECs within the Study Area

3.15.5.1 Macalloy Corporation Superfund Site

The Macalloy Corporation Superfund Site is located in the southernmost portion of the study area, approximately 1,000 feet south of Parcel 16, along Shipyard Creek. There should be minimal involvement with the Macalloy Corporation Superfund Site due to any of the alternatives associated with the project site or the River Center project site.

The Macalloy Corporation Superfund Site was formerly owned and operated by Pittsburgh Metallurgical Company (1941 to 1966), Airco (1966 to 1979), and Macalloy (1997 to 1998). Ferrochromium alloy was used in the production of stainless steel at this site. These production activities generated hazardous waste, including hexavalent chromium and other metals. At various times from 1942 to 1998, the U.S. Department of Defense owned, operated, or utilized the Macalloy site to produce and store ferrochromium alloy, ore, and waste slag. Waste generated by the operations was typically disposed of in landfills, pits, or ponds at the site that were later filled. The Macalloy site was investigated by the USEPA and was found to have contaminated soils, sediments, and groundwater, which also impacted Shipyard Creek. The Macalloy site was listed on the National Priorities List (NPL) in 2000. Remediation of the site was planned in 2002, and remediation activities were completed in 2006. EPA completed the Five-Year Review Report for this site in August 2015 (USEPA 2015l). The site currently has LUCs in place, which allow for only commercial and industrial uses of the property. Groundwater monitoring to sample for chromium is performed annually because a small portion of the property continues to exhibit chromium concentrations that exceed EPA criteria. The Five-Year Review Report also recommended supplemental groundwater remediation in a limited area and installation of additional monitoring wells to further delineate the chromium-impacted groundwater area.

3.15.5.2 Montenay Incinerator Site

The Montenay Incinerator site, also known as the former Foster Wheeler Facility, is located to the southeast of Parcel 16. It operated until recently as an incinerator for Charleston County, which processed only non-hazardous municipal waste. The primary environmental concern related to this facility was airborne emissions from the incinerator's smokestack; however, an assessment performed in 1986 identified groundwater contaminated by volatile organic compounds in the northern portion of the Montenay site. The source or extent of the contaminated groundwater was not confirmed. The incinerator structure was recently demolished, and the Montenay site is now vacant.

The Montenay Incinerator site was identified as a REC in the Phase I ESA for Parcel 16 due to its proximity to Parcel 16, due to the presence of groundwater contamination, and due to the regulatory status of the site. For the Proposed Project, the intent is to construct the arrival/departure tracks along the west side of the Montenay Incinerator site. Investigations to determine any impacts to the use of the site resulting from the contaminated groundwater associated with this site would be completed prior to construction of the arrival/departure tracks.

3.15.5.3 Charleston/Spruill Avenue Dump

A former landfill was located in the area between Jacksonville Avenue, the existing railroad right-of-way, Hampton Avenue, and Carner Avenue/Meeting Street, to the west of the Parcel 16 section of the project (about 250 feet west of the proposed ICTF). Three solid waste facilities (Charleston/Spruill Avenue Dump, Gaston Dump, and Charleston County Dump) were listed in this area, but no specific address information was available. A SCDHEC file review confirmed that a municipal landfill was present in the area, and it may have extended onto the Parcel 16 location and the adjacent ConGlobal property. Review of aerial photographs from the 1960s and 1970s showed soil disturbances in the Parcel 16 area, at the current ConGlobal property, and at the adjacent property to the west (across the railroad right-of-way). It was not conclusively determined from the aerial photograph review that all of the soil disturbances were due to landfilling activities.

Correspondence from the file review indicated deficiencies in the operations and maintenance of the landfill. The file review indicated that the landfill was operational as late as 1975. The Phase I ESA for the Parcel 16 site identified the former landfill as a REC due to the unknown boundaries of the landfill, the unknown contents of the landfill, lack of detailed information, and the fact that the landfill operated prior to the implementation of regulations governing landfills. For the Proposed Project, the intent is to construct the arrival/departure tracks through the Parcel 16 site. Investigations to determine any impacts to the use of the site resulting from the possible former landfill in this area would be completed prior to construction of the arrival/departure tracks.

3.15.5.4 ConGlobal Facility

The ConGlobal Facility is the larger parent property for Parcel 16, and it is located immediately to the east and southeast of Parcel 16. The facility repairs container boxes, chassis, and flat racks for shipping vehicles. Interviews with ConGlobal staff indicated that petroleum, oil, and lubricants are used on the site and are typically recycled or shipped off-site by a private vendor. There are currently two 400-gallon gasoline ASTs on the larger ConGlobal facility that are used for fueling equipment. All paint blasting operations have been shut down and all such equipment has been removed.

Review of regulatory file information for the ConGlobal facility indicated that a former abrasive blasting area operated on the site, and the site formerly had additional ASTs. The SCDHEC file for the facility included an Air Quality Inspection Report (dated January 18, 2012), which indicated that the site had air quality issues. The air quality issues had been referred to SCDHEC enforcement for review, and the file also noted the presence of blasting slag located at the rear of the property. Investigations to determine any impacts to the use of Parcel 16 resulting from the former or current operations of the ConGlobal Facility in this area would be completed prior to construction of the arrival/departure tracks.

3.16 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

3.16.1 Introduction

The affected environment for socioeconomics and Environmental Justice provides an overview of the social and economic characteristics within the study area, as well as descriptions of community characteristics, resources, and services. These characteristics include topics such as population growth, age, race, income, housing, employment, and vehicle availability.

The study area used for the assessment of socioeconomic resources includes the area surrounding the project that is likely to be directly or indirectly affected in any way during, throughout, and after construction of any of the project alternatives. The study area, as shown on Figure 3-16.1, is generally bounded by Greenleaf Road to the south(south of the Union Heights neighborhood), Rivers Avenue to the west (south of McMillan Avenue), Spruill Avenue to the west (north of McMillan Avenue), Buist Avenue to the north, and Hobson Avenue to the east.

U.S. Census data is used to evaluate the social and economic characteristics of the study area. Census data was collected for 16 block groups from the 2010 Census that encompass the study area. These block groups are listed in Table 3.16-1 and shown on Figure 3.16-1. Due to the fact that the study area boundary does not follow Census boundaries, the Census block groups cover a slightly larger area than the study area. This allows for a more complete understanding of socioeconomic conditions in the study area. In addition, Census block groups including the Park Circle and Olde North Charleston neighborhoods were included since these neighborhoods have been active in the public involvement process. For comparison purposes, Census data was also collected for the cities of Charleston and North Charleston, Charleston County and the state of South Carolina.

Additional information on socioeconomics and Environmental Justice is provided in the *Community Impact Assessment* (Atkins 2015, included as Appendix K).

3.16.2 Social Characteristics

Demographic information was obtained from the most current data available, which includes the 2010 U.S. Census, American Community Survey (ACS) 5-Year Estimates (2009–2013), and other state and local sources. Demographic data for Census block groups that include the study area were compared to demographic data for the cities of Charleston and North Charleston, Charleston County, and South Carolina to identify notable population groups and trends.

NAVY BASE ICTF EIS

Socioeconomics and Environmental Justice Study Area and Notable Populations
Figure 3.16-1

US Army Corps Of Engineers Charleston District

POC_ADEIS2_EIS_Census_Pack.mxd JNL 04.04.2016

Table 3.16-1
Study Area Census Tracts, Block Groups and Associated Neighborhoods

2010 Census Geography		North Charleston Neighborhoods
Census Tract	Block Group	
35	1	Park Circle, Oak Park, Palmetto Gardens, Cameron Terrace
	2	
36	1	Liberty Hill, Olde North Charleston, Mixson Avenue
	2	
	3	
37	1	Whipper Barony, Hunley Waters, St. Charles Place Apartments
	2	
	3	
*43	1	Chicora Place, Cherokee Place, Nafair
	2	
	3	
	4	
*55	1	
	2	
54	1	Windsor, Union Heights
	2	

Source: U.S. Census Bureau, 2010

*These census tracts include areas with the greatest potential for direct impacts as a result of project alternatives.

This section provides a description of demographic trends in the study area and identifies notable population groups. Topics discussed include population trends, age distribution, racial composition, Limited English Proficiency, educational attainment, housing trends, age of housing, median house values, home ownership and vehicle availability.

2010 Census vs. American Community Survey

The U.S. Census is conducted once every 10 years to provide an official count of the entire U.S. population and report basic characteristics (e.g., sex, age, race, origin, and homeowner status).

The American Community Survey (ACS) is conducted every year to provide up-to-date information about social and economic characteristics (e.g., age, sex, race, income, education, and commuting information). About 1 in 38 households per year receives an invitation to participate in the ACS. ACS data is available in one-year, three-year, or five-year estimates. Five-year estimates are best for analyzing small populations when precision and reliability are important.

3.16.2.1 Population Trends

From 2000 to 2010, the overall population of the study area decreased from 16,248 to 13,236, or 18.5 percent (average annualized decrease of 2 percent). The population loss in the study area is in stark contrast to the population increases for the City of North Charleston (22.4 percent) and Charleston County (13 percent) over the same period, as shown in Table 3.16-2. In general, the population loss is attributed to closure of the CNC in 1996, clearing of land to make way for redevelopment projects, and the instability of the study area amid speculation about how the area would be redeveloped.

Table 3.16-2
Population Trends 2000–2010

2010 Census Geography[1]		2000	2010	Difference	Percent Change 2000 to 2010	
Census Tract	Block Group				Overall	Annualized
35	1	1,142	1,103	-39	-3.4%	-0.3%
	2	1,276	1,160	-116	-9.1%	-0.9%
36	1	671	621	-50	-7.5%	-0.8%
	2	1,205	1,149	-56	-4.6%	-0.5%
	3	919	463	-456	-49.6%	-6.6%
37	1	1,128	1,106	-22	-2.0%	-0.2%
	2	2,539	1,903	-636	-25.0%	-2.8%
	3	420	374	-46	-11.0%	-1.2%
43	1	485	439	-46	-9.5%	-1.0%
	2	667	555	-112	-16.8%	-1.8%
	3	972	721	-251	-25.8%	-2.9%
	4	1,070	827	-243	-22.7%	-2.5%
54	1	861	709	-152	-17.7%	-1.9%
	2	840	862	22	2.6%	0.3%
55	1	1,251	538	-713	-57.0%	-8.1%
	2	802	706	-96	-12.0%	-1.3%
Study Area		**16,248**	**13,236**	**-3,012**	**-18.5%**	**-2.0%**
North Charleston		79,641	97,471	17,830	22.4%	2.0%
Charleston		96,650	120,083	23,433	24.2%	2.2%
Charleston County		309,969	350,209	40,240	13.0%	1.2%
South Carolina		4,012,012	4,625,364	613,352	15.3%	1.4%

Source: U.S. Census Bureau, Census 2010 and Census 2000, Summary File 1 100% Data, Table P1 and P001, "Total Population"
1. Several block groups changed boundaries, changed numbers, or were merged between Census 2000 and 2010.
Note: CT = Census Tract, BG = Block Group. Shaded cells indicate block groups with notable population loss of 25 percent or greater.

3.16.2.2 Age Distribution

Overall, the percentages of the study area population in all age groups are similar to those of the City of North Charleston and the county; however, two block groups in the study area have notably higher percentages of persons under the age of 18 compared to Charleston County, and one block group has a notably higher percentage of persons aged 65 and over. More than 55 percent of the population of Census Tract 54, Block Group 2, in the southern end of the study area is under the age of 18. Further investigation identified a large affordable housing complex, the Bridgeview Village Apartments, located in this block group, but well south of the study area at 108 North Romney Street in Charleston.

The second concentration of children (37.9 percent) is located in Census Tract 37, Block Group 2, in the northwestern portion of the study area, north of McMillan Avenue and west of Spruill Avenue. Further investigation identified a large apartment complex, St. Charles Place, located at 1920 McMillan Avenue that was previously owned by the North Charleston Housing Authority and provided low-income housing. This complex consists of approximately 464 apartments and is located just outside the study area.

There is higher concentration of persons age 65 and older in Census Tract 35, Block Group 2, located in the northwestern corner of study area, which includes a portion of the Park Circle neighborhood.

The age distributions of the population of the study area and each block group, as well as the cities of North Charleston and Charleston, Charleston County, and South Carolina are shown in Table 3.16-3.

3.16.2.3 Racial Composition

The racial compositions of the study area, the cities of Charleston and North Charleston, Charleston County, and South Carolina are shown in Table 3.16-4. The study area has a notably higher percentage of Black or African American residents (67.1 percent) in comparison to the City of North Charleston (47.2 percent), the City of Charleston (25.4 percent), and Charleston County (29.8 percent).

The percentage of Black or African American residents in 11 of the 16 block groups encompassing the study area exceeds 50 percent of the total population, with percentages ranging from 68 to 97 percent. These include all the block groups in the central and southern portion of the study area.

Data also were obtained from the 2010 Census to identify populations of Hispanic or Latino origin, as summarized in Table 3.16-5. The U.S. Census recognizes Hispanic or Latino as an ethnic category that can include persons of any race. As a result, the Hispanic or Latino population is discussed exclusive of race. The Hispanic percentage of the study area population (4 percent) is similar to the county (5.4 percent), but less than the City of North Charleston (10.9 percent).

Table 3.16-3
Age Distribution

2010 Census Geography		Total Population	Under 18		18 to 64		65 and Over	
Census Tract	Block Group		#	%	#	%	#	%
35	1	1,103	192	17.4%	757	68.6%	154	14.0%
	2	1,160	161	13.9%	726	62.6%	273	23.5%
36	1	621	123	19.8%	459	73.9%	39	6.3%
	2	1,149	226	19.7%	784	68.2%	139	12.1%
	3	463	71	15.3%	329	71.1%	63	13.6%
37	1	1,106	224	20.3%	758	68.5%	124	11.2%
	2	1,903	722	37.9%	1,109	58.3%	72	3.8%
	3	374	91	24.3%	261	69.8%	22	5.9%
43	1	439	128	29.2%	280	63.8%	31	7.1%
	2	555	144	25.9%	380	68.5%	31	5.6%
	3	721	167	23.2%	467	64.8%	87	12.1%
	4	827	177	21.4%	534	64.6%	116	14.0%
54	1	709	155	21.9%	438	61.8%	116	16.4%
	2	862	478	55.5%	366	42.5%	18	2.1%
55	1	538	104	19.3%	388	72.1%	46	8.6%
	2	706	141	20.0%	515	72.9%	50	7.1%
Study Area		**13,236**	**3,304**	**25.0%**	**8,551**	**64.6%**	**1,381**	**10.4%**
North Charleston		97,471	24,831	25.5%	64,428	66.1%	8,212	8.4%
Charleston		120,083	21,651	18.0%	83,732	69.7%	14,700	12.2%
Charleston County		350,209	72,658	20.7%	232,830	66.5%	44,721	12.8%
South Carolina		4,625,364	1,080,474	23.4%	2,913,016	63.0%	631,874	13.7%

Source: U.S. Census Bureau, Census 2010, Summary File 1 100%, Table P12, "Sex by Age"
Note: Shaded cells identify block groups where the percentage of the population in that particular age group exceeds the county percentage by more than 10 percentage points.

