COVER SHEET

RESPONSIBLE AGENCIES	U.S. Army Corps of Engineers, Mobile District (Lead Agency) Mississippi Development Authority National Marine Fisheries Service U.S. Environmental Protection Agency
TITLE OF PROPOSED ACTION	Port of Gulfport Expansion Project Gulfport, Harrison County, Mississippi
LEAD AGENCY POINT-OF-CONTACT	Mr. Philip Hegji SAM-2009-1768-DMY Post Office Box 2288 Mobile, Alabama 36628-0001 philip.a.hegji@usace.army.mil (251) 690-3222

The U.S. Army Corps of Engineers, Mobile District, Regulatory Division, is evaluating the Mississippi State Port Authority/Port of Gulfport application for a Department of the Army permit under Section 10 of the Rivers and Harbors Act of 1899, Section 404 of the Clean Water Act, and Section 103 of the Marine Protection, Research, and Sanctuaries Act of 1972, as amended. The Mississippi Development Authority, the National Marine Fisheries Service, and the U.S. Environmental Protection Agency are cooperating agencies for the preparation of this Final Environmental Impact Statement (EIS). USACE has prepared this EIS to assess the potential environmental impacts associated with the proposed Port of Gulfport Expansion Project (or Project). The proposed Project evaluated in this EIS is to expand the facilities at the Port of Gulfport to provide appropriate infrastructure for handling 1.7 million Twenty-foot Equivalent Units annually by 2060 and involves the dredging and filling of estuarine mud and sand bottom in the Mississippi Sound; construction of wharfs, bulkheads, terminal facilities, container storage areas, and intermodal container transfer facilities; placement of new-work and maintenance dredged material; and construction of a breakwater.

In cooperation with the U.S. Environmental Protection Agency under § 1506.10, comments to this Final EIS for the Port of Gulfport Expansion Project must be received on or before July 10, 2017.

U.S. ARMY CORPS OF ENGINEERS, MOBILE DISTRICT
FINAL
ENVIRONMENTAL IMPACT STATEMENT
FOR THE
PROPOSED PORT OF GULFPORT EXPANSION PROJECT
GULFPORT, HARRISON COUNTY, MISSISSIPPI

U.S. ARMY CORPS OF ENGINEERS, MOBILE DISTRICT
FINAL
ENVIRONMENTAL IMPACT STATEMENT
FOR THE
PROPOSED PORT OF GULFPORT EXPANSION PROJECT
GULFPORT, HARRISON COUNTY, MISSISSIPPI

U.S. Army Corps of Engineers
Mobile District
109 Saint Joseph Street
Mobile, Alabama 36602

Prepared by:

Atkins
7406 Fullerton Street, Suite 350
Jacksonville, Florida 32256

June 2017

ABSTRACT

FINAL
ENVIRONMENTAL IMPACT STATEMENT
FOR THE
PROPOSED PORT OF GULFPORT EXPANSION PROJECT
GULFPORT, HARRISON COUNTY, MISSISSIPPI

LEAD AGENCY: Department of the Army
U.S. Army Corps of Engineers, Mobile District

COOPERATING AGENCIES: Mississippi Development Authority
National Marine Fisheries Service
U.S. Environmental Protection Agency

FOR FURTHER INFORMATION CONTACT: Mr. Philip Hegji
SAM-2009-1768-DMY
Post Office Box 2288
Mobile, Alabama 36628-0001
philip.a.hegji@usace.army.mil
(251) 690-3222

The U.S. Army Corps of Engineers (USACE), Mobile District, Regulatory Division, is evaluating the Mississippi State Port Authority (MSPA)/Port of Gulfport (Port) application for a Department of the Army permit under Section 10 of the Rivers and Harbors Act of 1899, Section 404 of the Clean Water Act, and Section 103 of the Marine Protection, Research, and Sanctuaries Act of 1972, as amended. The Mississippi Development Authority, the National Marine Fisheries Service, and the U.S. Environmental Protection Agency are cooperating agencies for the preparation of this Environmental Impact Statement (EIS). USACE has prepared this EIS to assess the potential environmental impacts associated with the proposed Port of Gulfport Expansion Project (PGEP or Project). Under the proposed Project, approximately 282 acres of estuarine mud and sand bottom in the Mississippi Sound would be dredged and/or filled for the construction of wharfs, bulkheads, terminal facilities, container storage areas, intermodal container transfer facilities, and construction of a breakwater. Included in the evaluation is the beneficial use and placement of new work and maintenance dredged material. USACE has determined the overall project purpose is to increase throughput capabilities at the Port beyond 1.0 million Twenty-foot Equivalent Units annually and stimulate the local, regional, and state economies by providing expansion opportunities for existing tenants and to attract new tenants or concessionaires that would construct a semi-automated container terminal, thereby creating direct, indirect, and induced jobs. The Proposed Project Alternative and the No-Action Alternative were evaluated further in this EIS.

Table of Contents

Page

Page

Page

Page

Page

Page

Page

Page

Page

Page

Page

List of Appendices

List of Figures

List of Tables

List of Tables, cont'd

List of Tables, cont'd

List of Tables, cont'd

Acronyms and Abbreviations

AADT	Annual Average Daily Traffic
AAPA	American Association of Port Authorities
ADT	average daily traffic
ADTT	average daily truck traffic
ARRA	American Recovery and Reinvestment Act
ATON	aids to navigation
AWOIS	Automated Wreck and Obstruction Information System
BA	Biological Assessment
B.C.E.	Before the Common Era
BG	block group
BLS	U.S. Bureau of Labor Statistics
BMC	Biloxi Marsh Complex
BMP	Best Management Practice
BU	beneficial use
BUG	Beneficial Use Group
CAA	Clean Air Act
CBC	Construction Battalion Center
CBD	Central Business District
CDBG	Community Development Block Grant
CDP	Census Designated Place
C.E.	Common Era
CEPA	Coastal Electric Power Association
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	cubic feet per second
CH_4	methane
CIA	Community Impact Assessment
CIAP	Coastal Impact Assistance Program
CNG	compressed natural gas
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	Carbon Dioxide Equivalents
cSEL	cumulative sound exposure level
CSX	CSX Corporation
CT	census tract
cu ft	cubic feet
CWA	Clean Water Act
cy	cubic yards
CZC	Coastal Zone Consistency

CZMA	Coastal Zone Management Act
DA	Department of the Army
dB	decibel
dBA	A-weighted sound level
DDT	dichloro-diphenyl-trichloroethane
DEIS	Draft Environmental Impact Statement
DMMP	Dredged Material Management Plan
DNL	Day-Night Average Sound Level
DO	dissolved oxygen
DoD	Department of Defense
DOT	Department of Transportation
DTT	daily truck traffic
EA	Environmental Assessment
ECA	Emission Control Area
EDR	Environmental Data Resources Inc.
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EJ	environmental justice
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ERDC	U.S. Army Engineer Research and Development Center
ERL	Effects Range Low
ERNS	Emergency Response Notification System
ESA	Endangered Species Act
°F	degrees Fahrenheit
FAA	Federal Aviation Administration
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FHWG	Fisheries Hydroacoustic Working Group
FINDS	Facility Index System
FNC	Gulfport Harbor Federal Navigation Channel
FONSI	Finding of No Significant Impact
FPPA	Farmland Protection Policy Act of 1981
FR	*Federal Register*
FRA	Federal Railway Administration
FTA	Federal Transit Administration
FTE	full-time equivalent job
GBN	ground-borne noise
GBV	ground-borne vibration
GHG	Greenhouse Gas

GIS	geographic information system
GIWW	Gulf Intracoastal Waterway
GMFMC	Gulf of Mexico Fisheries Management Council
GOMA	Gulf of Mexico Alliance
GRBO	Gulf Regional Biological Opinion
GRPC	Gulf Regional Planning Commission
GSMFC	Gulf States Marine Fisheries Commission
GSSC	Great Southern Shopping Center
Gulf	Gulf of Mexico
HAP	Hazardous Air Pollutant
HAPC	Habitat Areas of Particular Concern
HCM	Highway Capacity Manual
HCUA	Harrison County Utility Authority
HHS	Department of Health and Human Services
HTRW	hazardous, toxic, and radioactive waste
HUD	U.S. Department of Housing and Urban Development
I	Interstate
IMMS	Institute for Marine Mammal Studies
IMO	International Maritime Organization
IPCC	Intergovernmental Panel on Climate Change
JCPA	Jackson County Port Authority
KCS	Kansas City Southern
L_{dn}	Day-Night Sound Level
LDNR	Louisiana Department of Natural Resources
LED	light-emitting diode
LEDPA	least environmentally damaging practicable alternative
LEP	Limited English Proficiency
L_{eq}	equivalent sound level
LLC	Limited Liability Company
LOA	length overall
LOS	Level of Service
LPG	liquefied petroleum gas
LZA	Littoral Zone Area
MARPOL	International Convention on the Prevention of Pollution from Ships of the Marine Pollution
MCC	Maritime Commerce Center
mcy	million cubic yards
MDA	Mississippi Development Authority
MDAH	Mississippi Department of Archives and History
MDEQ	Mississippi Department of Environmental Quality
MDES	Mississippi Department of Employment Security
MDMR	Mississippi Department of Marine Resources

MDOT	Mississippi Department of Transportation
MDPS	Mississippi Department of Public Safety
MDWFP	Mississippi Department of Wildlife, Fisheries, and Parks
mg/L	milligrams per liter
mgd	million gallons per day
mL	milliliter
MLLW	mean lower low water
MMNS	Mississippi Museum of Natural Science
MNHP	Mississippi Natural Heritage Program
mph	miles per hour
MPN	Most Probable Number
MPRSA	Marine Protection, Research, and Sanctuaries Act
MSA	Metropolitan Statistical Area
MSAT	Mobile Source Air Toxic
MsCIP	Mississippi Coastal Improvements Program
MSFCMA	Magnuson-Stevens Fishery Conservation And Management Act
msl	mean sea level
MSPA or Applicant	Mississippi State Port Authority
MT	metric tons
MULTIPLAN	Mississippi's Unified Long-range Transportation Infrastructure Plan
NA	not applicable
NAAQS	National Ambient Air Quality Standards
NASA	National Aeronautics and Space Administration
NAVD	North American Vertical Datum
NBIC	National Ballast Information Clearinghouse
NCA	National Coastal Assessment
NCAADC	National Climate Assessment and Advisory Development Committee
NCDC	National Climatic Data Center
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NO	nitric oxide
N_2O	nitrous oxide
NO_2	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NO_X	nitrogen oxides
NPS	National Park Service
NRC	National Response Center
NRCS	Natural Resources Conservation Service

NRHP	National Register of Historic Places
NWI	National Wetland Inventory
O_3	ozone
OCS	Outer Continental Shelf
ODMDS	Ocean Dredged Material Disposal Site
OMB	Office of Management and Budget
PAH	polycyclic aromatic hydrocarbon
Pb	lead
PCB	polychlorinated biphenyl
PCE	primary constituent element
PEL	probable effects level
PGEP or Project	Port of Gulfport Expansion Project
pg/g	picograms per gram
PGRP	Port of Gulfport Restoration Program
PL	Public Law
PM_{10}	particulate matter of 10 micrometers or less
$PM_{2.5}$	particle diameters of 2.5 micrometers or less
Port	Port of Gulfport
ppm	parts per million
ppt	parts per thousand
RCRA	Resource Conservation and Recovery Act
RMG	rail-mounted gantry (crane)
RMS	root mean square
ROD	Record of Decision
ROI	region of influence
Ro-Ro	Roll-on/Roll-off dock
SAV	submerged aquatic vegetation
SCS	Soil Conservation Service
SD	School District
SEIS	Supplemental Environmental Impact Statement
SEL	sound exposure level
SHPO	State Historic Preservation Office(r)
SHWS	State Hazardous Waste Sites
SIP	State Implementation Plan
SOC	Species of Concern
SO_2	sulfur dioxide
SO_X	sulfur oxide
SQuiRTS	Screening Quick Reference Tables
SSM	Supplemental Safety Measure
STAR	Simulation, Training, Assessment & Research
SVOC	semivolatile organic compound

SWPPP	Stormwater Pollution Prevention Plan
TDT	total daily traffic
TEL	threshold effects level
TEQ	Toxic Equivalent
TEU	Twenty-foot Equivalent Unit
TNC	The Nature Conservancy
TOC	total organic carbon
TRG	Target Remediation Goal
tpy	tons per year
TSS	total suspended solids
TWLTL	two-way left-turn lane
µg/L	micrograms per liter
$\mu g/m^3$	micrograms per cubic meter
US	U.S. Highway
USACE	U.S. Army Corps of Engineers
USC	United States Code
USCG	U.S. Coast Guard
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USM	University of Southern Mississippi
VdB	vibration decibels
VOC	volatile organic compound
WQC	Water Quality Certification
WRDA	Water Resources Development Act

ES.1 INTRODUCTION AND AUTHORITY

The Mississippi State Port Authority (MSPA or Applicant) applied for a Department of the Army (DA) permit, under Section 10 of the Rivers and Harbors Act of 1899 (33 United States Code [USC] 403), Section 404 of the Clean Water Act (CWA) (33 USC 1344), and Section 103 of the Marine Protection, Research and Sanctuaries Act (MPRSA) of 1972, as amended (33 USC 1413) from U.S. Army Corps of Engineers (USACE) for activities related to the proposed expansion of the Port of Gulfport (Port). MSPA initially submitted a permit application on March 9, 2010, for Port expansion activities (Appendix A-1). This permit application was noticed to the public on April 16, 2010 (Appendix A-2). Activities subject to USACE jurisdiction would include filling estuarine mud and sand bottom areas in Mississippi Sound, dredging in navigable waters to expand the Gulfport Turning Basin (located outside the federally authorized project), and placement of dredged material to fill "waters of the U.S." The project proposed in the permit application was revised in early 2011 to reduce the overall potential fill required for implementation. Based on the DA permit application submitted by MSPA, USACE determined that the permitting action for the proposed Port expansion activities (i.e., dredge and fill) constitutes a major Federal action with potentially significant effects and/or substantial public interest. USACE published a Notice of Intent (NOI) to prepare a Draft Environmental Impact Statement (DEIS) in the *Federal Register* (FR) and provided notice to the public on March 11, 2011 (Appendix A-3).

In April 2013, MSPA submitted another revised permit application to the USACE (Appendix A-4). Revisions to the permit application included modification to the Gulfport Harbor Federal Navigation Channel (FNC) and Turning Basin. USACE determined this was a significant change to the originally proposed expansion project and issued a NOI to conduct additional public scoping on the project on May 9, 2013 (Appendix A-5). The project has changed since 2013, and as of February 2015, MSPA does not intend to expand or maintain an expanded FNC as part of the proposed expansion of the Port (see letter in Appendix A-6). As such, the current proposed action being evaluated for a DA permit is expansion of the Port via modifications to the West Pier, East Pier, North Harbor, and Turning Basin, and includes construction of a breakwater on the eastern side of the FNC. This proposed action is referred to as the Port of Gulfport Expansion Project (PGEP).

Pursuant to the National Environmental Policy Act (NEPA) of 1969, as amended (42 USC 4323 et seq.), USACE serves as the Lead Agency for the preparation of this Environmental Impact Statement (EIS). The EIS has been prepared to analyze and disclose the potential impacts of the PGEP and reasonable alternatives on the natural and human environment. It is intended to be sufficient in scope to address Federal, state, and local requirements with respect to the proposed activities and permit approvals. The Mississippi Development Authority (MDA), the National Marine Fisheries Service (NMFS), and U.S. Environmental Protection Agency (EPA) are cooperating agencies.

ES.2 PURPOSE AND NEED

The purpose of the proposed PGEP is to contribute to the long-term economic development of the State of Mississippi and the Gulf Coast region by expanding the Port footprint and facilities to increase the Twenty-foot Equivalent Unit (TEU) throughput, provide additional employment opportunities, and to increase the economic benefits produced by the Port. An expanded footprint would allow the Port to increase container throughput and add direct, indirect, and induced jobs within the region by attracting new tenants to expand and grow.

The Port currently has limited capability to grow in size. To provide long-term growth for the Port, the Port needs additional acreage to attract new tenants or concessionaires that would utilize a semi-automated container terminal. Therefore, additional backlands and wharf space are necessary for increasing Port capacity to meet expected needs (volume projections of 1.0 million TEUs by 2040 and 1.7 million TEUs annually by 2060 (Section 1.4 and Appendix B). Increased Port capacity would enable the Port to contribute to future employment opportunities and economic growth in Gulfport and its surrounding communities (see Appendix C).

ES.3 DESCRIPTION OF PROPOSED ACTION

The proposed action evaluated in this EIS is to expand the facilities at the Port to provide appropriate infrastructure for handling 1.7 million TEUs annually by 2060 and includes the following main features:

- Expansion of the West Pier
- Expansion of the East Pier
- Fill in the North Harbor
- Expansion of the federally authorized Gulfport Turning Basin (at 36-foot depth)
- An eastern breakwater
- Placement of dredged material
- Site configuration and automation

Such an effort involves the dredging and filling of estuarine mud and sand bottom in Mississippi Sound; construction of wharfs, bulkheads, terminal facilities, container storage areas, and intermodal container transfer facilities; placement of new-work and maintenance dredged material; and construction of a breakwater. The proposed expanded Port facility would be elevated to up to +25 feet mean sea level (msl) to provide protection against future tropical storm surge events. A conceptual schedule was developed by MSPA, and based on that schedule, it is assumed that construction would occur in 2018.

The proposed action assumes that the Restoration Project has been completed. The Restoration Project, referred also as the 84-acre Project, consists of restoring 60 acres destroyed by Hurricane Katrina and filling 24 acres on the west side of the West Pier, thereby completing the 84-acre Restoration Project, as originally permitted in 1998. The Restoration Project will raise the elevation of the Port to up to +14 feet above msl and reduce the potential impacts associated with storm events.

ES.4 POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION

This EIS addresses the potential impacts from construction and operation of the proposed PGEP on the environment and those resources identified during the public interest review, taking into consideration proposed mitigation measures. The evaluation of alternatives to the Proposed Project Alternative, including the No-Action Alternative, is provided in Section 2 of this EIS. The EIS identified and evaluated a range of reasonable and practicable alternatives for the proposed action. As a result of the alternatives development and screening, as described in Sections 2.1–2.7, two alternatives were carried forward for evaluation in the EIS: the No-Action Alternative and the Proposed Project Alternative. Cumulative impacts of this Project with other past, present, and reasonably foreseeable actions in the Project area were also assessed (see Section 5.0).

All factors that may be relevant to the proposed Project were considered, including dredged material management, air quality, shoreline erosion, economics, minority and low-income communities, railroad and rail traffic, and historic resources. The major issues identified during the evaluation of resource impacts from implementation of the Proposed Project Alternative are summarized below and include: Land Use/Recreation/Aesthetics, Socioeconomic Resources, Environmental Justice, Roadway and Rail Traffic, Air Quality, Noise, Coastal Geologic Processes, Water and Sediment Quality, Commercial and Recreational Navigation, Aquatic Ecology, and Threatened and Endangered Species. A more detailed discussion of the affected environment and potential impacts from Project implementation in comparison to the No-Action Alternative are provided in Sections 3 and 4 of this EIS, respectively.

Land Use/Recreation/Aesthetics

The expansion of the Port would increase the industrial land uses of the greater Gulfport metropolitan area; however, no major changes in land use to, or adjacent to, the Port, which is currently zoned as an I-2 Heavy Industrial District, are anticipated. It is possible that an increase of throughput may lead to the potential development of secondary or ancillary industries, such as Port and shipping-related support industries, transportation centers, or distribution warehouses. Many of these land uses already exist adjacent to the Port, but some additional increase in these adjacent land uses is likely and is consistent with existing trends.

The Proposed Project Alternative should have a minimal impact on recreation. Although some disruptions of access to the main channel may occur during construction of the proposed 4,000-foot, 18-acre breakwater, these impacts should be temporary and short term. Additionally, the West Pier Expansion would require boaters to move farther out into the Gulf to circumvent Port structures, and it would therefore take more time than currently to navigate around the Port.

The Proposed Project Alternative would have a moderate impact on the aesthetic value of the area due to expansion of Port facilities both in area and height, creation of the proposed breakwater, and larger throughput allowing increased cargo traffic. Because the Port expansion would be upgrading an existing industrial facility, the Proposed Project Alternative would remain consistent with the current aesthetic landscape of the study area and any additional aesthetic impact would be minor compared with the existing visual impact of the Port facilities.

Socioeconomics Resources

New employment and income opportunities would be created by the PGEP. Temporary employment opportunities would be created during construction of the PGEP. Permanent jobs (both full and part time) would also be created during the operational phase of the Port expansion resulting from the increased container capacity. Wage earnings are also anticipated to increase, benefiting personal income levels throughout the greater Gulfport metropolitan area and surrounding areas. Additional public finances would be generated by the taxes associated with the Port expansion and from the economic benefits of the Project. Overall, the Proposed Project Alternative would have a benefit on all economic sectors and would have greater overall benefits on labor force, employment, and industrial sectors.

Environmental Justice

To address Presidential Executive Order (EO) 13166, *Improving Access to Services for Persons with Limited English Proficiency* and EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, a specific Environmental Justice (EJ) analysis or Community Impact Assessment (CIA) was conducted as part of this EIS (see Appendix H). The CIA focused on population characteristics of the City of Gulfport, such as, race, ethnicity, and age, from an EJ perspective. It also addressed important issues, such as income and employment, traffic, air quality, noise, and community cohesion, all from an EJ perspective.

The CIA found no disproportionate impacts on minority, low-income, or limited English Proficiency (LEP) populations from the PGEP, and found that the Proposed Project Alternative is the more beneficial alternative from an EJ perspective through provision of increased jobs, revenue, and other associated economic benefits. Both the No-Action Alternative and the Proposed Project Alternative would result in minor or no impacts to air quality, community cohesion or other socioeconomic indicators. In addition, both the No-Action and the Proposed Project Alternatives would generate minor impacts to traffic and noise in census tract block groups with a higher minority percentage than the city population. However, there would be no disproportionate impacts to EJ communities. The minor impacts to traffic and noise would occur in EJ communities and non-EJ communities alike. Additionally, potential impacts to traffic under 2060 forecast scenarios for the Proposed Project Alternative would be essentially the same as described for the No-Action Alternative. Overall, the majority of impacts experienced in the vicinity of the Port would be caused by background traffic rather than Port-related traffic. Also, the potential minor impacts to traffic for the Proposed Project Alternative would not be felt immediately due to the expected gradual increase in TEU throughput. As a result, there would be sufficient time to address the potential issues associated with the No-Action and Proposed Project Alternatives; these issues would therefore be mitigated before being considered impacts. The CIA also presents mitigation measures that would ensure that the beneficial impacts from the PGEP, increased jobs and economic growth, are maximized.

Roadway and Rail Traffic

For the traffic analysis prepared for this EIS (see Appendix I), transportation impacts for the No-Action Alternative were assessed under the most recent official traffic forecasts, 2012 conditions, and under forecast conditions in the years 2020, 2040, and 2060. This baseline represents the level of growth expected to occur if the Port remains as approved by current permits and no additional work under the jurisdiction of the USACE is performed. Travel demand model forecasts were used to determine future traffic levels in 2020, 2040, and 2060 under the Proposed Project Alternative.

Results of the traffic analysis for the increase in freight truck and freight rail traffic, as well as passenger car and service truck traffic, under the No-Action Alternative in comparison to the Proposed Project Alternative, are provided in Section 4.4. The impact of proposed Port traffic on surrounding transportation facilities was determined using traffic analysis procedures derived from the Highway Capacity Manual (HCM). As discussed further in the traffic analysis (Appendix I), of the 40.2 miles studied, 0.3 mile would be deficient. Other than the eastbound approach of 28th Street at Canal Street, the analysis indicates that neither the Proposed Project Alternative nor background traffic growth through 2020 (No-Action Alternative) would cause other roadway segments in the study area to experience a Level of Service (LOS) worse than D. Since virtually no Port traffic uses this road segment, the capacity deficiency is likely due to background traffic growth not associated with the Proposed Project Alternative.

Overall, the majority of impacts seen in the vicinity of the Port based on the traffic analysis would be caused by background traffic rather than Port-related traffic. Additionally, it should be noted that traffic forecasting and modeling included only those roadway improvements that have been approved and funded. Thus, it is likely that changes in roadway planning over time would alleviate many of the LOS issues identified.

While additional train trips would be generated by the Port, the analysis projects the duration of delays and frequency of delays caused by the additional train trips generated by the Proposed Project Alternative should fall within the same thresholds as the No-Action Alternative. Therefore, impacts associated with changes in rail transport activities at the Port are expected to be the same as described for the No-Action Alternative. The slight changes in throughput would not substantially change expected delays at railroad crossings.

Air Quality

Air quality impacts associated with construction of the Proposed Project Alternative would include emissions from dredge vessels and land-based equipment. As discussed in Section 3.5, Harrison County is currently designated as attainment or unclassifiable with the National Ambient Air Quality Standards (NAAQS) for all regulated pollutants. The estimated air contaminant emissions, except ozone (O_3), are compared with the 2011 emissions inventory for Harrison County. Construction activities for the Proposed

Project Alternative would result in localized, short-term impacts on air quality caused by temporary increases in air pollution from equipment associated with construction and the combustion of fuel for dredging and support vessel activities. Due to the limited duration of the construction activities, emissions associated with construction of the Proposed Project Alternative are not expected to adversely impact the long-term air quality in the area.

Under the Proposed Project Alternative, an increase in throughput and ancillary operations would result in an increase in air contaminant emissions due to increased truck, rail, employee vehicle, and ship traffic resulting from both the growth of existing business and new business at the Port. However, criteria pollutant and Hazardous Air Pollutant (HAP) emissions from the Proposed Project Alternative would equal very small percentages of the total criteria pollutants and HAPs emitted in the study area. Impacts of criteria pollutants and HAPs from the operational inventory of the Proposed Project Alternative would be minor. Estimates for the projected near-road and near-rail impacts on ambient air quality from line haul locomotives and container trucks operating off-property from the Port of Gulfport north to Creosote Road are provided in Section 4.5. Dispersion modeling results of these sources estimated carbon monoxide (CO), nitrogen dioxide (NO_2), particulate matter of 10 micrometers or less (PM_{10}), and particle diameters of 2.5 micrometers or less ($PM_{2.5}$) concentrations would not exceed the NAAQS. Impacts to localized air quality from the Proposed Project Alternative would be minor. Additionally, annual maintenance dredging and disposal activities would result in minor impacts on air quality from the combustion of fossil fuels.

Climate change impacts are by nature, cumulative and long term. An individual project cannot generate enough greenhouse gas (GHG) emissions to influence global climate change. The Proposed Project Alternative participates in this potential impact by its incremental contribution combined with the cumulative increase of all other sources of GHGs, which when taken together create changes in the climate. Because the GHG emissions from the construction phase of the Proposed Project Alternative are short-term in nature, the impacts from the construction GHG emissions of the Proposed Project Alternative on global climate change would be minor. Although the Proposed Project Alternative is estimated to result in higher GHG emissions than the No-Action Alternative in the long-term, this is largely due to the facilitation of increased container throughput, rather than inefficiencies by the Port when compared to the No-Action Alternative. Therefore, the Proposed Project Alternative would result in minor impacts to global climate change.

Noise

The implementation of the PGEP would result in short- and long-term noise impacts in the vicinity of the Port. Construction of the proposed Project would require the use of heavy equipment. As noted in Section 3.6 of this EIS, the noise-sensitive receptors nearest to the Port include a recreational park located 2,100 feet from the site, a residential area 2,300 feet from the site, a school 2,300 feet from the site, and a church located approximately 3,000 feet from the site. Expansion activities at the East Pier, West Pier, and proposed breakwater would be a greater distance from noise-sensitive receptors; therefore Project-related construction noise at sensitive receptor sites would be lower when work is underway in those areas.

Considering the distance between Port expansion or dredging operations and the noise-sensitive sites, the short-term noise increase associated with the Proposed Project Alternative would be anticipated to be insignificant.

Forecasted changes in traffic volume resulting from the implementation of the Proposed Project Alternative according to the traffic analysis (Appendix I) would result in very small increases in traffic volumes within the regions of influence (ROIs). The change in noise resulting from this small increase in traffic would not be perceptible to the human ear.

The Proposed Project Alternative would result in increases in train-generated noise along the Kansas City Southern (KCS) rail line (Appendix J). The majority of these impacts would occur in the Hattiesburg and Gulfport areas due to the combination of high population densities and numerous at-grade rail crossings (with their associated horn noise). Adoption of the approved Supplemental Safety Measures (SSM) outlined in Section 4.6.1 would help to mitigate the anticipated severe and moderate impacts to the noise-sensitive receptors in the study area from implementation of the Proposed Project Alternative.

Coastal Geologic Processes

The Proposed Project Alternative would alter 282 acres of estuarine mud and sand bottom habitat due to dredging, material placement, and Port expansion activities. Local physiography and topography at the Port (described in Section 2.8.2) would undergo a change from an elevation increase of up to +25 feet msl and from an increase of total Port footprint from about 369 to 650.5 acres. The Proposed Project Alternative would require dredging for the expansion of the East and West piers, the North Harbor, and the Turning Basin. Sediment rework and an increase in sediment suspension could result in short-term impacts due to expansion activities and maintenance dredging associated with the Proposed Project Alternative. Additionally, the expansion of the West Pier could potentially have an impact on sediment net transport direction. A modeling evaluation of impacts to Harrison County beaches showed that the proposed Project would not result in significant changes in wave heights or breaking wave angles along the adjacent beaches.

Water and Sediment Quality

Construction of the Proposed Project Alternative would lead to localized, short-term degradation of water quality, such as minor increases in turbidity during dredging and placement operations. Turbidity increases would be localized to the area nearby where sediment is disturbed and would be managed by Mississippi's regulated standards.

Commercial and Recreational Navigation

Under the Proposed Project Alternative, there would be no impacts to the existing Federal channel aids to navigation (ATON) or Commercial Small Craft Harbor; however, the Commercial Small Craft Channel would be realigned and six buoys and three beacons would be relocated.

The Proposed Project Alternative would increase throughput to up to 1.7 million TEUs annually by 2060, yielding 2,833 container vessel trips per year, or 7.8 trips per day. Some delays could be encountered by recreational boaters using the Gulfport Yacht Club and Gulfport Small Craft Harbor or the Commercial Small Craft Harbor immediately adjacent to the Port while yielding to larger ships transiting the FNC. However, these delays are not expected to be excessive, given the number of ships expected to call at the Port in a given day.

Aquatic Ecology

The Proposed Project Alternative would directly affect the aquatic communities in Mississippi Sound and temporarily reduce the quality of Essential Fish Habitat (EFH) in the vicinity of Port by the loss of 196.5 acres of open-water habitat, which would be removed with the expansion of the West and East Piers, creation of breakwaters, and North Harbor Expansion, and permanent conversion of 85 acres to deeper habitat, thus reducing the amount of food and habitat available to some aquatic communities. However, the area involved would be a small fraction (0.04 percent) of the total available habitat within the entire system.

The release of sediment during Project construction and dredged material placement activities may affect some aquatic organisms near the dredging activity. However, turbidities can be expected to return to near ambient conditions within a few hours after dredging ceases in a given area. Notwithstanding the potential harm to some individual organisms, no long-term impacts to finfish or shellfish populations are anticipated from project construction, dredging, and placement activities associated with the PGEP.

Vessel traffic would be expected to increase with the Proposed Project Alternative, slightly increasing the probability of a petroleum spill. However, in the unlikely event a petroleum spill should occur, adult shrimp, crabs, and finfish are probably motile enough to avoid most areas of high oil concentration. Larval and juvenile finfish and shellfish tend to be more susceptible to a petroleum spill than adults and could be affected extensively by a spill during active immigration periods. An oil spill in the Project area could also result in impacts to phytoplankton, algal, and zooplankton. However, since these organisms have the ability to recover rapidly from a spill, due primarily to their rapid rate of reproduction and to the widespread distribution of dominant species, long-term impacts would not be expected.

Additionally, under the Proposed Project Alternative, new work dredged material that is structurally suitable would be used for fill on the Project site, while the remaining new work material would be evaluated for potential beneficial use and possible placement at a designated or candidate Beneficial Use (BU) site, such as the Biloxi Marsh Complex (BMC) (if approved and authorized for use). This habitat would have the potential to be more productive than the open-water habitat that would be lost as a result of the Proposed Project Alternative. As such, the aquatic community in Mississippi Sound may benefit from the higher productivity of the marsh, which would create an overall positive benefit to the bay system throughout the life of the 50-year Project.

Threatened and Endangered Species

The U.S. Fish and Wildlife Service (USFWS) and NMFS have identified 22 federally listed threatened and endangered species as potentially occurring in the study area as described in Section 3.19, but only 14 species have the potential to occur in the Project area, including piping plover, rufa red knot, West Indian manatee, blue whale, finback whale, humpback whale, sei whale, sperm whale, Kemp's ridley sea turtle, hawksbill sea turtle, green sea turtle, leatherback sea turtle, loggerhead sea turtle, and Gulf sturgeon. Critical habitat has been designated in the study area for both the piping plover and the Gulf sturgeon. The majority of impacts to threatened and endangered species anticipated as a result of the PGEP would be temporary in nature due to construction and dredging activities and are discussed further in the formal Biological Assessment (BA) (Appendix N) and Section 4.19.