Table 3.16-4
Racial Composition

2010 Census Geography		Total Population	White		Black or African American		American Indian and Alaska Native		Asian		Native Hawaiian and Other Pacific Islander		Other		Two or More Races	
Census Tract	Block Group		#	%	#	%	#	%	#	%	#	%	#	%	#	%
35	1	1,103	806	73.1%	239	21.7%	11	1.0%	5	0.5%	0	0.0%	33	3.0%	9	0.8%
	2	1,160	966	83.3%	163	14.1%	1	0.1%	4	0.3%	0	0.0%	13	1.1%	13	1.1%
36	1	621	296	47.7%	277	44.6%	3	0.5%	9	1.4%	0	0.0%	21	3.4%	15	2.4%
	2	1,149	541	47.1%	530	46.1%	13	1.1%	9	0.8%	4	0.3%	12	1.0%	40	3.5%
	3	463	262	56.6%	189	40.8%	2	0.4%	1	0.2%	0	0.0%	2	0.4%	7	1.5%
37	1	1,106	266	24.1%	757	68.4%	10	0.9%	14	1.3%	0	0.0%	46	4.2%	13	1.2%
	2	1,903	154	8.1%	1629	85.6%	6	0.3%	28	1.5%	3	0.2%	38	2.0%	45	2.4%
	3	374	45	12.0%	307	82.1%	0	0.0%	8	2.1%	0	0.0%	1	0.3%	13	3.5%
43	1	439	18	4.1%	415	94.5%	1	0.2%	2	0.5%	0	0.0%	1	0.2%	2	0.5%
	2	555	24	4.3%	509	91.7%	0	0.0%	0	0.0%	0	0.0%	18	3.2%	4	0.7%
	3	721	56	7.8%	659	91.4%	1	0.1%	0	0.0%	0	0.0%	2	0.3%	3	0.4%
	4	827	82	9.9%	682	82.5%	7	0.8%	5	0.6%	0	0.0%	34	4.1%	17	2.1%
54	1	709	15	2.1%	680	95.9%	1	0.1%	1	0.1%	0	0.0%	1	0.1%	11	1.6%
	2	862	10	1.2%	840	97.4%	1	0.1%	0	0.0%	0	0.0%	0	0.0%	11	1.3%
55	1	538	98	18.2%	398	74.0%	5	0.9%	10	1.9%	1	0.2%	7	1.3%	19	3.5%
	2	706	86	12.2%	604	85.6%	3	0.4%	3	0.4%	0	0.0%	2	0.3%	8	1.1%
Study Area		**13,236**	**3,725**	**28.1%**	**8,878**	**67.1%**	**65**	**0.5%**	**99**	**0.7%**	**8**	**0.1%**	**231**	**1.7%**	**230**	**1.7%**
North Charleston		97,471	40,514	41.6%	45,964	47.2%	453	0.5%	1,897	1.9%	157	0.2%	6,067	6.2%	2,419	2.5%
Charleston		120,083	84,258	70.2%	30,491	25.4%	271	0.2%	1,971	1.6%	122	0.1%	1,205	1.0%	1,765	1.5%
Charleston County		350,209	224,910	64.2%	104,239	29.8%	1,068	0.3%	4,719	1.3%	299	0.1%	9,477	2.7%	5,497	1.6%
South Carolina		4,625,364	3,060,000	66.2%	1,290,684	27.9%	19,524	0.4%	59,051	1.3%	2,706	0.1%	113,464	2.5%	79,935	1.7%

Source: U.S. Census Bureau, Census 2010, Summary File 1 100% Data, Table P3 "Race"
NOTE: Shaded cells indicate block groups where the percentage of the population in that minority racial group exceeds 50 percent.

Table 3.16-5
Hispanic or Latino Origin

2010 Census Geography		Total Population	Hispanic		Not Hispanic	
Census Tract	Block Group		#	%	#	%
35	1	1,103	61	5.5%	1,042	94.5%
	2	1,160	37	3.2%	1,123	96.8%
36	1	621	40	6.4%	581	93.6%
	2	1,149	54	4.7%	1,095	95.3%
	3	463	5	1.1%	458	98.9%
37	1	1,106	80	7.2%	1,026	92.8%
	2	1,903	89	4.7%	1,814	95.3%
	3	374	8	2.1%	366	97.9%
43	1	439	5	1.1%	434	98.9%
	2	555	22	4.0%	533	96.0%
	3	721	15	2.1%	706	97.9%
	4	827	67	8.1%	760	91.9%
54	1	709	4	0.6%	705	99.4%
	2	862	1	0.1%	861	99.9%
55	1	538	20	3.7%	518	96.3%
	2	706	23	3.3%	683	96.7%
Study Area		**13,236**	**531**	**4.0%**	**12,705**	**96.0%**
North Charleston		97,471	10,617	10.9%	86,854	89.1%
Charleston		120,083	3,451	2.9%	116,632	97.1%
Charleston County		350,209	18,877	5.4%	331,332	94.6%
South Carolina		4,625,364	235,682	5.1%	4,389,682	94.9%

Source: U.S. Census Bureau, Census 2010, Summary File 1 100% Data, Table P4 "Hispanic or Latino Origin"
Note: Hispanic or Latino is an ethnic category and can include persons of any race; therefore, the Hispanic or Latino percentages are presented exclusive of race.

3.16.2.4 Limited English Proficiency (LEP)

Executive Order 13166, "Improving Access to Services for Persons with Limited English Proficiency," requires all recipients of Federal funds to provide meaningful access to persons who are limited in their English proficiency (LEP). The U.S. Department of Justice defines LEP individuals as those, "who do not speak English as their primary language and who have a limited ability to read, write, speak, or understand English" (67 FR 41459).

The study area does not meet the U.S. Department of Justice's Safe Harbor threshold for presence of a LEP population, as identified in guidance issued by the USDOT's *Policy Guidance Concerning Recipients' Responsibilities to Limited English Proficient Persons* (2005). This guidance defines the Safe

Harbor threshold as either 5 percent of the study area population or 1,000 persons within a particular language group who speak English less than "Very Well." If the Safe Harbor threshold is met or exceeded for a LEP group, vital written materials should be translated. Data were used from the ACS 5-Year Estimates (2009-2013) to identify adults aged 18 or older who speak English less than "Very Well" by language group. Results of the LEP analysis are shown in Table 3.16-6.

Although the Safe Harbor threshold was not met for the translation of vital documents, U.S. Census data indicate notable populations (more than 50 persons) of Spanish language speakers who speak English less than "Very Well" in two block groups, as identified by shaded cells in Table 3.16-6. Census Tract 35, Block Group 1, located directly north of the study area, includes 51 Spanish-speaking LEP adults.

Census Tract 36, Block Group 2, located just northwest of the study area, includes 69 Spanish-speaking LEP adults. Spanish language assistance will be offered for Spanish-speaking individuals within the study area during the project development process to ensure they are provided meaningful access to project information. Assistance could be in the form of oral interpretation and notices in special media. Additional information on language assistance will be outlined in Palmetto Railways community engagement and awareness plan included in Appendix B.

3.16.2.5 Educational Attainment

The educational attainment of the population of the study area is shown in Table 3.16-7. Overall, the percentage of the population of the study area without a high school diploma (26.3 percent) is slightly higher when compared to the population of the City of North Charleston (20.3 percent) and more than double when compared to Charleston County (11.7 percent). The population percentage without a high school diploma exceeds 40 percent in four block groups. These block groups include the River Place Apartments and the northern end of the study area, as well as parts of the Chicora-Cherokee neighborhood. Similarly, the percentage of people in the study area with a college degree (19.1 percent) is much lower compared to Charleston County (46.9 percent).

Table 3.16-6
Limited English Proficiency

2010 Census Geography		Total Adult Population	Primary Language Group of Persons Who Speak English Less than Very Well							
			Spanish		Other Indo-Euro		Asian/Pacific Island		Other	
Census Tract	Block Group		#	%	#	%	#	%	#	%
35	1	917	51	5.6%	0	0.0%	0	0.0%	0	0.0%
	2	866	1	0.1%	0	0.0%	19	2.2%	0	0.0%
36	1	555	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	2	1,156	69	6.0%	0	0.0%	35	3.0%	8	0.7%
	3	468	0	0.0%	0	0.0%	0	0.0%	0	0.0%
37	1	866	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	2	865	16	1.8%	5	0.6%	11	1.3%	0	0.0%
	3	301	0	0.0%	0	0.0%	0	0.0%	0	0.0%
43	1	229	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	2	445	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	3	695	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	4	664	0	0.0%	0	0.0%	0	0.0%	8	1.2%
54	1	627	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	2	260	0	0.0%	0	0.0%	0	0.0%	0	0.0%
55	1	388	17	4.4%	0	0.0%	0	0.0%	0	0.0%
	2	569	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Study Area		**9,871**	**154**	**1.6%**	**5**	**0.1%**	**65**	**0.7%**	**16**	**0.2%**
North Charleston		75,188	4,344	5.8%	226	0.3%	785	1.0%	69	0.1%
Charleston		99,979	547	0.5%	391	0.4%	494	0.5%	161	0.2%
Charleston County		284,861	6,098	2.1%	823	0.3%	1,547	0.5%	218	0.1%
South Carolina		3,600,525	83,991	2.3%	13,059	0.4%	15,848	0.4%	2,703	0.1%

Source: U.S. Census Bureau, American Community Survey 5-Year Estimates (2009-2013), Table B16004, "Age by Language Spoken at Home for the Population 5+ Years"
NOTE: Shaded cells indicate block groups with 50 or more persons in an LEP language group.

Table 3.16-7
Educational Attainment for Persons Age 25 and Older

2010 Census Geography		Population Age 25 and Older	Not a High School Graduate		High School Graduate or GED Alternative		Some College		College Graduate (Associate's Degree or Higher)	
Census Tract	Block Group		#	%	#	%	#	%	#	%
35	1	819	73	8.9%	185	22.6%	323	39.4%	238	29.1%
	2	730	43	5.9%	205	28.1%	188	25.8%	294	40.3%
36	1	437	0	0.0%	85	19.5%	225	51.5%	127	29.1%
	2	1,043	229	22.0%	324	31.1%	266	25.5%	224	21.5%
	3	397	99	24.9%	82	20.7%	26	6.5%	190	47.9%
37	1	726	213	29.3%	212	29.2%	186	25.6%	115	15.8%
	2	530	237	44.7%	127	24.0%	121	22.8%	45	8.5%
	3	262	127	48.5%	62	23.7%	28	10.7%	45	17.2%
43	1	229	112	48.9%	57	24.9%	42	18.3%	18	7.9%
	2	369	111	30.1%	207	56.1%	32	8.7%	19	5.1%
	3	588	301	51.2%	129	21.9%	114	19.4%	44	7.5%
	4	540	152	28.1%	252	46.7%	108	20.0%	28	5.2%
54	1	571	182	31.9%	266	46.6%	61	10.7%	62	10.9%
	2	210	65	31.0%	99	47.1%	21	10.0%	25	11.9%
55	1	309	96	31.1%	129	41.7%	68	22.0%	16	5.2%
	2	474	127	26.8%	146	30.8%	119	25.1%	82	17.3%
Study Area		**8,234**	**2,167**	**26.3%**	**2,567**	**31.2%**	**1,928**	**23.4%**	**1,572**	**19.1%**
North Charleston		62,236	12,647	20.3%	18,214	29.3%	14,344	23.0%	17,031	27.4%
Charleston		80,882	6,018	7.4%	14,467	17.9%	15,498	19.2%	44,899	55.5%
Charleston County		243,560	28,451	11.7%	51,872	21.3%	49,046	20.1%	114,191	46.9%
South Carolina		3,118,029	481,983	15.5%	933,232	29.9%	651,510	20.9%	1,051,304	33.7%

Source: U.S. Census Bureau, American Community Survey 5-Year Estimates (2009-2013), Table B15003 "Educational Attainment for the Population 25 Years and Over"
Note: Shaded cells identify individual block groups where the percentage of the population that did not complete high school is 25 percentage points greater than the county.

3.16.2.6 Housing Trends

In contrast to housing growth in North Charleston and Charleston County, the number of housing units in the study area decreased 13 percent between 2000 and 2010, as shown in Table 3.16-8. This is likely related to the CNC closure and clearing of land related to subsequent redevelopment initiatives in the area, such as the Noisette Project. The block group that experienced the greatest loss of housing is Census Tract 36, Block Group 3, located in the northwestern portion of the study area. The number of housing units in this block group decreased by half, from 495 to 231, between 2000 and 2010. During this time, a portion of the housing in this block group was razed for redevelopment, resulting in a loss of housing units. This area has since been redeveloped as Mixson, which includes new housing and mixed-use development.

According to local planners, the decline in population and housing in the study area has leveled off since 2010 and there has been some new housing construction, including West Yard Lofts, which provides low-income multi-family housing in the northern portion of the study area, and Hunley Waters, a new single-family housing development on O'Hear Avenue near the northern boundary of the study area.

3.16.2.7 Age of Housing

Approximately 67 percent of the existing housing in the study area was built before 1970, as shown in Table 3.16-9. This percentage is more than double the percentages in the City of North Charleston (30 percent) and Charleston County (30.5 percent). The higher percentage of older homes in the study area is expected due to development associated with the Navy Base expansion during World War II.

Only three block groups in the study area have housing units built since 2010. Census Tract 37, Block Group 3, located directly north of the study area includes new homes in the Hunley Waters community. Census Tract 55, Block Group 1, which includes a large portion of the study area, includes new housing units in the Navy Yard Lofts affordable housing complex. New housing units also have been constructed in Census Tract 55, Block Group 1, but these units are located outside the study area.

Table 3.16-8
Housing Trends, 2000–2010

2010 Census Geography[1]		2000	2010	Difference	Percent Change 2000 to 2010	
Census Tract	Block Group				Overall	Annualized
35	1	537	543	6	1.1%	0.1%
	2	595	596	1	0.2%	0.0%
36	1	369	355	-14	-3.8%	-0.4%
	2	609	588	-21	-3.4%	-0.4%
	3	495	231	-264	-53.3%	-7.3%
37	1	557	542	-15	-2.7%	-0.3%
	2	1,097	874	-223	-20.3%	-2.2%
	3	268	248	-20	-7.5%	-0.8%
43	1	256	206	-50	-19.5%	-2.1%
	2	335	309	-26	-7.8%	-0.8%
	3	416	357	-59	-14.2%	-1.5%
	4	486	414	-72	-14.8%	-1.6%
54	1	464	335	-129	-27.8%	-3.2%
	2	298	278	-20	-6.7%	-0.7%
55	1	301	257	-44	-14.6%	-1.6%
	2	310	302	-8	-2.6%	-0.3%
Study Area		**7,393**	**6,435**	**-958**	**-13.0%**	**-1.4%**
North Charleston		33,631	42,219	8,588	25.5%	2.3%
Charleston		44,563	59,522	14,959	33.6%	2.9%
Charleston County		141,031	169,984	28,953	20.5%	1.9%

Source: U.S. Census Bureau, Census 2010 and Census 2000, Summary File 1 100% Data, Table H1 and H001, "Housing Units"
1. Several block groups changed boundaries, were merged, or the geographic identity numbers were reassigned between Census 2000 and 2010.
Note: CT = Census Tract, BG = Block Group. Shaded cells indicate block groups with notable housing unit loss of 25 percent or greater.

Table 3.16-9
Year Housing Units Built

2010 Census Geography		Total Housing Units	Built 2010 or Later		Built 2000 to 2009		Built 1970 to 1999		Built 1969 or Earlier	
Census Tract	Block Group		#	%	#	%	#	%	#	%
35	1	570	0	0.0%	17	3.0%	23	4.0%	530	93.0%
	2	565	0	0.0%	17	3.0%	37	6.5%	511	90.4%
36	1	326	0	0.0%	30	9.2%	103	31.6%	193	59.2%
	2	682	0	0.0%	0	0.0%	280	41.1%	402	58.9%
	3	213	0	0.0%	0	0.0%	6	2.8%	207	97.2%
37	1	689	0	0.0%	77	11.2%	181	26.3%	431	62.6%
	2	739	0	0.0%	263	35.6%	120	16.2%	356	48.2%
	3	293	18	6.1%	60	20.5%	118	40.3%	97	33.1%
43	1	193	0	0.0%	7	3.6%	31	16.1%	155	80.3%
	2	302	0	0.0%	20	6.6%	61	20.2%	221	73.2%
	3	404	0	0.0%	29	7.2%	55	13.6%	320	79.2%
	4	485	0	0.0%	29	6.0%	167	34.4%	289	59.6%
54	1	362	0	0.0%	6	1.7%	77	21.3%	279	77.1%
	2	332	0	0.0%	54	16.3%	179	53.9%	99	29.8%
55	1	177	44	24.9%	0	0.0%	40	22.6%	93	52.5%
	2	393	20	5.1%	0	0.0%	80	20.4%	293	74.6%
Study Area		6,725	82	1.2%	609	9.1%	1,558	23.2%	4,476	66.6%
North Charleston		42,656	397	0.9%	12,340	28.9%	17,476	41.0%	12,443	29.2%
Charleston		59,283	559	0.9%	14,673	24.8%	22,386	37.8%	21,665	36.5%
Charleston County		171,625	1,220	0.7%	36,320	21.2%	81,690	47.6%	52,395	30.5%
South Carolina		2,143,464	18,086	0.8%	445,807	20.8%	1,138,412	53.1%	541,159	25.2%

Source: U.S. Census Bureau, American Community Survey, 5-Year Estimates (2009-2013), Table B25034 "Year Structure Built"

3.16.2.8 Median House Values

According to ACS 5-Year Estimates (2009–2013), median house values within the study area vary widely by block group, as shown in Table 3.16-10. There is not enough information in five of the 16 block groups to calculate a median value. House values in the northern portion of the study area, generally are higher when compared to the City of North Charleston. No block groups in the study area have house values higher than the median values for Charleston or Charleston County.

Table 3.16-10
Median House Value

2010 Census Geography		Value
Census Tract	Block Group	
35	1	$138,100
	2	$172,000
36	1	$226,700
	2	$144,700
	3	$146,300
37	1	$88,500
	2[1]	- N -
	3	$159,400
43	1[1]	- N -
	2[1]	- N -
	3	$61,300
	4	$62,900
54	1	$66,900
	2[1]	- N -
55	1[1]	- N -
	2	$212,500
Study Area		NA
North Charleston		$138,300
Charleston		$253,800
Charleston County		$236,100
South Carolina		$137,400

Source: U.S. Census Bureau, American Community Survey, 5-Year Estimates (2009-2013), Table B25077

1. There is not enough sample data in this block group to calculate a median house value.

NA = Not Available.

3.16.2.9 Home Ownership

Occupancy status of housing units in the study area is shown in Table 3.16-11. The percentage of owner-occupied housing units in the study area (30.2 percent) is lower than both the City of North Charleston and Charleston County. The percentage of renter-occupied housing units in the study area (54.8 percent) is higher than both the City of North Charleston (45.6 percent) and county (33.7 percent). Twelve of the 16 block groups encompassing the study area have a notably higher percentage of renter-occupied units when compared to the county.

Table 3.16-11
Occupancy Status of Housing Units

2010 Census Geography		Total Housing Units	Owner Occupied		Renter Occupied		Vacant	
Census Tract	Block Group		#	%	#	%	#	%
35	1	543	345	63.5%	160	29.5%	38	7.0%
	2	596	440	73.8%	107	18.0%	49	8.2%
36	1	355	88	24.8%	208	58.6%	59	16.6%
	2	588	229	38.9%	294	50.0%	65	11.1%
	3	231	128	55.4%	77	33.3%	26	11.3%
37	1	542	185	34.1%	278	51.3%	79	14.6%
	2	874	32	3.7%	702	80.3%	140	16.0%
	3	248	21	8.5%	130	52.4%	97	39.1%
43	1	206	15	7.3%	156	75.7%	35	17.0%
	2	309	27	8.7%	210	68.0%	72	23.3%
	3	357	63	17.6%	230	64.4%	64	17.9%
	4	414	125	30.2%	210	50.7%	79	19.1%
54	1	335	134	40.0%	133	39.7%	68	20.3%
	2	278	4	1.4%	269	96.8%	5	1.8%
55	1	257	36	14.0%	175	68.1%	46	17.9%
	2	302	73	24.2%	189	62.6%	40	13.2%
Study Area		**6,435**	**1,945**	**30.2%**	**3,528**	**54.8%**	**962**	**14.9%**
North Charleston		42,219	17,673	41.9%	19,242	45.6%	5,304	12.6%
Charleston		59,522	27,288	45.8%	25,053	42.1%	7,181	12.1%
Charleston County		169,984	87,068	51.2%	57,241	33.7%	25,675	15.1%

Source: U.S. Census Bureau, Census 2010, Tables H1, "Household Units," H3, "Occupancy Status" and H4, "Tenure"
Note: Shaded cells identify block groups where the percentage of renter-occupied homes is more than 10 percentage points higher than the county percentage.

3.16.2.10 Vehicle Availability

Data on vehicle availability by occupied housing units is shown in Table 3.16-12. The percentage of housing units in the study area without a vehicle (27.4 percent) is notably higher when compared to the City of North Charleston (11.3 percent) and Charleston County (8.5 percent). More than half of the occupied housing units in the Chicora-Cherokee neighborhood (Census Tract 43, Block Groups 1 to 3), located centrally in the study area, do not have a vehicle available. This indicates that many people in this neighborhood rely on transit, walking, and biking to reach their destinations.

Table 3.16-12
Vehicle Availability by Occupied Housing Units

2010 Census Geography		Total	No Vehicle Available	
Census Tract	Block Group		#	%
35	1	514	23	4.5%
	2	452	73	16.2%
36	1	241	0	0.0%
	2	671	79	11.8%
	3	186	0	0.0%
37	1	531	174	32.8%
	2	561	142	25.3%
	3	164	27	16.5%
43	1	140	68	48.6%
	2	262	150	57.3%
	3	320	123	38.4%
	4	359	154	42.9%
54	1	315	77	24.4%
	2	250	175	70.0%
55	1	142	75	52.8%
	2	359	158	44.0%
Study Area		5,467	1,498	27.4%
North Charleston		36,384	4,127	11.3%
Charleston		51,591	5,196	10.1%
Charleston County		143,717	12,242	8.5%
South Carolina		1,780,251	123,997	7.0%

Source: U.S. Census Bureau, American Community Survey 5-Year Estimates (2009-2013), Table B25044 "Tenure by Vehicles Available"
NOTE: Cells shaded in grey identify block groups where the percentage of housing units with no vehicle is 10 percentage points or more than the county percentage.

3.16.3 Economic Characteristics

The following sections summarize the economic characteristics of the study area, including median household income, population living below poverty level, unemployment, major employers, and commuting patterns.

3.16.3.1 Median Household Income

Data on median household income within the study area is shown in Table 3.16-13. The median household income for 13 of the 16 block groups encompassing the study area is lower than both the City of North Charleston and Charleston County. The block group (Census Tract 54, Block Group 2) with the lowest median household income ($6,263) is located in the southern portion of the study area, and includes the Bridgeview Village low-income apartment complex. The block group (Census Tract 36, Block Group 3) with the highest median household income ($70,500) is located in the northern portion of the study area, in the Park Circle neighborhood, and includes the new Mixson mixed-use development. Table 3.16-14 shows the household income for the study area in comparison to the City of North Charleston, the City of Charleston, Charleston County, and South Carolina.

3.16.3.2 Unemployment

The annual average unemployment rates for the Charleston-North Charleston-Summerville Metropolitan Statistical Area (MSA), Charleston County, and the state of South Carolina over the last decade are shown in Table 3.16-15. In each year, the unemployment rates for the MSA and Charleston County are slightly lower than for the state as a whole. The impact of the recent recession on unemployment rates is evident in the large increase in unemployment rates after 2008. For example, unemployment rates in Charleston County increased from 5.3 percent in 2008 to 8.9 percent in 2009. In October 2014 (the most current data available from the Bureau of Labor Statistics), Charleston County had an average unemployment rate was 5.3 percent.

3.16.3.3 Major Employers

The 15 largest employers in the Charleston County MSA as of February 2013 are shown in Table 3.16-16. The top employer, U.S. Air Force Joint Base Charleston, is located approximately six miles northwest of the study area. The Charleston County School District is the only employer listed that has locations that provide work opportunities within the study area.

Table 3.16-13
Median Household Income in the Past 12 Months

2010 Census Geography		Income in the past 12 months[1] (in 2013 inflation adjusted dollars)
Census Tract	Block Group	
35	1	$44,861
	2	$35,526
36	1	$46,953
	2	$25,368
	3	$70,500
37	1	$18,064
	2	$16,454
	3	$38,625
43	1	$12,031
	2	$18,393
	3	$17,143
	4	$19,550
54	1	$21,139
	2	$6,263
55	1	$15,147
	2	$11,875
Study Area		NA
North Charleston		$39,322
Charleston		$51,737
Charleston County		$50,792
South Carolina		$44,779

Source: U.S. Census Bureau, American Community Survey, 5-Year Estimates (2009-2013), Table B19013

1. The data is actually an estimate based on the data collected from the annual surveys over that 5-year period, not a specific 12-month period.

NA = Not Available

Table 3.16-14
Household Income in the Past 12 Months

2010 Census Geography		Total Households	Number of Households by Household Income in the Past 12 Months							
Census Tract	Block Group		Less than $24,999	$25,000 to $49,999	$50,000 to $74,999	$75,000 to $99,999	$100,000 to $124,999	$125,000 to $149,999	$150,000 to $199,999	$200,000 or More
35	1	514	130	168	78	68	54	16	0	0
	2	452	137	133	62	44	52	8	9	7
36	1	241	69	55	76	0	3	0	30	8
	2	671	333	166	91	19	45	9	8	0
	3	186	45	18	54	20	8	6	35	0
37	1	531	384	84	27	0	0	25	11	0
	2	561	433	100	15	13	0	0	0	0
	3	164	51	62	23	0	6	18	4	0
43	1	140	97	8	35	0	0	0	0	0
	2	262	172	71	19	0	0	0	0	0
	3	320	229	66	0	25	0	0	0	0
	4	359	195	79	48	37	0	0	0	0
54	1	315	183	85	32	6	5	0	4	0
	2	250	218	19	13	0	0	0	0	0
55	1	142	110	20	12	0	0	0	0	0
	2	359	265	32	52	7	0	3	0	0
Study Area		**5,467**	**3,051**	**1,166**	**637**	**239**	**173**	**85**	**101**	**15**
North Charleston		36,384	11,886	10,019	6,950	3,490	2,247	676	710	406
Charleston		51,591	13,356	11,714	8,418	6,358	3,885	2,389	2,418	3,053
Charleston County		143,717	37,091	33,794	25,119	16,131	10,944	6,282	7,045	7,311
South Carolina		1,780,251	504,119	470,017	321,440	198,097	119,668	64,173	56,280	46,457

Source: U.S. Census, American Community Survey 5-Year Estimates (2009-2013), Table B19001.