In summary, none of the five whale species is expected to occur in the Project area, and therefore, no effects to the five whale species are anticipated from the Proposed Project Alternative. New work and maintenance dredging activities have the potential to negatively impact all five federally listed sea turtle species, should they be present in the Project area during the time of construction and dredging. Adverse effects could occur from impingement, temporary physical and behavioral impacts from noise, increased turbidity and re-suspended sediment, and loss of benthic food resources during dredging and placement activities. Potential entrainment of listed sea turtle species and Gulf sturgeon during dredging activities is the most significant potential impact associated with the Proposed Project Alternative. Avoidance, minimization, and other conservation measures formalized by NMFS in the Gulf Regional Biological Opinion (NMFS, 2003, 2005, 2007) and adopted for the PGEP would greatly reduce the likelihood of adverse effects to these sea turtle species and the Gulf sturgeon. Additional impacts include the loss of 196.5 acres of estuarine mud and sand bottom habitat and permanent conversion of 85 acres to deeper habitat under the Proposed Project Alternative; however, the acreage of Gulf sturgeon critical habitat impacted by the proposed Project is relatively small (0.06 percent) compared with the overall size of Gulf sturgeon critical habitat in the Mississippi Sound.

This page intentionally left blank.

1.0 INTRODUCTION, PURPOSE, AND NEED

1.1 INTRODUCTION

The Mississippi State Port Authority (MSPA or Applicant) applied for a Department of the Army (DA) permit, under Section 10 of the Rivers and Harbors Act of 1899 (33 U.S. Code [USC] 403), Section 404 of the Clean Water Act (CWA) (33 USC 1344), and Section 103 of the Marine Protection, Research, and Sanctuaries Act (MPRSA) of 1972, as amended (33 USC 1413) from U.S. Army Corps of Engineers (USACE) for activities related to the proposed expansion of the Port of Gulfport (Port). MSPA initially submitted a permit application on March 9, 2010, for Port expansion activities (Appendix A-1). This permit application was noticed to the public on April 16, 2010 (Appendix A-2). Activities subject to USACE jurisdiction would include filling estuarine mud and sand bottom areas in Mississippi Sound, dredging in navigable waters to expand the Gulfport Turning Basin (located outside the federally authorized project), and placement of dredged material to fill "waters of the U.S." The project proposed in the permit application was revised in early 2011 to reduce the overall potential fill required for implementation. Based on the DA permit application submitted by MSPA, USACE determined that the permitting action for the proposed Port expansion activities (i.e., dredge and fill) constitutes a major Federal action with potentially significant effects and/or substantial public interest. USACE published a Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS) in the *Federal Register* (FR) and provided notice to the public on March 11, 2011 (Appendix A-3).

In April 2013, MSPA submitted another revised permit application to USACE (Appendix A-4). Revisions to the permit application included modification to the Gulfport Harbor Federal Navigation Channel (FNC) and Turning Basin. USACE determined this was a significant change to the originally proposed expansion project and issued a NOI to conduct additional public scoping for the project on May 9, 2013 (Appendix A-5). As of February 2015, MSPA determined that widening and deepening of the FNC is no longer a requirement of known incoming tenants. Furthermore, MSPA does not intend to expand or maintain an expanded FNC without first receiving funding and prior Federal approval through the Water Resources Development Act (WRDA) 204(f) process. Therefore, the purpose and need of the project has changed, and no modification to the FNC is currently proposed as part of the expansion project (see letter in Appendix A-6). Modification to the FNC will be discussed in the Environmental Impact Statement (EIS) as part of cumulative impacts and reasonably foreseeable future actions. The current proposal being evaluated for a DA permit is expansion of the Port via modifications to the West Pier, East Pier, North Harbor, and Turning Basin, and includes construction of a breakwater on the eastern side of the FNC. This proposed action is referred to as the Port of Gulfport Expansion Project (PGEP or Project).

Pursuant to the National Environmental Policy Act (NEPA) of 1969, as amended (42 USC 4323 et seq.), USACE serves as the Lead Agency for the preparation of this EIS. The EIS has been prepared to analyze and disclose the potential impacts of the PGEP and reasonable alternatives on the natural and human environment. It is intended to be sufficient in scope to address Federal, state, and local requirements with respect to the proposed activities and permit approvals. The Mississippi Development Authority (MDA), the NMFS, and the U.S. Environmental Protection Agency (EPA) are cooperating agencies.

Under Section 404(b)(1) guidelines, the USACE process requires selection of the least environmentally damaging practicable alternative (LEDPA) that would avoid or minimize the impacts to waters of the U.S., over which USACE has jurisdiction, and that meets USACE's purpose and need for the proposed Project.

1.2 PROJECT BACKGROUND

The Port is located south of the City of Gulfport in Harrison County, Mississippi, within city limits (Figure 1.2-1) and is approximately 7 miles south of Interstate (I)-10, approximately 80 miles west of Mobile, Alabama, and 80 miles east of New Orleans, Louisiana. The Port encompasses approximately 369 acres and is located on the north shore of the Mississippi Sound within 5 miles of the Gulf Intracoastal Waterway (GIWW) and 10 miles from the Gulf of Mexico (Gulf) and Gulf Island National Seashore.

The Port is constructed on fill over former open-water bottom areas in Mississippi Sound and includes the East Pier, North Harbor, West Pier, and Commercial Small Craft Harbor. Access to the Port is via the FNC and a Commercial Small Craft Channel (8 feet deep). Located to the east of the Port are the Gulfport Small Craft Harbor, Gulfport Yacht Club, Harbor Square Park, and U.S. Coast Guard (USCG) Station Gulfport. Public beaches are located to the east and west of, and adjacent to, the Port. The northern boundary of the Port is U.S. Highway (US) 90. These features are shown on Figure 1.2-2.

The Federal Gulfport Harbor Navigation Project was adopted by the Rivers and Harbors Act (approved on July 3, 1930) and the Rivers and Harbors Act (approved on June 30, 1948). In 1932, construction of the existing Gulfport Harbor began and was completed in 1950. Improvements to the existing harbor were authorized in the Fiscal Year 1985 Supplemental Appropriations Act (Public Law [PL] 99-98). The WRDA of 1986 (PL 99-662) and 1988 (PL 100-676) further modified the previous authorizations to cover widening and deepening and thin-layer disposal, respectively. The authorized deepening was completed in 1993 and the widening was completed in 2011.

The FNC is 300 feet wide in the inner channel (Sound Channel) and maintained to a depth of 36 feet within Mississippi Sound. The outer channel (Bar Channel) from Ship Island south to the safety fairway is 400 feet wide with a depth of 38 feet. The Port's North Harbor (Inner Harbor) is maintained to a depth of 32 feet, while the South Harbor (Outer Harbor) and Gulfport Turning Basin, which are approximately 1,320 feet wide, are maintained to a depth of 36 feet (USACE, 2009a). The depths provided do not include 2 feet of allowable over depth and 2 feet of advance maintenance.

In November 2015, the Port was designated a Strategic Seaport by the Department of Defense (DoD), in conjunction with the Department of Transportation (DOT) Maritime Administration. U.S. ports are designated as Strategic Seaports based on their location and proximity to DoD installations and efficient transportation infrastructure. Strategic seaports are used to transport cargo and equipment from surrounding

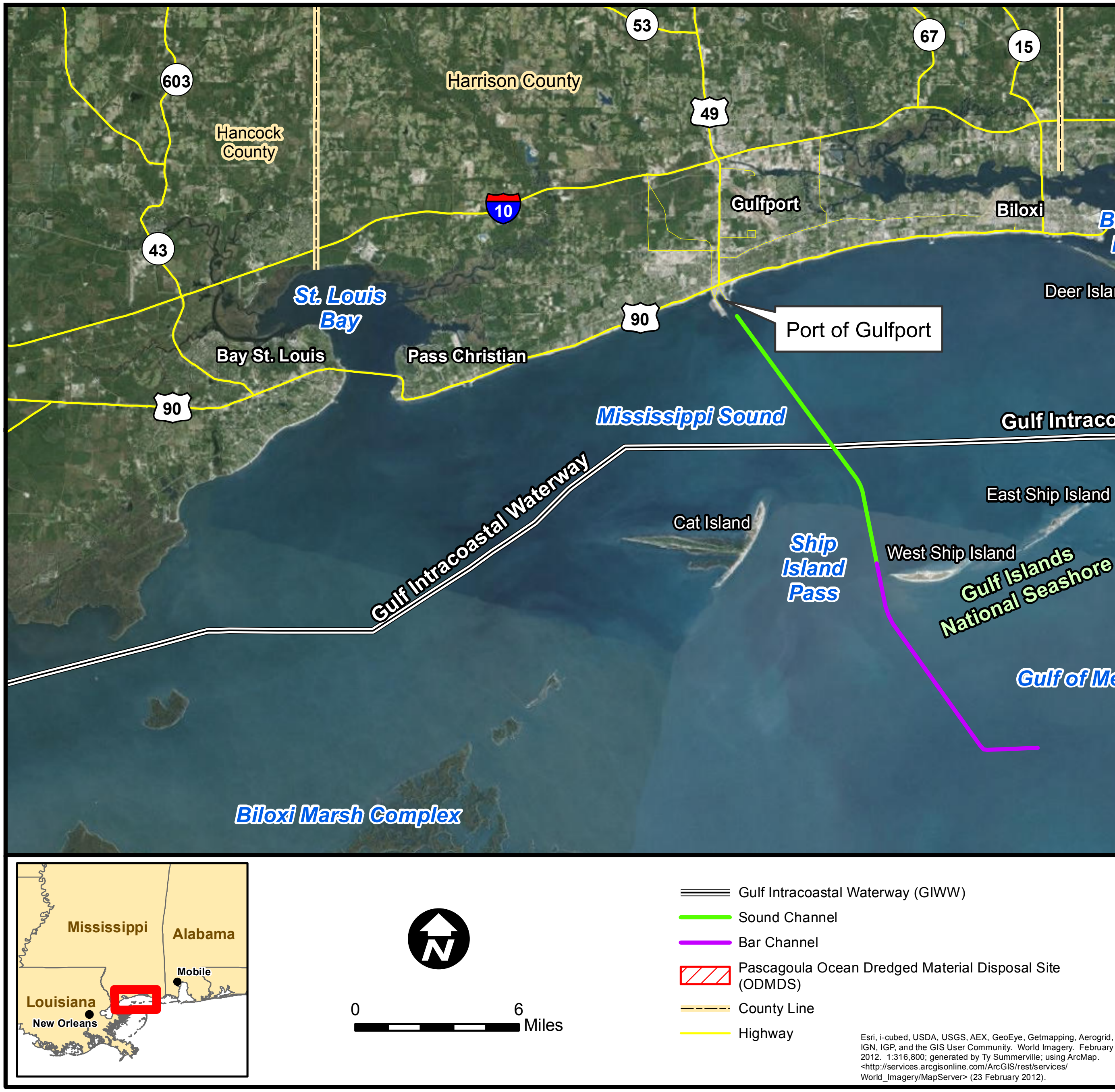


Figure 1.2-1

Port of Gulfport Expansion Project

Project Location

Prepared By: 25913	Scale: 1" = 30,000 feet
Job No.: 100018536	**Date: October 7, 2015**

File: N:\Clients\M_N\Mississippi_State_Port_Authority\100018536\geospatial\Figs_EIS\2015_Revisions\PGEP_EIS_Figure_1_2_1_Proj_Loc_100715.mxd

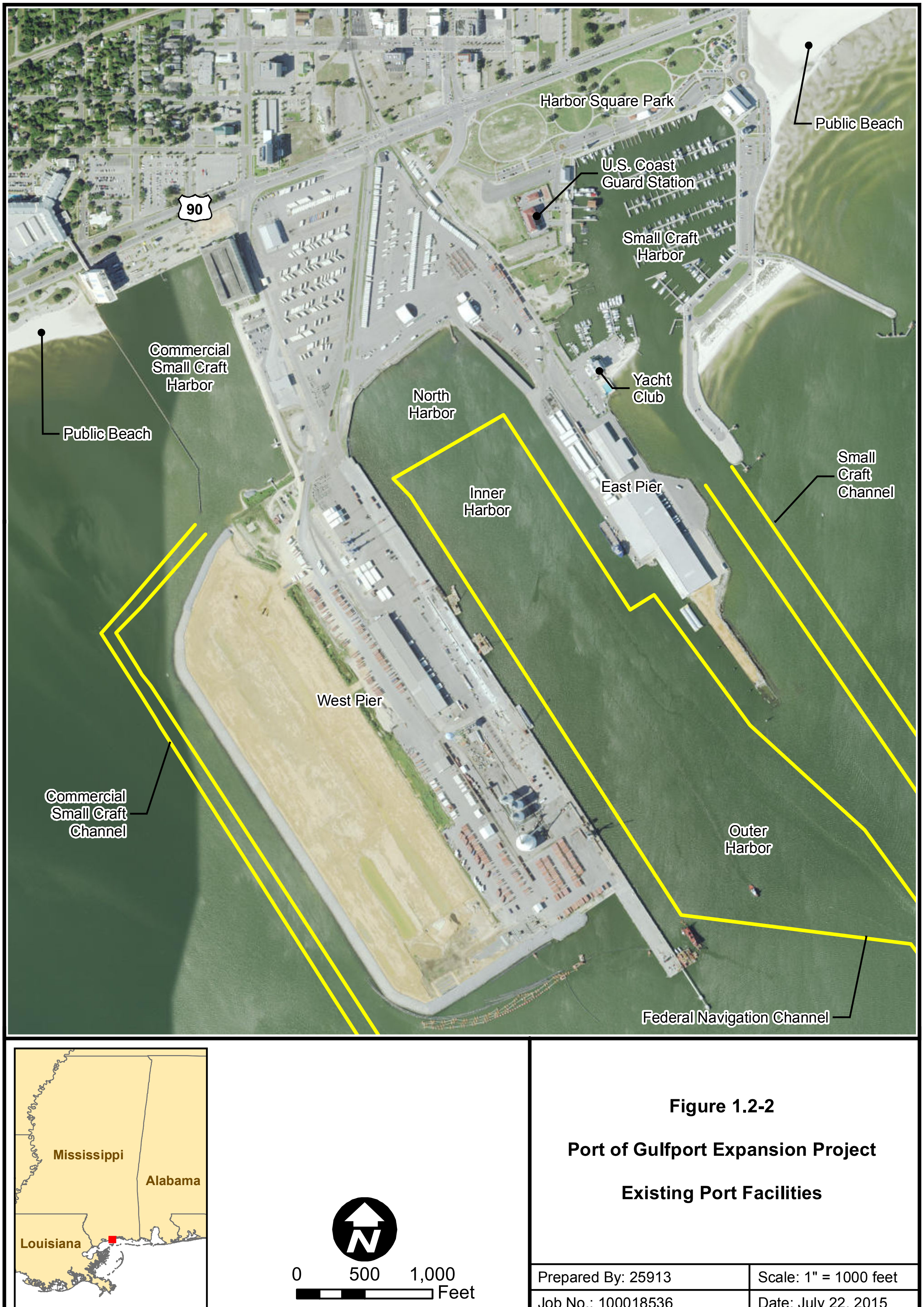


Figure 1.2-2

Port of Gulfport Expansion Project

Existing Port Facilities

Prepared By: 25913	Scale: 1" = 1000 feet
Job No.: 100018536	Date: July 22, 2015

File: N:\Clients\M_N\Mississippi_State_Port_Authority\100018536\geospatial\Figs_EIS\2015_Revisions\PGEP_EIS_Figure_1_2_2_Existing_Port_Facilities_150722.mxd military installations to sites overseas during times of war or international emergencies. With the Port's central location in the southeastern defense corridor, it can provide military installations with direct on-dock rail service and quick access to the major east/west corridor of I-10. The Port will support the Mississippi National Guard and DoD assets in the region (Keesler Air Force Base, Camp Shelby and the Naval Construction Battalion Center in Gulfport). The Port is one of 17 commercial ports designated as Strategic Seaports. The Port's responsibilities as a Strategic Seaport include ensuring specific facilities needed to conduct a military deployment are available to the military within 48 hours of written notification. The Port is required to have 28 acres and two berths available to DoD when needed.

The Port, located on the Mississippi Gulf Coast, presently has eight major maritime tenants and one non-maritime related business line: Dole Fresh Fruit Company (Dole); Crowley Maritime Corporation (Crowley); McDermott International (McDermott); Gulf Coast Shipyard Group; Chemours (formerly DuPont); TopShip, LLC; the University of Southern Mississippi; Chiquita Fresh North America (Chiquita), and Island View Resort and Casino. Maritime-based tenant operations include container, bulk and break-bulk operations as well as oil and gas suppliers, shipbuilders, and marine exploration. Dole, Crowley and Chemours are noted for shipping cargo and containers into and out of the Port, but this does not convey the number of containers that go through the Port annually. In 2014, 190,000 Twenty-foot Equivalent Units (TEUs) went through the Port with Dole and Chiquita making up 99 percent of container traffic. Even when Chiquita departed the Port in late 2014 for New Orleans, it continued to use Port facilities to ripen its products. However, the company has since returned their operations to Gulfport.

The West Pier area is currently utilized by Crowley, Chemours, and Dole, and contains the Port's Roll-on/Roll-off (Ro-Ro) dock. The East Pier, together with a portion of the North Harbor, is utilized by McDermott.

Current facilities at the Port include:

- Ten berths totaling nearly 6,000 feet in length
- More than 400,000 square feet of covered storage
- Two Gottwald mobile harbor cranes
- Open container storage with reefer plug outlets for refrigerator cars, trucks, trailers, etc.
- Dockside and off-dock storage
- Customs secured boundaries with roving patrols
- Ro-Ro dock
- Rail service provided by Kansas City Southern (KCS) Railway and CSX Corporation (CSX), with access to the Illinois Central and Canadian National Railroads
- Three rail-mounted gantry (RMG) cranes

According to data obtained from the American Association of Port Authorities (AAPA), Gulfport's container volumes have grown and then slightly declined over the past 2 decades, first reaching the

200,000 TEU level in 2003 and then 223,740 TEUs in 2010. According to the Port, container volumes decreased to 190,000 TEUs in 2014. The Port has generally maintained a volume of 200,000 TEUs since 2003, representing about 0.5 percent of the U.S. total. Hurricane Katrina caused a significant disruption in volume and shares of the U.S. total, with declines in Gulfport, as well as New Orleans in 2005 (AAPA, 2010).

On August 29, 2005, Hurricane Katrina made landfall on the Mississippi Gulf Coast. The high winds, waves, storm surge, and storm debris severely impacted the Port. The Port's docks, terminals, electrical power supply, roads, water, sewer, rail, small craft harbor, fendering systems, navigational aids, and lighting and security systems were all destroyed or damaged beyond repair. Loss in operating capacity as a result of Hurricane Katrina directly impacted the number of job opportunities at the Port.

As part of the U.S. Department of Housing and Urban Development (HUD), Community Development Block Grant (CDBG) program, $5.4 billion in Federal aid was allocated to the State of Mississippi to assist in recovery and rebuilding efforts after Hurricane Katrina. MDA was designated by the governor as the agency responsible for administering the CDBG funds (Pike, 2007). The Port was designated as a key element in these efforts, and HUD allocated $570 million to reestablish a sustainable port facility capable of repositioning itself in the maritime marketplace. Currently, the Port is utilizing these funds to restore the facilities by constructing new terminals and infrastructure to be more storm resistant, as well as position the Port for potential future growth (this effort is referred to as the Restoration Project and is described in Section 1.3.1).

The Port intends to expand its current footprint to support construction of new wharfs and backlands and dredge a turning basin to provide the necessary berths and turning radius for larger ships. The PGEP is intended to provide local and state economic benefits by expanding an existing industry and creating jobs both directly and indirectly. CDBG funds may not be used for construction of the PGEP, if permitted. Instead, construction would be funded by the Port, private investors, and tenants.

1.3 PORT PLANNING AND OTHER RELEVANT PROJECTS

MSPA began developing strategic plans for the Port in the early 1990s. The following outlines the history of the MSPA Strategic Plans and objectives:

- 1994 MSPA strategic Master Plan objectives (Vickerman, Zachary, Miller, 1994):
  - Reorganize the Port's cargo-handling infrastructure in order to maximize throughput capacity, while taking advantage of limited expansion capability to meet forecasted growth.
  - Include expansion of the West Pier by 84 acres to accommodate container storage, an Intermodal Container Transfer Facility, and a new berth.
  - Evaluate an East Pier recreational area.
  - Create a Traffic Management Plan that will ensure efficient and safe flows for all current and future industries (rail activities would remain unchanged).

- 2003 Gulfport Master Plan objectives (JWD Group, 2003):
  - Complete construction of 60-acre fill on the West Pier and modify the permit to fill 24 acres on the East Pier (total 84 acres).
  - Relocate US 90 inland towards downtown, linking it to the revitalized waterfront.
  - Relocate truck access corridor linking I-10 with the Port via an access over US 90 and into the Port facility.
  - Use of Inland Port to enhance movement of domestic and international containerized cargoes.
- 2007 MSPA Gulfport Master Plan Update (DMJM Harris/AECOM, 2007):
  - The Port's 2007 Master Plan Update resulted following Hurricane Katrina in 2005 with the reevaluation of the 2003 Master Plan having many similarities to the original 2003 plan, but with renewed vision and accelerated focus to change.
  - During the review of the 2003 Master Plan, it was determined that many of the objectives were still applicable after the hurricane.
  - This plan intends to complete the 84 acres of fill as a 5-year plan and proposes an additional 105 acres of fill as a 10-year plan (the additional 105 acres of fill was not implemented).
  - Included discussion of an Inland Port to be used to increase the Port's throughput capacity and for hurricane evacuation.
  - One change since the adoption of the 2003 Master Plan was the completion of the Mississippi Department of Transportation's (MDOT) feasibility study for the proposed I-310 Project.

Development of these strategic master plans resulted in consideration of the following efforts in this EIS: the Port of Gulfport Restoration Project (the 1998 permitted 84-acre Project plus raising the Port elevation, referred to hereafter as the Restoration Project) and the MDOT Central Harrison County Connector Highway Project (referred to hereafter as the I-310 Project). The two projects are discussed in more detail below.

1.3.1 Restoration Project

The Restoration Project, also referred to as the 84-acre Project, consists of restoring 60 acres (Phases I and II of the previously permitted 84-acre Project) destroyed by Hurricane Katrina and executing Phase III of the originally proposed project (USACE, 1998a). Phase III included filling 24 acres on the west side of the West Pier, thereby completing the 84-acre Restoration Project, as permitted in 1998. In conjunction with the modified Port footprint, construction activities included fill placement to increase elevations of the West Pier and modifications to wharf, terminal, utility, and railroad facilities. These improvements are designed to better serve existing Port tenants, accommodate higher-volume container and non-container terminal operations and future non-terminal concessions, provide for long-term recovery of the operating capacity of the Port, provide protection against future tropical storm events, and establish a solid infrastructure foundation for current and future operations of MSPA.

Over the past 2 decades, MSPA has prepared several master plans to develop the Port and attract new tenants to increase the throughput of the Port as discussed above. This development at the Port was initiated in 1996 with submittal of a CWA Section 404 and Rivers and Harbors Act Section 10 permit application to the USACE. The application was approved by the USACE in 1998 with their issuance of a Finding of No Significant Impact (FONSI) for the Restoration Project based on the results of the Environmental Assessment (EA) (USACE, 1998a). Construction of 60 acres of the 84-acre Project was underway when Hurricane Katrina impacted the area in 2005, causing significant damage to the partially constructed facility.

In November 2005, the former governor of the State of Mississippi (Haley Barbour) presented to Congress and members of the Mississippi Legislature a request for long-term funding to address recovery needs. In keeping with that original plan, MSPA is utilizing a portion of the disaster recovery funding provided by HUD to restore public infrastructure and publicly owned facilities, which were destroyed by Hurricane Katrina, to provide mitigation against future damage, and to provide for the long-term recovery of the operating capacity of the Port. In 2009, MDA issued an EA for the Restoration Project which concluded with a FONSI, and HUD approved the release of funds to complete 60 acres of fill. This work was completed in 2011. Construction on the remaining fill (24 acres) and construction of infrastructure was completed in July 2013 following MDA's release of the 2010 EA and FONSI and HUD's approval of the release of funds for this work. It should be noted that in 2012, the change in elevation of the West Pier was reduced from +25 feet above mean sea level (msl) to up to +14 feet msl.

Upon completion of the Restoration Project, the Port is expecting the improved facilities to provide a more modern and efficient port for users. Depending on configuration of tenants, the amount of automation, and the condition of land-based rail and roadway infrastructure, the restored Port facility will be able to accommodate between 250,000 and 1.0 million TEUs annually by 2060. With regard to the PGEP, the No-Action Alternative assumes that the Restoration Project has been completed.

In July 2016, MSPA submitted a joint permit application to the USACE/MDMR for construction of a barge mooring structure at the northern end of the Gulfport Anchorage Basin. The purpose of the project is to provide additional berthing space for barges at the Port in support of the Restoration Project. The mooring structure will include an eight-pile cluster dolphin fender on the southern end, and 15 single mooring piles installed in a "T" configuration, north of the dolphin fender. Construction of the structure is expected to be completed in September 2017. As with the Restoration Project, with regard to the PGEP, the No-Action Alternative assumes that the barge mooring structure has been constructed.

1.3.2 Mississippi Department of Transportation's I-310 Project

MDOT's I-310 Project was mandated by Mississippi Senate Bill 2058 (known as Vision 21), and is proposed as a four-lane roadway and interchange intended to provide a more-direct, controlled access route between US 90 and I-10. In 2003, the Federal Highway Administration (FHWA) issued a FONSI for the project based on MDOT's EA (Parsons Brinckerhoff Quade and Douglas Inc., 2003). Survey and design work was initiated in 2005 and right-of-way acquisition began on the northern portion of the project. Although construction of the project has not started at this time, it is included in the Gulf Coast Regional Plan, and MDOT considers it as part of their No-Build scenario for future planning efforts. However, due to litigation, this project has been vacated and it is unknown when the project will move forward. For evaluation purposes, it is assumed that the project would not be operational. Instead, this project is included in the cumulative impacts assessment of this EIS as a Reasonably Foreseeable Future Action (Section 5.0).

1.4 MARKET FORECAST

In support of the evaluation of the proposed PGEP, an evaluation of the container cargo market was conducted (Gulfport Container Volume Projections, Appendix B). The Gulfport Container Volume Projections evaluation focused on the container market within the Gulf and projection of container volume throughput at the Port. The projections were based on existing and historic container volume flows through the Port and four different future scenarios were considered: baseline, low-growth, high-growth, and optimistic growth. Based on existing markets, and taking into account the expansion of the Panama Canal, existing carriers in the Gulf, road and rail infrastructure, and the attractiveness of the Port to existing and potential carriers, estimates of container throughput were made for each scenario over a 50-year period.

The baseline projection for Gulfport's container volume assumed an average annual growth rate of 3.3 percent through 2040, largely based on increasing imports from Central America (i.e., growth in banana and apparel imports based on increased consumption of consumer goods in the U.S.). For evaluation purposes, the baseline projection assumed the Restoration Project was completed. Under these assumptions, it was projected that TEU volumes would total 600,000 in 2040, growing to approximately 1.0 million in 2060.

The low-growth projection of container volumes also assumed completion of the Restoration Project and was based on a relatively low growth rate of 2.8 percent in existing markets through 2040. TEU volumes would total less than 500,000 in 2040, increasing to 900,000 in 2060.

A high-growth scenario of container volumes was based on a higher growth rate of 3.8 percent through 2040. TEU volumes would total 700,000 in 2040 and 1.2 million in 2060.

An optimistic view of growth in container volumes was based on a growth rate of 5.3 percent through 2040 and not on capturing U.S. imports from Northeast Asia or Europe, but rather on a doubling in Gulfport's share of imports from the Caribbean, Central America, and South America. Such share increases would require successful competition with other Central Gulf ports, in part based on improved capabilities for reaching inland markets by rail. TEU volumes would total less than 1.0 million in 2040 and 1.7 million in 2060. It should be noted that this evaluation of future markets and container volume transport at the Port was conducted in 2011, during an economic downturn in the U.S. and world markets. As such, actual potential for growth could be increased beyond what was projected under this evaluation.

According to the Port (pers. comm., Elizabeth Calvit, CH2M HILL, July 20, 2016), existing cargo includes a variety of items including fruit, textiles, retail distribution stock, and industrial goods. Other goods imported and exported include paper (shipped to South America to make boxes), cotton, and ilmenite ore from Mozambique, Africa which is railed or trucked to the Chemours facility in DeLisle, Mississippi. The Port is expecting to sign another tenant in the coming months that will add new jobs and increase tonnage and TEUs. The addition of McDermott in 2014 and the acquisition of a new inland port facility on Seaway Road in 2015, coinciding with a lease agreement with TopShip, LLC, has significantly increased the number of ship and barge calls at the Port.

1.5 PURPOSE AND NEED

1.5.1 Applicant's Purpose Statement

The purpose of the proposed PGEP is to contribute to the long-term economic development of the State of Mississippi and the Gulf Coast region by expanding the Port footprint and facilities to increase the TEU throughput, provide additional employment opportunities, and to increase the economic benefits produced by the Port. An expanded footprint would allow the Port to increase container throughput and add direct, indirect, and induced jobs within the region by attracting new tenants and allowing existing tenants to expand and grow.

1.5.2 Applicant's Need Statement

The Port currently has limited capability to grow in size. The Restoration Project will raise the elevation of the Port to up to +14 feet msl and reduce the potential impacts associated with storm events. Raising the Port will benefit existing tenants and may attract future tenants, as the increase will reduce the need for tenants to remove equipment and goods from the Port facility in the event of a storm. The Port would have an estimated effective capacity of between 250,000 and 400,000 TEUs per year immediately following completion of the Restoration Project, with the potential to increase to up to 1.0 million TEUs annually by 2060.

To provide long-term growth for the Port, the Port requires additional acreage to attract new tenants or concessionaires that would utilize a semi-automated container terminal. The ability to recruit tenants and concessionaires is constrained by the Port's capacity. Unencumbered land available on the restored Port will be very limited and will be utilized, along with automation and improved intermodal infrastructure, to realize the effective capacity of up to 1.0 million TEUs annually by 2060. Therefore, additional backlands and wharf space are necessary for increasing Port capacity to meet expected needs (volume projections of 1.0 million TEUs annually by 2040 and 1.7 million TEUs annually by 2060 under the optimistic growth scenario; Section 1.4 and Appendix B). Increased Port capacity would enable the Port to contribute to future employment opportunities and economic growth in Gulfport and its surrounding communities (Appendix C).

1.5.3 Purpose and Need for USACE Action

Basic Project Purpose: Section 404(b)(1) guidelines require that USACE determine whether a project is "water dependent." Water dependent means that the project requires access or proximity to, or sighting 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]).

USACE has determined that the basic purpose for the MSPA is to expand the Port. USACE considers the proposed PGEP a water-dependent activity. Through close evaluation of resources and coordination with regulatory authorities, it has been determined that the PGEP would not impact a special aquatic site as defined in Subpart E § 230.40 part (a).

Overall Project Purpose: In addition to the Applicant's purpose discussed above, the Section 404(b)(1) Guidelines require that USACE 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 USACE permits is the sole responsibility of USACE. While generally focusing on the Applicant's purpose and need statement, USACE 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). USACE has determined the overall project purpose is to increase throughput capabilities at the Port beyond 1.0 million TEUs annually and stimulate the local, regional, and state economies by providing expansion opportunities for existing tenants and to attract new tenants or concessionaires that would construct a semi-automated container terminal, thereby creating direct, indirect, and induced jobs. The screening process used to identify practicable alternatives is described in Sections 2.3 through 2.6.

The concept of public and private need for the proposed Project is important to the balancing process of USACE public interest review. Regulations at 33 *Code of Federal Regulations* (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 USACE 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 USACE permit decision. USACE will question the public need for a project if the proposed project appears to be unduly speculative.

USACE has reviewed the information provided by MSPA, and determines that there is a need to expand the Port to increase the TEU throughput, provide additional employment opportunities, and to increase the economic benefits produced by the Port.

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

1.6 DESCRIPTION OF THE PROPOSED ACTION

The proposed action evaluated in this EIS is to expand the facilities at the Port to provide appropriate infrastructure for handling 1.7 million TEUs annually by 2060. Such an effort involves the dredging and filling of estuarine mud and sand bottom in the Mississippi Sound; construction of wharfs, bulkheads, terminal facilities, container storage areas, and intermodal container transfer facilities; placement of new-work and maintenance dredged material; and construction of a breakwater. The proposed expanded Port facility would be elevated to up to +25 feet msl to provide protection against future tropical storm surge events. A conceptual schedule was developed by the MSPA, and based on that schedule, it is assumed that construction would occur in 2018. Alternative designs considered for the proposed action are discussed in Section 2.0.

2.0 DESCRIPTION AND EVALUATION OF ALTERNATIVES

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 USACE to make specific findings under Section 404(b)(1) of the CWA (practicable alternatives).

NEPA. To comply with NEPA, guidelines developed by the Council on Environmental Quality (CEQ) and the USACE 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 could 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 proposed action must meet Section 404(b)(1) guidelines in order for the USACE to issue a DA permit. Section 404(b)(1) guidelines provide regulations outlining measures to avoid unnecessary aquatic impacts, aquatic impact minimization measures, and compensatory mitigation. Through the 404(b)(1) alternatives analysis, the USACE determines whether the guidelines have been followed and whether the proposed action is the LEDPA, and that no other practicable alternative exists that would cause less impact on waters of the U.S.

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 and evaluated in the EIS. As per Appendix B-33 CFR 325(9)(b)(5)(a), reasonable alternatives must be those that are feasible and such feasibility must focus on the accomplishment of the underlying purpose and need (of the applicant or the public) that would be satisfied by the proposed Federal action (permit issuance). 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."

An EIS involving a DA permit that is prepared by the USACE should be thorough enough to determine compliance with NEPA under Appendix B 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. As such, an alternatives analysis was conducted for the proposed PGEP that included:

- identification of preliminary considerations
- development of preliminary alternatives
- identification of Tier I screening criteria
- evaluation using Tier I screening criteria
- identification of Tier II screening criteria

- evaluation using Tier II screening criteria
- further refinement of alternatives

The alternatives analysis presented in this EIS complies with NEPA and provides the basis for the USACE to make the required findings under the Section 404(b)(1) guidelines.

2.1 IDENTIFICATION OF PRELIMINARY CONSIDERATIONS

The purpose and need for the project are centered on providing a facility that is capable of attracting additional tenants or concessionaires to increase throughput, provide additional employment opportunities, and increase economic benefits produced by the Port. Based on the market forecast (Section 1.4), it is reasonable for the Port to expect the market to support up to 1.7 million TEUs annually by 2060. Following completion of the Restoration Project, the Port will be capable of increasing annual throughput to 1.0 million TEUs annually by 2060. However, the amount of throughput that the Port will be able to achieve is limited by the following:

1. Backlands space and configuration of tenants
2. Amount of automation at the facility
3. Capacity of intermodal transportation from the Port
4. Amount of wharf space available at the Port
5. Ability of large, deep-draft vessels to navigate the FNC to the Port

These constraints were used as a guide for considering preliminary alternatives that may allow the Port to increase its annual throughput and stimulate economic growth and are the reason that TEU throughput effective capacity is estimated to be between 250,000 and 400,000 TEUs immediately following completion of the Restoration Project. The following sections describe how each constraint was considered and contributed to the development of alternatives for further consideration.

Backlands Space

As described above, the Port has been constructed within the Mississippi Sound on estuarine mud and sand bottom. This means the Port is not land-based and there are no upland backlands within the existing Port facility footprint. All backlands space is generated from filling of estuarine mud and sand bottom (with proper permits and approvals). Configuration of Port facilities, such as roadways, rail lines, and central buildings affects the amount of space available for concessionaires and tenants. Arranging such facilities in a manner that minimizes their footprint and maximizes efficiency allows more space to be used by tenants. Likewise, the manner in which tenant lease areas are arranged within the available space can influence the number of tenants. The efficiency of operations correlates to the amount of space needed by each tenant. Thus, promoting efficiency with existing tenants can enhance throughput, which allows growth with existing tenants and enables the Port to make space available for new tenants. Efficiency can be driven by improved infrastructure, automation, and suitable ingress/egress to the Port to quickly move containers and product through the Port. Moving product off port efficiently is critical to enhancing greater throughput. Automation and infrastructure are specifically addressed below.

The existing Port consists of the East Pier, West Pier, the North Harbor, and the Commercial Small Craft Harbor. Significant changes to the East Pier, currently used by McDermott, are constrained by the presence of the Gulfport Small Craft Channel and Harbor, Gulfport Yacht Club, Harbor Square Park, and the USCG Station Gulfport. These facilities are presently located immediately adjacent to the Port on the east side and could be affected by expansion of the East Pier. Therefore, the focus of expansion is primarily on the West Pier, which supports multiple tenants and has fewer physical and ownership constraints.

After completion of the Restoration Project, the Port will have approximately 140 acres of backland space available for tenant leases or concessionaires on its West Pier. It is expected that immediately following completion of the Restoration Project, the majority of available space at the West Pier will be used by existing tenants. Remaining space will be available to accommodate additional tenant throughput. Over time, it is expected that more efficient use of space will allow for present leases to be modified, providing opportunities for additional throughput. Regardless of efficiencies, at some point in the future it is anticipated that the Port will need to expand its facilities to accommodate additional tenants.

Automation

Increased automation allows tenants to operate more efficiently and potentially within a smaller space, but increased automation changes the types of jobs needed at the facility, requiring fewer manual labor jobs and more technology-focused jobs. Automation also has a direct impact in turning a ship (the amount of time necessary for unloading, loading, and departing). Throughput is driven by the speed in which ships can be loaded or unloaded. This directly impacts the time a ship is on a wharf and the total number of movements that can be made in a year. Increased automation allows for more ship turns and greater throughput using the same space requirements (wharf and backlands).

Intermodal Transportation

To move product through the Port (to and from) efficiently, the rail and roadway infrastructure must be configured and in place to import and export via rail and roads in a timely manner. Utilization of the rail and roads increases efficiency of the Port and allows for additional tenants and increased throughput.

The I-310 Project is intended to improve highway infrastructure, allowing for, among other things, more efficient transport of containers to and from the Port by truck. Because the I-310 Project has been delayed, and it is unknown when the project will move forward, it is not considered as a baseline condition. Instead, the project is included in the cumulative impacts assessment of this EIS as a Reasonably Foreseeable Future Action.

With completion of the Restoration Project, the Port's ability to increase long-term throughput will be enhanced via updated and improved road and rail infrastructure, including new rail and road access to and from the Port. New rail infrastructure includes additional rail spurs on the West Pier, providing tenants the ability to "build" trains on the Port, improving on-site capabilities leading to improved efficiencies in tenant operations. This new rail and road system would be extended for the PGEP.

Also, the KCS Improvements Project has been completed, which will improve rail capacity to move cargo off the Port. This project consisted of repairs and upgrades, including new rail and ties; improved and additional siding; new switches and other modernization devices; and repairs, replacements, rebuilds, and improvements to existing road crossings and bridges. The improvements also included upgrades to 67.5 miles of rail to accommodate double-stacked containers at 49 miles per hour (mph) from Gulfport to Hattiesburg, Mississippi.

Wharf Space

Upon completion of the Restoration Project, the Port will have approximately 3,600 linear feet of wharf space along its West Pier. The amount of available wharf space for calling vessels plays an important role in determining traffic patterns into and out of the Port. Insufficient wharf space for the number of calling vessels can result in delays entering the Port and demurrage assessed against the operators. The attractiveness of a given port is somewhat driven by the amount of time vessels may have to wait to call. Thus, providing more wharf space and adjacent backlands can make a port more attractive to potential callers, increasing the opportunity to have a higher annual throughput at a given facility.

Navigation Channel Dimensions

The FNC, as currently federally authorized, is 300 feet wide and 36 feet deep at its smallest dimensions. According to ship simulation studies conducted by Simulation, Training, Assessment & Research (STAR) Center (see Appendix D), the existing navigation channel can safely accommodate ships up to 106-foot width and 650-foot length overall (LOA), with normal tidal currents, and wind velocities up to 30 knots. Current restrictions (pers. comm., Bob Wren, Gulfport Pilots Association) for channel navigation to the Port include:

- Pilots restrict (at their discretion) larger vessels to two pilots.
- Vessels 750-foot LOA and above are restricted to daylight only transit.
- Restrictions regarding wind or currents are left up to the discretion of the pilots.

Current channel dimensions combined with normal tide and current velocities allow a typical vessel to transit the FNC to the Port in approximately 2 hours. A wider channel at the same depth would better-accommodate two-way traffic and longer and broader vessels, while a deeper channel would allow for deeper-draft, longer vessels and higher transit speeds for certain vessels. A wider and deeper channel would accommodate more and larger vessels and potentially ease or eliminate certain transit restrictions. Such improvements to the existing navigation channel would enhance Port efficiencies, potentially reducing transit and waiting times and increasing the attractiveness of the Port to potential callers.

Although modification to the existing navigation channel is not necessary for implementation of the proposed PGEP, it is recognized that at some point in the future, channel modification may be necessary to attract additional tenants.

2.2 DEVELOPMENT OF PRELIMINARY ALTERNATIVES

Consideration of the above constraints led to development of a suite of preliminary alternatives by the Port and includes expansion of both the East and West Piers in different configurations. These high-level alternatives were developed for the Port to evaluate options for potential future scenarios for the PGEP.

Development of alternatives also included projecting the economic benefits for each alternative for comparison purposes. To quantify the economic benefits, and therefore projected future growth in the region, the proposed annual throughput for each alternative was used to calculate new jobs created. In an economic study conducted for the Port, it was calculated that for each 1,000 TEUs, 4.758 jobs are created annually (Appendix C). Using this formula, the economic benefits and future growth associated with each alternative were estimated and used to screen the preliminary alternatives.

For all alternatives, the same level of funding was assumed and a projected level of risk was assigned to each alternative using three categories: financial risk; schedule risk; and risk to achieving the objectives of future Port growth and regional economic benefits. Financial risk was defined as the cost of construction labor, equipment and materials and is dependent on the status of the overall economy. For example, a high financial risk would be extreme economic hardships in the overall economy resulting in higher costs for labor, equipment and materials. The rankings (high, moderate, low) were not based on a definitive analysis but rather were intended to provide general context to the risk within the alternative. As such, a high risk is equated to a low probability for achievement, a moderate risk is associated with "normal," or reasonably anticipated circumstances, as compared to other similar programs of this type and magnitude, and a low risk indicates a high probability for success.

Preliminary Alternatives considered are shown in Figure 2.2-1, and included:

Alternative 1: Allows for future expansion of the Port footprint to include modification to the East and West Piers, adding approximately 96 acres to the East Pier and an additional 486 acres south of the West Pier. With this alternative, it is assumed the Port is successful in obtaining a bid for a concession, therefore the West Pier expansion footprint would include 160 acres plus a concession of approximately 326 acres. This alternative assumes the minimum time requirements to complete environmental review, design and construction activities. Alternative 1 represents a moderate to high risk with respect to funding, a high risk with respect to schedule, and a low risk with respect to future growth and economic benefits. This alternative was estimated to accommodate up to approximately 4.0 million TEUs annually and would take 10 years to construct. The economic benefits for this alternative would be 19,032 jobs annually by 2060.

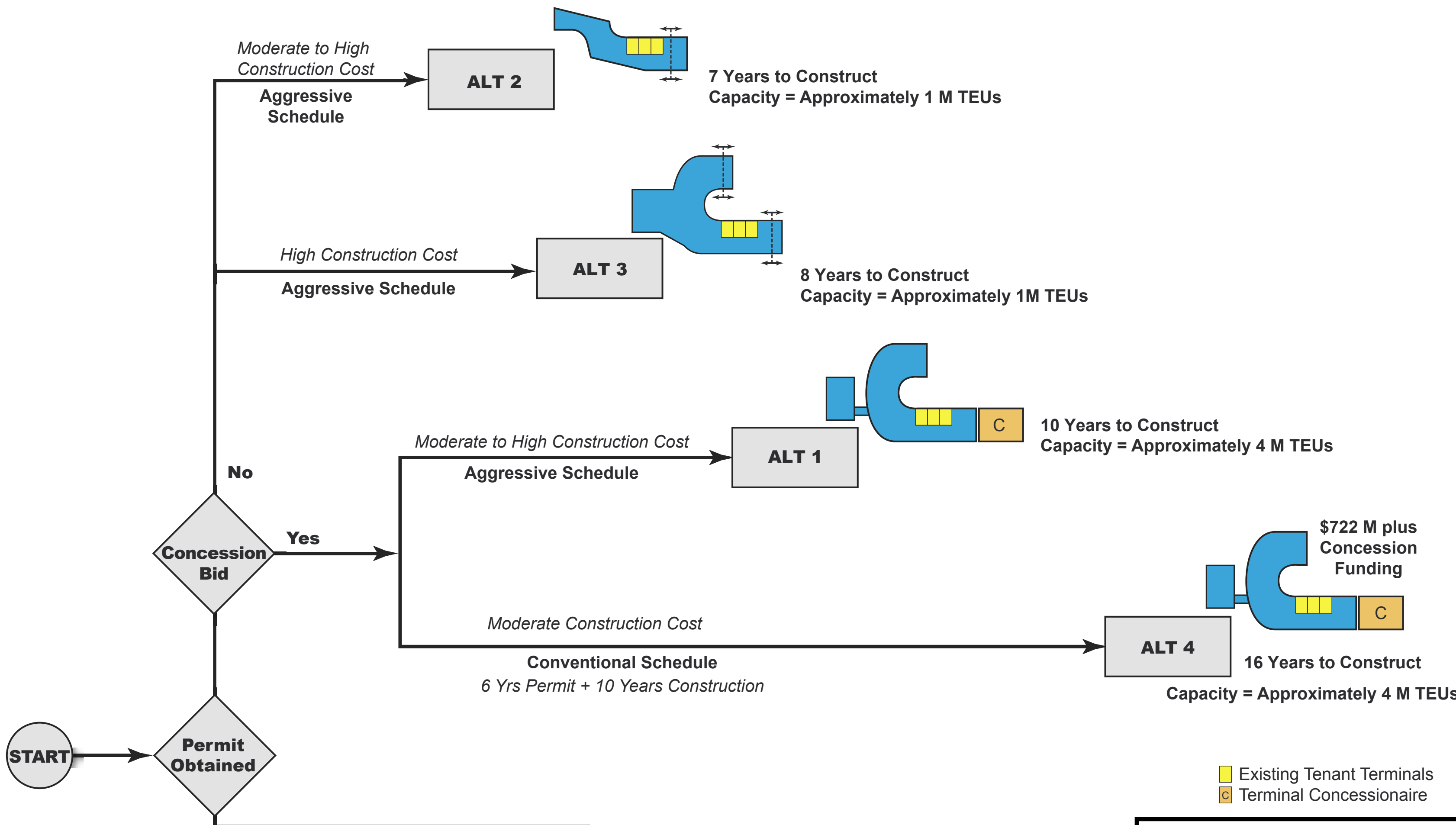


Figure 2.2-1

Port of Gulfport Expansion Project

Alternatives

Prepared By: 18827	
Job No.: 100018536	Date: May 3, 2016

File: N:\Clients\M_N\Mississippi_State_Port_Authority\100018536\geospatial\Figs_EIS\2015_Revisions\PGEP_EIS_Figure_2_2_1_Alternatives.mxd

Alternative 2: Allows for future expansion of the Port footprint on the West Pier and would add approximately 160 acres south of the Restoration Project footprint. This alternative assumes the minimum time requirements to complete environmental review, design and construction activities, higher costs for construction, and a smaller than desired, yet fully operational, facility. With this alternative, a concession bid is either not attempted or is unsuccessful in providing additional funds. Alternative 2 represents a moderate to high risk with respect to funding, a moderate risk with respect to schedule, and a moderate risk with respect to future growth and economic benefits. This alternative was estimated to accommodate up to approximately 1.0 million TEUs annually and would take 7 years to construct. The economic benefits for this alternative would be 4,758 jobs annually be 2060.

Alternative 3: A combination of Preliminary Alternatives 1 and 2. The footprint includes an expansion footprint on the East Pier similar to that of Alternative 1 (96 acres) and on the West Pier similar to that of Alternative 2 (160 acres). This alternative assumes the minimum time requirements to complete environmental review, design and construction activities and construction is not hampered by extreme economic hardships, thus creating a more favorable, moderate cost environment. Under Alternative 3 conditions, the Port does not attempt or is unsuccessful in obtaining a concession bid. Alternative 3 represents a high risk with respect to funding, a high risk with respect to schedule, and a low to moderate risk with respect to future growth and economic benefits. This alternative was estimated to accommodate up to approximately 1.0 million TEUs annually and would take 8 years to construct. The economic benefits for this alternative would be 4,758 jobs annually by 2060.

Alternative 4: The same footprint as Alternative 1, but would take longer to construct. With this alternative, moderate construction cost and a successful concession bid are assumed. The 16-year construction period associated with this alternative represents a more realistic or more conventional compilation of time requirements for environmental review, design, and construction activities. For construction activities, this could mean no accelerated construction schedules and no 24-hour construction operations. This alternative represents a moderate risk with respect to funding, a moderate risk with respect to schedule, and a low to moderate risk with respect to future growth and economic benefits. This alternative was estimated to accommodate up to approximately 4.0 million TEUs annually and would take 16 years to construct. The economic benefits for this alternative would be 19,032 jobs annually by 2060.

2.3 IDENTIFICATION OF TIER I SCREENING CRITERIA

In consideration of the purpose and need for the Proposed Project, screening criteria were developed to evaluate potential alternatives. Criteria were used to eliminate alternatives and to define differences between similar alternatives. Alternatives that were not eliminated are analyzed further within the scope of this EIS.

Two different levels of screening were used: Tier I and Tier II. Tier I criteria looked to optimize the projected TEU throughput of the proposed alternative with the time and money to complete it. Criteria included:

- Projected TEU throughput
- Estimated cost
- Schedule

Increased Port capacity and throughput would enable the Port to contribute to future employment opportunities and economic growth in Gulfport and its surrounding communities. As such, projected TEU throughput was a key criterion for evaluating alternatives, as it identified whether a given alternative would satisfy the purpose and need of the proposed Project (to expand the Port to increase TEU capacity to meet anticipated future projections of container throughput, provide additional employment opportunities, and to increase the economic benefits produced by the Port). Schedule was also a critical factor, as a return on investment would need to be realized in the short-term. Additionally, a condensed schedule would be advantageous, as jobs created by the finished proposed Project would provide opportunities for those currently unemployed; and increased throughput capacity at the Port could attract workers to the area, likely providing a positive impact to the economy. Cost was another critical factor based on an assumption that limited funding would be available for execution of any alternative. These factors were considered in the initial evaluation of alternatives to carry forward through the EIS.

2.4 EVALUATION USING TIER I SCREENING CRITERIA

Each of the four preliminary alternatives was evaluated using the Tier I screening criteria in attempt to optimize the cost and schedule per TEU throughput capacity (Table 2.4-1). Only Preliminary Alternatives 1 and 4 would allow the Port to meet the future container projections to satisfy the purpose and need of the Proposed Project. Although the cost to construct Preliminary Alternative 4 would be less than that for Preliminary Alternative 1, the reduced schedule for Preliminary Alternative 1 would result in the expedited realization of economic benefits to Gulfport and its surrounding communities. As a result, Tier I screening criteria narrowed the analysis to Preliminary Alternative 1 for further consideration. Alternative 1 was refined and presented to the USACE as the Permit Application Alternative in the Port’s joint DA Permit Application, submitted in March 2010 (Appendix A-1).

Table 2.4-1
Preliminary Alternatives and Tier I Screening Criteria

	Maximum Projected TEU Throughput	Relative Cost to Construct	Schedule (years to construct)	Carried Forward for Further Evaluation? (Yes/No)
Preliminary Alternative 1	4 million	Moderate to High	10	Yes
Preliminary Alternative 2	1 million	Moderate to High	7	No
Preliminary Alternative 3	1 million	High	8	No
Preliminary Alternative 4	4 million	Moderate	16	No

TEU = twenty-foot equivalent unit

Based on comments to reduce the size of the impact area received from the public and State and Federal agencies following notice of the Permit Application (April 2010), an alternative to the Permit Application Alternative was developed. Under the new alternative, referred to here as Alternative 1B, the West Pier would be expanded by approximately 160 acres and the East Pier by approximately 15 acres. Unlike the preliminary alternatives (including Alternative 1), in which improvements to road and rail infrastructure were planned on the post-Restoration Project footprint (thereby pushing the new tenant space to the south onto the newly expanded West Pier footprint), under Alternative 1B, the intermodal infrastructure on the West Pier was redesigned to avoid modification to the post-Restoration footprint. As a result, under Alternative 1B, the expansion footprint would be dedicated to providing additional space for concessions, increasing the capacity for throughput to up to approximately 2 million TEUs per year, thereby satisfying future container projections stated in the purpose and need for the Proposed Project. With this alternative, the future growth and economic benefits are estimated to be 9,516 jobs annually by 2060. Evaluation of alternatives using Tier I screening criteria therefore resulted in two alternatives (Alternative 1 and Alternative 1B) that were carried forward for subsequent evaluation.

2.5 IDENTIFICATION OF TIER II SCREENING CRITERIA

For those alternatives that were carried forward from Tier I analysis (Alternative 1 and Alternative 1B), Tier II screening criteria were used to further develop the alternatives analysis through the consideration of:

- Meets purpose and need (projected TEU throughput, additional employment opportunities, economic benefits)
- Environmental impact (acreages of dredge and fill)

As a critical component of the purpose and need statement, projected TEU throughput was again a principal criterion for evaluating the alternatives carried forward from the Tier I analysis. In addition, in an effort to work towards the alternative with the least environmental impacts and address comments received from the public and State and Federal agencies following notice of the 2010 Permit Application, the acreages of dredge and fill of estuarine mud and sand bottom associated with each expansion alternative were also considered.

2.6 EVALUATION USING TIER II SCREENING CRITERIA

Alternative 1 (2010 Permit Application Alternative) was designed to accommodate up to approximately 4.0 million TEUs annually. This alternative includes dredging activities and impact to approximately 840 acres of open-water bottom. Estimates of direct impacts can be seen in Table 2.6-1.

Alternative 1B was designed to accommodate up to approximately 2.0 million TEUs annually. This alternative includes dredging activities and impact to approximately 300 acres of open-water bottom. Estimates of direct impacts can be seen in Table 2.6-1. For both alternatives, expansion footprints would be elevated to +25 feet msl, to be consistent with the Restoration Project (this was prior to the change in elevation to up to +14 feet msl).

Although Alternative 1 does meet the purpose and need, it has potential impacts much greater than those anticipated for Alternative 1B. As seen in Table 2.6-1, the impacts to open-water bottom from placement of fill or dredged material would be considerably higher for Alternative 1 compared with Alternative 1B. Additionally, Alternative 1 provides for capacity far beyond that anticipated under an Optimistic Growth Scenario per the Gulfport Container Volume Projections performed as part of the project evaluation process (see Appendix B). Alternative 1 also includes considerable expansion of the East Pier, which would significantly impact existing resources east of the Port facility. For this reason, and because of the potential increased level of impact associated with the larger footprint, Alternative 1 was dropped from further consideration and Alternative 1B was carried forward for further evaluation.

Table 2.6-1
Comparison of Potential Alternatives Using Tier II Screening Criteria

	Tier II Screening Criteria							
	Meets Purpose and Need				Environmental Impact			
Alternative	Estimated TEU Throughput	Economic Benefits	Increased Throughput	Consistent with Market Forecast	Acreage Fill	Acreage Dredged	Dredged Material Volume (mcy)	Carried Forward for Further Evaluation? (Yes/No)
Alternative 1	4.0 million	Yes	Yes	Over Demand	678	160	27.7	No
Alternative 1B	2.0 million	Yes	Yes	Yes	196.5	85	7.68	Yes

mcy = million cubic yards

TEU = twenty-foot equivalent unit

2.7 FURTHER REFINEMENT OF ALTERNATIVES

Alternative 1B was further developed over the next two years, including consideration of different levels of efficiencies and automation. In April 2013, the MSPA proposed that the proposed Project be modified to include widening and deepening of the existing FNC, and submitted a revised permit application to include modifications to the FNC (2013 Revised Permit Application alternative). The intent of these changes was to allow for increased ease of navigation of the FNC by current users and to allow larger, deeper-draft vessels to enter the Port. Over the next year, the MSPA continued to pursue new tenants, and in 2014 a new tenant (McDermott) was added to Port operations on the East Pier. This addition and other changes in tenant use promulgated a reconfiguration of tenants on the West Pier. In February 2015, MSPA determined that widening and deepening of the FNC is no longer a requirement of known incoming tenants, and MSPA does not intend to expand or maintain an expanded FNC, without first receiving funding and proper prior Federal approval through the WRDA 204(f) process. Therefore, modifications to the FNC are no longer part of the Proposed Project.

2.8 ALTERNATIVES DESCRIPTION

As a result of the alternatives development, screening, and further refinement described above, there are two alternatives to be carried forward for evaluation in the EIS: the No-Action Alternative and the Proposed Project Alternative. These alternatives are described in more detail in the following sections.

2.8.1 No-Action Alternative

The No-Action Alternative provides a means to evaluate the environmental impacts that would occur if no construction requiring a USACE permit is performed; work that does not require a USACE permit may be implemented. This scenario may transpire by (1) the applicant electing to modify his proposal to eliminate work under the jurisdiction of the USACE, or by (2) the denial of the USACE permit for the proposed expansion of the Port facilities. Since the PGEP requires dredging activities in navigable waters subject to Section 10 of the Rivers and Harbors Act, and fill activities subject to Section 404 of the CWA (33 USC 1344), and Section 103 of the MPRSA of 1972, as amended (33 USC 1413), construction activities involving dredge and fill would not proceed without a permit from the USACE. In the event of permit denial, the potential impacts described for the proposed action would not occur.

While the PGEP would not occur under the No-Action Alternative, it is assumed that previously permitted actions at the Port and in the vicinity of the Port (e.g., Restoration Project) would continue and are assumed as complete during the environmental consequences evaluation. The Restoration Project (which is under construction and will be completed in 2017, see Section 1.3.1), is reflected as complete in the No-Action Alternative, thus, future projected conditions from approved NEPA documentation will be used to aid in the description of future conditions under the No-Action Alternative, as appropriate.

Following completion of the Restoration Project, the Port facilities would include a footprint of approximately 264 acres and the currently federally authorized FNC and turning basin (Table 2.8-1). Immediately following completion of the Restoration Project, an annual throughput of between 250,000 and 400,000 TEUs is anticipated due to tenant configuration and cargo handling practices. Thus, under the No-Action Alternative, the Port would continue to operate without the proposed expanded facilities, and Port activities would be limited by the existing, post-Restoration Project facility configuration (Figure 2.8-1). As described in Section 2.1, the Port has been constructed within the Mississippi Sound on estuarine mud and sand bottom and all backlands space is generated from filling of estuarine mud and sand bottom (with proper permits and approvals). As discussed in Section 1.4 and Appendix B, it is expected that over time, improved economic conditions, improvements in Port efficiencies, changes in tenant configuration and automation, and other unforeseeable changes in Port practices or economic conditions would allow the Port to achieve an annual throughput up to 1.0 million TEUs by 2060. This assumption allows a worst-case scenario with regard to the maximum potential throughput under the No-Action Alternative for comparison purposes with the Proposed Project Alternative. It is assumed that space constraints would limit throughput to 1.0 million TEUs annually. Thus, under this alternative, the Applicant's purpose and need for the project, as defined in Section 1.5, would not be met.

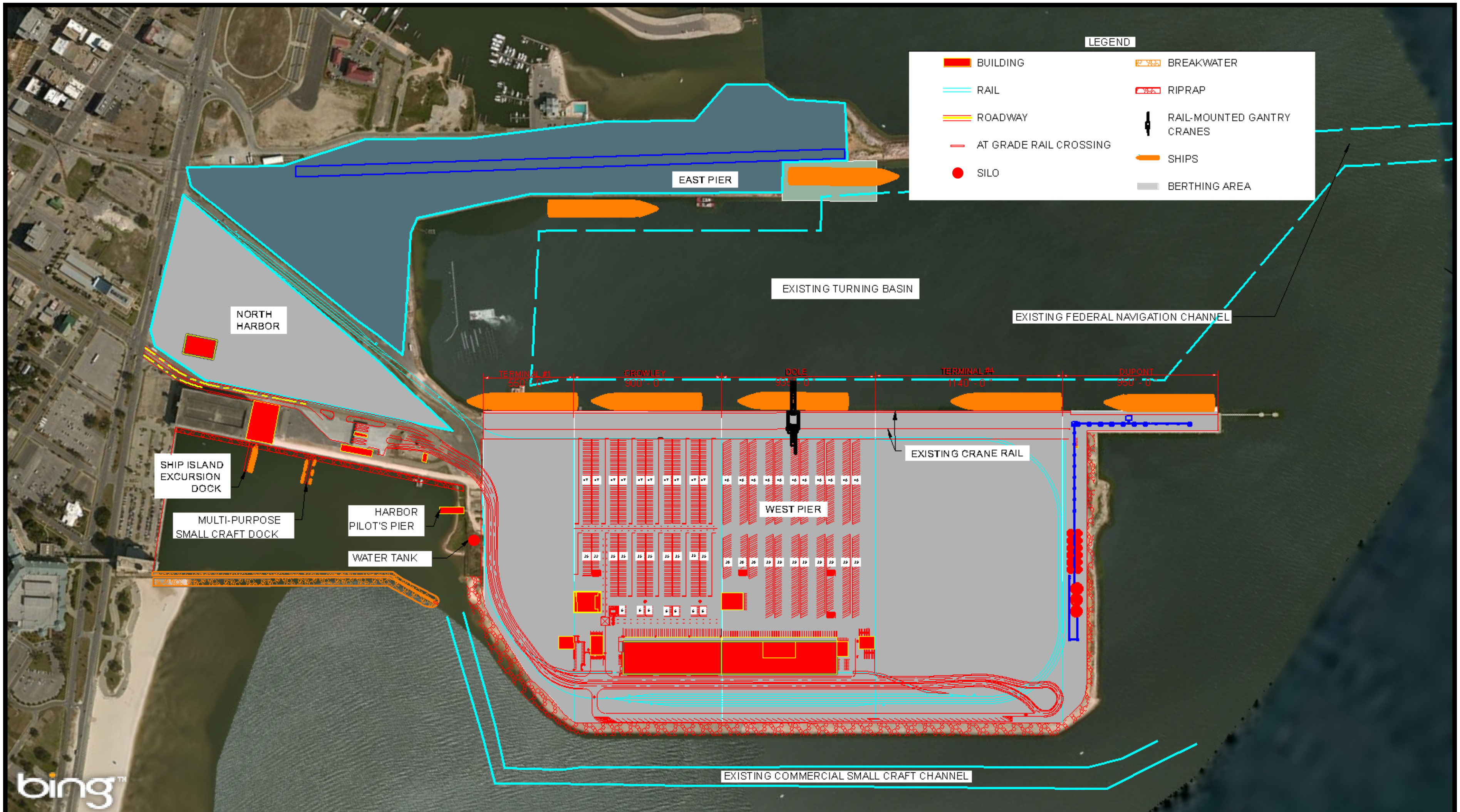
Table 2.8-1
Port Footprint Following Restoration Project,
Including the Turning Basin (approximate acres)

Feature	Post-Restoration Footprint
West Pier	171
East Pier	30
North Harbor	63
Turning Basin	105
Breakwater	N/A
Total Footprint	369

Although the No-Action Alternative does not meet the purpose and need of the proposed PGEP, it is carried forward in this EIS (per 40 CFR Section 1502.14(d)) to provide a means by which to compare potential future conditions for action alternatives. In other words, the potential environmental effects of the future *without* the project are compared to the effects of the future *with* the project.

2.8.2 Proposed Project Alternative

As a result of the evolution of the proposed expansion project alternatives as described above, the action/activities that MSPA is requesting a permit for (referred to as the Proposed Project Alternative) are described in this section. The Proposed Project Alternative is to expand the Port facility to include the main features shown on Figure 2.8-2, including:



0 1,000 Feet

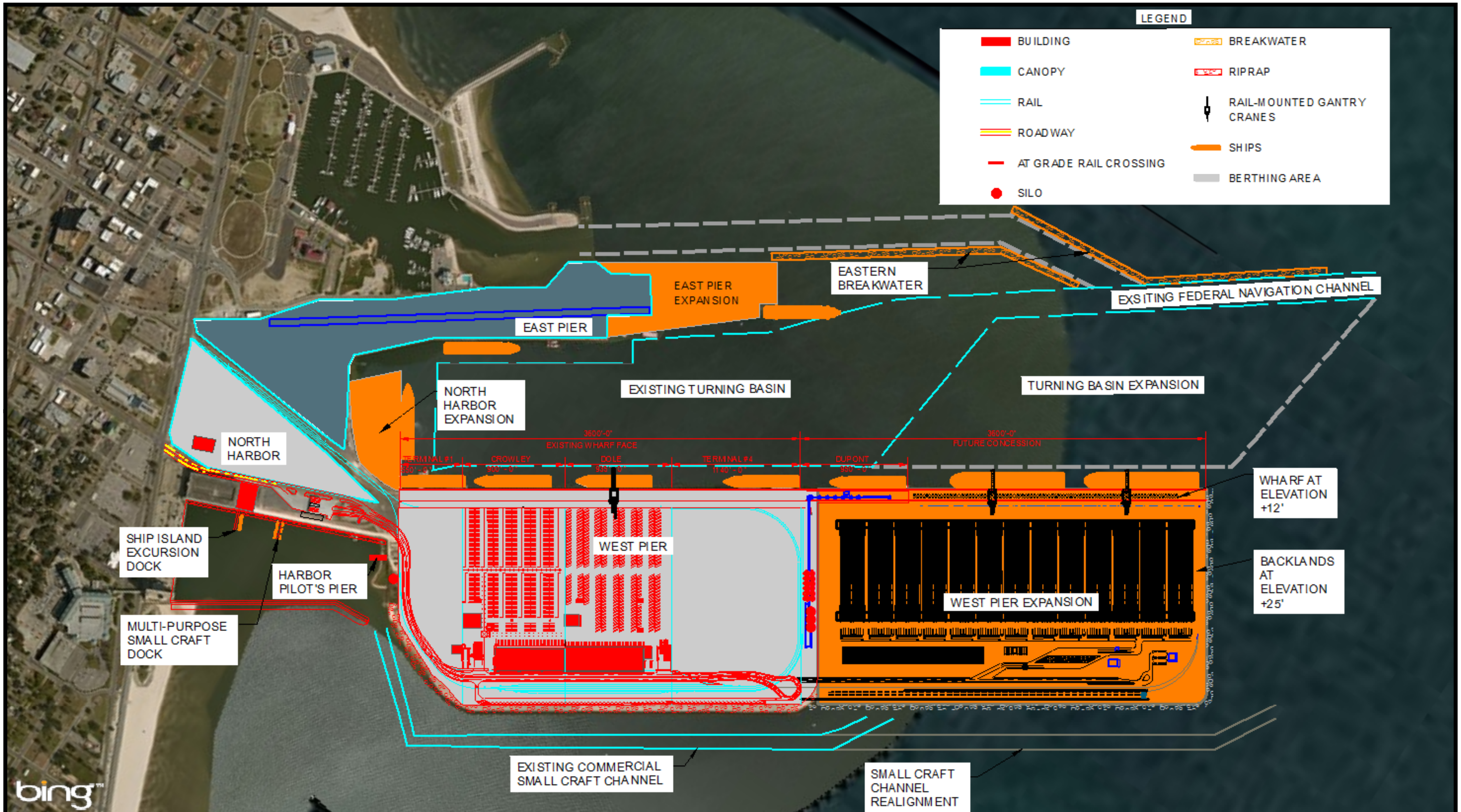
Figure 2.8-1

Port of Gulfport Expansion Project

No-Action Alternative

Prepared By: 18827	Scale: 1" = 1000 feet
Job No.: 100018536	Date: October 21, 2015

File: AN:\Clients\M_N\Mississippi_State_Port_Authority\100018536\geospatial\Figs_EIS\2015_Revisions\PGEP_EIS_Figure_2_8_1_Existing_Conditions_101615.mxd



0 1,000 Feet

Figure 2.8-2

Port of Gulfport Expansion Project

Proposed Project Alternative

Prepared By: 18827	Scale: 1" = 1300 feet
Job No.: 100018536	Date: January 13, 2016

- Expansion of the West Pier
- Expansion of the East Pier
- Fill in the North Harbor
- Expansion of the federally authorized Gulfport Turning Basin (at 36-foot depth)
- Construction of an eastern breakwater
- Placement of dredged material
- Site configuration and automation

As noted for the No-Action Alternative, the Proposed Project Alternative assumes that the Restoration Project has been completed. The proposed PGEP features would be added to the post-Restoration Project footprint, with a few exceptions as discussed below (see Figure 2.8-2 and Table 2.8-2).