Table 3.16-15
Annual Unemployment Rate, 2004–2013 (%)

Year	Charleston-North Charleston-Summerville Metropolitan Statistical Area	Charleston County	South Carolina
2004	NA	5.4	6.9
2005	NA	5.5	6.8
2006	NA	5.0	6.4
2007	NA	4.3	5.6
2008	NA	5.3	6.8
2009	9.5	8.9	11.4
2010	9.2	9.1	11.1
2011	8.5	8.3	10.3
2012	7.4	7.2	9.0
2013	6.3	6.0	7.6

Sources: Bureau of Labor Statistics, SC Department of Employment and Workforce
NA = Not Available

Table 3.16-16
Largest Public and Private Sector Employers, Charleston S.C. MSA

Rank	Company	Sector	Product or Service	Employees
1	Joint Base Charleston	Public	Area U.S. military commands	22,000
2	Medical University of South Carolina (MUSC)	Public	Hospital, post-secondary education, research	13,000
3	Boeing South Carolina	Private	Aircraft manufacturing	6,000
4	Charleston County School District	Public	Education/public schools	5,300
5	Roper St. Francis Healthcare	Private	Roper and Bon Secours St Francis Hospitals	5,100
6	Berkeley County School District	Public	Education/public schools	3,700
7	Dorchester County School District II	Public	Education/public schools	3,100
8	JEM Restaurant Group Inc.	Private	Taco Bell and Pizza Hut Franchises in the MSA	3,000
9	Trident Health System	Private	Hospital system	2,500
10	Walmart Inc.	Private	Retail merchandise	2,300
11	Robert Bosch LLC	Private	Antilock brake systems, fuel injectors, common rail & unit injectors	2,200
12	Charleston County	Public	Local government	2,100
13	College Of Charleston	Public	Post secondary education	2,000
14	Piggly Wiggly Carolina Co. Inc.	Private	Grocery wholesaler/retailer headquarters, distribution center	1,800
15	SAIC	Private	System engineering and integration services	1,800

Source: Center for Business Research, Charleston Metro Chamber of Commerce, 2/2013

3.16.3.4 Commuting

Based on travel time to work data from the ACS 5-Year Estimates (2009-2013), travel times to work for residents living in the study area generally are less than travel times for Charleston County as a whole. This is consistent with the urban nature of the study area and the location of many large employers and employment centers within 10 miles north and south of the overall study area. Approximately 53 percent of study area residents reported traveling less than 20 minutes to work, whereas only 45 percent of Charleston County residents reported traveling less than 20 minutes to work. Table 3.16-17 presents travel time to work for all block groups encompassing the study area.

Table 3.16-18 summarizes the transportation mode reported in the ACS 5-Year Estimates (2009–2013) for commuters living in the study area and Charleston County. The percentage of commuters in the study area who use public transportation (9.7 percent) is four times the percentage for Charleston County as a whole (2.1 percent). The percentage of public transportation users is highest in Census Tract 43, Block Group 2, which is located in the Chicora-Cherokee neighborhood, at 49.5 percent. Three other block groups in the study area also have notably high percentages of public transportation users. Block groups with a high percentage of public transportation users generally correlate to block groups with no vehicle available (see Table 3.16-12).

Six block groups in the study area, mostly in the northern portion, have a notably high number of carpoolers. The highest percentage of people who walk to work (21.7 percent) is in Census Tract 37, Block Group 3, in the north central study area along St. Johns Avenue. The highest percentage of people using taxicab, motorcycle, bicycle, or other means is located in Census Tract 54, Block Group 1, which includes the Union Heights neighborhood.

Table 3.16-17
Travel Time to Work

2010 Census Geography		Total	Less Than 10 Minutes		10 to 19 Minutes		20 to 29 Minutes		30 to 59 Minutes		60 or Minutes	
Census Tract	Block Group		#	%	#	%	#	%	#	%	#	%
35	1	497	28	5.6%	266	53.5%	93	18.7%	110	22.1%	0	0.0%
	2	491	51	10.4%	340	69.2%	47	9.6%	42	8.6%	11	2.2%
36	1	351	75	21.4%	115	32.8%	101	28.8%	60	17.1%	0	0.0%
	2	562	71	12.6%	281	50.0%	109	19.4%	101	18.0%	0	0.0%
	3	409	83	20.3%	150	36.7%	115	28.1%	55	13.4%	6	1.5%
37	1	423	25	5.9%	141	33.3%	188	44.4%	63	14.9%	6	1.4%
	2	512	16	3.1%	317	61.9%	120	23.4%	59	11.5%	0	0.0%
	3	139	40	28.8%	49	35.3%	9	6.5%	21	15.1%	20	14.4%
43	1	114	16	14.0%	29	25.4%	26	22.8%	43	37.7%	0	0.0%
	2	200	22	11.0%	50	25.0%	55	27.5%	55	27.5%	18	9.0%
	3	234	15	6.4%	9	3.8%	68	29.1%	85	36.3%	57	24.4%
	4	328	0	0.0%	116	35.4%	124	37.8%	80	24.4%	8	2.4%
54	1	229	59	25.8%	61	26.6%	38	16.6%	63	27.5%	8	3.5%
	2	191	0	0.0%	89	46.6%	37	19.4%	57	29.8%	8	4.2%
55	1	150	27	18.0%	46	30.7%	45	30.0%	16	10.7%	16	10.7%
	2	220	15	6.8%	84	38.2%	76	34.5%	35	15.9%	10	4.5%
Study Area		**5,050**	**543**	**10.8%**	**2,143**	**42.4%**	**1,251**	**24.8%**	**945**	**18.7%**	**168**	**3.3%**
North Charleston		44,837	4,755	10.6%	15,662	34.9%	12,352	27.5%	10,421	23.2%	1,647	3.7%
Charleston		59,752	8,275	13.8%	21,440	35.9%	16,290	27.3%	11,481	19.2%	2,266	3.8%
Charleston County		164,366	19,019	11.6%	54,734	33.3%	44,544	27.1%	39,980	24.3%	6,089	3.7%
South Carolina		1,922,427	254,775	13.3%	621,020	32.3%	440,955	22.9%	504,463	26.2%	101,214	5.3%

Source: U.S. Census Bureau, American Community Survey 5-Year Estimates (2009-2013), Table B08303 "Travel Time to Work"

Table 3.16-18
Means of Transportation to Work

2010 Census Geography		Total	Drove Alone		Carpooled		Public transportation (excluding taxicab):		Taxicab, Motorcycle, Bicycle or Other Means		Walked		Work At Home	
Census Tract	Block Group		#	%	#	%	#	%	#	%	#	%	#	%
35	1	548	448	81.8%	21	3.8%	0	0.0%	10	1.8%	18	3.3%	51	9.3%
	2	492	344	69.9%	107	21.7%	10	2.0%	30	6.1%	0	0.0%	1	0.2%
36	1	361	334	92.5%	17	4.7%	0	0.0%	0	0.0%	0	0.0%	10	2.8%
	2	562	464	82.6%	44	7.8%	9	1.6%	45	8.0%	0	0.0%	0	0.0%
	3	422	339	80.3%	14	3.3%	30	7.1%	26	6.2%	0	0.0%	13	3.1%
37	1	437	212	48.5%	132	30.2%	50	11.4%	0	0.0%	29	6.6%	14	3.2%
	2	512	305	59.6%	129	25.2%	47	9.2%	15	2.9%	16	3.1%	0	0.0%
	3	158	74	46.8%	33	20.9%	32	20.3%	0	0.0%	0	0.0%	19	12.0%
43	1	114	81	71.1%	25	21.9%	0	0.0%	0	0.0%	8	7.0%	0	0.0%
	2	200	79	39.5%	10	5.0%	99	49.5%	0	0.0%	12	6.0%	0	0.0%
	3	234	173	73.9%	0	0.0%	52	22.2%	0	0.0%	9	3.8%	0	0.0%
	4	338	157	46.4%	84	24.9%	79	23.4%	0	0.0%	8	2.4%	10	3.0%
54	1	250	150	60.0%	54	21.6%	0	0.0%	25	10.0%	0	0.0%	21	8.4%
	2	191	89	46.6%	36	18.8%	32	16.8%	18	9.4%	16	8.4%	0	0.0%
55	1	167	63	37.7%	36	21.6%	25	15.0%	0	0.0%	26	15.6%	17	10.2%
	2	226	149	65.9%	26	11.5%	38	16.8%	0	0.0%	7	3.1%	6	2.7%
Study Area		5,212	3,461	66.4%	768	14.7%	503	9.7%	169	3.2%	149	2.9%	162	3.1%
North Charleston		45,841	34,911	76.2%	6,588	14.4%	1,512	3.3%	994	2.2%	832	1.8%	1,004	2.2%
Charleston		62,471	48,008	76.8%	4,297	6.9%	1,769	2.8%	2,428	3.9%	3,250	5.2%	2,719	4.4%
Charleston County		172,101	135,991	79.0%	15,434	9.0%	3,592	2.1%	4,167	2.4%	5,182	3.0%	7,735	4.5%
South Carolina		1,994,198	1,649,097	82.7%	188,896	9.5%	11,605	0.6%	31,359	1.6%	41,470	2.1%	71,771	3.6%

Source: U.S. Census Bureau, American Community Survey 5-Year Estimates (2009-2013), Table B08301 "Means of Transportation to Work"
Note: Shaded cells identify block groups where the percentage of persons using a particular mode of transportation is 10 percentage points or more than the county percentage.

3.16.4 Community Characteristics

A number of neighborhoods and community resources contribute to community cohesion and the character of the study area. This section includes general descriptions of the neighborhoods and community resources in the study area.

Neighborhoods within the study area, based on boundaries developed by the City of North Charleston, are shown on Figure 3.16-2. To describe general social and economic characteristics, the neighborhoods in the study area are grouped by census tract and block group, as shown in Table 3.16-1. General descriptions of neighborhoods within each census tract are provided below based on information from Census and economic data, site visits, discussions with local planners, public involvement activities, and local planning documents. Please see Chapter 9, for more information on how public involvement activities were tailored for community outreach to these neighborhoods.

3.16.4.1 Park Circle, Palmetto Gardens, Cameron Terrace, and Oak Park

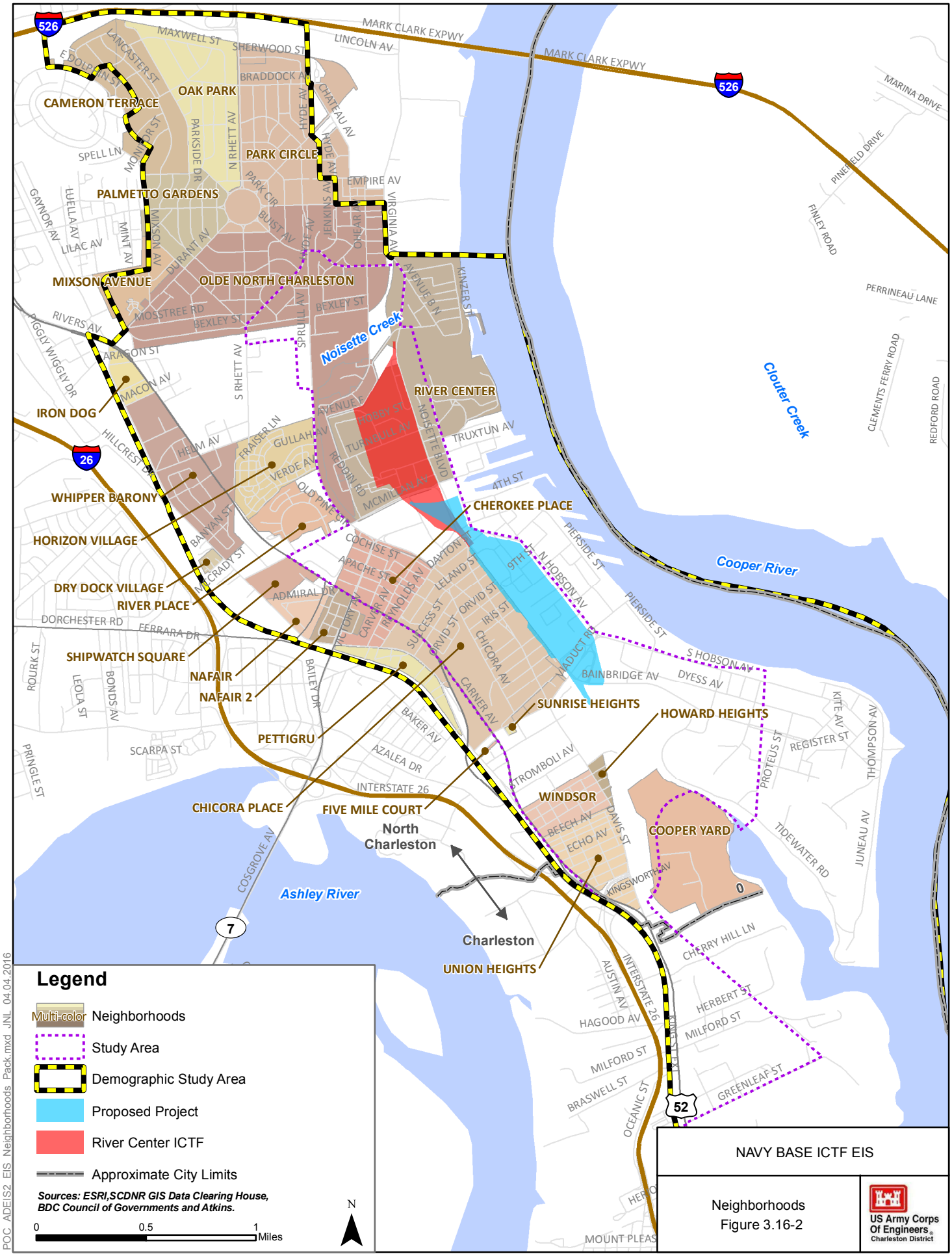
These neighborhoods are located in Census Tract 35 in the northern study area. Park Circle and Palmetto Gardens were developed during the housing boom of the World War II era in the 1940s and 1950s. Cameron Terrace/Oak Park is located just south of I-526 and was developed in the 1950s and 1960s. The population of these neighborhoods is predominantly white, with median household incomes similar to the City of North Charleston as a whole. These neighborhoods also have the highest percentage of owner-occupied housing in the study area and the lowest percentage of vacant housing units.

Community cohesion for this area is centered on the Park Circle community feature, which includes a playground, baseball fields, and the Felix C. Davis Community Center, and the commercial/retail corridor along Montague Avenue.

3.16.4.2 Liberty Hill, Olde North Charleston, and Mixson

These neighborhoods are located in Census Tract 36 on the south side of Park Circle and just north of the study area. Liberty Hill dates back to the 1870s, and is one of the earliest home ownership developments created for freed slaves. Olde North Charleston generally includes the southeastern quadrant of Park Circle from Durant Avenue to East Montague Avenue and was part of the original plan developed for the Park Circle area in the early twentieth century. Mixson was recently redeveloped as a mixed-use community.

The population of these neighborhoods is generally half white and half African American, with median household incomes that are slightly below the average for the City of North Charleston. This census tract has a higher percentage of renter-occupied housing than owner-occupied housing. The Park Circle community feature is also a source of community identity for these neighborhoods and they have expressed concern about additional rail traffic through their neighborhoods.


CAMERON TERRACE
OAK PARK
PARK CIRCLE
PALMETTO GARDENS
MIXSON AVENUE
OLDE NORTH CHARLESTON
RIVER CENTER
IRON DOG
WHIPPER BARONY
HORIZON VILLAGE
DRY DOCK VILLAGE
RIVER PLACE
SHIPWATCH SQUARE
NAFAIR
NAFAIR 2
PETTIGRU
CHICORA PLACE
FIVE MILE COURT
CHEROKEE PLACE
SUNRISE HEIGHTS
HOWARD HEIGHTS
WINDSOR
COOPER YARD
UNION HEIGHTS
North Charleston
Charleston
Noisette Creek
Ashley River
Cooper River
Clouter Creek
MARK CLARK EXPWY
INTERSTATE 26
Legend
Multi-color Neighborhoods
Study Area
Demographic Study Area
Proposed Project
River Center ICTF
Approximate City Limits
Sources: ESRI,SCDNR GIS Data Clearing House, BDC Council of Governments and Atkins.
0 0.5 1 Miles
N
NAVY BASE ICTF EIS
Neighborhoods
Figure 3.16-2
US Army Corps Of Engineers
Charleston District
POC ADEIS2 EIS Neighborhoods Pack.mxd JNL 04.04.2016

3.16.4.3 Whipper Barony, Hunley Waters, and St. Charles Place Apartments

These neighborhoods are located in Census Tract 37 and include the northwest portion of the study area. Whipper Barony was developed to meet the local housing shortage in the years just before World War II. Hunley Waters is a new gated community with 36 single-family homes. St. Charles Place Apartments, built in 1941, includes 464 apartment units on 41 acres on the north side of McMillan Avenue, and at one time was owned by the North Charleston Housing Authority. The population of these neighborhoods is more than 60 percent Black or African American and has median annual household incomes that range from $18,700 to $35,400. More than half of the housing in these neighborhoods is renter occupied.

3.16.4.4 Chicora Place, Cherokee Place, Nafair

These neighborhoods are located in the central study area and immediately to the west of the project site. Chicora Place and Cherokee Place are locally referred to as the Chicora-Cherokee Neighborhood.

The population of these neighborhoods is more than 80 percent Black or African American, with median annual household incomes of less than $19,000. Approximately three-quarters of the households in these areas are low-income and the majority of housing is renter occupied. There is a heavy reliance on transit, walking, and biking in these neighborhoods since approximately half of the households do not have a vehicle available. These neighborhoods have an active neighborhood council and a strong community identity. Community cohesion is centered around the Gussie Green Community Center and the Chicora Place Community Garden and adjacent playground, which host numerous neighborhood events and meetings. Sterett Hall, which provides important arts and recreational opportunities as well as meeting and performance space, is also a source of community cohesion for this neighborhood.

Chicora-Cherokee Neighborhood Sign.

3.16.4.5 Windsor and Union Heights

These neighborhoods are located in Census Tract 54 in the southern portion of the study area. Residences in these neighborhoods are concentrated between Meeting Street/Carner Avenue and Spruill Avenue, with Windsor located directly to the north of Union Heights. The population of these neighborhoods is more than 95 percent Black or African American, with annual median household

incomes of less than $19,000. More than 40 percent of the occupied housing units are renter occupied, and more than 32 percent of the occupied housing units do not have a vehicle. Community cohesion in this area is centered on the Gethsemani Community Center. A mosque is also located in the Union Heights neighborhood.

What is Section 6(f)?

The Land and Water Conservation Fund (LWCF) Act of 1965 (Public Law 88-578. 78 Stat 897) was enacted "… to assist in preserving, developing, and assuring to all citizens of the United States of present and future generations such quality and quantity of outdoor recreation resources as may be available and are necessary and desirable for individual active participation."

Section 6(f) of the LWCF Act ensures that if an area or property has been funded with LWCF money, it must be continually maintained as a public recreation use unless the Department of the Interior's National Park Service approves of replacement lands of equal value, location, and usefulness.

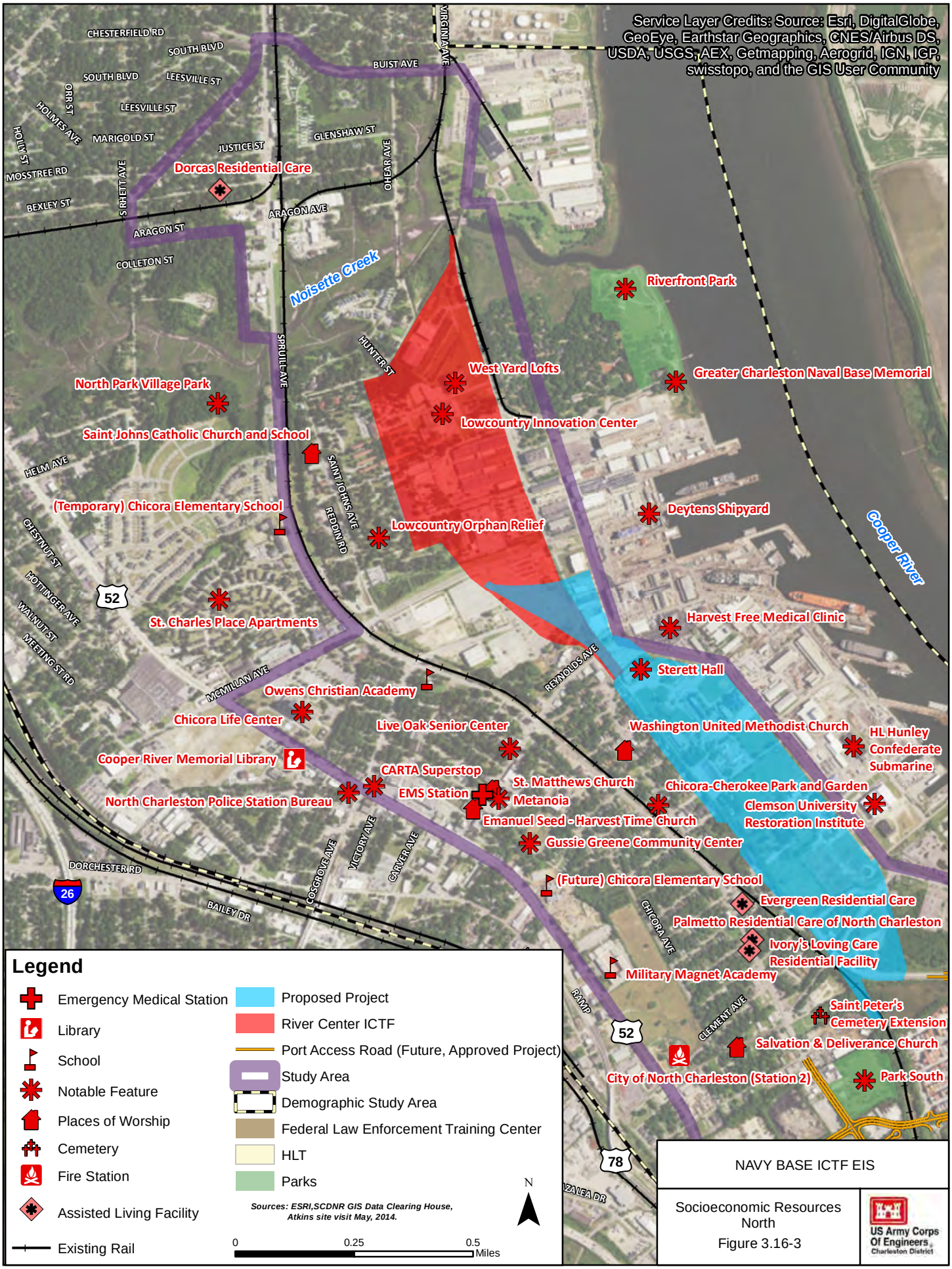
3.16.5 Community Resources

Community resources and services in the study area are described in the following sections. Community resources include facilities such as parks, recreation and community centers, health care facilities, schools, libraries, and post offices. Public services include police and law enforcement, fire protection, and emergency response. Multiple community facilities are located throughout the study area and are shown on Figures 3.16-3 and 3.16-4. Brief descriptions are provided for each resource.

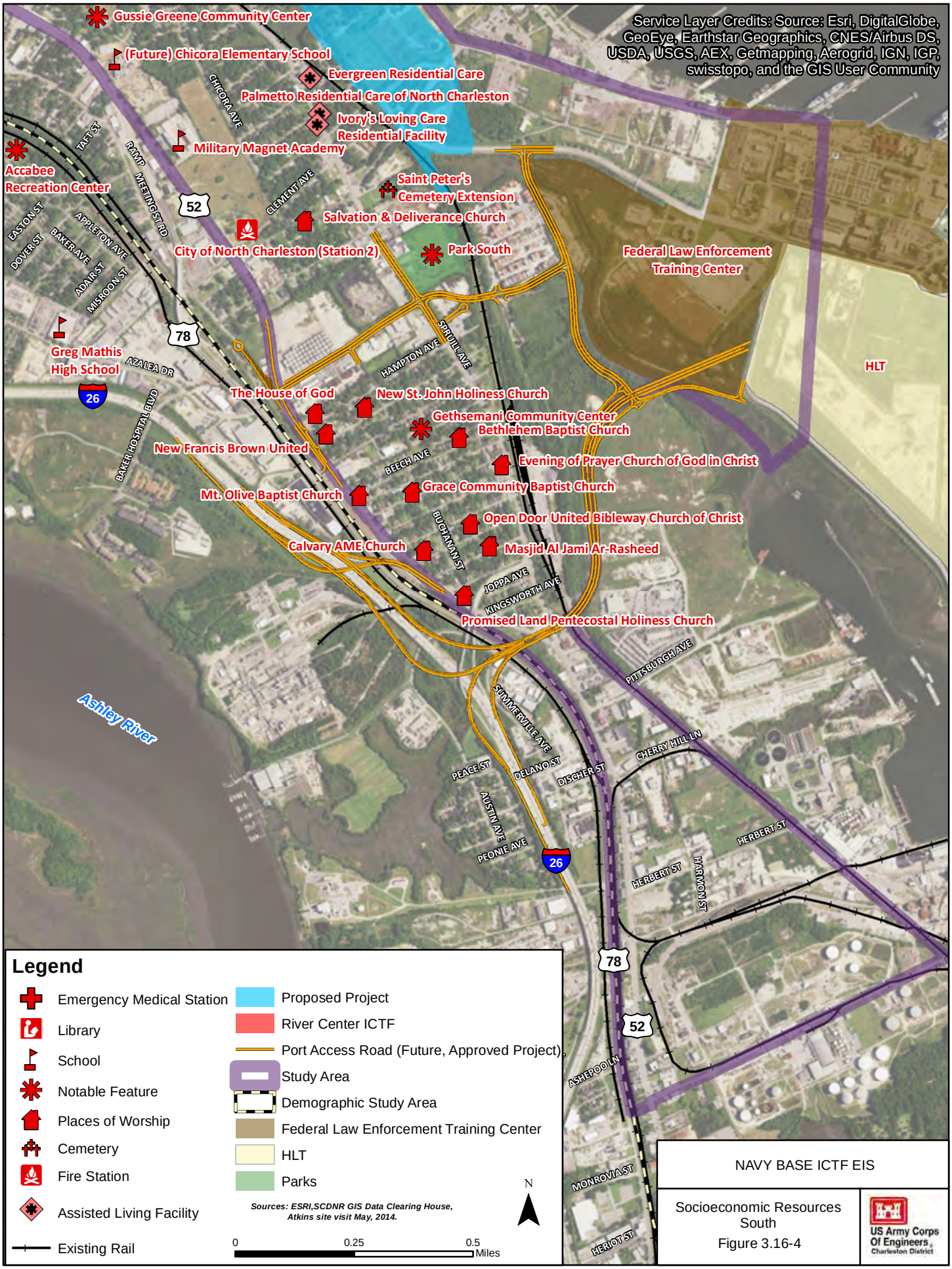
3.16.5.1 Parks

Two parks are located in the study area. These are:

- Park South—Located near the southern end of the study area on Spruill Avenue, this 11-acre park includes a playground, basketball court, green space, park benches, and picnic tables. This park received funding in 1982 through the U.S. Department of the Interior and National Park Service's Land and Water Conservation Fund and is, therefore, a Section 6(f) resource (NPS 2014). Per the Settlement Agreement between the City of North Charleston and South Carolina Public Railways (now Palmetto Railways), the City of North Charleston will transfer this property to Palmetto Railways if it desires to accept title to the property.
- Chicora-Cherokee Community Park—This community park includes a 2,300-square-foot playground and is located at 3107 North Carolina Avenue. The park is adjacent to a community garden and hosts community events such as movie night and community gardening days.



POC_ADEIS_EIS_SocioeconomicResources_A_Pack.mxd JNL 04.04.2016



POC_ADEIS_EIS_SocioeconomicResources_A_Pack.mxd JNL 04.04.2016

Two additional parks are located adjacent to the northern portion of the study area and provide recreational opportunities to residents. These parks are:

- Riverfront Park—Located just outside of the study area to the east, this park is set on the banks of the Cooper River. The only access to this park is through the study area via McMillan Avenue to North Hobson Avenue from the west and south, and via Noisette Boulevard from the north. The park is adjacent to historic homes that once served as officer housing for the Charleston Naval Base. The northern border of the park is Noisette Creek. Amenities within the 24-acre park include a boardwalk, a contemporary performance pavilion, art sculptures, crabbing dock, fenced dog park, fishing pier, fountain, green space, park benches, picnic pavilion, picnic tables, playground, and restrooms. The Greater Charleston Naval Base Memorial also is located in the park. Several large-scale City events are held here throughout the year, including the 4th of July celebration, concerts, and arts festivals.
- North Park Village Park—Located on the south bank of Noisette Creek, west of Spruill Avenue, this 12-acre park includes a playground and passive recreation.