The proposed expansion features (not including the post-Restoration Project footprint) would be elevated up to +25 feet msl to provide protection against future tropical storm surge events. The post-Restoration Project footprint would be elevated up to +14 feet msl, with the proposed expansion footprint elevated up to +25 feet msl. Each feature of the proposed expansion footprint is provided in Table 2.8-2 and described in detail below. Fill material would be obtained from permitted sites along the Tennessee-Tombigbee River and transported into the Port via barge for construction (see MSPA letter dated January 7, 2016, Appendix E-1).

Table 2.8-2
Port Footprint Following Proposed Port of Gulfport Expansion Project, Including the Turning Basin (approximate acres)

Feature	Post-Restoration Footprint	Proposed Expansion Footprint	Total Footprint
West Pier	171	155	326
East Pier	30	14.5	44.5
North Harbor	63	9	72
Turning Basin	105	85	190
Breakwater	N/A	18	18
Total Footprint	369	281.5	650.5

To simplify the description of project features and because it is considered the baseline condition for all alternatives evaluated in this EIS, the post-Restoration Project footprint will be considered the “existing” condition from this point forward.

West Pier Expansion

The West Pier Expansion is intended for development of a new concession area consisting of new multiuse semi-automated container terminals. The proposed concession area would extend to the south of the West Pier footprint approximately 3,500 linear feet, adding approximately 155 acres to the existing facility. Prior to construction, the expansion footprint may require dredging for removal of soft to very soft foundation materials and to mitigate mud waves outside of the Project footprint. The estimated volume of dredged material is 2.4 million cubic yards (mcy) (Anchor QEA LLC, 2017, Appendix F).

East Pier Expansion

The East Pier Expansion would add approximately 14.5 acres to the working surface of the Port's existing East Pier facility. This area would be used for rail operations and a new berth, and would provide additional space for McDermott. Similar to the West Pier Expansion, the fill area may require dredging prior to construction. The estimated volume of dredged material is 560,000 cubic yards (cy), which is generally debris that would be disposed of in the permitted upland Harrison County Development Commission disposal site on Industrial Seaway in Gulfport (Anchor QEA LLC, 2017, Appendix F). The disposal site is immediately adjunct to a canal and material would be transported by barge and unloaded and placed into disposal cells, with no additional hauling or trucking required (see MSPA letter dated August 17, 2016, Appendix E-1).

North Harbor Expansion

The North Harbor Expansion would create approximately 9 acres of upland in the area formerly occupied by the *Copa Casino* boat. This upland area would be used as a new berthing area. Both new work dredging associated with the construction of this berth and future maintenance dredging would be required in this area (Anchor QEA LLC, 2017, Appendix F).

Turning Basin Expansion

The existing Gulfport Turning Basin would be expanded to support the West Pier Expansion. The proposed Turning Basin Expansion (approximately 85 acres) would be between the existing Sound Channel and the proposed terminal, immediately adjacent to the existing Gulfport Turning Basin. This area would be dredged to a depth of –36-foot mean lower low water (MLLW) plus 2 feet of advance maintenance, plus 2 feet of allowable overdepth, and up to an additional 3 feet due to a sediment disturbance layer consistent with the adjacent FNC and USACE maintenance dredging practices (Anchor QEA LLC, 2017, Appendix F). The estimated volume of dredged material is 3.8 mcy.

Eastern Breakwater

A 4,000-linear-foot rip-rap breakwater is proposed on the eastern side of the FNC to provide protection from tropical storm events. The breakwater would vary from 98 to 102 feet wide at its base with a top width of 10 feet and a top elevation of +10 feet NAVD 88. The proposed breakwater would require placing approximately 250,000 cy of rip-rap over a footprint of approximately 18 acres. Baker (2011) evaluated four breakwater alternatives for the PGEP to determine the need to protect the expanded West Pier under storm conditions. Numerical modeling was used to recommend alternatives that would provide protection to the turning basin and terminals while maintaining operational and navigational utility. Modeling indicated that wave action would impact the expanded West Pier compared with current conditions and a need for a breakwater could not be ruled out. The Proposed Project Alternative provides protection from wave energy from the south and east. A breach midway along the alignment of the structure is planned to allow shallow-draft access to the FNC from the adjacent Bert Jones Marina and at the recommendation of the pilots performing ship simulations (see Appendix D).

Dredged Material Placement

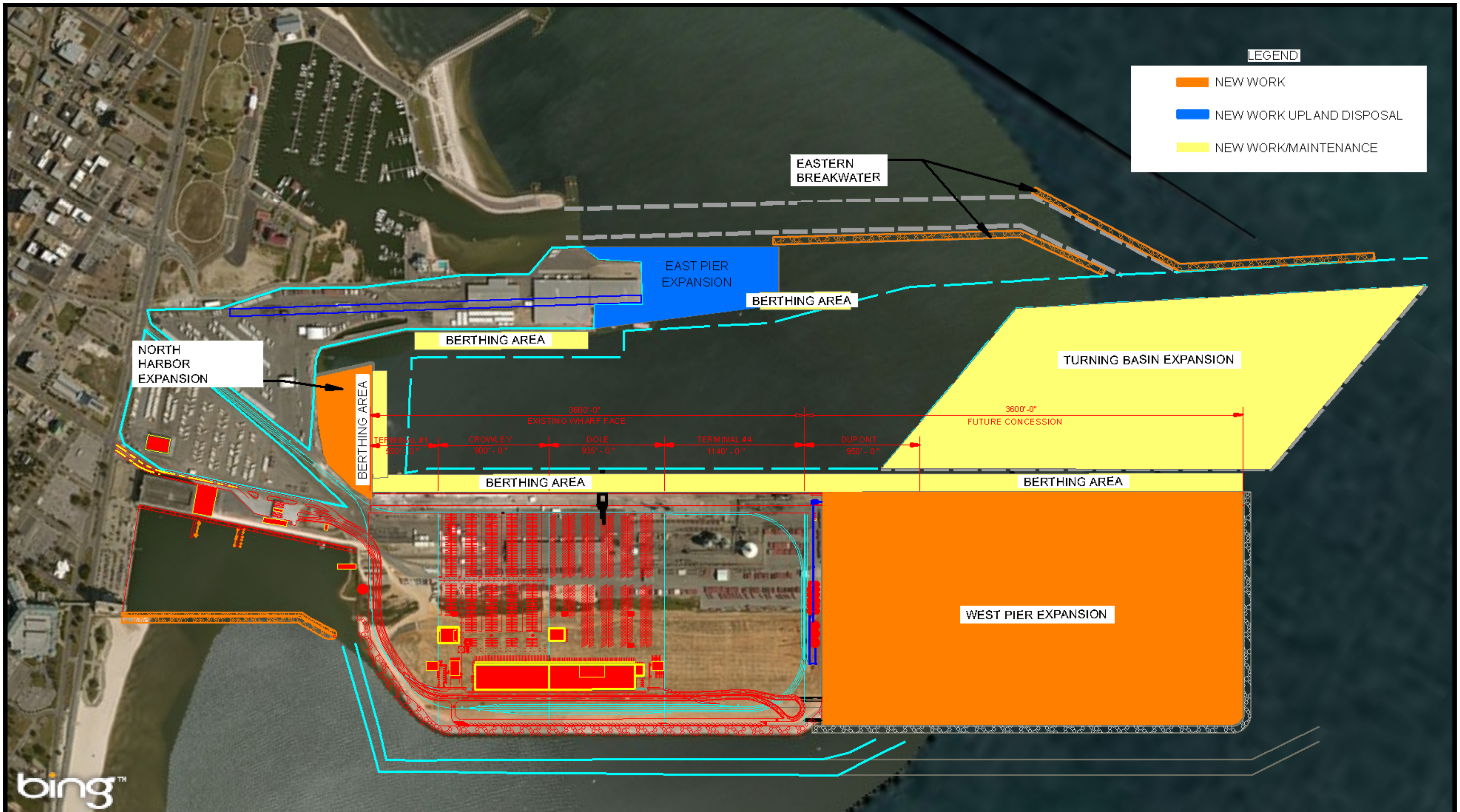
The new work dredging associated with the construction of the proposed West Pier and East Pier expansions, North Harbor and West Pier berthing areas, and the Turning Basin Expansion is estimated to require removal of approximately 7.68 mcy of dredged material, including 560,000 cy of dredged material (debris from East Pier) that would be designated for upland disposal (Figure 2.8-3). Following construction of the Turning Basin Expansion, the MSPA would be responsible for maintenance dredging of the portion of the new turning basin that is not part of the federally authorized project, as well as the berthing areas associated with the expanded East Pier, North Harbor, and West Pier (see Figure 2.8-3). Maintenance dredging associated with these areas is anticipated to require removal of approximately 486,000 cy to 1.3 mcy every year. A Dredged Material Management Plan (DMMP) was prepared to evaluate the potential placement options for the new work and maintenance dredged material associated with the Proposed Project Alternative (Anchor QEA LLC, 2017, Appendix F). Estimated dredged material quantities are shown in Table 2.8-3. Estimated dredge quantities assume maintenance for a 30-year period. At this time, it is expected that new work dredging would occur using a mechanical/hopper dredge and maintenance dredging would occur using a hydraulic/cutterhead or mechanical/hopper dredges, as necessary.

Table 2.8-3
Estimated Dredged Material Quantities (Proposed Project Alternative)

Feature	West Pier Expansion	East Pier and East Pier Berthing Areas	North Harbor and West Pier Berthing Areas	Turning Basin Expansion	Totals
New Work	2.4 mcy		913,000 cy	3.8 mcy	7.11 mcy
New Work (upland disposal)		560,000 cy			560,000 cy
Maintenance	N/A	63,000–172,000 cy/ year	212,000–581,000 cy/ year	211,000–586,000 cy/ year	486,000 cy–1.3 mcy/ year

Source: Anchor QEA LLC (2017, Appendix F).
cy – cubic yards
mcy – million cubic yards

The DMMP evaluated multiple placement alternatives for new work and maintenance dredged material. Sites considered for placement of dredged material include:



0 1,000 Feet

Figure 2.8-3

Port of Gulfport Expansion Project

Dredging Areas

Prepared By: 18827	Scale: 1" = 1200 feet
Job No.: 100018536	Date: October 21, 2015

- Use as fill for the West Pier Expansion
- 12 designated BU sites
- Thin-layer placement
- Candidate BU sites
- Placement in an approved Ocean Dredged Material Disposal Site (ODMDS)
- Placement in an approved and permitted upland disposal site(s)

All sites were evaluated based on feasibility, potential environmental impacts, cost, and suitability of material. Potential BU sites were evaluated based on capacity and distance to the dredge site, taking into consideration habitat value, stability, and sediment transport. Recommendations were made for each option (Anchor QEA LLC, 2017, Appendix F). Considering additional information is needed to finalize the recommendations of dredged material placement alternatives, the following summarizes the various placement options.

New work dredged material structurally suitable would be used for fill at the Project site. Any material not structurally suitable would be evaluated for potential beneficial use and possible placement at a designated or candidate BU site. The Mississippi Department of Marine Resources (MDMR) submitted a permit application to the USACE and Louisiana Department of Natural Resources (LDNR) in February 2016 to permit the Biloxi Marsh Complex (BMC) in Louisiana for beneficial use of dredged material. The goal of this designation is to provide a new BU site on the western side of the state to accommodate material generated from private and public dredging projects to meet the requirements of Mississippi’s beneficial use law.

During the DMMP evaluation, the Port began discussions with the MDMR/USACE Beneficial Use Group (BUG) on using the BMC as a placement area for suitable dredged material from the Port (see Figure 1.2-1). For the proposed PGEP, the BUG was in favor of a BU site instead of an ODMDS. As such, the BMC is the recommended placement alternative for the new work dredged material for the proposed Project (Anchor QEA LLC, 2017, Appendix F). If a suitable BU site is identified in Mississippi, appropriate coordination with MDMR and the Mississippi Department of Environmental Quality (MDEQ) for placement of dredged material at the approved and permitted location would occur at that time. The BMC BU site would function to provide needed particulate material for shoreline nourishment, as protection from shoreline erosion on the Mississippi and Louisiana coasts, and to offset impacts to Essential Fish Habitat (EFH). If the BMC is not permitted prior to dredging, and no other suitable BU sites are available, the Pascagoula ODMDS (see Figure 1.2-1) would be used for disposal of new work dredged material if the material is determined to be in compliance with Section 103 of the MPRSA (33 USC 1413). Appendix G provides results from sediment sampling and testing conducted by MSPA for all sediment that would be dredged as part of the proposed Project according to requirements of Section 103 of the MPRSA. This comprehensive sampling process satisfies the requirements of EPA, MDMR, USACE New Orleans District, MDEQ, and LDNR for the placement of dredged material in either an ODMDS or BU site. New work, dredged material not suitable for beneficial use would also be placed in the Pascagoula ODMDS if it meets the criteria in Section 103 of the MPRSA (33 USC 1413). If the dredged material is not suitable for the ODMDS, the material would be placed in an approved and permitted upland disposal site(s). Initial results indicate that only a portion of the disposal material would not be feasible for ODMDS disposal (see Appendix G) and would therefore be placed in a permitted and approved upland disposal site. Currently, the Harrison County Development Commission dredged material disposal site on the Industrial Seaway has capacity for up to 750,000 cy. The material would be transported by barge and offloaded to the disposal site as described in the DMMP (Anchor QEA LLC, 2017, Appendix F). Because dewatering of the material occurs in the disposal site, dewatering of the dredged material before transporting or offloading is unnecessary. This site would be suitable for the East Pier Expansion dredged material. Additionally, an upland disposal site 30 miles north of the Port in Stone County has been identified as a potential placement site for the remaining 7.11 mcy of dredged material; the name of the site and specific location have been withheld at the owner's request. For this option, the material would be mechanically dredged, dewatered, placed into trucks, and hauled to the disposal site for offloading. Considering that it would require approximately 14 years to dredge, transport, and offload the material to the upland disposal site, and would cost over $200 million, use of an upland disposal site for the 7.11 mcy of dredged material is not a viable placement alternative (Anchor QEA LLC, 2017, Appendix F). However, this upland site may still be utilized for the portion of disposal material that could not feasibly be placed in an ODMDS or BU site. The Port would be responsible for maintenance dredging of those areas outside of Federal jurisdiction. Maintenance dredged material would be disposed of using thin-layer placement, as discussed in the DMMP (Anchor QEA LLC, 2017, Appendix F).

Site Configuration/Automation

The PGEP would further develop the Port into a semi-automated container terminal. The Port has added three RMG cranes to Port operations. The road and rail access constructed for the Restoration Project would be extended south on the western side of the West Pier along the expansion footprint. The gantry crane rail would be extended south on the eastern side of the West Pier along the expansion footprint. New infrastructure would include a new wharf, backlands, gates, and an additional warehouse. The new terminal would increase throughput by reducing handling times, allowing ships to come into the Port, unload, reload, and depart in a day or less. The proposed layout assumes that all berths would be utilized as common berths, and the berthing of a vessel would be based on berth availability, vessel schedule, and tenant needs. With the semi-automated operation of the container terminal via RMG cranes, refrigerated containers would be grounded within the RMG crane container blocks and placed four containers high and nine containers wide per row. This layout would require reefer racks (three-story steel platforms) in front of each row for mechanics to access containers, plug into reefer receptacles, and perform monitoring, inspection, and pretripping of refrigerated equipment. Loading and unloading of containers would be performed by utilizing two RMG cranes to transfer containers between trackside ground positions and railcar well positions. The operation of the West Pier and the Turning Basin Expansion areas would include shared facilities, berths, backlands, and utilization of RMG cranes. With this layout, throughput capacity is projected to reach up to 1.7 million TEUs annually by 2060.

2.9 COMPARISON OF ALTERNATIVES

A summary of impacts by resource for the two alternatives carried forward for detailed analysis in the EIS (No-Action Alternative and the Proposed Project Alternative) is presented in Table 2.9-1. In general, under the No-Action Alternative, the total footprint of the Port would be 369 acres with an estimated throughput of 1 million TEUs annually by 2060. Under the Proposed Project Alternative, the total footprint of the Port would increase in size by 281.5 acres with an estimated throughput upon completion of construction of up to 1.7 million TEUs annually by 2060. As a result, the Proposed Project Alternative would have a larger physical and economic impact than the No-Action Alternative. Construction of the PGEP would result in the loss of 196.5 acres of estuarine mud and sand bottom habitat and permanent conversion of 85 acres to deeper habitat. Approximately 7.68 mcy of material would need to be dredged, including 560,000 cy of debris from the East Pier Expansion that would be designated for upland disposal. Beneficial use of dredged material in the BMC under the Proposed Project Alternative would meet the requirements of Mississippi's beneficial use law as well as replenish sediments, provide storm protection, reduce erosion rates, abate subsidence along the shorelines of the Mississippi and Louisiana coasts, and offset impacts to EFH. While maintenance dredging would require removal of 200,000 cy of material every 10 years under the No-Action Alternative, between 486,000 cy and 1.3 mcy of material would need to be removed annually under the Proposed Project Alternative. In addition, the number of vessel trips associated with the PGEP would increase by 3.2 daily trips over the No-Action Alternative. As a result of increased dredging and placement of material, increased volume of stormwater runoff, and the increased risk of spills due to additional vessel trips, the Proposed Project Alternative would have a larger impact on turbidity and water quality than the No-Action Alternative. However, many of these impacts would be temporary and occur only during construction.

In regards to benefits to the economy, the increased throughput associated with the Proposed Project Alternative, would create direct Port-related jobs and boost the local economy. It is expected that approximately 3,331 more Port-related full-time equivalent jobs (FTEs) would be created by the Proposed Project Alternative compared with the No-Action Alternative. In addition, there would be short-term economic growth and employment during construction of the PGEP.

In general, the Proposed Project Alternative would realize all of the direct impacts associated with the Port expansion footprint but would provide the benefits that meet the purpose and need of the Port.

Table 2.9-1
Port of Gulfport Expansion Project Comparison of Alternatives

Evaluation Criteria	No-Action Alternative	Proposed Project Alternative
Construction Dredging Volumes	None.	7.68 mcy, including 560,000 cy designated for upland disposal.
Maintenance Dredging Volumes (30-year period)	200,000 cy 10-year period for berths along the north and south harbor, the Commercial Small Craft Harbor, and the entrance channel.	486,000–1.3 mcy/year.
Project Expansion Footprint	None.	• West Pier – 155 acres • East Pier – 14.5 acres • North Harbor – 9 acres • Turning Basin – 85 acres • Breakwater – 18 acres
Land Use/Recreation/ Aesthetics	Increase proportionally to population trends. Beneficial impacts from implementation of landscaping project and water tower move and upgrade.	Increase in housing, services, industrial land uses, truck and rail traffic, development of industries; minimal impacts to recreation; moderate impact on aesthetics.
Community Infrastructure and Municipal Services	Increase proportionally to population trends. No impact to aviation as no structures on the Port facility would exceed 184 feet in height.	No major short- or long-term impacts on utility service levels; minor temporary impacts, or no impacts to public safety and health services; no impact on schools and libraries; no impact to aviation.
Socioeconomics	Increase in economic growth proportionally to historic trends and market demand. Expect 4,758 full-time equivalent jobs (FTEs) by 2060. No disproportionate impacts to Environmental Justice (EJ) communities.	Increase in economic growth and employment short-term during construction and long-term during the operational phase of the Port expansion; would expect 8,089 FTEs (3,331 more FTEs than the No-Action Alternative, of which 875 would be Port jobs). No disproportionate impacts to EJ communities.
Roadway and Rail Traffic	Level of Service (LOS) worse than D at five segments by 2060 primarily caused by background traffic growth. Rail crossing delays would decrease by 37 seconds to or from the Port to the Gulfport Rail Yard with up to 28 train trips per day; crossing delays may decrease by 67 to 146 seconds per crossing north of the Gulfport Rail Yard with nearly 18 train trips per day by 2060.	LOS worse than D at seven segments by 2060. Rail crossing delays would fall within same thresholds as the No-Action Alternative with up to 47 train trips per day between (to or from) the Port and the Gulfport Rail Yard and nearly 29 train trips per day north of the Gulfport Rail Yard by 2060.
Air Quality	Small increase in air contaminant emissions impacts in immediate vicinity of Project area, primarily due to increased truck, railroad, and container ship traffic; diminishing emissions dispersed over Harrison County. Criteria pollutant concentrations resulting from the operation of the No-Action Alternative would not exceed the applicable National Ambient Air Quality Standards (NAAQS).	Temporary air contaminant emissions associated with construction. Permanent increase in air contaminant emissions due to increased truck, rail, employee vehicle, and ship traffic and related Port operations from growth of existing business and new business at the Port. Long-term adverse impacts to localized air quality from the operation of the Proposed Project Alternative would be below the NAAQS.

Table 2.9-1, cont'd

Evaluation Criteria	No-Action Alternative	Proposed Project Alternative
Noise	Increase associated with increased throughput and increased rail and truck traffic expected to occur over time.	Short-term increases during construction; long-term increases with Port operations (about 2 dBA) and increased truck and rail traffic.
Physiography, Topography, and Bathymetry	Minor alterations due to maintenance dredging.	Local changes during construction would have negligible impact; impact to approximately 282 acres of Mississippi Sound bay bottom; beneficial use of dredged material at the Biloxi Marsh Complex (BMC) (if approved and authorized for use) would replenish sediments, provide shoreline protection, and reduce erosion rates.
Coastal Geologic Processes	Continued periodic disturbance during maintenance dredging including sediment redistribution, short-term sediment suspension, and minimal change in bathymetry.	Short-term increase in sediment rework and suspension; placement of dredged material at the BMC would potentially reduce erosion rates along Mississippi Sound shoreline and abate subsidence in the BMC; potential impact on sediment net transport direction; beneficial impact of breakwater including shoreline protection from erosion and storm events; potential minor impact of breakwater on hydrodynamics.
Energy and Mineral Resources	No change.	No impact to energy production; no substantial impacts to mineral resources beyond normal construction operations; shoreline protection components would have a long-term positive effect on the availability of gravel, due to decreased shoreline erosion from construction of the breakwater.
Soils	No change.	No impact.
Groundwater and Surface Water Hydrology	No change.	No impacts during construction and operation activities; possible impacts to shallow groundwater exist from the potential release of petroleum products during construction and hazardous material spills from shipping.
Hazardous Material	Limited potential to encounter hazardous material during maintenance dredging; due to physical constraints of the channel, there is an increased risk of contamination from a spill during lightening or offloading cargo.	Low probability for encountering hazardous materials or waste during construction; limited potential exists to encounter hazardous material during construction and dredging; operational impacts include increased risk of hazardous materials spill.
Water and Sediment Quality	No change; localized, temporary turbidity increases; temporary lower dissolved oxygen (DO) concentrations during maintenance dredging.	Localized change in sediment transport; placement of dredged material is not expected to measurably affect water exchange or inflow; temporary turbidity increases; low DO during dredging; increased volume of stormwater runoff might increase turbidity lower levels of oxygen; increased vessel trips may raise the risk of spills.

Table 2.9-1, cont'd

Evaluation Criteria	No-Action Alternative	Proposed Project Alternative
Commercial and Recreational Navigation	No impacts to existing Gulfport Harbor Federal Navigation Channel (FNC) Aids to Navigation (ATON) or the Commercial Small Craft Channel and Harbor; vessel traffic up to 4.6 daily trips in 2060; recreational boaters using the Gulfport Yacht Club and Gulfport Small Craft Harbor may encounter delays while yielding to larger ships transiting the FNC.	No impacts to existing FNC ATON or the Commercial Small Craft Harbor; Commercial Small Craft Channel would require realignment and relocation of six buoys and three beacons; vessel traffic up to 7.8 daily trips in 2060; recreational boaters using the Gulfport Yacht Club and Gulfport Small Craft Harbor may encounter delays while yielding to larger ships transiting the FNC.
Ecological Setting	No change; impacts to terrestrial vegetation communities with residential and commercial growth and development.	No change; impacts to terrestrial vegetation communities with residential and commercial growth and development.
Wetlands and Submerged Aquatic Vegetation	No change; minor impacts with continued regional growth and development.	No impacts are expected; no submerged aquatic vegetation (SAV) occurs within 5 miles of the proposed Project area.
Terrestrial Wildlife	No change.	No impacts due to urbanization and industrialization of the project area; temporary impacts due to noise and construction activity associated with placement of dredged material; potential long-term beneficial effects of placement of dredged material include increased habitat for foraging, burrowing, resting, roosting, breeding, and nesting.
Aquatic Ecology	Short-term turbidity increases; burial of benthic organisms.	Loss of 196.5 acres of open-water habitat and permanent conversion of 85 acres to deeper habitat; temporary turbidity increases during project construction, dredging within the project area, and dredged material placement; removal of benthic community; burial of benthic organisms at placement areas; slight increase in the probability of a petroleum spill with increase in vessel traffic; positive benefit if dredged material to be used beneficially within the BMC.
Threatened and Endangered Species	No change; maintenance dredging activities would continue in Gulf sturgeon critical habitat and may negatively impact Gulf sturgeon and sea turtles, if present; short-term increases in turbidity and reduced DO conditions; slight increase in spills and ship strikes due to increased vessel traffic.	Temporary impacts from construction and maintenance dredging in Gulf sturgeon critical habitat; impacts due to underwater noise from pile installation, dredging and boat traffic; increased vessel strikes to mammals due to increased vessel traffic; short term increases in turbidity and reduced DO conditions; sea turtles most likely to be affected negatively by dredging activities; increase in vessel traffic slightly increases probability of a petroleum spill; possibility of entrainment mortality of Gulf sturgeon by dredging equipment.
Cultural Resources	No change.	No recorded sites listed in the National Register of Historic Places (NRHP); probability for unrecorded site is low; no impacts to terrestrial or submerged sites during construction.

Table 2.9-1, cont'd

Acronyms and abbreviations:

ATON	– U.S. Coast Guard Aids to Navigation
BMC	– Biloxi Marsh Complex
cy	– cubic yard
dBA	– A-weighted decibel (sound level)
DO	– dissolved oxygen
EJ	– Environmental Justice
FNC	– Gulfport Harbor Federal Navigation Channel
FTE	– full-time equivalent job
LOS	– Level of Service
MCY	– million cubic yards
NAAQS	– National Ambient Air Quality Standards
NRHP	– National Register of Historic Places
SAV	– Submerged Aquatic Vegetation

This page intentionally left blank.

3.0 AFFECTED ENVIRONMENT

The purpose of the Affected Environment section of this EIS is to provide a description of the existing environment in areas likely to be affected by the proposed PGEP alternatives in a manner that allows effects to be completely understood. In an effort to reduce the size of this document, descriptions are commensurate with the importance of the anticipated impact, with resources likely to have little or no impact summarized and a more-thorough description provided for resources more likely to be impacted.

To more-accurately describe existing resources and potential impacts associated with the proposed PGEP, a study area (The Endangered Species Act [ESA] [16 USC 1536] of 1973 “Action Area”), Project area, and National Historic Preservation Act (NHPA) [36 CFR 800, Appendix C, 33 CFR 325] Permit Area have been defined. The study area encompasses an area that provides spatial boundaries for resources that could be indirectly impacted by the proposed PGEP (Figure 3.0-1). The study area is defined to facilitate discussion of existing conditions in a general context as well as discussion of indirect and cumulative impacts. For some resources (e.g., air quality, noise, socioeconomics) the study area may be defined differently. The study area shown on Figure 3.0-1 was defined primarily to account for a portion of Mississippi Sound for addressing the potential impacts the proposed Project may have on the Gulf sturgeon (*Acipenser oxyrhynchus desotoi*).

The Project area provides spatial boundaries for evaluation of resources that may be more-directly impacted by the construction and operation of the proposed Project, and is therefore a smaller area, more immediate to the proposed Project features. Specifically, the Project area surrounding the Port is defined as the footprint of the project features with a 5,000-foot buffer (Figure 3.0-2).

The permit area is limited to the waters of the U.S. within the immediate vicinity of the proposed Project, including the area in which construction would take place and the waters immediately adjacent to those waters, including upland areas with facilities directly related to the harbor expansion (i.e., expanded parking area and boat launch), and the primary, secondary and cumulative impacts that the activities authorized by this permit would have on those waters and associated uplands. The Project area and the permit area are the same for all resources discussed. Detailed descriptions of the study, Project, and permit areas along with the natural systems and human components are discussed below.

3.1 LAND USE/RECREATION/AESTHETICS

3.1.1 Land Use

The Port is an existing commercial port facility with intermodal land transportation facilities (road and rail) interconnections for the distribution of cargoes to inland destinations. The following is a description of the Port and surrounding land uses within the greater Gulfport area. The existing FNC is included in this land use description, since it is a dedicated use of Mississippi Sound and an essential facility for waterborne

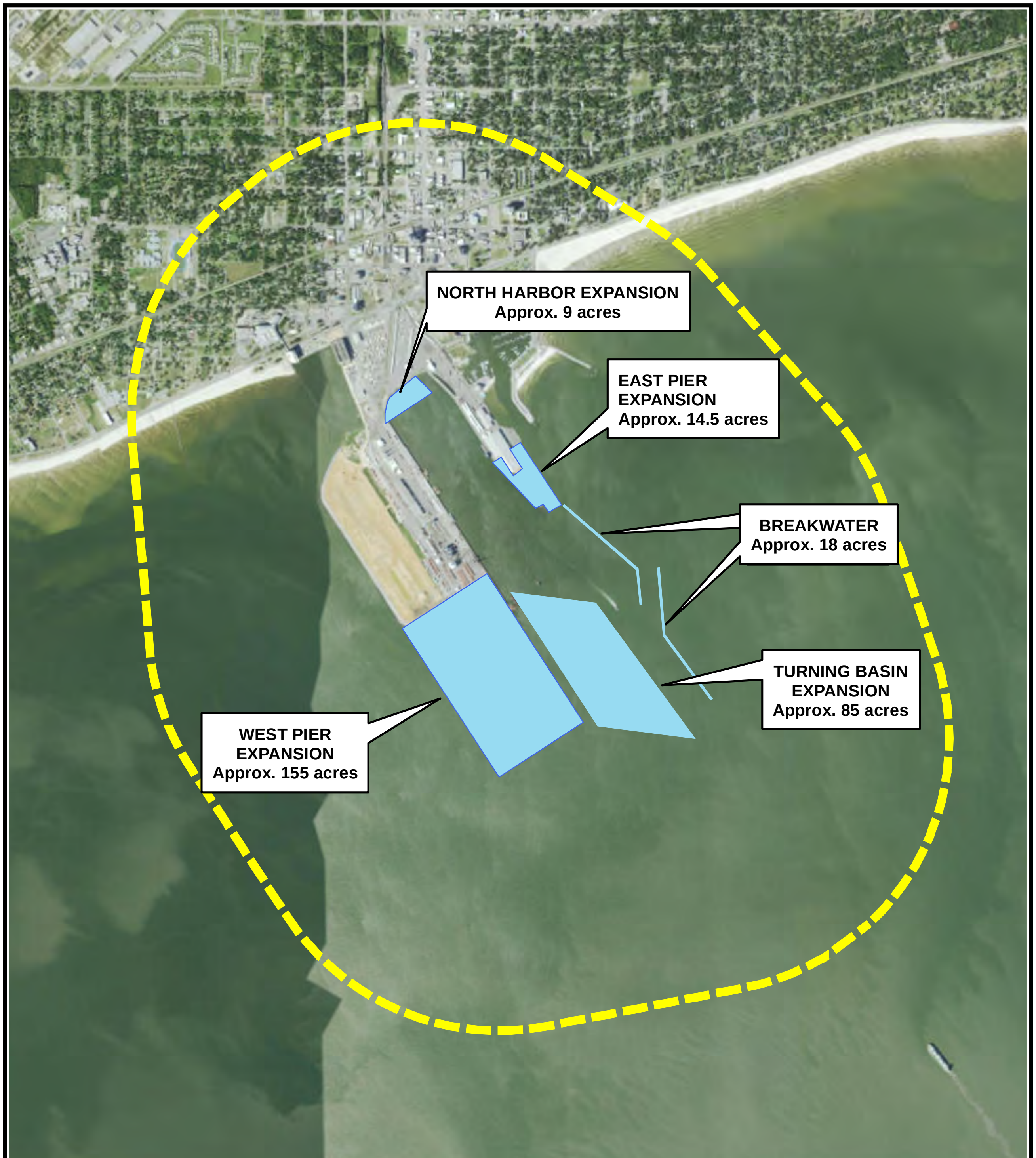
Figure 3.0-1

Port of Gulfport Expansion Project

Study Area

Prepared By: 19910	Scale: 1" = 6 miles
Job No.: 100018536	Date: Sept 18, 2015

File: N:\Clients\M_N\Mississippi_State_Port_Authority\100018536\geospatial\Figs_EIS\2015_Revisions\PGEP_EIS_Figure_3_0_1_Study_Area_150918.mxd



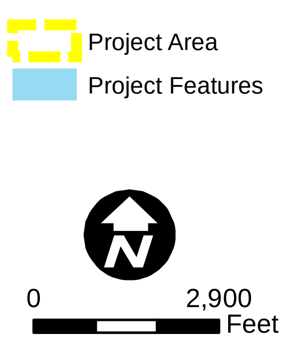


Figure 3.0-2

Port of Gulfport Expansion Project

Proposed Project Features and Project Area

Prepared By: 13029	Scale: 1" = 3000'
Job No.: 100018536	Date: May 5, 2017

File: N:\Clients\M_N\Mississippi_State_Port_Authority\100018536\geospatial\Figs_EIS\2015_Revisions\PGEP_EIS_Figure_3_0_2_Proposed_Proj_Features_and_Proj_Area_050316.mxd commercial transportation. The Port and many land uses along the Mississippi Gulf Coast experience varying levels of impact from hurricanes, most recently by Katrina in 2005 and both Gustav and Ike in 2008. Recovery operations are continuing on many land uses and structures.

The Port is zoned as an I-2 Heavy Industrial District within the City of Gulfport Code of Ordinances (Municode, 2013). This industrial district allows for heavy manufacturing and related activities and requires access to existing and future arterial thoroughfares, highways, railway lines, and waterways. As the heaviest industrial zoning classification within the City of Gulfport, this I-2 District is supportive of the Port's operation.

The Port is accessed by ship from the Gulf via the FNC that runs 22 nautical miles from the deepwater terminus in the Gulf, between West Ship Island and Cat Island to the Port terminals (see Figure 1.2-1). The channel is maintained at a depth of 38 feet and a width of 400 feet in the outer or Bar Channel and 36-foot depth and 300-foot width in Mississippi Sound to allow navigational access for oceangoing commercial vessels. In addition to this commercial channel, designated dredged material disposal areas adjacent to the shipping channel are dedicated uses of Mississippi Sound bottom lands. These areas receive dredged material during channel maintenance dredge operations. The south harbor and turning basin in the vicinity of the Port are also maintained at a depth of 36 feet. Industrial facilities at the Port include berths with container and bulk material unloading systems, covered storage, open container bulk storage, and a Ro-Ro ramp for wheeled cargoes.

Land access to the Port is available for truck and rail transport. Truck access to and from I-10 is routed along US 49 through the City of Gulfport. Rail access to the Port is provided by a north-south rail line paralleling 27th Avenue. Rail services on the Port rail lines are operated by KCS, while both CSX and KCS railroads operate on the regional and national rail lines.

The Gulfport Small Craft Harbor (Bert Jones Yacht Harbor) is located east of and adjoining the East Pier. This harbor includes a recreational boating marina, the Gulfport Yacht Club, and USCG Station Gulfport (see Figure 1.2-2). The outer breakwater for the harbor includes a sheltered recreational beach and fishing piers. Small craft access to this inner-harbor utilizes the yacht basin channel, which is segregated from the Port by breakwaters.

A commercial small craft harbor is located on the western side of the Port (see Figure 1.2-2). This western harbor was designed to accommodate a commercial shrimp fleet with 7 to 9 piers, berths for 40 to 60 shrimp boats, seafood markets, and limited fuel facilities. The breakwater and terminals for this western harbor were extensively damaged during the 2005 and 2008 hurricane seasons and currently offer limited capabilities.

East and West Ship islands, located approximately 11 miles off the coast, are part of the Gulf Islands National Seashore and are protected as environmental, cultural, and historical lands. These islands are managed for passive recreational activities by the National Park Service (NPS) and are discussed further in Section 3.1.2.

US 90 parallels the coast and provides a scenic vista and access to Mississippi Sound beaches. Land uses north of US 90 are a mix of commercial offices, hotels, casinos, residential, and retail. Preliminary data from the 2010 Census indicate that the City of Gulfport has approximately 67,793 residents (City of Gulfport, 2013a). Downtown Gulfport is located immediately north of the Port centering on US 49 and US 90. Land uses within downtown Gulfport include a mix of commercial offices with street-level retail and mixed residential. The Gulfport-Biloxi International Airport is located northeast of downtown, south of I-10. The airport provides both passenger service on commercial carriers and general aviation fixed based operations. An industrial park occupies the area north of the airport. This park includes a mix of heavy and light industrial uses and distribution facilities. A barge canal extends to Three Rivers Road south of the industrial park (and just east of the intersection of I-10 and US 49), providing water access to industrial facilities for barge transport and ship maintenance. This canal accesses the Gulf through the Back Bay of Biloxi to the Biloxi Bay navigation channel.

The City of Gulfport Government administers land uses with three approved codes and plans: the City of Gulfport Code of Ordinances, the Old Gulfport Community Plan, and the Mississippi City Community Plan (City of Gulfport, 2007a, 2007b; Municode, 2013). These community plans establish the uses, densities, and intensities of land uses within their respective boundaries, while the Zoning Code applies to areas of the city outside of the planning district's boundaries.

Collectively these codes and plans identify permissible land uses as:

- Residential
- Commercial
- Processing and manufacturing
- Industrial
- Energy related uses, such as oil and gas extraction, mining and dredging, and energy production
- Transportation
- Recreation
- Institutional

The City of Gulfport land uses blend with the urban development and residential subdivisions that extend along the Gulf Coast within the City of Biloxi to the east, and Long Beach and Pass Christian to the west.

3.1.2 Recreation

The Port lies near the center of Mississippi's 26 miles of coastal beaches on the Gulf. These beaches and the nearshore waters of Mississippi Sound and the Gulf offer numerous recreational opportunities to beach goers and recreational boaters. In addition to these valuable marine resources, there are numerous recreational opportunities within the De Soto National Forest, Big Biloxi Recreation Area, and inland wildlife management areas.

The Mississippi coast recreational beaches extend nearly unbroken between Pass Christian and Biloxi. The Port and the associated Gulfport Small Craft Harbor are centrally located along this stretch of public beaches. These beaches are accessed from US 90 (Beach Boulevard) by periodic pull-over areas where public parking, restrooms/bath house, and beach concessions are available at strategic locations to serve the needs of beach goers. Popular beach recreation activities include sun bathing, swimming, and other recreational pursuits.

The Gulfport Small Craft Harbor is located east of and adjoining the Port and shares the deep-water access of the main FNC. This harbor is one of the primary recreational boating facilities along the coast. Other coastal boating access points include the Long Beach and Pass Christian marinas, both located west of the Port. However, most of the boat ramps and boating access facilities within the three-county area are located in the sheltered waters of the coastal embayments of St. Louis Bay and Back Bay of Biloxi.

The Gulfport Small Craft Harbor, as with most of the Gulf Coastal communities, was severely damaged by Hurricane Katrina in 2005 and both Gustav and Ike in 2008. The redesigned harbor features a variety of mixed-use leisure and recreational facilities. Among these are Harbor Square Park, a new marina with up to 319 slips, Gulfport Yacht Club facilities (72 slips), boat ramp, Urie Pier, a recreational beach, and a fisherman’s village with a mix of resorts, retail shops, and restaurants. All redesigned facilities are accommodated with ample parking and accessed from US 90 on landscaped internal roadways. The Gulfport Small Craft Harbor also supports USCG Station Gulfport and a marine life education center.

Harbor Square Park (Bert Jones Park) is located between the Gulfport Small Craft Harbor and US 90. It is the largest public park on the Gulf Coast and offers passive and recreational opportunities for residents and visitors. Access to the park is from US 90 on 20th, 23rd, and 25th avenues. Other predominant land uses in the vicinity of the Port include the Island View Casino, Gulfport Senior Citizens Center, and Gulf Haven Campground, all located north of US 90 west of the Port and the U.S. Post Office, east of US 49 in downtown Gulfport.

Three barrier islands, East and West Ship islands and Cat Island, are situated 11 miles south of the Port and are part of the Gulf Islands National Seashore, which is designated by the NPS as a preserved area of natural and recreational significance. Private lands also exist on Cat Island. All three islands are popular destinations of recreational boaters and offer ample opportunities for outdoor recreation including camping (except West Ship Island), fishing, swimming, and hiking. For those seeking recreational through-access to the natural environment, these barrier islands provide undeveloped beaches with opportunities to enjoy the coastal and marine environment and wildlife along the shoreline.

West Ship Island is served by seasonal ferry excursions that provided island access to over 60,000 visitors prior to Hurricane Katrina in 2005. Fort Massachusetts is one of the primary attractions on West Ship Island. This historic military fort was constructed in 1862 as part of America’s coastal defense system. Before it was completed, the Fort was captured by the Union Navy, which maintained control of the Fort throughout the Civil War. During these years, the Fort was used to enforce the blockade of Confederate ports and serve as a Confederate prisoner-of-war facility. At its peak, the Fort reached a capacity of 18,000 union troops, and facilities at the fort included a hospital, barracks, mess hall, and bakery. The red-brick fort has survived numerous hurricanes, and now serves as a recreational and cultural destination for residents and tourists (Pan Isles Inc., 2011). West Ship Island also includes recreational amenities, including a dock, boardwalk, restrooms, and concession facilities. Coastal tour boats access the island during the summer tourist season. East Ship Island can be accessed by pleasure boaters and provides isolated beaches and fishing opportunities.

Other historic facilities along the Gulf Coast include Beauvior, The Jefferson Davis Home, and Civil War cemetery, as well as a number of cultural and artistic museums.

All three barrier islands were severely damaged by Katrina in 2005, and ferry service was curtailed. Efforts to rebuild recreational facilities on the island were hampered again by the landfall of Gustav and Ike in 2008. These combined hurricanes completely submerged East Ship Island and severely damaged West Ship Island. However, by fall 2009, the islands' ranger station, pier and boardwalk, restrooms, visitor's center, and snack bar had been rebuilt and were receiving visitors. Ferry excursions have been reinitiated and ridership continues to increase as recreational visitors return to the Mississippi Gulf Coast after the post-hurricane rebuilding period and the Deepwater Horizon oil rig explosion and oil spill in 2010.

The Deepwater Horizon oil rig explosion and oil spill occurred in the Gulf on April 20, 2010, through July 15, 2010, 41 miles southeast of the Louisiana coast. It is estimated that more than 200 million gallons of oil were released into the Gulf, causing significant impacts to environment, Gulf coastal communities, and economic activity (Restore the Gulf, 2010). Along the Gulf Coast shoreline, approximately 625 miles were oiled as a result of the spill, including 105 miles in Mississippi. These numbers represent a daily snapshot of the impacts at that time and do not include cumulative impacts or shoreline that was previously cleared (Gulf Oil Spill Information Portal, 2013).

Gambling is legal in Mississippi and the presence of casinos along the Gulf Coast of Mississippi serves to attract a number of visitors to the area. While not recreation in the traditional sense, visitors attracted to the casinos may participate in other recreational activities during their stay on the Gulf Coast. Other commercial recreational facilities include golf courses, resort hotels, and retail establishments.

Collectively, these recreational resources along the Mississippi Gulf Coast are a significant benefit to the local and state economy, creating jobs and providing revenue to local businesses, while preserving the local natural and cultural heritage of the region.

Recreational boating along the Gulf Coast is a popular pursuit with over 54,700 registered recreational water craft in the three-county region. Harrison County, which includes the City of Gulfport, has the largest number of registered boats (24,207) among these three counties (Burrage et al., 1999). The majority of these boats are in the 16-foot range and used for fishing in nearshore and offshore waters. Freshwater fishing on the interior bayous and rivers is also popular with residents and visitors, along with canoeing and kayaking on the Mississippi Sound and these inland waters.

3.1.3 Aesthetics

The Port has been in operation since its inception in 1902. It has been continuously upgraded through the years and is currently an active commercial Port facility, which lies adjacent to both commercial land uses within the City of Gulfport and open recreational beaches of the Mississippi Sound. The Port encompasses 250 acres, with approximately 110 acres of open storage space and 400,000 square feet of covered warehouse space (Port of Gulfport, 2015). Existing structure heights vary at the Port between one story to well over ten stories; however, the visual impact is lessened by the placement of structures in relation to the viewer. The tallest structures are the three RMG cranes used to lift containers. These cranes can reach well over 100 feet and can lift cargo to over 170 feet (MSPA, 2014). As with the other structures at the Port (e.g., light towers, existing cranes, and silos), the RMG cranes are illuminated at night.

The Port lies near the center of the 26 miles of Mississippi coastline between Biloxi Bayou and Pass Christian. Much of the coastline is recreational beaches providing an open-space vista of the Mississippi Sound. As a heavy industrial land use, the Port is highly visible along the coast and has an aesthetic impact on the recreational beaches of the Mississippi Sound. The Port also lies immediately south of the City of Gulfport urban center, where the city's commercial and institutional land uses have a view of the industrial Port and the ships that frequent the terminals. The lack of buffers between the industrial and commercial land uses means the Port facilities and operations can be viewed as an aesthetic impact. However, the Port has been in continuous operation for over 100 years, and residents and visitors have become accustomed to the visual impact and intensity of Port operations.

3.2 COMMUNITY INFRASTRUCTURE AND MUNICIPAL SERVICES

This section presents a brief description of the utilities, public safety and health services, schools and libraries, and aviation within the study area. Data were collected from research of local chambers of commerce and governmental agencies.

3.2.1 Utilities

The Port is located within the City of Gulfport in Harrison County. Within Harrison County, a variety of entities provide electric, natural gas, water, sewer, telecommunications, and solid-waste disposal services. These services are summarized in Table 3.2-1.

Table 3.2-1
Utility Services for Harrison County

Electricity	Natural Gas	Water	Wastewater	Solid Waste Disposal	Telecom-munications
Mississippi Power	CenterPoint Energy	City of Biloxi	Harrison County Utility Authority	Allied Waste	AT&T Mississippi
Coast Electric Power Association		City of Gulfport	Harrison County Development Commission	Advanced Disposal Services	Cable One
		City of D'Iberville		Waste Management	
		City of Long Beach		Republic Services	
		City of Pass Christian			
		Harrison County Utility Authority			

Electricity. Electrical power for the State of Mississippi, including the Gulf coastal region within the study area, is provided by Mississippi Power, a subsidiary of Southern Company. Mississippi Power corporate headquarters is located on West Beach Boulevard in the City of Gulfport. Power to the study area and Port facilities is provided primarily from Mississippi Power's Plant Watson, a 1,012-megawatt steam-generating plant, located within northeast Harrison County.

Mississippi Power serves 186,679 customers in 23 counties in southeast Mississippi from an integrated power grid comprising 8 power plants, 147 substations, and 2,118 miles of transmission lines. Collectively this power grid provides power to the study area (Mississippi Power, 2013). Mississippi Power's system was severely damaged by Hurricane Katrina in 2005; however, repairs have been completed, and all systems are operational.

Mississippi Power Company wholesales power to the Coastal Electric Power Association (CEPA), an electric co-operative that operates a transmission and distribution system to deliver power to rural areas in Harrison, Hancock, and Pearl River counties. The CEPA serves more than 77,000 members within their service area, which includes a portion of the study area. The Port receives electrical service directly from Mississippi Power and is not served by CEPA (CEPA, 2012).

Natural Gas. Natural gas service within the study area is provided by CenterPoint Energy, Inc. CenterPoint, headquartered in Houston, Texas, maintains an extensive distribution system serving the Gulf Coast region with natural gas. CenterPoint is supplied with natural gas from the Gulf South Pipeline, which runs east-west through the coastal area. Natural gas is supplied to the various cities from taps in this transmission line. Residential and commercial natural gas customers are connected directly to the distributions system and supplied with gas at a pressure of 25 to 50 pounds per square inch. Two lines provide natural gas to the Port area. One capped line terminates at the Port entrance on 30th Avenue and a second line, located within the Captain James McManus Drive right-of-way, serves the Gulfport Yacht Club east of the Port (CenterPoint Energy, 2011).

Water, Sewer, Solid Waste, and Stormwater. The Harrison County Utility Authority (HCUA), a public entity created by the Mississippi Legislature, provides public water, sanitary sewer, and stormwater services to Harrison County.

Potable water for Harrison County is supplied from 34 groundwater wells tapping the Mississippi Embayment Aquifer system. These wells produce 28.5 million gallons per day (mgd), which is treated and distributed through an interconnected network of treatment plant, transmission lines, and storage tanks (HCUA, 2011a). Operation of this system is directed by the HCUA under the provisions of the Mississippi Gulf Region Water and Wastewater Plan (MDEQ, 2007). HCUA wholesales potable water to the cities of Gulfport, Biloxi, Long Beach, and Pass Christian, which retail potable water to residential and commercial customers in their respective service areas (HCUA, 2011a).

Sanitary sewer collection services within the study area are managed by individual municipalities. These cities maintain sanitary sewers within their respective cities and discharge effluent to one of four regional wastewater treatment plants operated by HCUA within the study area. Wastewater from the City of Gulfport, including the Port, is treated at the Gulfport South Waste Water Treatment Plant, which operates at an average daily flow of 8.22 mgd with a peak flow capacity of 40 mgd. The plant is a secondary treatment facility with advanced effluent disinfection. Following treatment, effluent is discharged to Gulfport Lake (HCUA, 2011b).

The three other wastewater treatment plants in the study area include:

- Gulfport North Wastewater Treatment Plant, with an average daily flow of 7.75 mgd and a peak capacity of 22.8 mgd. Gulfport North is a secondary treatment plant discharging chlorinated effluent to Gulfport Lake (HCUA, 2011b).
- West Biloxi Wastewater Treatment Plant averages 9 mgd with a peak capacity of 25.2 mgd. West Biloxi is a secondary treatment plant discharging chlorinated effluent to Gulfport Lake (HCUA, 2011b).
- Long Beach/Pass Christian Wastewater Treatment Plant averages 7 mgd with a peak capacity of 18 mgd. Long Beach/Pass Christian is a secondary treatment plant with chlorinated effluent (HCUA, 2011b).

All of the wastewater treatment plants within the study area meet or exceed EPA Region IV treatment standards and have sufficient capacity to accommodate increased flows as the region’s population increases (HCUA, 2011b).

Discharges of pollutants or special waste, such as oily waste from marine vessels, are required to comply with the USCG requirements (33 CFR 158). This CFR requires pretreatment prior to discharging wastewaters to regional or municipal facilities (MSPA, 2010a).

Solid waste collection within the study area is provided by private solid waste companies, under contract with the municipalities or HCUA. The Port also contracts with private solid waste transport firms to remove waste from Port property (see Table 3.2-1). Disposal of waste is accommodated at landfills managed by the HCUA. Wastes are placed in the Pecan Grove Sanitary Landfill or the Coastal Recyclers Landfill, both of which are located in Harrison County. Recycling of household wastes is provided by private contractors under the Curbside Collection Program. HCUA also provides separate scheduled collection programs for yard clippings, motor oil, tires, and household hazardous waste (HCUA, 2011c).

The HCUA also provides stormwater management services. Stormwater priorities of the HCUA are areas of localized flooding and the protection of infrastructure from storm damage (HCUA, 2011d). A stormwater treatment facility was designed for the West Pier as part of the Restoration Project. The West Pier has eight drainage areas where stormwater is collected in a type of detention pond. Stormwater runoff is treated (primarily to remove sediment and floating debris) before being conveyed to the storm sewer pipes (CDM Smith, 2012).

Telecommunications. Telephone, internet, and television services are provided to customers within the study area by a number of companies, including AT&T Mississippi, Verizon, and Cable One.

3.2.2 Public Safety and Health Services

The study area has a well-developed infrastructure to provide health, police, firefighting, emergency, and social services. A wide range of public programs, services, and facilities are offered at different locations throughout the study area.

3.2.2.1 Fire Departments

Fire and emergency medical services are provided by the municipalities within the study area as well as Harrison County. All of the fire departments within the study area maintain a mutual-aid policy and provide fire and emergency medical support to other departments upon request.

The City of Gulfport Fire Department has 11 fire stations, with another under construction, and employs 174 full-time fire protection and rescue service workers (City of Gulfport, 2013b). The department responds to a variety of calls, such as structure fires, aircraft emergencies, hazardous material spills, emergency medical calls, and marine emergencies. They also provide special services in hazardous waste response and disaster preparedness, and have trained personnel to respond to the potential threats of weapons of mass destruction. The department serves a population of 67,793 citizens (U.S. Census Bureau, 2013a).

The Biloxi Fire Department has 9 fire stations and employs 140 full-time firefighters and staff members. They have 9 engine companies, 3 ladder companies, 3 tankers, 2 command vehicles, 1 heavy rescue vehicle, 1 fire boat, 1 air/light vehicle, 1 support service vehicle, 2 reserve engines, 1 fire investigations unit, and numerous staff vehicles. The department protects more than 44,000 citizens in an area of approximately 61 square miles (City of Biloxi, 2013a).

The Long Beach Fire Department serves a population of 15,000 residents from 3 fire stations. Staff includes 40 full-time firefighters and communication personnel. The department provides emergency response, fire protection, basic life support services, including first responders, emergency medical services, safety training, and public education (City of Long Beach, 2013).

The Pass Christian Fire Department serves a population of 4,081 residents from 2 fire stations. The department has a full-time staff of 19 firefighters and administrative staff and 20 volunteers. Services include fire protection, emergency medical services, and hazardous materials response. The department maintains a mutual-aid policy and responds to requests from other fire departments for backup (City of Pass Christian, 2011a).

The D'Iberville Fire Department serves the city from 1 fire station staffed with 27 firefighters and administrative staff. Services include structure and woodlands fire protection, emergency medical services, and response to hazardous materials emergencies. The department's staff members are currently training to perform marine search and rescue/recovery. The department coordinates emergency services with surrounding cities under a mutual-aid policy and provides support outside of the city upon request (City of D'Iberville, 2011a).

The Harrison County Fire Service protects the citizens living in the unincorporated areas of the county, a total rural area of approximately 408 square miles with a population of 43,931. They employ 8 full-time paid fire personnel, 1 clerical person, 6 part-time paid personnel, and 140 volunteers (Harrison County Board of Supervisors, 2013).

The Port enforces fire protection rules through the provision of the Port tariff and maintains cooperative agreements with county and municipal fire departments for fire protection and emergency medical services. The Port has a fire protection and fire suppression system in place that works in cooperation with the City of Gulfport Fire Department to address fire protection in and around the Port. A Hot Work Permit will be issued before any hot work (e.g., welding) begins (MSPA, 2012).

The fire station located closest to the location of the proposed PGEP is at 1515 23rd Avenue, two blocks north of US 90.

3.2.2.2 Security

The MSPA works in cooperation with the Gulfport Police Department and the U.S. Department of Homeland Security to implement safety and security programs for the Port. Security functions are maintained on MSPA premises through contract with an independent security service. The security service provides continuous surveillance of all Port facilities, protects against unlawful entry and pilferage, enforces fire detection control regulations, and performs other assigned security duties. The security functions of the service are coordinated with municipal, county, state, and Federal law enforcement authorities (MSPA, 2012).

As an international transportation facility, the Port is supported by the U.S. Customs and Border Protection and the U.S. Department of Homeland Security, each of which provides security services for cargo movement and personnel. Employees and transient Port workers are required to obtain security clearance in order to access the Port facilities and maintain current transportation workers identification cards (MSPA, 2012). The USCG also enforces safety and security provisions for vessels operating in waters of the U.S. (USCG, 2011a).

The U.S. Customs and Border Protection provide certain law enforcement services from its location at the Port. The border patrol is authorized to enforce provisions of the customs and navigational laws of the U.S. under Sec. 19 CFR 101.1. The border patrol is also authorized to inspect and accept entering merchandise and collect duties on imports received at the Port (U.S. Department of Homeland Security, 2011).

The Mississippi Office of Homeland Security provides leadership in protecting the citizens of Mississippi from foreign and domestic terrorist attacks. The Mississippi Office of Homeland Security is also tasked with providing leadership for preventing, preparing against, mitigating, and recovering from any man-made or natural crisis (Mississippi Office of Homeland Security, 2011).

The USCG provides security to the Port under the Ports, Waterways, and Coastal Security provisions of the Homeland Security Act of 2002. The USCG Station Gulfport, located adjacent to the Port on the eastern marina basin, carries out this mission with 41 active duty members, 9 reservists, and 60 members of the USCG Auxiliary. The station maintains a fleet of two 41-foot utility boats, one 25-foot Defender B Class boat, two 24-foot Special Purpose Craft-Shallow Water boats, and two 87-foot patrol boats. The station coordinates its activities with local law enforcement and fire departments, as well as environmental and wildlife agencies and other Federal law enforcement agencies (USCG, 2011a).

Law enforcement within the study area is provided by the county sheriff and municipal police departments. The Harrison County Sheriff's Department provides protective services to unincorporated portions of the county, which includes portions of the study area. The department has various divisions, including aviation, criminal investigation, communications, community relations, criminal records, operations, adult detention facility, marine patrol, motor carrier, and professional standards and reserves (Harrison County Sheriff's Department, 2011).

The City of Gulfport Police Department provides public safety service to the incorporated areas of the city, including the Port. The department employs 293 personnel, including 201 sworn officers, and serves a community population of 80,000 residents and a daily service population of 144,000 (City of Gulfport, 2013c).

The Biloxi Police Department employs 130 officers, 76 full- or part-time civilians, and has more than 250 vehicles. The Lopez-Quave Public Safety Center, located in East Biloxi, houses the police, fire, and municipal court personnel. The Communications Center, located in North Biloxi, houses the City's 911 emergency dispatchers. The department provides a wide array of services to the community, including patrol operations, criminal investigations, crime scene processing, search and rescue operations, special narcotics enforcement teams, and canine support (City of Biloxi, 2013b).

The Long Beach Police Department serves an estimated population of 15,000 citizens within the municipal boundary of the City (U.S. Census Bureau, 2013a). The department has 50 employees including 35 sworn law enforcement officers. In addition to serving the City with community patrols and crime investigation, the department provides emergency management, public safety, and educational services. Officers within the department have undergone training in counter-terrorism and weapons of mass destruction response. The department maintains a mutual-aid policy with surrounding law enforcement agencies and provides assistance outside of the City upon request (City of Long Beach, 2011).

The Pass Christian Police Department provides police protection to 4,081 citizens within the municipal boundaries of Pass Christian. The department has 24 employees, of which 22 are sworn officers who provide community law enforcement and investigative services. The department maintains an informal mutual-aid understanding with other law enforcement agencies in the region and responds to requests for assistance (City of Pass Christian, 2011b).

The City of D'Iberville is located within the northeast portion of the study area, generally between Back Bay Biloxi and I-10. The D'Iberville Police Department serves the 32,400 citizens within the municipal boundaries with 30 sworn police officers and an administrative staff of 2. The department provides security patrols, investigative services, community relations, search and rescue operations, and marine patrol. Officers within the department have undergone counter-terrorism and weapons of mass destruction response training. The department maintains a mutual-aid policy with surrounding law enforcement agencies (City of D'Iberville, 2011b).

State law enforcement agencies provide support and assistance to the sheriff and local police departments. These include the Mississippi Bureau of Investigation and the Mississippi Highway Patrol, which are divisions within the Mississippi Department of Public Safety (MDPS). The Mississippi Bureau of Investigation has general police powers to investigate; report and prevent criminal activities; coordinate between Federal, state, and local agencies; and maintain criminal information (MDPS, 2011a). The Mississippi Highway Patrol enforces traffic laws on State and Federal highways, assists local law enforcement agencies, and responds to statewide emergencies at the direction of the Governor (MDPS, 2011b).

3.2.2.3 Health Services

Harrison County is served by three civilian general medical hospitals (Biloxi Regional Medical Center, Garden Park Medical Center, and Gulfport Memorial Hospital), and one limited services facility (Select Specialty Hospital Gulf Coast), with a combined total of 834 licensed beds, as well as 7 ambulatory surgical facilities. Harrison County also has 5 licensed and certified long-term care facilities, 7 licensed personal care homes, and 6 certified hospices.

Harrison County has 144 active primary care medical doctors. The 2008 estimated population of Harrison County lead to a primary care physician-to-population ratio of one care provider for every 1,247 persons, which is lower than the state-preferred ratio of 1,488 persons per primary physician (Cossman et al., 2005).

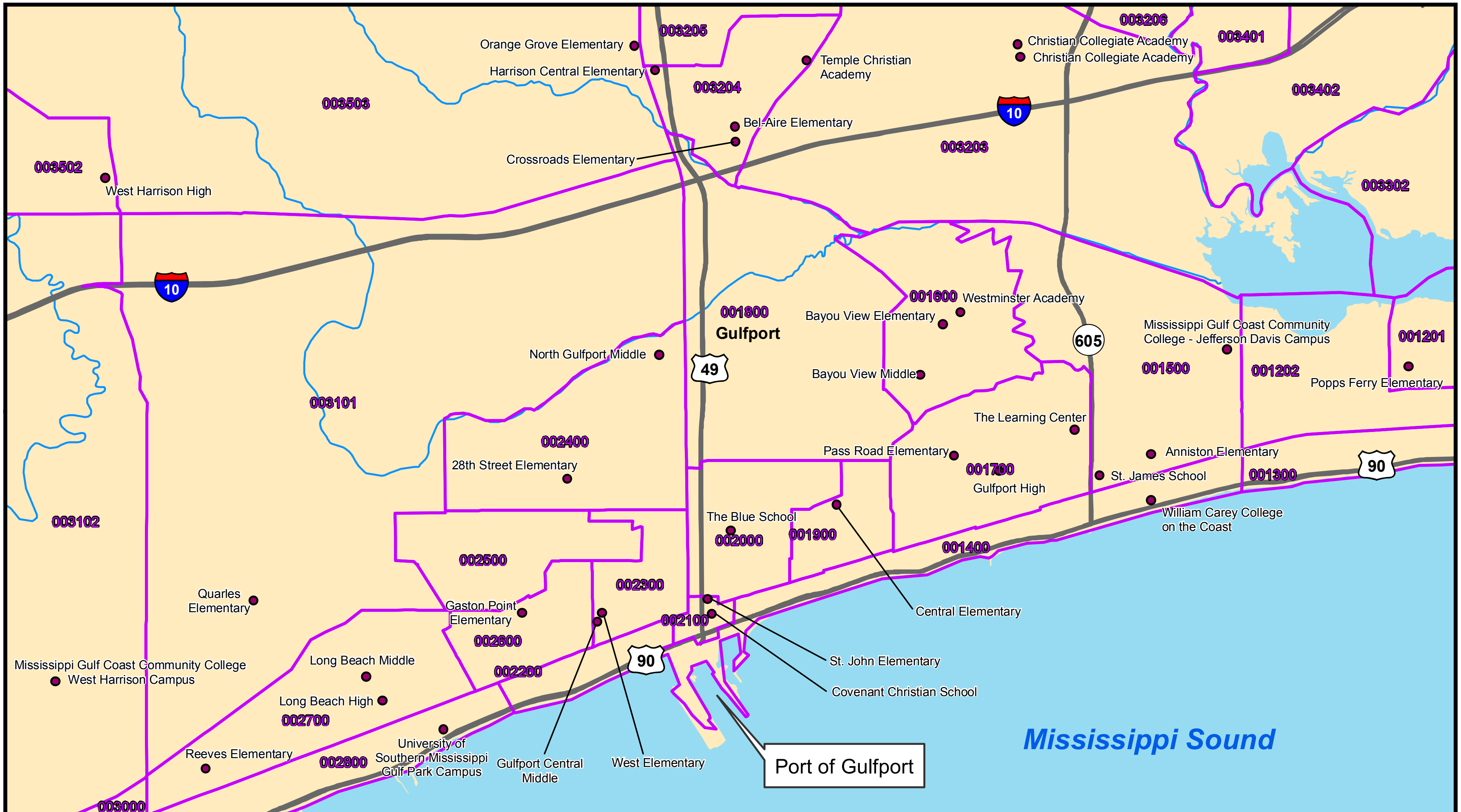
The 81st Medical Group operates Keesler Medical Center, one of the largest medical centers in the Air Force, located in Biloxi. It provides healthcare for more than 7,500 active duty and 27,000 eligible local beneficiaries. The 81st Medical Group Commander also oversees the Gulf Coast Multi-Service Market, which includes five military medical treatment facilities and two USCG medical facilities stretching from Mobile to New Orleans, coordinating care for more than 80,000 eligible beneficiaries along the Gulf Coast (U.S. Air Force, 2012).

The Veterans Administration (VA) Gulf Coast Veterans Health Care System in Biloxi provides outpatient primary and specialty care, inpatient care, long-term care, mental healthcare, and a psychosocial residential treatment program. The Biloxi facility is one of four VA Gulf Coast Veterans Health Care Systems along the Alabama and Mississippi Gulf Coast and the Florida Panhandle (U.S. Department of Veterans Affairs, 2013).