3.16.5.2 Recreation and Community Centers

Recreation and community centers are an important source of community cohesion in the study area. One recreation center and three community centers are located in or near the study area. These include:

- Sterett Hall—Located near the center of the study area, Sterett Hall serves as both a community center and a recreation center. Recreational amenities include an indoor basketball court; a fitness facility with free weights, machines, and cardio equipment; and saunas. Several recreational sports leagues use the facility. The City of North Charleston's Cultural Arts Department manages rental space at Sterett Hall. Facilities available within Sterett Hall include a 960-seat theater-style auditorium, a reception hall, studios, rehearsal space, office space, and meeting rooms. According to area residents, the facility is very well used and is an important resource to the community. In addition, a building behind Sterett Hall is used by cultural and community groups on an ongoing basis for rehearsal and meeting space.

Sterett Hall Recreation Center

- Live Oak Senior Center—Located at 1920 Reynolds Avenue in the central portion of the study area, this small senior center offers activities such as sewing.
- Gussie Greene Community Center—This community center is located at 2012 Success Street, near the former Chicora Elementary School building in the Chicora-Cherokee neighborhood. It hosts community meetings and youth programs, and includes the Gussie Green Technology Center, which is a computer lab created through cooperation between the City of North Charleston, LAMC, and Clemson University. A community rain garden, developed through collaboration between the City of North Charleston and USEPA, is also located at the community center.
- Gethsemani Community Center—Located to the south of the study area at 2449 Beacon Street, this community center serves the Union Heights neighborhood. Amenities include a 2.5-acre public park with a playground, basketball court, and picnic shelter.

3.16.5.3 Health Care Facilities

There are four assisted-living facilities within the study area. These facilities are shown on Figures 3.16-3 and 3.16-4 and described below:

- Evergreen Residential Care is located at 1818 Norwood Street. This facility has 51 resident beds.
- Palmetto Residential Care of North Charleston is located at 2834 Spruill Avenue. This facility has 12 resident beds.
- Ivory's Loving Care Residential Facility is located at 2827 Spruill Avenue. This facility has seven resident beds.
- Dorcas Residential Care I is located at 1131 Bexley Street. This facility has five beds.

In addition, the Harvest Free Medical Clinic is located just east of the study area across Hobson Avenue from Sterett Hall at 1670 Drydock Avenue. Harvest Free Medical Clinic is a non-profit Christian organization that provides free medical care and medications to those without resources to pay. The clinic relies almost entirely on a volunteer work force and is funded by individual and corporate donations.

3.16.5.4 Schools

The study area is located within the service area of Charleston County Schools.

3.16.5.4.1 Elementary Schools

Children residing in the study area attend one of two elementary schools, of which only one is currently located in the study area, the Chicora School of Communications Elementary Magnet School.

- The Chicora School of Communications Elementary Magnet School is currently located at 3795 Spruill Avenue in a temporary facility while a new facility is being constructed next to the Military Magnet Academy located at 2950 Carner Avenue. This school is a partial magnet school with approximately 345 students in Child Development (CD) through grade 5. The boundary for this school attendance zone includes the study area south of McMillan Avenue.
- North Charleston Elementary School is located well north of the study area at 4921 Durant Avenue. This neighborhood school has an approximate enrollment of 566 students in CD through grade 5 and serves the portion of the study area north of McMillan Avenue.

3.16.5.4.2 Middle and High Schools

Students residing in the study area are zoned to attend Morningside Middle School located at 1999 Singley Lane, and North Charleston High School located at 1087 East Montague Avenue. Both of these schools are located to the north of the study area. In addition to traditional schools, there are options for magnet and charter schools located throughout the county. Two of these schools are located in or adjacent to the study area:

- The Military Magnet Academy is a county-wide magnet middle and high school located just west of the study area at 2950 Carner Avenue. Approximate enrollment is 546 students.
- Palmetto Scholars Academy was located in the study area at 2415 Avenue F. This charter school serves grades 6 to 12 and is recently moved to a new facility well outside of the study area in the Hunley Park development near the Charleston Air Force Base in December 2016.

3.16.5.4.3 Private Schools

There are two private schools located in the study area:

- The St. John Catholic School is a private school for students in grades K to 8 located in the northern portion of the study area at 3291 St. Johns Avenue. The church and school has a master plan for expansion on the current site.
- Owens Christian Academy is a small private school for children age 2 through first grade located at 3377 Ridgeway Street along the western edge of the study area.

3.16.5.5 Places of Worship

Places of worship identified in the study area and shown on Figures 3.16-3 and 3.16-4 include:

- St. John's Catholic Church is located at 3921 St. Johns Avenue in the northern portion of the study area.
- Washington United Methodist Church is located at 1816 Success Street in the central portion of the study area.

- St. Matthew Baptist Church is located at 2005 Reynolds Avenue in the Chicora-Cherokee neighborhood in the central portion of the study area.
- Salvation & Deliverance Church is located at 1916 Burton Lane in the southern portion of the study area.
- Emanual Seed Harvest Time Church is located 2012 Reynolds Avenue in the Chicora-Cherokee neighborhood in the central portion of the study area.

Eleven additional places of worship, consisting of neighborhood churches and one neighborhood mosque, are located in the Union Heights neighborhood, south of the project site:

- House of God is located at 2050 Hampton Avenue.
- New St. John Holiness Church is located at 2026 Riverview Avenue.
- New Francis Brown United Methodist Church is located at 2517 Corona Street.
- Bethlehem Baptist Church is located at 1981 Arbutus Avenue.
- Evening of Prayer Church of God in Christ is located at 2361 Spruill Avenue.
- Grace Community Baptist Church is located at 2029 Delaware Avenue.
- Open Door United Bibleway Church of Christ is located at 2000 Groveland Avenue.
- Calvary AME Church is located at 2040 Groveland Avenue.
- Masjid Al Jami Ar Rasheed Mosque is located at 1998 Hugo Avenue.
- Promised Land Pentecostal Holiness Church is located at 2216 Meeting Street.
- Mt. Olive Baptist Church is located at 2416 Meeting Street.

The Saint Peter's Cemetery Extension is located at 2280 Spruill Avenue and is the only known cemetery in the study area.

3.16.5.6 Libraries

There are no libraries located in the study area. The nearest library, the Cooper River Memorial Library, is located just to the west of the study area at 3503 Rivers Avenue, on the north side of Dorchester Road.

3.16.5.7 Post Offices

There are no post offices located within the study area. The nearest post office is located at 2180 McMillan Avenue, approximately one-quarter mile to the west of the study area.

3.16.5.8 Grocery Stores

There is a notable absence of grocery stores in the study area. The USDA defines a "food desert" as a, "census tract with a substantial share of residents who live in low-income areas that have low levels of access to a grocery store or healthy, affordable food retail outlet." Three out of the six census tracts in the study area are USDA-designated food deserts. The City of North Charleston's website identifies the locations of convenience stores and grocery stores. Within the study area, there are no grocery stores; the only food markets available are convenience stores located along Spruill Avenue.

3.16.5.9 Other Notable Community Resources

This section describes other notable features in the study area that are not included in any of the categories above. These other notable features are noted with an asterisks on Figures 3.16-3 and 3.16-4.

- A Federal Law Enforcement Training Center (FLETC) is located in the southernmost portion of the study area. The center is one of only three residential training sites for Federal law enforcement agencies in the United States. The facility opened on October 1, 2004, and also operates as a Federal complex with administrative and operational law enforcement agencies. Federal agencies using the facility include the Department of State, NOAA, U.S. Coast Guard Sector Charleston, Sea Hawk Interagency Operations Center, and U.S. Maritime Administration.

  The property consists of more than 200 acres, and includes a new five-story, 400-bed dormitory that opened in September 2011. The facility can house 767 students on site and the on-center dining facility is capable of serving more than 1,000 students and staff. For FY 2013, the total student throughput was approximately 6,285. The center has near and long-range plans for expansion, including construction of a new shipping and receiving facility in FY 2014 and construction of a new, nine-acre scenario-based training area.

- Metanoia is located adjacent to St. Mathew Baptist Church at 2005 Reynolds Avenue in the Chicora-Cherokee neighborhood in the central portion of the study area. Metanoia is a non-profit organization focused on investing in neighborhood assets to build leaders, establish quality housing, and generate economic development. The Metanoia organization's initiatives include an after-school program, a youth entrepreneurship and volunteer center, and renovating homes to create home ownership and rental opportunities. They also assisted with development of the Chicora Place Community Garden.

- Lowcountry Orphan Relief, located at 1850 Truxton Avenue in the northern portion of the study area, provides support services to meet the needs of children identified as at-risk or suffering from abandonment, abuse, and/or neglect. Their facility includes offices and a donation center, and hosts several large events throughout the year. Based on information gathered during public involvement activities, the facility relies on the donations it receives and the many volunteers that come to work at the facility each week. The facility recently added a 5,000-square-foot addition.

- West Yard Lofts is a 60-unit low-income housing complex located off of Noisette Boulevard to the north of Turnbull Avenue, in the northern portion of the River Center project site. The complex opened in 2011.
- Lowcountry Innovation Center is located at 1535 Hobby Street in the northern portion of the River Center project site. The center offers quality office space at below-market rates to meet the needs of knowledge-based companies. The center currently houses more than 20 companies that employ more than 200 employees.
- Chicora Life Center is located at 3600 Rivers Avenue in the former Charleston Navy Hospital. The nearly 400,000-square-foot, 10-story facility is being renovated for an approximate cost of $30 million dollars by private investors. The purpose of the center is to serve as a social services hub for multiple social, government, and non-profit agencies. The first tenant moved into the facility in April 2015. As of March 2016, tenants in the center include Charleston County Vital Records, Charleston County Coroner's Office, S.C. Department of Alcohol and Other Drugs Abuse Services, S.C. Department of Health and Environmental Control, the Fetter Health Care Network, and Tri-County Intergroup Office with supports Alcoholics Anonymous.

3.16.6 Community Services

This section describes public services, including police, fire, and emergency medical services, provided to the study area, as well as any related facilities located within the study area.

3.16.6.1 Fire Service

The North Charleston Fire Department is divided into 3 divisions with 11 fire stations located throughout the city. Station 2, located at 1791 North Hobson Avenue, is currently located within the study area. However, this station will be combined with Station 8 (currently located just outside the study area at 2630 Meeting Street). Neither of these stations is shown on Figure 3.16-3 or Figure 3.16-4. The new Station 2 is expected to open in January 2016 at the corner of Carner Avenue and Clement Avenue within the study area (shown on Figures 3.16-3 and 3.16-4). The new station will be the City's newest and largest fire station housing three fire companies (two engines and one aerial apparatus). The new Station 2 will include five bays for active and reserve trucks, a training facility, offices for the city's arson investigators, and crew living quarters. The next nearest station, Station 1, is located north of the study area near Park Circle at 4830 Jenkins Avenue.

3.16.6.2 Police Service

The City of North Charleston Police Department is divided into three bureaus: North, South, and Central. The central and southern portions of the study area are served by the South Bureau and the northern portion of the study area is covered by the Central Bureau. None of the bureau offices are located within the study area, but the South Bureau office is located approximately one-quarter mile west of the study area at 3401 Rivers Avenue, as shown on Figures 3.16-3 and 3.16-4.

3.16.6.3 Emergency Medical Services

Emergency medical services are provided by Charleston County Emergency Medical Services (EMS), which provides medical care and transportation to hospital emergency rooms and provides field emergency medical support services. There are no EMS facilities or hospitals located within the study area. The nearest EMS facility is located just west of the central portion of the study area at 2006 Reynolds Avenue.

3.16.7 Environmental Justice

An Environmental Justice analysis has been conducted to assess whether the study area population meets the criteria for the presence of a minority and/or low-income population. Title VI of the Civil Rights Act of 1964 protects individuals from discrimination on the grounds of race, age, color, religion, disability, sex, and national origin. In addition, Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority and Low-Income Populations," mandates Federal agencies to identify and address any disproportionately high and adverse effects on minority and/or low-income populations. The Order also directs Federal agencies to provide minority and low-income communities access to public information and meaningful public participation.

Environmental Justice Populations in the Study Area

Eleven of the sixteen block groups encompassing the study area have Black or African American minority Environmental Justice populations. Eleven of these same block groups also have low-income Environmental Justice populations.

The principles of Environmental Justice are:

1) to ensure the full and fair participation of all potentially affected communities in the decision-making process;
2) to avoid, minimize or mitigate disproportionately high and adverse human health or environmental effects, including social and economic effects, on minority or low income populations; and
3) to fully evaluate the benefits and burdens of Federal programs, policies, and activities, upon low-income and minority populations.

The CEQ has oversight of the Federal government's compliance with Executive Order 12898 and NEPA, and developed guidance (*Environmental Justice Guidance Under the National Environmental Policy Act*, December 1997) to assist Federal agencies in effectively identifying and addressing Environmental Justice concerns.

Based on the CEQ Guidance (described in greater detail below), the study area includes both minority and low-income populations that meet the criteria for Environmental Justice populations. The block groups that meet the criteria are identified in Table 3.16-19 and Figure 3.16-1. Eleven of the sixteen

block groups encompassing the study area have Black or African American minority Environmental Justice populations. Eleven of these same block groups also have low-income Environmental Justice populations.