3.2.3 Schools and Libraries

The study area counties are served by 11 school districts. The school districts in closest proximity to the Port are Biloxi, Gulfport, Long Beach, and Pass Christian have their own school districts, while the Harrison County School Board administers schools within the unincorporated areas of the county. A summary of the school districts in the study area, including number of schools and student enrollment, is provided in Table 3.2-2. The location of schools within the study area is provided on Figure 3.2-1, capacity information was not available.

The county also supports a number of parochial and private schools. Collectively, these public and private schools provide elementary and secondary education to a county population of approximately 187,105. Approximately 47,400 residents (27.3 percent) are under the age of 18; the majority of these are attending school within one of the above listed school districts. An estimated 83.6 percent of Harrison County residents have received a high school education (U.S. Census Bureau, 2013a).



N

0 1.5 Miles

● School

Census Tract

Sources: Biloxi School District; Gulfport School District; Harrison County School District; Long Beach School District; Pass Christian School District; Catholic Diocese of Biloxi, Department of Education; Mississippi Association of Independent Schools, 2011

Figure 3.2-1

Port of Gulfport Expansion Project

Schools within the Study Area

Prepared By: 13209	Scale: 1" = 1.5 miles
Job No.: 100018536	Date: October 7, 2015

File: N:\Clients\M_N\Mississippi_State_Port_Authority\100018536\geospatial\Figs_EIS\2015_Revisions\PGEP_EIS_Figure_3_2_1_Schools_100715.mxd

Table 3.2-2
Public Schools in the Study Area

School District	Elementary School	Middle School	High School	Student Enrollment[1]
Harrison County	12	4[3]	3	14,037
Gulfport	7	2	1	6,013
Biloxi	4	1	1	5,347
Pass Christian	2	1	1	1,864
Long Beach	3[2]	1	1	2,956
Hancock County	4	1	1	4,436
Bay St. Louis-Waveland	2	1	1	1,993
Jackson County	7[4]	3	3	9,518
Moss Point Separate	3[4]	1	1	2,336
Ocean Springs	4[5]	1	1	5,590
Pascagoula	13	3	2	6,919
Total	61	19	16	61,009

Source: Mississippi Department of Education (2013); Gulfport School District (2013); Biloxi School District (2013); Pass Christian School District (2013); Long Beach School District (2013); Harrison County School District (2013).
[1] Enrollment as of the start of 2012–2013 school year.
[2] Two elementary schools are kindergarten through 3rd grade, and one is 4th, 5th, and 6th grades.
[3] Combined elementary and middle schools.
[4] Includes upper, lower and conventional elementary schools.
[5] Includes upper and conventional elementary schools.

Post-secondary education is available in Harrison County at the Mississippi Gulf Coast Community College, and the Gulf Campus of the University of Southern Mississippi. William Carey University, Virginia College, and Madison University also have campuses in the study area, along with a number of trade and specialty schools.

The Harrison County library system serves the 187,105 county residents from 8 public libraries along the Gulf Coast. Services offered by the library system include an extensive book collection, on-line catalog, computer services, genealogy research resources, interlibrary loans, summer programs for the kids, traveling exhibits, audio books for the blind, and the “ask the librarian” reference services. All of the public libraries experienced damage to their physical facilities and/or library materials during Hurricane Katrina and currently two libraries continue to operate from temporary facilities, while the libraries are being rebuilt and restocked. The library system administration office also continues to operate from temporary trailers, as of first quarter 2013 (Harrison County Library System, 2013).

The City of Long Beach operates one library for residents of the city. The Long Beach library offers a library book collection, children’s department, library loans, the Magnolia data base, preschool story time, and internet access (Long Beach Public Library, 2013).

3.2.4 Aviation

Six aviation facilities are located within the study area. Primary among these are the Gulfport-Biloxi International Airport and Keesler Air Force Base. In addition, four private helicopter pads are also located within the study area. They include the Memorial Hospital Heliport, located northwest of the Port, and the Gulfport Jail Heliport, located immediately south of I-10.

The Gulfport-Biloxi International Airport is a full-service commercial and general aviation airport located immediately south of I-10, 3 miles northeast of the City of Gulfport. Commercial flights are offered by five airlines with nonstop service to Atlanta, Charlotte, Dallas-Fort Worth, Houston, Jacksonville, Memphis, and Tampa. Airport runways include a 9,002-foot primary and a 4,935-foot secondary runway. The commercial airport terminal comprises 165,000 square feet, and supports the operations of commercial airlines. The airport averages 173 aircraft operations daily, including military, commercial, and general aviation flights (AirNav, 2013a).

In addition to the airport's commercial passenger services, the airport also provides facilities for cargo operations. With a primary focus on perishables, the air cargo facility operator can handle, clear customs, consolidate, and distribute products throughout North America. The 46,000-square-foot cargo facility includes 20,000 square feet of chiller space, 20,000 square feet of cargo sorting and distribution space, and 6,000 square feet of office space (AirNav, 2013a).

Keesler Air Force Base airfield has a single 7,630-foot runway used primarily for military flight training and transient military aircraft. Flights originating from Keesler are conducted by the 45th and 815th Airlift Squadrons and the 53rd Weather Reconnaissance Squadron. Private aircraft are restricted from using Keesler airfield (AirNav, 2013b).

The Memorial Hospital Heliport is located on top of the hospital on 13th Street in the City of Gulfport. This helicopter pad is a 70-square-foot controlled-landing area used predominantly for the transport of trauma patients to the Hospital (AirNav, 2013c).

The Harrison County Sheriff operates a helicopter landing pad at the Gulfport Jail. The 120-square-foot pad is used for law enforcement flights (AirNav, 2013d).

The Gulf Coast Community Hospital Emergency Heliport operates a 30-square-foot pad located just north of the beach in the northwest corner of the intersection of US 90 and Gateway Drive in Biloxi. This heliport is used for transporting emergency patients to the hospital (AirNav, 2013e).

Lundys Heliport is a private heliport located north of I-10, off Cedar Lake Road in Biloxi. This helipad is made of turf and features a 60-square-foot pad (AirNav, 2013f).

3.3 SOCIOECONOMIC RESOURCES

This section presents a summary of economic and demographic characteristics of the Project area in Harrison County and of the surrounding areas within Hancock and Jackson counties. Data collected to analyze the area's population, employment, and economy, and to address Environmental Justice (EJ) issues are also included in this section.

The proposed Project is located within Harrison County, Mississippi; however, communities that are potentially affected by the Project are located in Hancock and Jackson counties (located to the west and east of Harrison County, respectively). The socioeconomic and demographic analysis focused on the Gulfport-Biloxi Metropolitan Statistical Area (MSA) and the communities located (or partially located) within this MSA. The communities included in this analysis are Bay St. Louis, the City of Biloxi, the City of D'Iberville, Gulf Hills Census Designated Place (CDP), Gulf Park Estates, the City of Gulfport, Long Beach, Ocean Springs, Pass Christian, Shoreline Park, St. Martin CDP, and Waveland.

3.3.1 Labor Force and Employment

Data from the U.S. Bureau of Labor Statistics (BLS, 2015) was gathered to compare employment trends of the study area with the greater region and the state. The Gulfport-Biloxi MSA was expanded in 2013 to include Pascagoula (Office of Management and Budget [OMB], 2013). Data presented prior to 2013 will be for the Gulfport-Biloxi MSA and data presented after 2013 will be for Gulfport-Biloxi-Pascagoula MSA. Generally, the Gulfport-Biloxi MSA and counties within the study area have followed the same trends as the state. Between 1990 and 2000, the Gulfport-Biloxi MSA and the study area counties experienced increases in their labor forces, ranging from 15.6 percent (Jackson County) to 52.5 percent (Hancock County), while the state increased only 11.8 percent (Table 3.3-1). Between 2000 and 2010, the labor forces of the Gulfport-Biloxi MSA, Hancock County, Harrison County, and the state decreased slightly, while the labor force of Jackson County increased slightly. Between 2010 and 2015, the labor forces in all of the study area counties and the state declined (BLS, 2015).

Table 3.3-1
Study Area Labor Force and Unemployment

	Labor Force							Percent Unemployment Rate			
	Annual				Percent Change						
Place	1990	2000	2010	2014	1990–2000	2000–2010	2010–2014	1990	2000	2010	2014
Gulfport-Biloxi MSA*	140,474	174,582	172,825	161,064	24.3	-1.0	-6.8	6.9	5.0	9.1	7.5
Hancock County	12,795	19,516	18,749	18,330	52.5	-3.9	-2.2	7.3	4.9	9.1	7.4
Harrison County	71,744	90,854	87,933	83,826	26.6	–3.2	-4.7	6.8	4.8	8.9	7.0
Jackson County	54,944	63,505	64,127	58,908	15.6	1.0	-8.1	7.3	6.0	9.4	8.3
State of Mississippi	1,175,744	1,314,154	1,313,441	1,236,310	11.8	–0.1	-5.9	7.7	5.7	10.4	7.8

Source: BLS, 2015.
Gulfport-Biloxi Metropolitan Statistical Area (MSA) was changed to include Pascagoula in 2013. Labor force data includes that update.
*Gulfport-Biloxi-Pascagoula MSA after 2013

Unemployment rates for the Gulfport-Biloxi MSA and Gulfport-Biloxi-Pascagoula MSA have generally followed the same trends as the study area counties, but have been consistently lower than the state average. The annual unemployment rate for the Gulfport-Biloxi-Pascagoula MSA in 2014 was 7.5 percent compared with 7.8 percent for the state (BLS, 2015).

The economy of the study area relies on manufacturing, military installations, tourism, public administration, healthcare, and education. Table 3.3-2 lists the leading employers and their number of employees by county.

Of the 15 top employers listed for Harrison County, five are located in Gulfport. Of these five, the leading employer is RPM Pizza followed by Memorial Hospital and the Naval Construction Battalion Center. The largest employer for Harrison County in Biloxi is the Beau Rivage Casino. The leading employers for the study area counties are hospitality (Beau Rivage, Silver Slipper, Hollywood Casino), government, military-related (Stennis Space Center, Naval Oceanographic Office, Pratt and Whitney), or healthcare (Singing River Hospital System, Memorial Hospital, Hancock Medical Center).

The Mississippi Department of Employment Security (MDES, 2015) provides labor market information for the State of Mississippi through grants from the BLS. Table 3.3-3 presents 2013 data on employment and wages by industry and county.

According to the MDES, the industries in Hancock County that employed the largest percentage of the labor force were accommodation services (14.64 percent), retail trade (13.30 percent), and technical services (11.36 percent). The industries with the highest average annual wages were manufacturing ($70,934), utilities ($60,280), and technical services ($58,711) (MDES, 2013).

For Harrison County, the industries that employed the largest percentage of the labor force were accommodation services (23.03 percent), retail trade (13.94 percent), and health care (13.79 percent). The Divisions Industry category (defined as industries that failed to meet criteria for disclosure of information) reported the highest average annual wages of $78,175. The industries with the next highest average annual wages were computer management ($77,552), technical services ($56,090), and manufacturing ($51,745) (MDES, 2013).

The highest percentages of Jackson County's labor force are employed in manufacturing (27.76 percent), health care (12.18 percent), and construction (9.70 percent), with the industries with the highest average annual wage being mining ($81,006), utilities ($72,618), manufacturing ($68,759 (MDES, 2013).

Casinos in Gulfport and Biloxi are an integral part of the study area's economy in terms of revenue and employment. Table 3.3-4 summarizes employment and payroll expenditures for casinos within the study area.

Table 3.3-2
Top Employers for the Study Area Counties

Company	Location	Employment
Hancock County		
Hollywood Casino Bay St Louis	Bay Saint Louis	2,950
Naval Oceanographic Office	Stennis Space Center	1,000
Silver Slipper Casino	Bay Saint Louis	800
Gulf Cities Testing & Engineering	Diamondhead	582
Hancock Medical Health Service	Bay Saint Louis	500
National Aeronautics and Space Administration (NASA)	Stennis Space Center	475
NASA	Stennis Space Center	400
Celebrity Grill	Bay Saint Louis	359
Walmart Supercenter	Waveland	350
Stennis Space Center	Stennis Space Center	300
PSL North America Limited Liability Company (LLC)	Bay Saint Louis	275
Pratt & Whitney	Stennis Space Center	217
Harrison County		
Beau Rivage Resort & Casino	Biloxi	4,000
Rpm Pizza LLC	Gulfport	3,500
Memorial Hospital	Gulfport	3,000
Keesler Air Force Base	Keesler Air Force Base	3,000
Harrah's Casino	Biloxi	3,000
Naval Construction Battalion Center (CBC)	Gulfport	2,500
Memorial Hospital at Gulfport	Gulfport	2,100
Island View Casino Resort	Gulfport	2,000
U.S. Veterans Affairs Department	Biloxi	1,500
Hard Rock Hotel and Casino	Biloxi	1,400
Gulf Coast Veterans Health	Biloxi	1,200
IP Casino Resort and Spa	Biloxi	1,150
Asplundh Tree Expert Company	D'Iberville	1,000
Premier Entertainment Biloxi	Biloxi	850
Jackson County		
Chevron Pascagoula Refinery	Pascagoula	1,290
Singing River Health System	Ocean Springs	855
VT Halter Marine Inc.	Pascagoula	750
Ingalls Shipbuilding	Pascagoula	650
Walmart Supercenter	Pascagoula	545
Walmart Supercenter	Ocean Springs	500
George Regional Hospital	Lucedale	495
Northrop Grumman Electro Systems	Ocean Springs	400
VT Halter Marine Inc.	Moss Point	350
County of Jackson Road Department	Vancleave	300
Floore Industrial Contractors	Moss Point	300
Welltech	Pascagoula	300
U.S. Navy Engineering	Pascagoula	250
Jackson County Sheriff's Office	Pascagoula	250
George County Supervisors Board	Lucedale	250

Source: MDES (2015).

Table 3.3-3
2013 Employment and Wages by Industry for the Study Area Counties

Industry[1]	Average Monthly Employment	Number of Establishments	Average Annual Wage
Hancock County			
Utilities	240	9	$60,280
Construction	533	99	$45,361
Manufacturing	818	31	$70,934
Wholesale Trade	78	20	$45,321
Retail Trade	1,486	103	$22,117
Transportation	120	32	$39,811
Information	88	8	$32,647
Finance	225	34	$44,163
Real Estate	117	38	$32,699
Technical Services	1,269	114	$58,711
Adm. Waste	1,029	38	$47,746
Education Services	1,014	9	$44,902
Health Care	966	58	$36,892
Arts, Entertainment, and Recreation	675	13	$25,119
Accommodation Services	1,636	79	$21,073
Other Services	157	49	$28,531
Public Administration	657	12	$27,044
Other Divisions	67	12	$51,020
Total	11,175	758	
Harrison County			
Construction	3,629	410	$42,786
Manufacturing	4,131	126	$51,745
Wholesale Trade	1,321	140	$49,288
Retail Trade	10,719	628	$24,793
Transportation	2,359	129	$40,074
Information	909	42	$43,901
Finance	2,165	181	$48,563
Real Estate	1,384	239	$31,614
Technical Services	2,169	399	$56,090
Administrative and Waste Services	4,776	228	$22,824
Education Services	5,443	52	$34,685
Health Care	10,604	408	$44,000
Arts, Entertainment, and Recreation	3,032	54	$24,879
Accommodation Services	17,710	399	$22,484
Other Services	1,723	319	$27,969
Public Administration	3,299	22	$37,258
Other Divisions	1,526	44	$78,175
Total	76,899	3,820	

Table 3.3-3, cont'd

Industry[1]	Average Monthly Employment	Number of Establishments	Average Annual Wage
Jackson County			
Agriculture, Forestry, Etc.	26	4	$26,053
Mining	57	7	$81,006
Utilities	522	10	$72,618
Construction	4,684	227	$56,931
Manufacturing	13,407	78	$68,759
Wholesale Trade	429	65	$51,494
Retail Trade	4,640	332	$23,654
Transportation	879	53	$39,627
Information	652	18	$36,727
Finance	990	108	$43,544
Real Estate	390	95	$31,678
Technical Services	1,655	229	$58,984
Management Companies	409	12	$64,850
Administrative and Waste Services	2,523	126	$32,254
Education Services	4,050	26	$34,161
Health Care	5,883	231	$50,204
Arts, Entertainment, and Recreation	309	29	$15,558
Accommodation Services	4,143	218	$13,901
Other Services	924	175	$37,711
Public Administration	1,729	18	$34,754
Total	48,301	2,061	

Source: MDES (2013).

[1]Industries not listed failed to meet criteria for disclosure of information.

Table 3.3-4
Employment and Payroll Expenditures for Study Area Casinos for Second Quarter of 2015

Study Area Casinos	Number of Employees	Gross Revenue	Payroll Expenditures
Biloxi			
Beau Rivage Casino	3,069	N/A	N/A
Boomtown	406	N/A	N/A
Golden Nugget	1,110	N/A	N/A
Hard Rock Casino	1,054	N/A	N/A
Harrah's Gulf Coast Hotel & Casino	743		
Imperial Palace	1,510	N/A	N/A
Palace Casino	649	N/A	N/A
Treasure Bay	638	N/A	N/A
Gulfport			
Island View Casino	1,599	N/A	N/A
Coastal Region Total	12,026	$416,719,653.39	$95,914,838.61
Mississippi State Total	20,937	$733,857,635.18	$168,164,708.05

Source: Mississippi Gaming Commission (2015).

Casinos in the Coastal Region area (Bay St. Louis, Biloxi, and Gulfport) employ a total of 12,026 persons. While payroll expenditures were not available for individual casinos, aggregated data for all Coastal Region casinos was over $95 million in payroll expenditures. Of the 12,026 persons employed by casinos in the Coastal Region, 10,778 (89.6 percent) are employed by casinos in Biloxi and Gulfport (Mississippi Gaming Commission, 2015).

3.3.2 Population and Social Characteristics

Population within the study area counties experienced moderate increases over the past 20 years. As shown in Table 3.3-5, the greatest change in population for all three counties and the state occurred between 1990 and 2000, increases in population ranged from 14.0 percent in Jackson County to 35.3 percent in Hancock County. The study area's population growth, like much of the Gulf Coast, was affected by Hurricane Katrina. Population growth slowed in many areas and declined in others. From 2000 to 2010, Hancock County and Jackson County experienced increases of 2.2 percent and 6.3 percent, respectively, while Harrison County experienced a decline in population of 1.3 percent. The State of Mississippi's population increased by 2.9 percent from 2000 to 2010 (U.S. Census Bureau, 2013a, 2013b, 2013c).

Table 3.3-5
State of Mississippi and Study Area Counties Population and
Percent Change 1990, 2000, 2010, and Projected Population 2010–2025

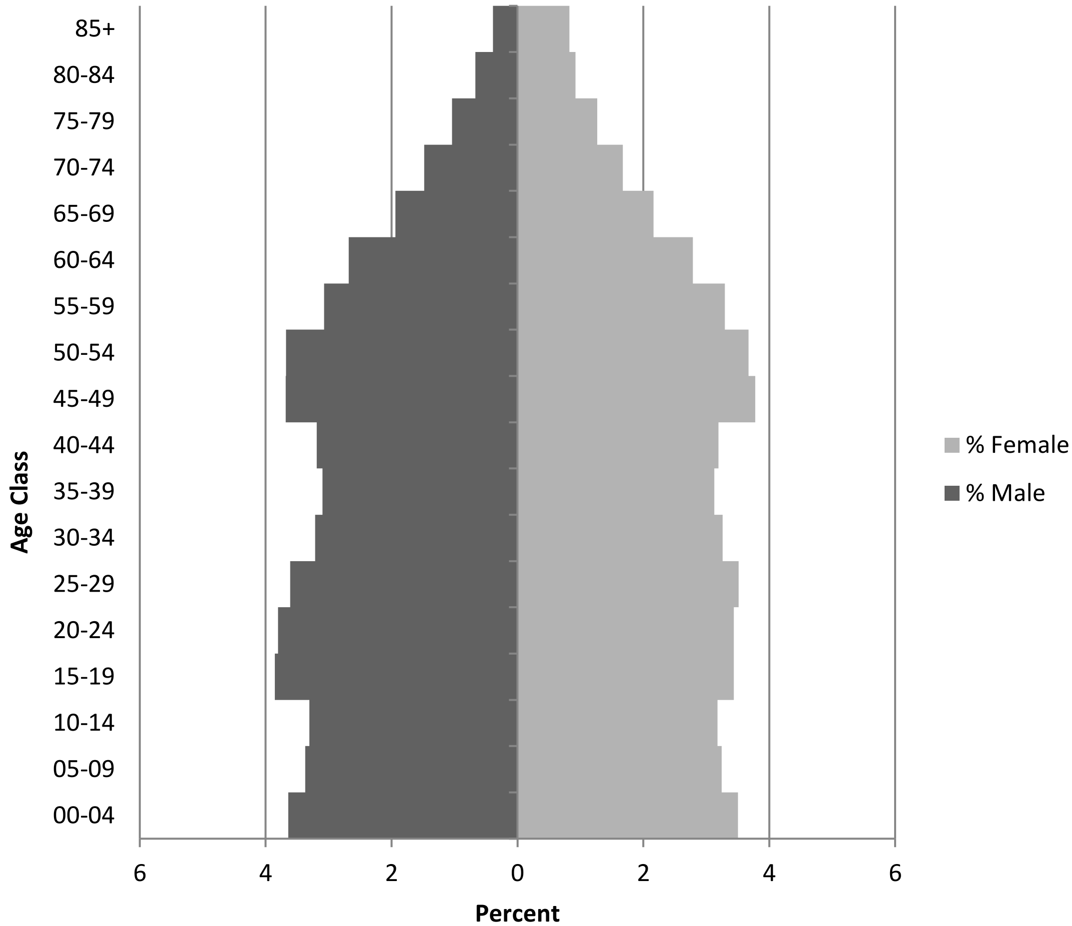
Place	Population				Percent Change		
	1990	2000	2010	2025	1990–2000	2000–2010	2010–2025
Mississippi	2,575,475	2,884,658	2,967,297	3,227,364	12.0	2.9	8.8
Hancock County	31,760	42,967	43,929	51,062	35.3	2.2	16.2
Harrison County	165,365	189,601	187,105	219,047	14.7	−1.3	17.1
Jackson County	115,253	131,420	139,668	156,273	14.0	6.3	11.9

Source: U.S. Census Bureau (2013a-c); Mississippi Institutions of Higher Learning, Center for Policy Research and Planning (2012).

Population projections from the Center for Policy Research and Planning at the Mississippi Institutions of Higher Learning, Center for Policy Research and Planning (2012) indicate that moderate growth is anticipated for the study area counties in the coming 15 years (see Table 3.3-5). Between 2010 and 2025, it is expected that Hancock County's population will increase by 16.2 percent, Harrison County's by 17.1 percent, and Jackson County's by 11.9 percent. The state's population is expected to increase by 8.8 percent.

Historical and projected population estimates were not available for the Gulfport-Biloxi MSA; however, current population data are available for this area. The 2010 population of the Gulfport-Biloxi MSA is 248,820. Figure 3.3-1 shows the population by sex and age (U.S. Census Bureau, 2013a).

As shown on Figure 3.3-1, the population is evenly distributed among the age groups until age 55, at which point the percentage of the population declines rapidly. This could suggest a short life expectancy for the study area. It also appears that the population skews slightly male in the younger age groups (ages 0–49), but tends to be more female in the older age groups (ages 50–85+). This could indicate that females have a longer life expectancy than males in the study area.



Source: U.S. Census Bureau (2013a)

Figure 3.3-1
Gulfport-Biloxi MSA Population Pyramid

The study area counties are served by 11 school districts. There are two school districts in Hancock County: Hancock County School District (SD) and Bay St. Louis-Waveland SD. In Harrison County, there are five school districts: Harrison County SD, Biloxi Public SD, Gulfport Public SD, Long Beach SD, and Pass Christian Public SD. Jackson County is served by four school districts: Jackson County SD, Moss Point Separate SD, Ocean Springs SD, and Pascagoula SD. Figure 3.2-1 shows the location of schools by census tracts.

As shown in Table 3.3-6, the educational attainment of the Gulfport-Biloxi MSA is generally consistent with the study area counties and the State of Mississippi. A majority of the population of Gulfport-Biloxi MSA (54.1 percent of the population aged 18 and older) have achieved some college instruction or a higher level of attainment, which is slightly higher than the State of Mississippi (50.0 percent) (U.S. Census Bureau, 2010). The Gulfport-Biloxi MSA and Harrison County have slightly higher percentages of those with some college education; this could be due to the fact that the University of Southern Mississippi Gulf Park Campus is located in Long Beach, in Harrison County.

Table 3.3-6
Educational Attainment for the Population Age 18 and Older

Place	Population Age 18 and Older	Percent of Population with Highest Level of Education Achieved: Less than 9th Grade	9th to 12th Grade, No Diploma	High School Graduate, GED, or Alternative	Some College	Associate's Degree	Bachelor's Degree	Graduate or Professional Degree
Gulfport-Biloxi MSA	185,801	5.2	10.6	30.1	27.2	8.4	11.7	6.8
Hancock County	32,916	5.3	9.0	31.6	24.1	8.9	13.7	7.5
Harrison County	139,712	5.1	10.6	29.6	28.1	8.4	11.4	6.8
Jackson County	103,260	4.2	10.9	33.9	25.9	9.1	10.7	5.3
State of Mississippi	2,199,726	6.4	13.2	30.3	24.9	7.5	11.5	6.1

Source: U.S. Census Bureau (2010).

GED = General Equivalency Diploma

Table 3.3-7 presents disability data for the civilian noninstitutionalized population for the study area. The population of the Gulfport-Biloxi MSA has similar percentages of individuals with hearing, vision, cognitive, ambulatory, and self-care difficulties as Hancock, Harrison, and Jackson counties. The percentages of those with self-care difficulties in the Gulfport-Biloxi MSA and the study area counties are consistently lower than those of the state's overall population.

Table 3.3-7
Disability Characteristics of the Study Area

Place	Total Estimated Population[1]	Estimated Percent of Population with Difficulty[2]: Hearing Difficulty	Vision Difficulty	Cognitive Difficulty	Ambulatory Difficulty	Self-Care Difficulty	Independent Living Difficulty
Gulfport-Biloxi MSA	242,631	3.6	2.4	6.5	9.3	2.8	5.4
Hancock County	42,846	4.7	3.5	5.2	8.9	2.5	4.6
Harrison County	177,255	3.9	3.0	6.4	8.9	3.3	5.4
Jackson County	136,939	4.1	2.8	5.7	9.1	3.2	4.6
State of Mississippi	2,877,959	4.2	3.6	6.5	9.7	3.6	6.1

Source: U.S. Census Bureau (2010).

[1]Civilian noninstitutionalized population.

[2]Individuals capable of reporting multiple difficulties.

The Gulfport-Biloxi MSA has lower occurrences of hearing and vision difficulties when compared with the study area counties and the state. The percentage of persons with cognitive difficulties in the Gulfport-Biloxi MSA is higher than any of the study area counties, but is equal to that of the state. Ambulatory difficulties are the most common difficulty in the Gulfport-Biloxi MSA, affecting 9.3 percent of the civilian noninstitutionalized population (U.S. Census Bureau, 2010).

3.3.1 Personal Income

Table 3.3-8 shows median household income, as well as income brackets and the percentage of each area's population that falls into each bracket.

Table 3.3-8
Study Area Individual Income

	Percent of Population[1] at Income Level					
Income	City of Gulfport	Gulfport-Biloxi MSA	Hancock County	Harrison County	Jackson County	State of Mississippi
Total Est. Population	52,355	181,898	31,993	137,506	102,002	2,289,048
No Income	10.8	11.6	14.0	10.8	13.2	13.9
$1 to $9,999 or Less	23.6	21.4	20.2	20.9	20.4	23.9
$10,000 to $14,999	12.4	10.7	10.9	10.9	9.8	11.4
$15,000 to $24,999	16.0	15.8	15.8	16.2	15.3	15.2
$25,000 to $34,999	12.5	12.4	12.0	12.6	12.3	11.8
$35,000 to $49,999	11.6	12.6	11.1	13.1	12.3	10.6
$50,000 to $64,999	5.7	7.1	7.2	7.1	7.5	5.8
$65,000 to $74,999	1.5	2.0	2.3	2.0	2.6	2.0
$75,000 or more	6.0	6.4	6.4	6.5	6.7	5.3
Median Household Income[2]	$39,035	$44,768	$45,956	$44,846	$50,203	$37,696

Source: U.S. Census Bureau (2008, 2010) and U.S. Department of Health and Human Services (HHS, 2014).

[1]Population 15 years and over.

[2]In 2010 inflation-adjusted dollars.

For the City of Gulfport, the majority of the population (52.0 percent) earns between $1 (or less) and $25,000. For the City of Gulfport, the Gulfport-Biloxi MSA, the study area counties, and the state, the highest percentage of the population 15 years and older earns $1 to $9,999 (U.S. Census Bureau, 2008, 2010). Median household incomes range from $39,035 to $50,203, and the 2014 poverty threshold for a family of four is $23,850 (U.S. Department of Health and Human Services [HHS], 2014).

3.3.2 Tourism

The Port lies near the center of Mississippi's 26 miles of coastal beaches on the Gulf. The Mississippi coast recreational beaches extend in a nearly unbroken band between Pass Christian and Biloxi. These beaches are accessed from US 90 (Beach Boulevard) by strategically located pull-over areas. These access areas have public parking, restrooms, and beach concession areas to serve the needs of beach goers. Additionally, the beaches provide numerous tourism opportunities. As a result, the Mississippi Gulf Coast has been a leading tourism destination in the region for many years, with the majority of the attractions and destinations centered in the Hancock, Harrison, and Jackson County area. As shown in Table 3.3-9, in 2008, visitors to

Hancock, Harrison, and Jackson counties accounted for 26.4 percent of the total tourism expenditures for the State of Mississippi.

According to a Mississippi Gulf Coast Convention and Visitors Bureau press release from 2012, tourism has developed to such an extent that the current room inventory on the Mississippi Gulf Coast is over 12,500 hotel rooms and condominium units (Mississippi Gulf Coast Convention and Visitors Bureau, 2012). In 2012, MDA (2013) prepared a report of the economic impacts of tourism on the State of Mississippi and its counties. Table 3.3-9 summarizes the impacts of tourism on the study area economy.

Table 3.3-9
Economic Impact of Tourism on the Study Area Counties

County	Tourism Expenditures by Visitors	Direct Tourism Employment	Tourism Employment Percentage[1]	State and Local Taxes Attributed to Tourism[2]
Hancock County	$115,241,091	1,830	12.8	$16,969,331
Harrison County	$1,342,950,816	20,340	23.2	$152,044,435
Jackson County	$126,215,877	1,830	3.5	$15,168,187
Mississippi	$6,159,258,428	83,345	7.7	$587,565,648

Source: MDA (2013).

[1]The Tourism Employment Percentage equals the estimated direct Tourism jobs/county level Establishment Based nonfarm employment. Data are based on where the employees work, not where they reside.

[2]Estimated State and Local Tourism Taxes from Tourist/Visitor Expenditures and some other activity. Includes the 7.0 percent sales tax and the 18.5 percent portion diverted to cities; state-licensed casinos; seawall taxes; city-county state-licensed casino gaming tax revenues; Room/Restaurant special Taxes; motor vehicle rental tax and petroleum tax diversions to counties; Alcohol Beverage Control county level share of permit license fees; and available Tourism Capital Investment local level permit fees.

The greatest economic impact from tourism in the study area is in Harrison County, where the proposed Project is located. The highest expenditures by visitors, direct tourism employment, percentage of employment dedicated to industries supported by tourism, and state and local taxes attributed to tourism are all in Harrison County. Tourism is a significant part of Harrison County and the study area's economy.

As stated in Section 3.3.1, the accommodation industry is the largest employment sector in Hancock and Harrison counties. As such, there are three tourist attractions in close proximity to the Port, Island View Casino Resort, the Gulfport Small Craft Harbor, and the Great Southern Shopping Center (GSSC).

Island View Casino Resort, a prominent tourist attraction and one of the largest employers in Gulfport, is located diagonally west and across US 90 from the Port. The beach that is used by guests of the resort is adjacent to the Port on the west boundary. The Gulfport Small Craft Harbor is located east of and adjoining the marine terminal. This harbor includes a recreational boating marina, the Gulfport Yacht Club, and the USCG Station Gulfport and is one of the primary recreational boating facilities along the coast. The GSSC is a single-level strip mall center with a total gross leasable area of 364,195 square feet. Major tenants include JoAnn Fabrics, Sears Hardware, Fashion Bug, and Big Lots (GSSC, 2012).

3.3.3 Public Finance

In Mississippi, much of county revenue is derived from property taxes. Property is appraised by the county tax assessor and collected by county tax offices. The taxes are used to fund public schools, city streets, county roads, and police and fire protection. Table 3.3-10 provides millage rates (expressed as dollars collected per thousand) by county and the services supported by these funds.

Table 3.3-10
Millage Rates* for Study Area Counties

County	General County	Roads	Bond Interest & Sinking Fund	County School	Junior Colleges	Fire Protection	County Garbage Collection	Other
Hancock	24.82	1.00	0.85	40.53	2.00	0.25	2.00	7.53
Harrison	22.29	1.00	4.23	48.34	5.25	2.45	5.25	4.59
Jackson	26.23	10.50	5.24	56.03	4.88	4.60	4.35	3.53

Source: Mississippi Department of Revenue (2012).
*Millage rates expressed as dollars collected per thousand.