Table 3.16-19
Environmental Justice Analysis

2010 Census Geography		Total Population	Total Minority Population[1]	Percentage Minority Population	Threshold for EJ Status for Minority Population Met?[2]	Total Households	Low-Income Households	Percentage of Low-Income Households	Threshold for EJ Status for Low-Income Population Met?[2]
Census Tract	Block Group								
35	1	1,103	255	23.1%	No	514	130	25.3%	No
	2	1,160	168	14.5%	No	452	137	30.3%	No
36	1	621	289	46.5%	No	241	69	28.6%	No
	2	1,149	556	48.4%	No	671	333	49.6%	Yes
	3	463	192	41.5%	No	186	45	24.2%	No
37	1	1,106	781	70.6%	Yes	531	384	72.3%	Yes
	2	1,903	1,666	87.5%	Yes	561	433	77.2%	Yes
	3	374	315	84.2%	Yes	164	51	31.1%	No
43	1	439	418	95.2%	Yes	140	97	69.3%	Yes
	2	555	509	91.7%	Yes	262	172	65.6%	Yes
	3	721	660	91.5%	Yes	320	229	71.6%	Yes
	4	827	694	83.9%	Yes	359	195	54.3%	Yes
54	1	709	682	96.2%	Yes	315	183	58.1%	Yes
	2	862	841	97.6%	Yes	250	218	87.2%	Yes
55	1	538	414	77.0%	Yes	142	110	77.5%	Yes
	2	706	610	86.4%	Yes	359	265	73.8%	Yes
Study Area		13,236	9,050	68.4%	Yes	5,467	3,051	55.8%	Yes
North Charleston		97,471	48,471	49.7%		36,384	11,886	32.7%	
Charleston		120,083	32,855	27.4%		51,591	13,356	25.9%	
Charleston County		350,209	110,325	31.5%		143,717	37,091	25.8%	

Source: U.S. Census Bureau, Census 2010, Summary File 1 100% Data, Table P3 "Race", American Community Survey 5-Year Estimates (2009-2013), Table C17002 "Ratio of Income to Poverty Level in the Past 12 Months"
1. Per CEQ guidance, the total minority population is comprised of the following population groups: American Indian or Alaskan Native; Asian; Pacific Islander; Black, not of Hispanic origin; and Hispanic or Latino. However, the U.S. Census recognizes Hispanic or Latino as an ethnic category that can include persons of any race. As a result, the Hispanic or Latino population is presented exclusive of race in Table 3.16-5. As identified in Table 3.16-5, the Hispanic or Latino population of the study area does not meet CEQ guidance criteria in identifying Environmental Justice populations.
2. CEQ guidance identifies the presence of minority or low-income populations when the percentage of the population group exceeds 50 percent.

3.16.7.1 Minority Population

The CEQ Guidance defines minority as individuals who belong to one of the following population groups:

- American Indian or Alaskan Native;
- Asian;
- Pacific Islander;
- Black, not of Hispanic origin; or
- Hispanic

For purposes of identifying an Environmental Justice population, a minority population exists when "the minority population of the affected area exceeds 50 percent, or the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population" (CEQ, 1997).

Based on data from the 2010 U. S. Census as shown in Table 3.16-4, eleven of the sixteen block groups encompassing the study area have Black or African American minority populations that meet CEQ guidelines for the presence of a minority Environmental Justice population. All of these block groups are located south of Bexley Street. Two block groups located north of Bexley Street have Black or African American minority populations that are near the CEQ guidelines for the presence of a minority Environmental Justice population.

3.16.7.2 Low-Income Households

Low-income populations are defined as households with a median household income at or below the U.S. Department of Health and Human Services (HHS) 2014 Poverty Guidelines. The 2014 Poverty Guideline for the 48 contiguous states and the District of Columbia is $23,850 for a four-person household. For the purposes of Environmental Justice analysis, a low-income population exists where the percentage of low-income households in a block group exceeds 50 percent of the total households in that block group.

The ACS Five-Year Estimates (2009–2013) provide household income in $5,000 increments. The HHS 2014 Poverty Guideline ($23,850) is within the $20,000 to $24,999 increment. As a result, all households in this increment and below (regardless of the number of individuals in the household) are considered low income. More than half of the households, approximately 56 percent, within the study area are considered low income and four block groups in the study area—including three that include the Chicora-Cherokee neighborhood—have low-income percentages that exceed 70 percent. Overall, eleven of the 16 block groups encompassing the study area meet the criteria for the presence of a low-income Environmental Justice population (i.e., the percentage of low-income households exceeds 50 percent). All of these block groups also include African American minority Environmental

Justice populations. Table 3.16-20 identifies the percentage of low-income households in each block group encompassing the study area.

Table 3.16-20
Low-Income Households

2010 Census Geography		Total Households	Number of Households by Household Income in the Past 12 Months				Low Income Households	
Census Tract	Block Group		Less than $10,000	$10,000 to $14,999	$15,000 to $19,999	$20,000 to $24,999	Subtotal	% of Total
35	1	514	23	75	0	32	130	25.3%
	2	452	18	0	72	47	137	30.3%
36	1	241	0	25	44	0	69	28.6%
	2	671	223	52	29	29	333	49.6%
	3	186	0	38	7	0	45	24.2%
37	1	531	124	44	161	55	384	72.3%
	2	561	130	122	81	100	433	77.2%
	3	164	14	0	32	5	51	31.1%
43	1	140	31	48	0	18	97	69.3%
	2	262	53	20	76	23	172	65.6%
	3	320	101	41	42	45	229	71.6%
	4	359	91	46	47	11	195	54.3%
54	1	315	54	73	10	46	183	58.1%
	2	250	186	0	15	17	218	87.2%
55	1	142	33	37	40	0	110	77.5%
	2	359	148	79	34	4	265	73.8%
Study Area		**5,467**	**1,229**	**700**	**690**	**432**	**3,051**	**55.8%**
North Charleston		36,384	3,810	2,696	2,695	2,685	11,886	32.7%
Charleston		51,591	5,724	2,717	2,757	2,158	13,356	25.9%
Charleston County		143,717	13,410	7,815	8,051	7,815	37,091	25.8%
South Carolina		1,780,251	163,030	116,039	114,375	110,675	504,119	28.3%

Source: U.S. Census, American Community Survey 5-Year Estimates (2009-2013), Table B19001. "Household Income in the Past 12 Months"
Note: The HHS 2014 Poverty Threshold for FY2014 is $23,850 for a household of 4-Persons. This amount falls within the ACS income range of $20,000 and $24,999. As a result, all households in that income range are included in the estimate of low-income households. Shaded cells indicate block groups where 50% or more of the households are low-income.

3.17 HUMAN HEALTH AND SAFETY

This section provides an overview of human health and safety in the study area based on data from Federal and state sources, as well as data from other sections of this EIS that are related to human health and safety (noise, air quality, water resources, etc.).

3.17.1 State Data on Public Health and Safety

The SCDHEC compiles data and information on the health and safety of state residents. The project site in Charleston County is within the Low Country Region reporting area. Data on selected reportable diseases is reported by SCDHEC by region and county (http://www.scdhec.gov/Health/SCPublicHealthStatisicsMaps/).

Cause of death is an indicator of key issues associated with public health and safety. As reported by SCDHEC for 2012, the 10 leading causes of death in Charleston County and the Low Country Region (which includes 11 counties in the southern portion of South Carolina) are show in the bar graph below (Figure 3.17-1).

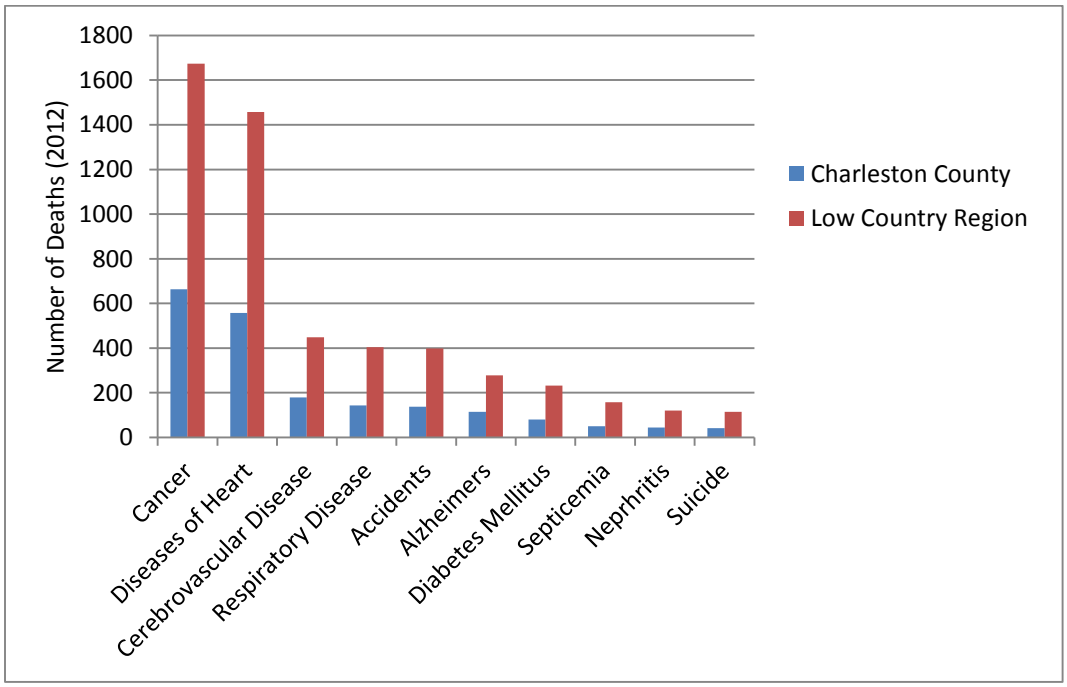


Figure 3.17-1. Leading causes of death in Charleston County and the Low County Region (2012)

3.17.2 Water Quality and Human Health

Water quality is important to human health, since contaminated water supplies can become unusable for human consumption due to risk of illness. Water quality standards are set by the state of South

Carolina to regulate how clean a water body should be. Water quality standards include a water body's designated uses, criteria to protect those uses, and anti-degradation policies. Existing water quality conditions in the project area are discussed in detail in Section 3.3.

Municipal water supplies for the City of North Charleston are served by the Charleston Water System. This utility gets their water primarily from Bushy Park Reservoir and secondarily from the Edisto River. The Charleston Water System has no operating groundwater wells in the study area (personal communication, Jane Byrne, Charleston Water System, September 30, 2014).

3.17.3 Noise and Human Health

Noise is defined as unwanted sound. It is emitted from many natural and man-made sources. According to the USEPA, human health concerns related to noise include "stress-related illnesses, high blood pressure, speech interference, hearing loss, sleep disruption, and lost productivity" (USEPA 2014d). Potential noise from the proposed facility has been identified as a major concern of local residents. The existing noise environment in the study area is discussed in detail in Section 3.12.

3.17.4 Air Quality and Human Health

The quality of ambient air plays an important role in the health of the public. Exposure to pollutants is associated with numerous effects on human health, including increased respiratory symptoms, hospitalization for heart or lung disease, and even premature death. Health effects associated with criteria air pollutants and existing air quality in the project area are discussed in detail in Section 3.13.

According to a 2013 assessment by the World Health Organization's (WHO) International Agency for Research on Cancer (IARC), "outdoor air pollution is carcinogenic to humans, with the particulate matter component of air pollution most closely associated with increased cancer incidence, especially cancer of the lung. An association also has been observed between outdoor air pollution and increase in cancer of the urinary tract/bladder" (WHO website: www.who.int/media centre/factsheets/fs313/en, accessed October 24, 2014). The WHO's report further states that ambient (outdoor air pollution) in both cities and rural areas was estimated to cause 3.7 million premature deaths worldwide per year in 2012; this mortality is due to exposure to small particulate matter of 10 microns or less in diameter (PM_{10}), which cause cardiovascular and respiratory disease, and cancers."

As stated in Section 3.13 (Air Quality), the Charleston region currently meets all national ambient air quality standards, but ozone levels in North Charleston are relatively high due to industrial and mobile sources in the area. Implementation of the Proposed Project is anticipated to generate diesel particulate matter (DPM) (USEPA 2015g), a known Hazardous Air Pollutant (HAP).

DPM is not directly measured by the USEPA or state monitoring sites; however, the size of diesel particulates that are of greatest health concern are those in the categories of fine and ultra-fine particles (USEPA 2015c). Fine particles, also known as $PM_{2.5}$, are a criteria pollutant and measured in the area. $PM_{2.5}$ measurements are used to assess the DPM emissions near the project site. Ultrafine particles are a subset of $PM_{2.5}$ emissions and therefore are included as part of the monitored $PM_{2.5}$ data.

Local concerns near the project site were identified by the LAMC in their *Area Revitalization Plan* (LAMC 2010): "that SCDHEC found in a recent study that temporary saturation monitors in Chicora/Cherokee, Union Heights, Howard Heights, and Accabee showed slightly higher $PM_{2.5}$ readings in the Charleston Neck Area than regional averages, likely due to traffic congestion. Of the four neighborhoods sampled, Howard Heights had the highest levels, while Chicora/Cherokee had the lowest. However, the results demonstrated that $PM_{2.5}$ levels in the Charleston Neck Area are well below national standards."

As a result of these concerns, SCDHEC initiated the *Charleston Neck Area Air Monitoring Study* and installed an Air Quality Monitoring Station at Chicora Elementary School in 2009 to measure the amounts of toxic pollutants found in the air. Chicora Elementary was chosen for the study because it is located near a variety of pollution sources—cars, trucks, and buses on the highway and interstate, fueling stations, dry cleaners, and large industries. In addition, a study funded by the National Institutes of Health (*Assessment of Particulate Matter Levels in Vulnerable Communities in North Charleston, South Carolina prior to Port Expansion*, 2014) found a potential for local increases in air pollution that should be considered by stakeholders and policymakers to ensure that adequate attention is given to the pollution trends and environmental health concerns of the residents in the Charleston Neck communities. According to information presented at a Union Heights neighborhood association meeting in August 2014, the Charleston Community Research to Action Board (CCRAB) is working on a grant proposal to install air quality monitors in homes in the study area.

3.17.5 Hazardous Material Sites and Human Health

When hazardous materials are released into the air, water, or on the land, they can pose a risk to human health. The study area has a known history with soil and groundwater pollutants. Hazardous materials sites in the study area are discussed in detail in Section 3.15.

Local concerns near the Proposed Project were identified by the LAMC in their *Area Revitalization Plan* (April 2010). As part of a grant received from the National Institute of Environmental Health Sciences, LAMC and the University of South Carolina's Arnold School of Public Health are conducting a four-year environmental monitoring program that includes soil testing for hazardous materials. LAMC performed soil sampling in the areas to the west of the project site in 2011 and 2012. Preliminary results identified concentrations of arsenic and lead at levels of potential concern to local

residents. Upon completion of the soil sampling study, the study findings will be compared to USEPA standards to determine whether an existing soil risk to human health is present in the study area.

Lead contaminated soil can pose a risk to human health through direct ingestion, uptake in vegetable gardens, or tracking into homes. The USEPA's standard for lead in bare soil in play areas is 400 ppm by weight and 1,200 ppm for non-play areas.