In addition to taxes collected by the counties, several municipalities within the study area apply their own millage rate, including Bay St. Louis (17.75), Biloxi (30.10), D'Iberville (28.63), Gulfport (34.00), Long Beach (48.98), Ocean Springs (21.83), Pass Christian (47.46), and Waveland (26.23) (Mississippi Department of Revenue, 2011a).

The Mississippi State sales and use tax is 7.0 percent and applies to "all sales of tangible personal property in the State of Mississippi unless the law exempts the item or provides that the tax is computed at a reduced rate" and to "personal property acquired in any manner for use, storage, or consumption within this state" (Mississippi Department of Revenue, 2011a).

Residents of Mississippi are also subject to a state income tax, which is assessed using a graduated tax rate. The graduated income tax rate is 3 percent on the first $5,000 of taxable income, 4 percent on the next $5,000, and 5 percent on all taxable income over $10,000. According to the Mississippi Department of Revenue, the total value of personal income subject to state income tax was $116,977,346 for Hancock County, $450,136,552 for Harrison County, and $481,074,199 for Jackson County. All of these counties are defined as Class I counties by the Mississippi Code, meaning their total assessed values are over $25 million (Mississippi Department of Revenue, 2011b).

3.3.4 Housing

Table 3.3-11 provides information on housing in the Gulfport-Biloxi MSA, the study area counties, and the state. Of the housing units in the Gulfport-Biloxi MSA, 16.8 percent are vacant. Of the study area counties, Hancock County has the highest vacancy rate (19.0 percent), and Harrison and Jackson counties both have a vacancy rate of 16.5 percent. The statewide vacancy rate is 14.5 percent (U.S. Census Bureau, 2010).

Table 3.3-11
Housing Characteristics of the Study Area

Place	Total Housing Units	Percent Vacant	Occupied Housing Units: Percent Owner-Occupied	Occupied Housing Units: Percent Renter-Occupied	Median Value of Owner-Occupied Housing Units	Median Gross Rent for Occupied Units Paying Rent
Gulfport-Biloxi MSA	111,584	16.8	68.8	31.2	$146,000	$837
Hancock County	21,056	19.0	81.2	18.8	$149,200	$858
Harrison County	83,494	16.5	65.2	34.8	$148,200	$847
Jackson County	59,335	16.5	71.9	28.1	$129,100	$831
State of Mississippi	1,269,249	14.5	70.2	29.8	$99,800	$657

Source: U.S. Census Bureau (2010).

Of the occupied housing units, 70.2 percent are owner-occupied, statewide. This rate is similar to that of the Gulfport-Biloxi MSA (68.8 percent owner-occupied) and Jackson County (71.9 percent). Hancock County has a higher proportion of owner-occupied housing (81.2 percent), while Harrison County is lower (65.2 percent) (U.S. Census Bureau, 2010).

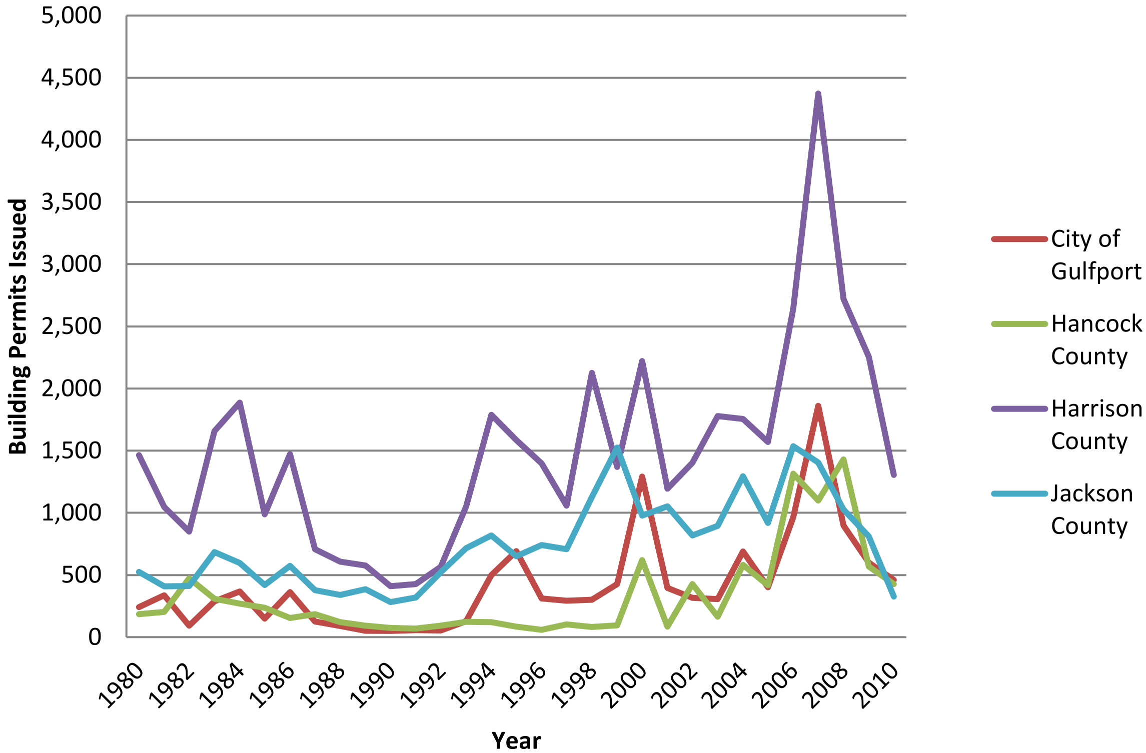
The median values of owner-occupied housing units in the Gulfport-Biloxi MSA and for the study area counties are consistently higher than the statewide median housing unit value ($99,800). This is also true of median gross rent, which was $837 for the Gulfport-Biloxi MSA, compared with $657 statewide (U.S. Census Bureau, 2010).

Data collected from the HUD State of the Cities Data Systems show the numbers of building permits issued in the City of Gulfport and the study area counties have followed similar trends over the past 30 years. As shown on Figure 3.3-2, Harrison County has consistently issued more building permits than Hancock or Jackson counties. All of the counties and the City of Gulfport reached the highest number of building permits issued in 2007–2008, and numbers have been declining since that time period (HUD, 2011).

3.3.5 Community Values and Environmental Justice

The City of Gulfport is one of the county seats for Harrison County, the other is Biloxi. Gulfport is a city that has been established since the late nineteenth century and has a rich history. The population of Gulfport is similar to other cities on the Mississippi Gulf Coast. Traditional values such as education, religion, and outdoor activities are emphasized as a part of community life in Gulfport.

The City of Gulfport has strong schools. The school district has a 71.2 percent graduation rate. Based on the Mississippi State Accountability Status, the school district has a “B” rating, which means that it is a high-performing district (Mississippi Department of Education, 2012).



Source: HUD (2011).

Figure 3.3-2
Study Area Building Permits Issued, 1980–2010

According to Church Angel, a Christian church listing service, there are 113 churches of 26 Christian denominations and one Jewish Synagogue located within the City of Gulfport (Church Angel, 2011). Baptist is the most prevalent Christian denomination with 43 churches listed, followed by Methodist with 13 churches listed, and Church of God with 9 listed churches.

The City of Gulfport's Department of Leisure Services provides residents and visitors with programs for youth and the elderly, parks, pools, and sports facilities, including gymnasiums, ball fields, and weight rooms. In addition, the department is responsible for community centers, senior centers, recreational facilities, youth athletic leagues, and after school and summer programs.

Currently, the City of Gulfport has not approved a new long-range comprehensive plan. However, the Port has been a part of the city for over a hundred years, and its operation is consistent with the community history of the study area. Also, the City of Gulfport's Department of Urban Development is responsible for the creation and implementation of building codes and land-use standards. It also manages housing development and the city's Planning and Zoning Commission. The department has aided families purchasing their own homes through partnerships, educational programs, and financial awareness classes. Additionally, the department works with residents, public agencies, neighborhood groups, and other city departments to create and design plans for community forum-based codes along with implementing building and land-use standards (City of Gulfport, 2014). A further discussion of the Gulfport community can be found in the Community Impact Assessment (CIA) (Appendix H).

In accordance with Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*, an analysis was performed to determine the presence of any minority or low-income populations that could potentially be impacted by the proposed Project, and then determine whether any potential impacts to these communities would be disproportionate compared with impacts to other communities that could potentially be affected by the proposed PGEP. For the purpose of this analysis, a minority population is defined as a group where less than 50 percent of the population is identified as non-Hispanic white. A low-income population is defined as a population whose median household income is less than the HHS' 2014 poverty guidelines for a family of four ($23,850) (HHS, 2014).

To determine a population more specific to the Port area than the county, census block group data were utilized for the zone of potential impact. The zone also considers block groups adjacent to US 49, and thus this analysis includes the communities of Turkey Creek and North Gulfport. The study area ends at the block group at the intersection of US 49 and I-10.

As indicated in Table 3.3-12, none of the three block groups adjacent to the Port are identified as predominantly minority (census tract [CT] 14 block group [BG] 1, CT 38 BG 1, and CT 38 BG 2) (Figure 3.3-3). Minority populations for the block groups adjacent to the Port are lower than city, county, and state minority populations. Of the 44 block groups found in the zone of potential impact, 21 have minority population percentages higher than that of the City of Gulfport as a whole.

There were no income data provided for the block group; however, census tract information was available to determine household income. None of the census tracts adjacent to the Port are categorized as either minority or low income (U.S. Census Bureau, 2013a). However, as indicated in Table 3.3-13, 10 of the 15 census tracts have median household incomes below that of the City of Gulfport as a whole. The lowest is CT 18 with a median household income of $18,967 for 2011. Both CT 18 and CT 26 fall below HHS 2014 poverty guidelines for a family of four ($23,850) (HHS, 2014).

CT 14 median income is slightly higher than the State of Mississippi. Also, CT 14 income is higher (9.3 percent) than CT 38. The Port and the proposed Project footprint are located within the boundaries of CT 14 BG 1, which is within the more affluent of the two census tracts.

A further discussion of EJ is found in the CIA in Appendix H. The CIA evaluated how the PGEP would affect the community and its quality of life, and specifically addresses the EJ communities within the area.

In characterizing the community, the CIA found that the population by race of both the county and city is predominantly white. Between 2000 and 2010, both the county and the city experienced population declines. Further, as of 2010, these areas have a significantly higher percentage of Hispanics or Latinos than reported in 2000. Comparing the county and the City of Gulfport populations, the Hispanic or Latino,

Table 3.3-12
Zone of Potential Impact Minority Population

Geography	Overall Population	Percent Minority
Mississippi	2,967,297	40.8
Harrison County	187,105	30.3
Gulfport	67,793	43.1
CT 14 BG 1	413	9.69
CT 14 BG 2	110	17.27
CT 14 BG 3	903	20.71
CT 14 BG 4	265	28.3
CT 17 BG 1	1,061	17.35
CT 17 BG 2	1,224	26.39
CT 17 BG 3	1,043	29.82
CT 17 BG 4	890	46.85
CT 17 BG 5	1,305	33.72
CT 18 BG 1	520	95.38
CT 18 BG 2	1,100	84.18
CT 18 BG3	1,188	83.08
CT 19 BG 1	1,198	64.19
CT 19 BG 2	886	42.44
CT 19 BG 3	727	22.28
CT 20 BG 1	1,164	57.3
CT 20 BG 2	653	62.33
CT 20 BG 3	1,383	46.93
CT 23 BG 1	438	85.16
CT 23 BG 2	763	81.0
CT 23 BG 3	952	37.82
CT 24 BG 1	848	97.88
CT 24 BG 2	2,401	80.42
CT 24 BG 3	798	93.73
CT 25 BG 1	1,812	31.29
CT 26 BG 1	1,238	63.0
CT 26 BG 2	652	76.07
CT 26 BG 3	1,902	85.54
CT 31.01 BG 1	1,045	68.42
CT 31.01 BG 2	1,375	29.75
CT 31.01 BG 3	2,235	18.84
CT 31.01 BG 4	2,650	8.3
CT 32.04 BG 1	767	38.07
CT 32.04 BG 2	1,073	56.29

Table 3.3-12, cont'd

Geography	Overall Population	Percent Minority
CT 32.04 BG 3	2,022	37.98
CT 32.08 BG 1	2,169	54.4
CT 32.08 BG 2	972	38.99
CT 32.08 BG 3	918	64.27
CT 35.05 BG 1	1,769	37.25
CT 35.05 BG 2	1,705	16.72
CT 35.05 BG 3	3,222	24.21
CT 38 BG 1	533	11.44
CT 38 BG 2	618	17.15
CT 9800 BG 1	85	62.35

Source: U.S. Census Bureau (2010).

CT = census tract

Table 3.3-13
Zone of Potential Impact Median Household Income

Geography	Median Household Income*
Mississippi	$38,718
Harrison County	$44,550
Gulfport	$39,246
CT 14	$38,906
CT 17	$35,847
CT 18	$18,967
CT 19	$32,374
CT 20	$25,817
CT 23	$26,719
CT 24	$28,039
CT 25	$39,283
CT 26	$21,179
CT 31.01	$49,875
CT 32.04	$38,319
CT 32.08	$38,802
CT 35.05	$51,250
CT 38	$35,595
CT 9800	**

Source: U.S. Census Bureau (2012).

*In 2011 inflation adjusted dollars.

**Either no sample observations or too few sample observations were available to compute an estimate.

CT = census tract

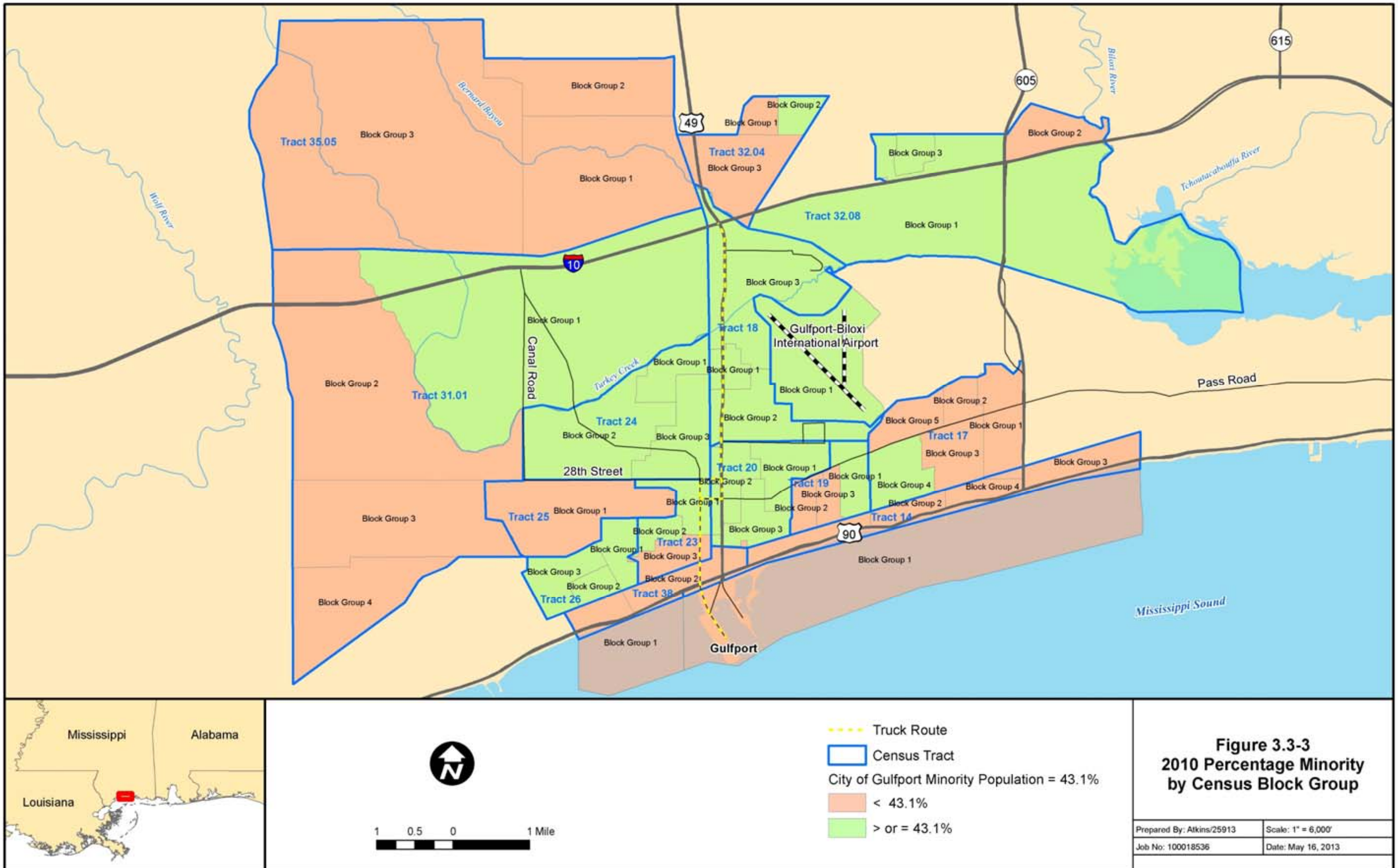


Figure 3.3-3
2010 Percentage Minority by Census Block Group

Source: U.S. Census 2010

Two or More Races, Some Other Races, and Native Hawaiian or Pacific Islander categories made up the same population percentages between these areas in 2000 and 2010. The CIA also found that there are neighborhoods along the Port's truck routes that have a larger minority population than that of the city. One CT in a low income neighborhood is located adjacent to the Port's truck route.

3.3.5.1 Protection of Children

On April 21, 1997, President Clinton issued Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks*. This Executive Order recognizes a growing body of scientific knowledge that demonstrates that children may suffer disproportionately from environmental health risks and safety risks. These risks arise because children's bodily systems are not fully developed; children eat, drink, and breathe more in proportion to their body weight and their behavior patterns may make them more susceptible to accidents. Based on these factors, the President directed each Federal agency to make it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children. The President also directed each Federal agency to ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health and safety risks.

Overall, the percentage of children in the study area is below the 25.6 percent average for the State of Mississippi (Table 3.3-14) (U.S. Census Bureau, 2012). There is less than 15.7 percent children in CT 14 and 14.8 percent in CT 38. Examples of potential risks to children include increased traffic volumes and industrial or production-oriented activities that would generate substances or pollutants children may ingest or come in contact with. Based on the totals shown above, there are no disproportionately large populations of children living near the Port.

Table 3.3-14
Study Area Children Under the Age of 18

Geography	Population	Population Under 18	Percent Under 18
Mississippi	2,956,700	756,959	25.6
Hancock County	43,322	10,328	23.8
Jackson County	138,511	35,451	25.6
Harrison County	185,120	45,443	24.5
Gulfport	67,322	16,483	24.5
CT 14	1,377	216	15.7
BG 1 CT 14	N/A	N/A	N/A
CT 38	955	141	14.8
BG1 CT 38	N/A	N/A	N/A
BG2 CT 38	N/A	N/A	N/A

Source: U.S. Census Bureau (2012).

CT = census tract

3.4 ROADWAY AND RAIL TRAFFIC

This section describes the recent history and existing conditions pertaining to transportation demand and supply in and around the Port. Since the Port is an intermodal freight transfer center, this section addresses both freight and passenger transportation modes.

The Project study area for roadway transportation impacts extends from Landon Road north of I-10 to US 90 on the south, and from US 49 on the east to Canal Road and 30th Avenue on the west. This study area covers all roadways that can be used by Port commuters and trucks that access intercity highways, such as I-10 and US 49. This study area also fully encompasses MDOT's planned I-310 Project and includes all roads that would be directly affected by its completion.

The Project site is situated south of US 90 (West Beach Boulevard), which runs along the Gulf Coast and between 30th Avenue and US 49 (25th Avenue). The Gulfport Central Business District (CBD) is situated immediately north of US 90, and a marina and recreational beach area are located just east of the site.

The current primary points of access to the Port are at signalized intersections along US 90 at 30th Avenue and at US 49 (25th Avenue). A secondary unsignalized access point is also available between these intersections at Copa Boulevard.

The freight rail (KCS) connection to the Port is also situated at Copa Boulevard. The rail line splits into two separate alignments just north of US 90. The west alignment extends into the main pier (West Pier) of the Port. The east alignment extends to the smaller East Pier. North of the Port, the KCS rail line extends inland to the north, and provides cross connection access to the east-west CSX freight rail line that runs along the Gulf Coast.

3.4.1 Transportation Demand

The Port generates travel demand for both freight and passengers. Passenger travel is associated with site workers and associated support services. As an intermodal Port, freight is accommodated by truck, freight rail, and ocean-going freight vessels.

3.4.1.1 Freight Demand

Prior to Hurricane Katrina (August 2005), the tonnage of freight handled by the Port had been growing steadily. From 2002 to 2005, freight traffic handled by the Port grew steadily from 2.1 to 2.5 million short tons of cargo per year. However, after the hurricane, freight traffic declined to 1.5 million short tons in 2006, or 60 percent of the 2005 level due to capacity limitations from hurricane damage. In terms of container cargo volume, the number of TEUs grew from 154,000 in 2002 to 230,000 in 2005 before decreasing to 170,000 in 2006. The number of vessel calls also declined from a range of 352 to 384 vessels per year between 2002 and 2005 to 225 vessels in 2006 (MSPA, 2006).

Although the Port's annual cargo volume is not back to pre-Katrina levels, it continues to grow. In 2010, the MSPA handled more than 2.15 million tons of cargo, 223,740 TEUs of containerized cargo, and 225 ships entering the Port. Based on 2009 data from MSPA, top exports were containerized cargo (90 percent of tonnage) and linerboard. The total weight of exports was 650,000 short tons in 2009. Top imports were fruit (60 percent of tonnage), ores (30 percent), and containers (10 percent). The total weight of imports was 1.4 million short tons (*Mississippi Business Journal*, 2010). Thus, the balance of trade from a weight perspective consists of about 68 percent imports to 32 percent exports. Based on comprehensive data on North American port operations, in 2008, Gulfport was the 30th busiest port behind New Orleans and ahead of Boston.

Currently, 95 percent of container freight imports leave the Port on rubber tires with more than 40 truck lines servicing the Port daily (*Gulfport News*, 2010; World Trade, 2010). However, former Mississippi Governor Haley Barbour announced in February 2010 that improvements to the freight rail line (KCS) between the Port and Hattiesburg (connecting to the Norfolk Southern mainline) had been funded by the American Recovery and Reinvestment Act (ARRA) of 2009. These recently completed improvements have led to an increase in freight rail capacity and mobility to the Port to help accommodate a larger portion of land-side freight traffic growth by rail.

3.4.1.2 Passenger Demand

Currently, the Port is staffed by 1,200 direct jobs and generates 486 indirect jobs and 540 induced jobs (MSPA, 2013a). According to the 2030 Harrison County Comprehensive Plan, over 90 percent of Harrison County residents travel to work in a personal vehicle alone, or as part of a carpool. Two-thirds of Harrison County residents commute more than 15 minutes to work. Keesler Air Force Base, the Naval Construction Battalion Center, and Beau Rivage Casino are the county's three biggest employers, and they are among the largest individual sources of travel to and from Biloxi and Gulfport (Harrison County, 2008).

3.4.2 Surface Transportation Network

The surface transportation network in the study area consists of an interstate highway, U.S. highways, state highways, and county and local roads that provide access to the Port, as well as private freight rail lines. Figure 3.4-1 shows a City of Gulfport roadway functional classification map that illustrates major thoroughfares and freight rail lines connecting to the Port (located on the small peninsulas along the Gulf coast at the bottom of the map). Red routes indicate principal arterials providing access to the Port, while the blue route is I-10. I-310 is a proposed highway that is included in the Gulf Coast Regional Plan, and MDOT considers it as part of their No-Build scenario for future planning efforts. However, due to litigation, this project has been delayed, and it is unknown when the project will move forward. This transportation network must accommodate both passenger travel flows by different travel modes for Port workers and freight flows that are transported by truck or rail to points inland.

Source: Gulf Regional Planning Commission (GRPC, 2003).

Figure 3.4-1
City of Gulfport Roadway Network and Classifications

3.4.2.1 Roadways

The following sections provide a summary of the existing conditions for the major roadways in the Project study area. These sections present historic traffic count data obtained from MDOT.

3.4.2.1.1 US 49

US 49 (also known as 25th Avenue in the Gulfport CBD) is a designated hurricane evacuation route, runs north-south, and connects Gulfport to Hattiesburg, Jackson, and other locations via intersecting highways. Within the study area, US 49 connects the cities of Gulfport, Landon, New Hope, and Orange Grove. US 49 is the primary point of access to a major retail activity center just north of I-10 (Crossroads Center), the Gulfport-Biloxi International Airport south of I-10, and the Gulfport CBD north of US 90. The US 49 interchange with I-10 serves as an anchor for large commercial developments with numerous large retail stores and restaurants located in the immediate area (MDOT and FHWA, 2008). On the south, US 49 ends on the Gulf Coast at US 90, and the south leg of this intersection is one of the entry roadways into the Port. Throughout the study area, US 49 has numerous access points, including several signalized and unsignalized intersections and a clover leaf interchange at I-10. The posted speed limit on the urban section of US 49 is 45 mph.

The KCS freight rail line runs north-south parallel to US 49 on the west side throughout Gulfport. South of I-10, the rail line is two to three blocks west of US 49, thus reasonably outside the area of influence of US 49 intersections. North of I-10, the rail line comes within 300 feet of US 49 at cross street intersections with Landon Road (at Crossroads Parkway), O'Neal Road, Clark Road, and Duckworth Road. All of these roads are currently two-lane roads as they cross the tracks.

As indicated in Table 3.4-1, 2012 Annual Average Daily Traffic (AADT) volumes on US 49 within the study area range from 15,000 to 58,000. The 2012 AADT volumes are smallest close to the Port and increase heading north towards I-10. These data suggest that a large proportion of the traffic on US 49 is generated within the urbanized area of Gulfport. Traffic volumes in Table 3.4-1 generally depict stagnant or decreasing growth trends between 2007 and 2012 in most locations.

Results of an accident analysis contained in the *SR 601 Traffic and Accident Analysis*, November 2007 (as described in MDOT and FHA, 2008), suggest crash rates on US 49 are relatively high. Crash rates have steadily increased throughout the corridor from 2001 to 2003. These increases are particularly significant in Harrison County, where the crash rate was nearly 5 times greater and injury rates were approximately 2.7 times greater in 2003 than in 2001. Forty-nine percent of the crashes in Harrison County in 2003 were rear-end collisions. This high rate of rear-end collisions is consistent with congested traffic conditions. Congested roadway conditions increase the potential for vehicular collisions and personal injuries. In Harrison County, the number of injuries resulting from these collisions increased with the accident rate. There were 146 injuries recorded in 2003, compared to 54 in 2001 (MDOT and FHWA, 2008). One location on US 49 within the study area was listed in the FHWA's Mississippi 2010 Five Percent Report, which identifies no less than 5 percent of roadway locations exhibiting the most severe safety needs (FHWA, 2010). Relevant accident statistics based on data from the period 2005 through 2009 and accident Severity Index ranges are provided in Appendix I. In general, the crash rate and Severity Index are relatively low, although mitigation measures have been applied at this location.

Table 3.4-1
Historical Two-Way Annual Average Daily Traffic on US 49 Within the Study Area

Jurisdiction	Location	2012	2011	2010	2009	2008	2007
Gulfport	North of Orange Grove Road	48,000	47,000	68,000	66,000	67,000	72,000
Gulfport	South of Dedeaux Road	48,000	47,000	64,000	62,000	63,000	65,000
Gulfport	North of Interstate (I)-10	58,000	63,000	64,000	62,000	63,000	65,000
Gulfport	South of I-10	34,000	34,000	60,000	59,000	60,000	64,000
Gulfport	South of Creosote Road	55,000	55,000	55,000	54,000	55,000	65,000
Gulfport	South of Airport Road	58,000	51,000	51,000	50,000	45,000	46,000
Gulfport	South of MLK Boulevard	47,000	47,000	47,000	46,000	47,000	48,000
Gulfport	South of John Hill Blvd	43,000	43,000	47,000	46,000	47,000	48,000
Gulfport	North of 28th Street	38,000	41,000	42,000	40,000	38,000	39,000
Gulfport	South of 25th Street	26,000	26,000	26,000	26,000	31,000	32,000
Gulfport	North of 14th Street	15,000	32,000	32,000	31,000	32,000	33,000

Source: MDOT (2012).

Underlined volumes are actual traffic counts, others are estimated from trends by MDOT.

In addition to connecting the Port to I-10, US 49 also connects to I-59 in Hattiesburg and I-55 in Jackson. The roadway has at least four lanes between Gulfport and Jackson and is divided in most locations. This corridor has a high priority for improvements in Mississippi's Unified Long-range Transportation Infrastructure Plan (MULTIPLAN), and is among the Corridors of Statewide Significance. The MULTIPLAN identifies numerous corridor improvement strategies, including capacity expansion, bypass routes, and bicycle and pedestrian improvements (I-10 to US 90) (MDOT, 2011).

North of Gulfport, US 49 is classified as a rural principal arterial. According to the Bureau of Transportation Statistics, in 2005 the fatality rate on rural principal arterials was 45 percent higher than rural interstate highways. This is partly due to the better physical conditions of the roadway and control of access on interstate highways (MDOT and FHWA, 2008). Thus, an element of the MULTIPLAN includes upgrading US 49 to Interstate Highway Standards from Gulfport to Jackson.

The rural US 49 highway is utilized by trucks transporting freight from the Gulf Coast cities and ports to other destinations in the U.S. As noted in Table 3.4-2, truck traffic over the entire US 49 corridor is expected to increase 44 percent in rural areas between 2006 and 2030 (MDOT, 2011).

Table 3.4-2
Freight Corridor Profile for US 49

Highway Corridor						
Name	Length	Truck Volume	Relative Performance	Percent Rail/Truck	Rail Line	2006–2030 Growth
US 49	334	7,259,049	Poor, highest portion of segments with average speed <50 miles per hour	7.6/92.4	Canadian National mainline (Jackson-Hattiesburg), KCS branch (Hattiesburg-Gulfport)	44%

Source: MDOT (2011).

3.4.2.1.2 Interstate 10

East-west travel patterns on the Mississippi Gulf Coast are accommodated by I-10 and US 90. These roadways stretch the extent of the three Mississippi Gulf Coast counties and are the only continuous east-west facilities that cross all bays and estuaries along the coast (Coast Transit Authority and MDOT, 2011). I-10 is a major economic corridor that stretches coast-to-coast across the southern U.S., and one of four transcontinental east-west interstate routes in the U.S. The corridor spans eight states: California, Arizona, New Mexico, Texas, Louisiana, Mississippi, Alabama, and Florida. I-10 is 4.7 miles north of the Port, and provides a route for trucks to distribute products to 75 percent of U.S. markets within 24 hours (City of Biloxi, 2008a). According to information from the National I-10 Freight Corridor Study, the economic impact of freight transported along the corridor is $1.38 trillion dollars (Harrison County, 2008). Table 3.4-3 presents the freight corridor profile for I-10 from the MULTIPLAN (MDOT, 2011). Based on the MULTIPLAN study, freight traffic growth on I-10 is expected to increase by 50 percent between 2006 and 2030.

Table 3.4-3
Freight Corridor Profile for Interstate (I)-10

Highway Corridor						
Name	Length	Truck Volume	Relative Performance	Percent Rail/Truck	Rail Line	2006–2030 Growth
I-10	77	5,410,134	Poor, lowest average speed for interstate	28.7/71.3	CSX Gulf Coast line	50%

Source: MDOT (2011).

I-10 has six lanes from County Farm Road (west of US 49) to I-110 in Biloxi, and four lanes outside these limits. In addition to carrying freight traffic, I-10 is heavily utilized by local residents. Most commuters who live in the three coastal counties use this roadway to travel the majority of their trips (Coast Transit Authority and MDOT, 2011). Existing and new retail developments near I-10 interchanges throughout Harrison County have increased traffic, impacting the operations of the adjacent interchange ramps. Interchange improvements would be needed to maintain sufficient capacity to support the additional growth expected in future years (City of Biloxi, 2008b).

Table 3.4-4 presents the AADT volumes on I-10 within the study area from west to east of US 49. As indicated by the data, 2012 AADT volumes range from 39,000 to 75,000. In the case of I-10, not all locations exhibited a drop in traffic due to Hurricane Katrina (August 2005) or the 2008 national economic downturn.

Table 3.4-4
Historic Two-Way Annual Average Daily Traffic on Interstate (I)-10 Within Study Area

Jurisdiction	Location	2012	2011	2010	2009	2008	2007
Harrison County	West of Kiln-Delisle	39,000	38,000	41,000	41,000	40,000	41,000
Harrison County	West of Menge Avenue	44,000	44,000	54,000	54,000	53,000	50,000
Harrison County	West of County Farm Road	48,000	47,000	47,000	64,000	63,000	65,000
Harrison County	West of Canal Road	51,000	51,000	54,000	41,000	40,000	41,000
Gulfport	East of Canal Road	60,000	50,000	50,000	49,000	49,000	47,000
Gulfport	East of US 49	59,000	57,000	65,000	63,000	66,000	70,000
Gulfport	East of Lorraine Road	70,000	69,000	71,000	62,000	61,000	60,000
Biloxi	West of Cedar Lake Road	75,000	74,000	74,000	72,000	88,000	91,000
D'Iberville	West of I-110	66,000	65,000	65,000	59,000	60,000	62,000

Source: MDOT (2012).
Underlined volumes are actual traffic counts, others are estimated from trends by MDOT.