3.17.6 Socioeconomics and Human Health

As noted in the Socioeconomic Resources section, there is a notable absence of grocery stores in the study area. Portions of the study area are identified as food deserts, which the USDA defines as a "census tract with a substantial share of residents who live in low-income areas that have low levels of access to a grocery store or healthy, affordable food retail outlet." Lack of access to healthy foods contributes to a poor diet and can lead to higher levels of obesity and other diet-related diseases, such as diabetes and heart disease.

3.17.7 Emergency Response Times and Human Health

A risk to human health can result from a lack of emergency service providers or inadequately spaced dispatch centers/garages. As identified in Section 3.16, Socioeconomics and Environmental Justice, there are no hospitals or emergency medical stations located near the Proposed Project, and the City of North Charleston recently consolidated two separate fire stations into a new larger Station 2 located at the corner of Carner Avenue and Clement Avenue.

According to the Charleston County Comprehensive Plan (October 2014), response time goals adopted by Charleston County EMS for urban/suburban areas are:

- Acceptable – Response time less than 8 minutes 80 percent of the time
- Marginal – Response time between 8 and 15 minutes
- Unacceptable – Response time greater than 15 minutes

3.18 SECTION 4(f) AND6(f) RESOURCES

3.18.1 Introduction

Section 4(f) of the U.S. Department of Transportation (DOT) Act (49 USC § 303(c)) provides protection for publicly owned parks, recreation areas, wildlife and waterfowl refuges, and historic properties or archaeological sites on or eligible for listing on the National Register of Historic Places (the National Register). With respect to the Navy Base ICTF, the FRA is responsible for protection of these resources, collectively referred to as 4(f) resources. While not binding on FRA, FRA uses FHWA regulations (23 CFR part 774) to guide its interpretation and implementation of Section 4(f).

Specifically, Section 4(f) provides that:

> "The Secretary of Transportation shall cooperate and consult with the Secretaries of the Interior, Housing and Urban Development, and Agriculture, and with the States, in developing transportation plans and programs that include measures to maintain or enhance the natural beauty of lands crossed by transportation activities or facilities… The Secretary may approve a transportation program or project…requiring the use of publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significant, or land of an historic site of national, State, or local significance (as determined by Federal, State, or local officials having jurisdiction over the park, area, refuge or site) only if:
>
> - There is no prudent and feasible alternative to using that land; and
> - The program or project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use."

A "use" of a protected property can occur in one of three ways:

- When land is permanently incorporated into a transportation facility (i.e., demolition or land acquisition);
- When there is a temporary occupancy of land that is adverse in terms of the statute's preservationist purposes (i.e. physical alteration of the land during construction); or
- When there is a constructive use of a Section 4(f) property (i.e. ancillary impacts such as noise, vibration or visual impacts).[35]

An alternative is not feasible if it cannot be built as a matter of sound engineering judgment. In determining whether an alternative is prudent, the FRA may consider if the alternative would result in any of the following: (1) compromise the project to a degree that is unreasonable for proceeding

[35] A Constructive use occurs when the transportation project does not incorporate land from a Section 4(f) resource but the project's proximity impacts are so severe that the protected activities, features, or attributes that qualify a resource for protection under Section 4f) are substantially impaired. Substantial impairment occurs only when the protected activities, features, or attributes of the resource are substantially diminished.

with the project in light of its stated purpose and need, (2) unacceptable safety or operational problems, (3) after reasonable mitigation the project results in severe social, economic, or environmental impacts; severe disruption to established communities; severe disproportionate impacts on minority or low-income populations; or severe impacts on environmental resources protected under other federal statutes, (4) additional construction, maintenance, or operational costs of an extraordinary magnitude, (5) other unique problems or unusual factors, (6) multiple factors that, while individually minor, cumulatively cause unique problems or impacts of extraordinary magnitude.

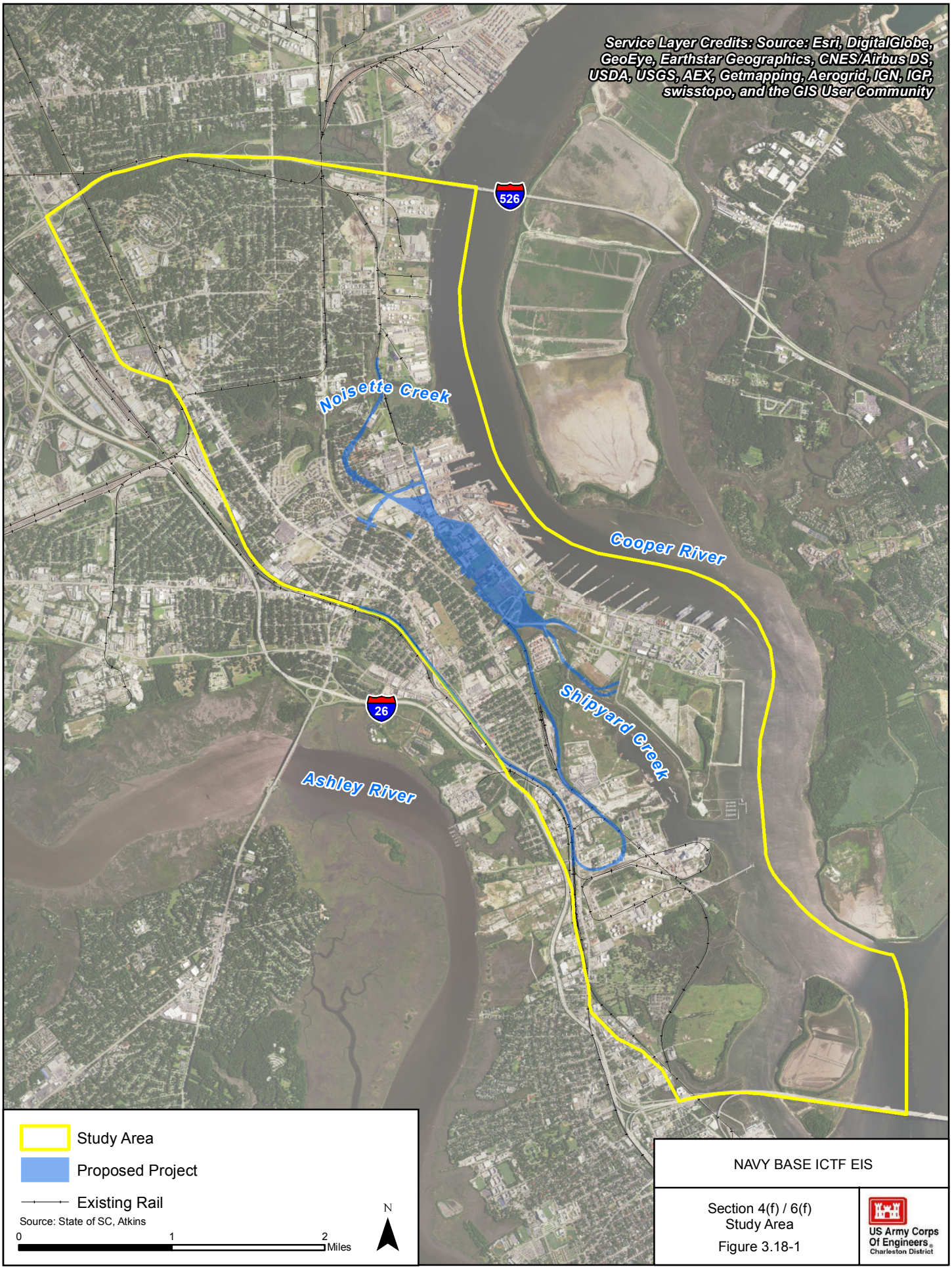
While uses of Section 4(f) properties are regulated by the U.S. Department of Transportation, uses to Section 6(f) lands are regulated by the U.S. Department of the Interior. Section 6(f) properties are recreation resources funded under the Land and Water Conservation Fund (LWCF) Act. Conversion of these lands for uses other than for outdoor recreation must be approved by the U.S. Department of the Interior. Direct impacts to these resources are prohibited unless there are no feasible and prudent alternatives for the use of the properties and the project incorporates all possible measures to avoid or minimize harm to such properties.

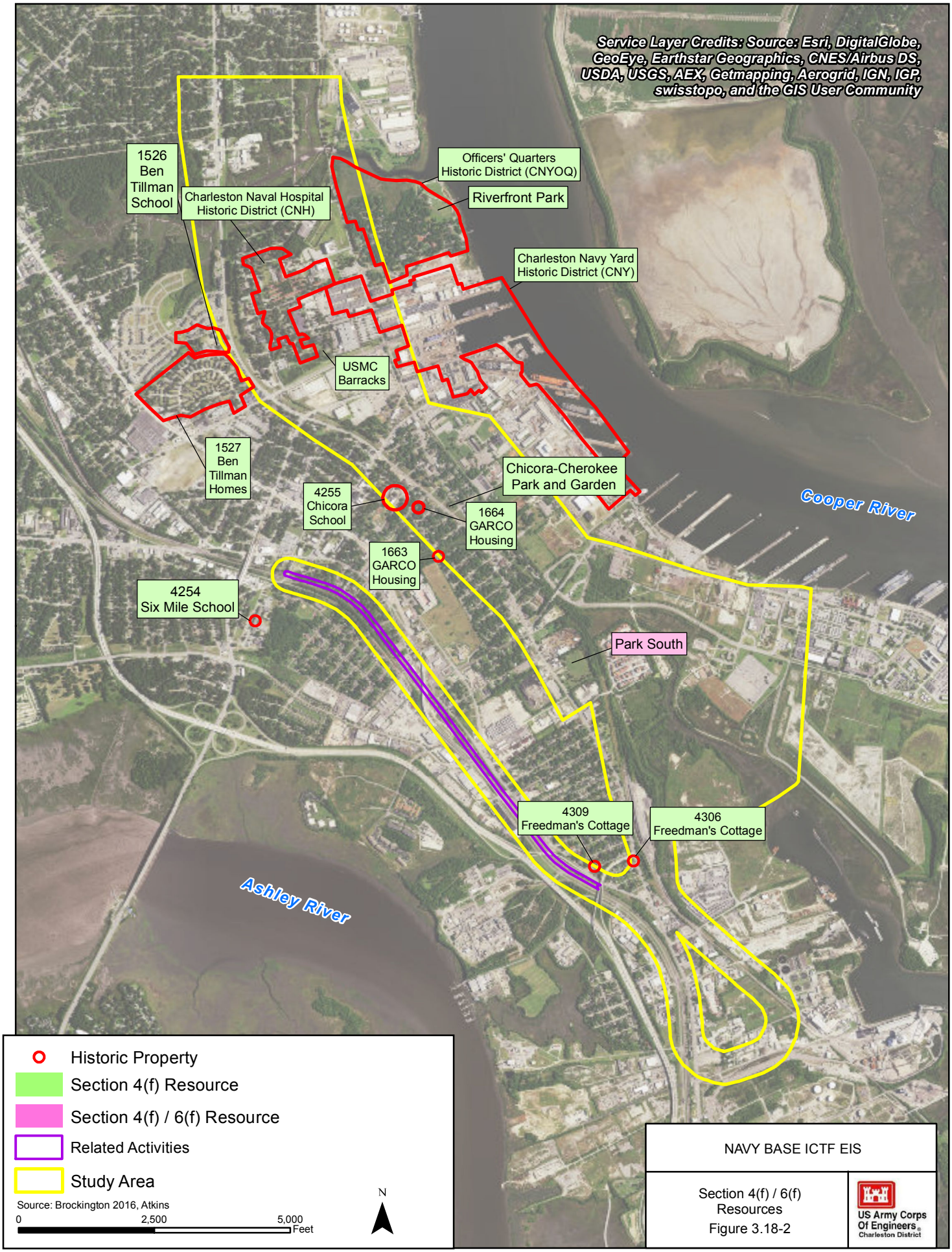
The study area for Section 4(f) and Section 6(f) resources is identified in Figure 3.18-1. Properties within the study area that are categorized as Section 4(f) and Section 6(f) resources are described in this section.

3.18.2 Existing Conditions

Three publicly-owned parks are located within the study area and are therefore considered Section 4(f) properties (see Figure 3.18-2). Descriptions of Park South, the Chicora-Cherokee Community Park, and Riverfront Park can be found in Section 3.16.5 (Community Resources). Park South received funding in 1982 through the U.S. Department of the Interior and National Park Service's Land and Water Conservation Fund, and as a result, this park is also classified as a Section 6(f) property.

There are 11 historic properties within the study area that are listed in or eligible for the NRHP, and as such, are classified as Section 4(f) properties. The Section 4(f) historic properties consist of three historic districts, one planned residential community, and eight individual buildings (one property contains two buildings). The three districts are the Charleston Navy Yard (CNY) Historic District, the Charleston Naval Hospital (CNH) Historic District, and the Charleston Navy Yard Officers' Quarters (CNYOQ) Historic District. The planned residential community is the Ben Tillman Homes. The historic buildings consist of three schools (Chicora Elementary School, The Ben Tillman Graded School, and Six Mile Elementary School), four residential structures (GARCO Residences [Resources 1663 and 1664], and the Charleston Freedman's Cottages [Resources 4306 and 4309]), and the former U.S. Marine Corps Barracks (see Figure 3-18.2). Detailed descriptions of these historic properties can be found in Section 3.10 (Cultural Resources).


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
526
Noisette Creek
Cooper River
Shipyard Creek
26
Ashley River
Study Area
Proposed Project
Existing Rail
Source: State of SC, Atkins
0
1
2
Miles
N
NAVY BASE ICTF EIS
Section 4(f) / 6(f)
Study Area
Figure 3.18-1
US Army Corps
Of Engineers
Charleston District


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
1526 Ben Tillman School
Charleston Naval Hospital Historic District (CNH)
Officers' Quarters Historic District (CNYOQ)
Riverfront Park
Charleston Navy Yard Historic District (CNY)
USMC Barracks
1527 Ben Tillman Homes
Chicora-Cherokee Park and Garden
4255 Chicora School
1664 GARCO Housing
1663 GARCO Housing
4254 Six Mile School
Park South
4309 Freedman's Cottage
4306 Freedman's Cottage
Cooper River
Ashley River
Historic Property
Section 4(f) Resource
Section 4(f) / 6(f) Resource
Related Activities
Study Area
Source: Brockington 2016, Atkins
0
2,500
5,000
Feet
N
NAVY BASE ICTF EIS
Section 4(f) / 6(f) Resources
Figure 3.18-2
US Army Corps Of Engineers
Charleston District

This page intentionally left blank.