3.4.2.1.3 US 90

US 90 runs east-west along the Mississippi Gulf Coast. It provides a connection from Harrison County across the St. Louis Bay to New Orleans and Biloxi Bay to Pascagoula (Harrison County, 2008). As previously stated, US 90 is considered a primary east-west arterial. Many commuters who originate from the southern parts of the Gulf Coast will often travel US 90 to their places of employment (Coast Transit Authority and MDOT, 2011). Additionally, due to its close proximity to the beach, this roadway is heavily utilized by tourists.

The traffic conditions that existed on US 90 immediately prior to Hurricane Katrina in 2005 included daily traffic volumes over 48,000, with Level of Service (LOS) ranging from E to F (refer to Section 3.4.4 for definitions of LOS; MDOT, 2008). As noted in Table 3.4-5, traffic volumes on US 90 in 2012 ranged from 23,000 to 31,000 within the study area. For many of the locations identified in Table 3.4-5, traffic volumes are below their 2007 levels. The lower AADT volumes are likely due to the damage to coastal development caused by Hurricane Katrina. The recovery to pre-Katrina levels has likely been impeded as a result of the economic recession and the low level of rebuilding along the beach for both commercial and residential buildings. In fact, 2012 traffic levels still indicate no growth.

Table 3.4-5
Historical Annual Average Daily Traffic (two-way) on US 90 Within the Study Area

Jurisdiction	Location	2012	2011	2010	2009	2008	2007
Gulfport	West of 38th Avenue	23,000	23,000	19,000	19,000	19,000	30,000
Gulfport	East of 30th Avenue	26,000	26,000	28,000	26,000	22,000	22,000
Gulfport	East of 20th Avenue	25,000	26,000	26,000	25,000	18,000	20,000
Gulfport	West of Kelly Avenue	27,000	27,000	27,000	26,000	20,000	22,000
Gulfport	East of Hewes Avenue	27,000	31,000	32,000	31,000	20,000	22,000
Gulfport	West of Teagarden Road	27,000	26,000	27,000	32,000	33,000	34,000
Gulfport	West of Cowan Road	24,000	24,000	24,000	24,000	25,000	26,000
Gulfport	East of Anniston Avenue	31,000	31,000	31,000	30,000	31,000	32,000
Biloxi	East of Debuys Road	23,000	23,000	23,000	29,000	29,000	30,000

Source: MDOT (2012).
Underlined volumes are actual traffic counts, others are estimated from trends by MDOT.

3.4.2.1.4 Other Study Area Roads

Table 3.4-6 summarizes the traffic count history among other study area roads that could be used by commuters or trucks accessing the Port. Trucks traveling to and from the Port currently use US 49 from I-10 to 28th Street or 25th Street, then travel west to 30th Avenue to access the Port. This route avoids the segment of US 49 through the Gulfport CBD, thus avoiding impacts to commercial and tourism destinations in the CBD. Traffic count trends again reveal no growth over the past 6 years.

Canal Road is currently a two-lane undivided roadway from I-10 to 28th Street and is part of one potential commuter route to reach the Port (see Figure 3.4-1). 25th Street currently is a four lane road with a two-way left-turn lane that provides a connection between US 49 and the main entrance to the Naval Construction Battalion Center military installation. 28th Street is currently a two-lane undivided roadway with left-turn lanes added at some intersections. 30th Avenue is a four-lane road that has different median treatments along its length. These include undivided, two-way left-turn lane and divided medians at different locations from 28th Street to US 90 at the main truck entry to the Port.

Table 3.4-6
Historical Annual Average Daily Traffic (two-way)
on Other Gulfport Roads Within the Study Area

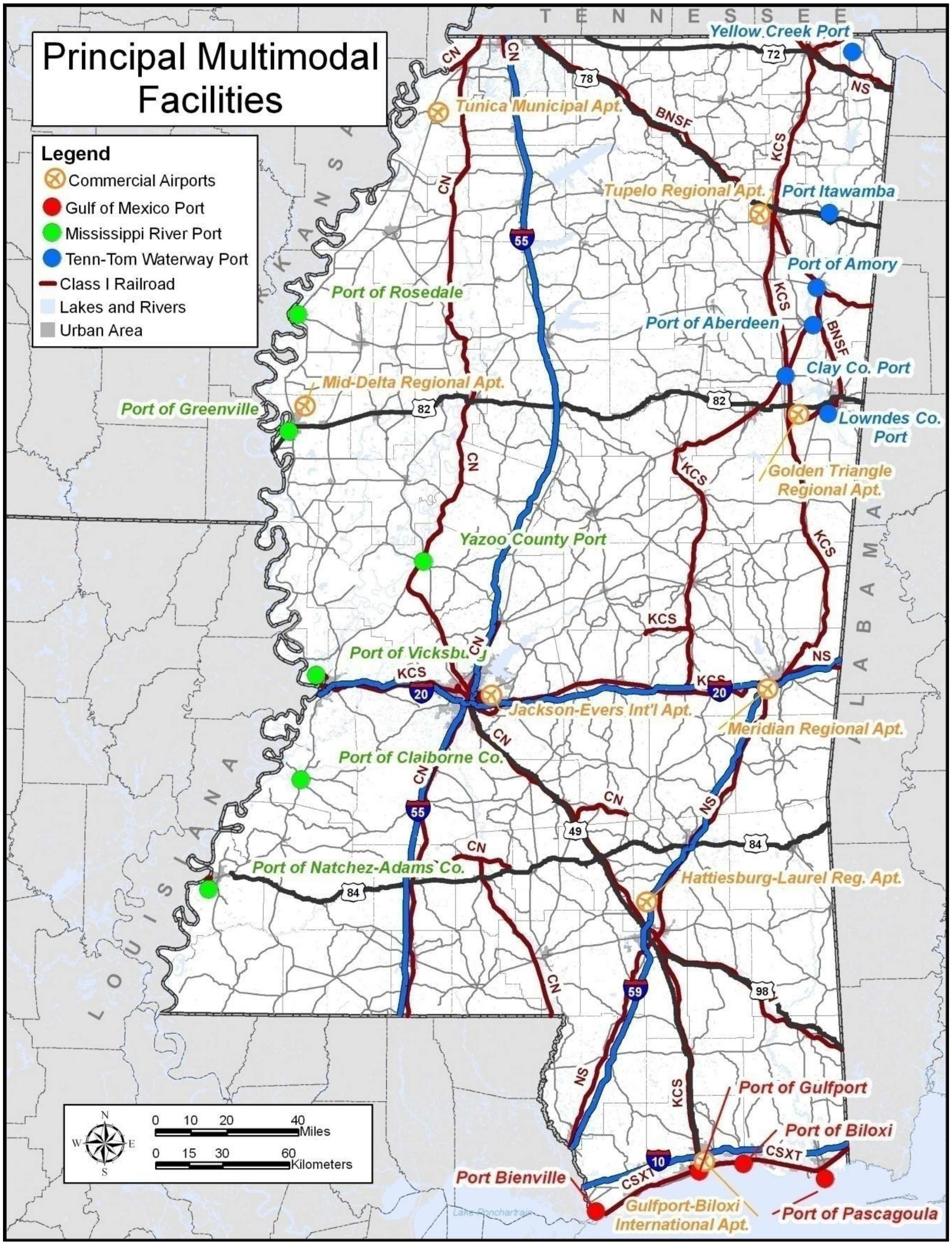
Route	Location	2012	2011	2010	2009	2008	2007
Airport Road	East of US 49	14,000	18,000	18,000	18,000	18,000	18,000
Canal Road	South of Interstate (I)-10	12,000	13,000	13,000	13,000	13,000	15,000
Canal Road	North of 28th Street	14,000	14,000	9,800	9,700	9,800	10,000
Creosote Road	East of US 49	11,000	13,000	13,000	13,000	13,000	14,000
25th Street	East of 32nd Avenue	10,000	10,000	10,000	9,700	9,900	10,000
28th Street	East of Canal Road	10,000	10,000	11,000	11,000	11,000	11,000
28th Street	West of 33rd Avenue	11,000	11,000	13,000	13,000	13,000	15,000
28th Street	East of 33rd Avenue	9,400	9,400	9,400	11,000	11,000	12,000
28th Street	East of 30th Avenue	12,000	12,000	11,000	11,000	11,000	11,000
30th Avenue	South of 28th Street	5,500	5,500	7,200	7,000	7,200	7,100
30th Avenue	South of 25th Street	9,800	9,800	10,000	9,400	9,600	10,000
30th Avenue	South of 18th Street	3,300	3,300	10,000	9,400	9,600	10,000
30th Avenue	South of 15th Street	6,500	6,400	6,400	6,300	4,600	5,000
30th Avenue	South of 12th Street	7,600	7,600	8,900	8,700	8,900	10,000

Source: MDOT (2012).
Underlined volumes are actual traffic counts, others are estimated from trends by MDOT.

3.4.2.2 Railroads

The Port currently has four major tenants that handle containerized and bulk cargo: Dole, Crowley, Chiquita, and Chemours. A fifth tenant, McDermott, focuses on non-container terminal operations. As depicted on Figure 3.4-2, once unloaded, cargo has access to Class I rail systems (largest operating railroads) operated by KCS and CSX, which have connections to other commercial distribution modes throughout the state. Both lines are privately owned and operated (World Trade, 2010; Harrison County Development Commission, 2011).

KCS operates a 67.5-mile-long freight railroad on a north-south track from the Port to north of Hattiesburg. The KCS rail line is a single-track line that connects directly to the Port and also provides turning tracks to access the east-west CSX rail line. The capacity of the line is constrained by the at-grade crossing between the KCS and CSX rail lines. From Gulfport to Perkinston, the KCS rail line is located to the west of US 49. In Perkinston, the KCS rail line shifts to the east side of US 49 (MDOT and FHWA, 2008). In Hattiesburg, the KCS rail line connects with the Norfolk Southern line that continues into the northeast U.S. and then connects to networks serving the entire eastern U.S. Also in Hattiesburg, the KCS rail line connects to the Canadian National line that continues to Chicago and Canada (*Gulfport News,* 2010).



Source: MDOT (2011).

Figure 3.4-2
Mississippi Water Ports, Airports, and Class 1 Railroads

Until recently, the KCS track could only accommodate 10-mph single-stack container freight (263,000-pound gross rail load) and typically averaged one train per day (*Gulfport News*, 2010; MDOT and FHWA, 2008). As described in Section 2.1, 67.5 miles of this line was upgraded under the KCS Rail Improvement Project. The improvements to the KCS rail line increased the operating speed from 10 to 49 mph, accommodating 286,000 pound car loads and increased the allowable train length from 2,940 to 3,900 feet. The speed increase reduced the travel time from 8.5 to 3.75 hours, or a reduction of 4.75 hours over the length of the line (Burk-Kleinpeter Inc. et al., 2011). This project was completed in 2012 and is operational. Current average rail operations consist of six trains per day, averaging 2,940 feet in length and a variety of car types.

Table 3.4-7 presents the maximum (total closure time) and average closure delay experienced by roadway vehicles that arrive at a rail-grade crossing while a train is present under different train speeds and allowable train lengths. Whereas 2 to 2½ minutes are required to clear a train at 10 mph, the same train clears in under a minute at a moderate speed of 30 mph or the maximum line speed of 49 mph.

Table 3.4-7
KCS Freight Rail – Estimated Total and Average Closure Time Scenarios

Allowable Train Length (feet)	Train Speed (miles per hour)	Train Speed (feet/second)	Track Clearance Time (seconds)	Total Crossing Closure Time (seconds)	Average Crossing Closure Time (seconds)
2,940	10	14.7	30	230.5	115.2
2,940	30	44.0	30	96.8	48.4
2,940	49	71.9	30	70.9	35.5
3,900	10	14.7	30	295.9	148.0
3,900	30	44.0	30	118.6	59.3
3,900	49	71.9	30	84.3	42.1

The rail line speed upgrade affects the length of time any given train will block road crossings. At 49 mph, a 3,900-foot-long train will only block the crossing around 25 percent of the time that the same train would block it at 10 mph. In the downtown Gulfport area, the KCS rail line has at-grade rail crossings at US 90 and 13th, 14th, 17th, 19th, 25th, and 28th Streets. North of the downtown area, at-grade rail crossings exist at 33rd Street, Martin Luther King Jr. Boulevard, Polk Street, Russell Boulevard, Factory Shop/Creosote Boulevard, and Landon Road. A rail yard extends from 33rd Street to the MLK crossing. Only I-10 has bridges over the tracks at this time.

Improvements to the Port would result in additional annual freight transport activity, which would increase the number of trains of cargo using the KCS rail line. The previously completed speed improvements to the KCS rail line have dramatically reduced the blockage time at highway rail grade crossings from 2 minutes or more to under 1 minute. Thus, when train blockages occur, the delay impact will now be no more severe than that of a typical traffic signal. Additional highway rail grade crossing blockages due to added train traffic could produce congestion issues if they occurred during daytime hours.

The CSX rail line provides transportation to the east and west. This rail line is the main Class I rail line that serves the Bienville and Pascagoula ports and provides connections to other regions outside of Mississippi. The CSX rail line services intermodal port terminals located at Gulfport and Pascagoula (Wilbur Smith Associates, 2009). Rail cars on the CSX rail line can run anywhere between 45 to 60 mph (*Mississippi Public Broadcasting News*, 2010); however, the corridor has numerous at-grade crossings with the inherent speed restrictions and safety problems.

The CSX rail line is a single-track line that crosses both 30th Avenue (four lane) and US 49 (four lane) via at-grade rail crossings. However, numerous other downtown grid streets also cross the CSX rail line as relievers. These include 20th, 22nd, 23rd (four lanes), 24th, and 33rd avenues.

3.4.3 Traffic Data Collection

Traffic counts at study area intersections were conducted on September 7, 2012, to support studies of specific roads, intersections, ramps, and entry points to the Port. These were collected to backfill those areas not covered by MDOT counts, or to obtain detailed information about specific areas relevant to this study. The counts cover intersections along US 90 and US 49, as well as the ramps accessing I-10 from US 49 and Canal Road. Year 2011 MDOT traffic counts on I-10 east of US 49 were used to determine through-traffic volumes along I-10 from west of Canal Road to east of US 49. Counts were taken at all intersections that access the Port along US 90, all intersections with major four-lane roads along US 49, and the interchange ramps at I-10. The location of traffic counts and discussion of traffic patterns is provided in Appendix I.

Current Truck Access to I-10

Tractor trailer truck traffic volumes south of I-10 were compared between Canal Road and US 49 to determine which roadway is used by trucks the most. US 49 immediately south of I-10 handles over 2,300 trucks per day. The Canal Road count taken at a point south of the trucker motorist service area south of I-10 handles 300 tractor trailer trucks per day.

General Turning Traffic Patterns at I-10 and US 49

The pattern of turning traffic at the I-10/US 49 interchange was determined from traffic count data to estimate the portion of truck and total traffic traveling in each direction from the Port. Of the overall volume of traffic on US 49 south of I-10 (53,730 vehicles per day), 19 percent travel to and from I-10 west, 23 percent to I-10 east, and 58 percent travel north on US 49. The pattern from tractor trailer trucks is slightly different. Of the overall volume of tractor trailer trucks on US 49 south of I-10 (2,330 vehicles per day), 23 percent travel to and from I-10 west, 19 percent to I-10 east, and 58 percent travel north on US 49.

Measured Port of Gulfport Trip Generation Rates

Based on 24-hour traffic counts taken at all the entry roadways to the Port in September 2012, the Port currently generates 2,200 vehicle trips per day (1,100 per direction) with the typical weekday truck traffic level at about 500 truck trips per day. Table 3.4-8 summarizes the number of daily trips by type of vehicle.

Table 3.4-8
Port of Gulfport Measured Year 2012 Weekday Trip Generation by Vehicle Type

Type of Vehicle	Counted Weekday Trips	Percent of Daily Total Trips
Passenger Cars	1,300	59
Single Unit Trucks	400	18
Tractor Trailer Trucks	500	23
Total	2,200	

As described in Appendix I, based on existing activity and TEU throughput at the Port, the typical weekday trip generation rate is about 1.9 vehicle trips per TEU.

3.4.4 Existing Traffic Conditions

The Project study area for roadway transportation impacts extends from Landon Road north of I-10 to US 90 on the south, and from US 49 on the east to Canal Road and 30th Avenue on the west. The quality of traffic flow on a roadway facility is assessed using a qualitative performance rating called LOS. There are six LOS ratings that are depicted by the letters A through F. A description of what these qualitative measures mean is described below:

- LOS A is the best LOS, and represents uncongested traffic with light traffic volumes;
- LOS B represents reasonably free flow, where maneuverability is slightly restricted;
- LOS C is normally the worst LOS tolerated in rural areas before improvements are warranted;
- LOS D is normally the worst tolerated in urban areas;
- LOS E represents traffic volumes near capacity; and
- LOS F is the worst, and represents congested traffic conditions due to traffic volumes that exceed the road’s capacity.

A traffic evaluation of year 2012 conditions was conducted to determine what directional roadway segments operate at an unacceptable LOS during peak hours (Appendix I). The City of Gulfport, Gulf Regional Planning Commission (GRPC), and MDOT do not have thresholds requiring mitigation in order to address the impacts of new traffic generated by development. As LOS D is widely considered the worst acceptable LOS tolerated in urban areas, LOS D or better was identified as the desirable LOS when evaluating whether traffic generated by the Proposed Project Alternative is significant compared to the No-Action Alternative. Road segments operating at LOS E or F would be considered unacceptable. Table 3.4-9 summarizes how many directional miles of each major corridor in the study area operate at LOS E or F under 2012 traffic conditions, along with the total directional mileage included in the evaluation. For example on 28th Street, 0.3 directional mile out of 6.8 directional miles operate at LOS E or F during the PM peak hour. This is the only unacceptable LOS of the 40.2 miles evaluated in the study area.

Table 3.4-9
Directional Road Miles at Level of Service (LOS) E or F
During 2012 AM and PM Peak Hour by Corridor

Year	Peak Hour	Interstate-10	US 49	US 90	Canal Road	25th Street	28th Street	30th Avenue	Study Area
2012	AM Peak	–	–	–	–	–	–	–	–
2012	PM Peak	–	–	–	–	–	0.3	–	0.3
	Total Length	8.1	10.6	2.6	6.9	2.4	6.8	2.9	40.2

Table 3.4-10 identifies which segments of each corridor operate at LOS E or F, and comments regarding potential causes. Only one intersection approach on 28th Street had a minor issue associated with traffic signal delay. Though there is sufficient capacity to accommodate 2012 traffic, the intersection carries traffic volumes that are fairly high for an intersection of two-lane roadways. Thus, a long signal cycle time is the cause of the delay.

Table 3.4-10
Roadway Corridor Level of Service (LOS) Deficiencies – 2012 Existing Conditions

Corridor Name	Corridor Limits	Potential Cause of LOS E-F
Interstate-10 Freeway	All LOS D or better	No issues
US 49 (25th Avenue)	All LOS D or better	No issues
US 90 (Beach Blvd.)	All LOS D or better	No issues
Canal Road	All LOS D or better	No issues
25th Street	All LOS D or better	No issues
28th Street	AM LOS E, eastbound approaching Canal Road	Traffic signal delay due to long cycle time, capacity is adequate
30th Avenue	All LOS D or better	No issues

3.5 AIR QUALITY

The following sections discuss the applicable regulatory framework and existing ambient air quality within the study area.

3.5.1 Regulatory Context – National Ambient Air Quality Standards

3.5.1.1 National Ambient Air Quality Standards

The Clean Air Act (CAA), which was last amended in 1990, regulates air emissions from area, stationary, and mobile sources. The CAA requires the EPA to establish National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. The CAA establishes two types of national air quality standards. Primary standards define the maximum levels of air quality that the EPA judges necessary, with an adequate margin of safety, to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards define the maximum levels of air quality that the EPA judges necessary to protect public welfare, including protection against decreased visibility, and damage to animals, crops, vegetation, and buildings. Air quality is generally considered acceptable if pollutant levels are less than or equal to these established standards on a continuing basis.

The EPA has set NAAQS for seven principal pollutants, referred to as "criteria" pollutants. They are carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), lead (Pb), inhalable particulate matter with an aerodynamic diameter less than or equal to a nominal 10 microns (PM_{10}), fine particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 microns ($PM_{2.5}$), and sulfur dioxide (SO_2). The NAAQS are further defined in 40 CFR Part 50.

CO is a colorless and practically odorless gas primarily formed when carbon in fuels is not burned completely. Transportation activities, indoor heating, industrial processes, and open burning are among the anthropogenic (man-made) sources of CO.

NO_2, nitric oxide (NO), and other oxides of nitrogen are collectively called nitrogen oxides (NO_x). These pollutants are interrelated, often changing from one form to another in chemical reactions. NO_2 is the pollutant commonly measured in ambient air monitors. NO_x are generally emitted in the form of NO, which can be oxidized to NO_2. The principal anthropogenic sources of NO_x are fuel combustion in motor vehicles and stationary sources such as boilers and power plants. Reactions of NO_x with other atmospheric chemicals can lead to the formation of O_3.

Ground-level O_3 is a secondary pollutant formed from daytime reactions of NO_x and volatile organic compounds (VOCs), rather than being directly emitted by natural and anthropogenic sources. VOCs, which have no NAAQS, are released in industrial processes and from evaporation of organic liquids such as gasoline and solvents. Ozone contributes to the formation of photochemical smog.

Pb is a heavy metal that may be present as dust or fumes. Dominant industrial sources of Pb emissions include waste oil and solid waste incineration, iron and steel production, lead smelting, and battery and lead alkyl manufacturing. The lead content of motor vehicle emissions, which was the major source of lead in the past, has significantly declined with the widespread use of unleaded fuel.

The NAAQS for particulate matter are based on two different particle-diameter sizes: PM_{10} and $PM_{2.5}$. PM_{10} are small particles that are likely to reach the lower regions of the respiratory tract by inhalation. $PM_{2.5}$ is considered to be in the respirable range, meaning these particles can reach the alveolar region of the lungs and penetrate deeper than PM_{10}. There are many sources of particulate matter, both natural and anthropogenic, including dust from natural wind erosion of soil, construction activities, industrial activities, and combustion of fuels.

SO_2 is a colorless gas with a sharp, pungent odor. SO_2 is emitted in natural processes, such as volcanic activity, and by anthropogenic sources such as combustion of fuels containing sulfur and the manufacture of sulfuric acid.

The CAA also requires the EPA to assign a designation to each area of the U.S. regarding compliance with the NAAQS results of the ambient air quality monitoring data for that area. The EPA categorizes the level of compliance or noncompliance with each criteria pollutant as follows:

- Attainment – area currently meets the NAAQS.
- Maintenance – area currently meets the NAAQS but has previously been out of compliance.
- Nonattainment – area currently does not meet the NAAQS.

Ozone nonattainment areas are further classified as extreme, severe, serious, moderate, or marginal depending on the severity of nonattainment.

3.5.2 Air Quality Baseline Conditions

Ambient air quality in the Project area is directly related to emissions from man-made sources such as stationary sources (stacks, vents, etc.); emissions from mobile sources such as vehicles, ships, trains, etc.; chemical reactions in the atmosphere such as the formation of O_3; and natural sources such as trees, fires, and wind-blown dust. Since all of these sources must be considered in an assessment of air quality, the EPA has identified air emissions inventories and ambient air monitoring as key methods for assessing air quality.

3.5.2.1 Existing Air Emissions Inventory

The existing air emissions inventory for Harrison County was established using data from EPA's emissions inventory database. Table 3.5-1 is a summary of emissions for Harrison County for 2011, the most recent data available from the EPA's database (EPA, 2015a). The inventory of Carbon Dioxide Equivalents (CO_2e) emissions for Harrison County is based on 2011 data from the EPA's National Emissions Inventory (EPA 2015a) for area and mobile sources and on more recent 2013 data for point sources of greenhouse gas (GHG) emissions from larger facilities in Harrison County (EPA, 2015b). The emissions information for each pollutant is separated by category: area source, point source, highway (on-road), off-highway (non-road), and biogenic emissions.

Table 3.5-2 is a summary of Hazardous Air Pollutants (HAPs) for Harrison County for 2011, also based on the EPA's emissions inventory database (EPA, 2015a). The emissions information shown is the sum of the HAPs reported for 2011 and is separated by source category: nonpoint source, point source, on-road vehicle, non-road vehicle, and biogenic emissions.

Table 3.5-1
Summary of 2011 Air Emissions Inventory for Harrison County (tons per year)

Source Category	Carbon Monoxide (CO)	Nitrogen Oxides (NO_x)	Inhalable Particulate Matter (PM_{10})	Fine Particulate Matter ($PM_{2.5}$)	Sulfur Dioxide (SO_2)	Volatile Organic Compounds (VOCs)*	Carbon Dioxide Equivalents (CO_2e, MT)
Area	11,728	430	23,682	3,434	35	4,417	50,253
Point	4,666	6,895	1,299	1,042	32,371	868	3,705,524
On-road Vehicles	28,697	5,243	338	154	28	2,556	1,451,046
Non-road Vehicles	14,649	3,791	279	262	490	3,552	149,727
Biogenic*	2,662	109	--	--	--	21,273	--
Total	62,403	16,468	25,598	4,892	32,925	32,666	5,356,551

Source: EPA (2015a, 2015b).
CO = carbon monoxide
NO_x = nitrogen oxide
PM_{10} = particulate matter of 10 micrometers or less
$PM_{2.5}$ = particulate matter of 2.5 micrometers or less
SO_2 = sulfur dioxide
VOC = volatile organic compound
CO_2e = Carbon Dioxide Equivalents
CO_2e is shown in units of metric tons (MT)
*Pollutants from natural sources such as plants.

Table 3.5-2
Summary of 2011 Hazardous Air Pollutant (HAP)
Emissions Inventory for Harrison County (tons per year)

Source Category	HAP Emissions
Nonpoint	678
Point	1,399
On-road Vehicles	692
Nonroad Vehicles	782
Biogenic	2,360
Total	5,911

Source: EPA (2015a).

For the inventory of emissions, the following definitions apply:

- "Point sources" are stationary sources (point sources, facilities) consisting of electric utility plants, chemical plants, steel mills, oil refineries, etc.
- "Nonpoint sources," also called "area" sources, are stationary sources that include neighborhood dry cleaners, gas stations, etc.
- "On-road" mobile sources consist of licensed motor vehicles, including automobiles, trucks, buses, and motorcycles.
- "Non-road" mobile sources consist of 2- or 4-stroke and diesel engines, non-road construction vehicles, aircraft, commercial marine vessels, and locomotives.

3.5.2.2 Existing Air-Monitoring Data

Ambient air concentrations of certain air contaminants within Harrison County are measured by air-monitoring stations, and the results are reported to the EPA. Current monitoring data for Harrison County are available for $PM_{2.5}$ and O_3. The 2015 design value for O_3 8-Hour in Harrison County is 67 ppb, which is below the NAAQS of 70 ppb. The 2015 design value for $PM_{2.5}$ Annual Average in Harrison County is 8.8 micrograms per cubic meter (µg/m^3), which is below the primary standard NAAQS of 12.0 µg/m^3. The 2015 design value for $PM_{2.5}$ 24-Hour Average in Harrison County is 19 µg/m^3, which is below the primary standard NAAQS of 35.0 µg/m^3. Monitoring data for Harrison County for the years 2000 – 2013 show an overall decreasing trend for monitored values. Harrison County is currently designated as attainment or unclassifiable with the NAAQS for all regulated pollutants (MDEQ, 2015).

3.5.3 Revisions to 8-Hour Ozone Standard

On January 19, 2010, the EPA proposed a revision to the NAAQS for ground-level ozone to a level with the range of 0.060 to 0.070 parts per million (ppm) (FR, 2010a). The EPA also proposed to establish a separate cumulative secondary standard within a range of 7 to 15 ppm-hours. The proposed revisions result from a reconsideration of the primary and secondary 8-hour O_3 standards set at 0.075 ppm in a proposed rule published by the EPA in 2008 (FR, 2008a). However, the EPA did not take final action on the proposed reconsideration; thus, the NAAQS for O_3 remained at 0.075 ppm, as established in 2008. The 2008 O_3 NAAQS retained the same general form and averaging time as the 0.08 ppm NAAQS set in 1997 but is set at a more protective level (FR, 2012).

On May 21, 2012, EPA promulgated a final rule establishing initial air quality designations for most areas in the United States for the 2008 primary and secondary NAAQS for O_3. In this action, EPA designated Harrison County as being in attainment or unclassifiable with this standard (FR, 2012).

On October 1, 2015 (EPA, 2015c), the EPA finalized a NAAQS for O_3 making revisions to both the primary standard, to protect public health, and the secondary standard, to protect the public welfare. Both standards would be 8-hour standards set at 70 parts per billion (ppb). These revisions are intended to improve public health protection, particularly for children, the elderly, and people of all ages who have lung diseases such as asthma. It is anticipated EPA would make attainment/nonattainment designations by October 2017 based on 2014-2016 air quality monitoring data. States would then have until 2020 to 2037 to meet the proposed health standard based on the attainment designations in the area. The 2015 design value for O_3 8-Hour in Harrison County is 67 ppb, which is below the NAAQS of 70 ppb, and thus, the data show the new standard is not being exceeded for this county (EPA, 2015d).

3.5.4 State Implementation Plan

Under the CAA, states are required to develop a State Implementation Plan (SIP) to define the strategies for assessing and maintaining the NAAQS. Under the 2008 8-hour O_3 standard, only a portion of De Soto County in Mississippi, within the Northeast Mississippi Intrastate Air Quality Control Region, is designated as being in "marginal" nonattainment with the standard. The rest of the state, including Harrison County, is designated as being unclassifiable or in attainment with the standard (FR, 2012). The 2015 design value for O_3 8-Hour in Harrison County is 67 ppb, which is below the NAAQS of 70 ppb, and thus, the data show the new standard is not being exceeded for this county.

The MDEQ will have the responsibility for developing a SIP, with approval by EPA, for those areas in nonattainment with the O_3 NAAQS. The SIP will describe how the area will reach attainment of the 8-hour O_3 standard. It is anticipated that the SIP will set emissions budgets for point sources such as power plants and manufacturers; area sources such as dry cleaners and paint shops; off-road mobile sources such as boats and lawn mowers; and on-road sources such as cars, trucks, and motorcycles.

3.5.5 Conformity of Federal Actions

As required by the CAA, the EPA has promulgated rules to ensure that Federal actions conform to the appropriate SIP. Two rules were promulgated: (1) the Transportation Conformity Rule (40 CFR Part 93); and (2) the General Conformity Rule (40 CFR 51, Subpart W). The Transportation Conformity Rule applies to FHWA/Federal Transit Authority projects within maintenance or nonattainment areas. The General Conformity Rule applies to Federal actions, except FHWA/Federal Transit Authority actions, within maintenance or nonattainment areas.

The CAA prohibits Federal agencies from funding, permitting, constructing, or licensing any project that does not conform to an applicable SIP. The purpose of this General Conformity requirement is for Federal agencies to consult with state and local air quality districts to help ensure these regulatory entities are aware of the expected impacts of the Federal action and can include expected emissions in their SIP emissions budget.

Because the proposed Project is located in Harrison County and the County has been designated in attainment or unclassifiable with the 2008 8-hour O_3 standard, the General Conformity requirements are not applicable, and a General Conformity Determination will not be required. However, should the attainment status change prior to construction, MSPA would need to coordinate with MDEQ regarding a General Conformity Determination.

3.5.6 Mobile Source Emissions

Mobile sources such as highway vehicles, off-road vehicles, locomotives, oceangoing vessels, etc., emit several air contaminants that could cause adverse health effects. Some of these Mobile Source Air Toxic (MSAT) emissions are present in gasoline and are emitted to the air when gasoline evaporates or passes through the engine as unburned fuel. Some MSATs are not present in the fuel, but are formed as by-products of the combustion process as fuel is burned in the vehicle engine. MSAT emissions depend on the composition of the fuel being burned in the vehicle engine; thus, programs to control air toxics pollution have centered on changing fuel composition as well as improving vehicle technology or performance.

The CAA, as amended in 1990, required the introduction of reformulated gasoline and the reduction in air toxic emissions beginning in 1995. The CAA also provided for improvement in diesel fuel through reductions in sulfur and other improvements. In addition, Tier II automobiles introduced in model year 2004 will continue to help reduce MSATs. The EPA has promulgated other rules that would require reductions in diesel fuel sulfur content, MSAT emissions, NO_X, and particulate matter emissions from on-road and off-road diesel engines including locomotive and marine engines.

3.5.6.1 Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements

By rule published June 18, 2001 (FR, 2001), EPA established a comprehensive national control program to regulate emissions from heavy-duty highway diesel engines and vehicles beginning in model year 2007. This rule provides for a reduction in emissions from heavy-duty vehicles based on the use of high-efficiency catalytic exhaust emission control devices or comparably effective advanced technologies. This program provided for the following:

- A standard for particulate matter emissions for new heavy-duty engines to take effect for diesel engines beginning with the 2007 model year;
- Standards for emissions of NO_x and nonmethane hydrocarbons from diesel engines beginning with model year 2007 and being phased in by 2010;
- Including gasoline engines in the new standards based on a phased-in approach requiring 50 percent compliance in the 2008 model year and 100 percent compliance in the 2009 model year; and
- The use of diesel fuel for use in highway vehicles with a sulfur content of no more than 15 ppm sulfur beginning in 2006.

It was estimated by the EPA that the implementation of this program would reduce particulate matter and NO_X emissions from heavy duty engines by 90 and 95 percent below current standard levels, respectively. To meet these more-stringent standards for diesel engines, the program called for a 97 percent reduction in the sulfur content of diesel fuel.

3.5.6.2 Control of Hazardous Air Pollutants from Mobile Sources

By rule published February 26, 2007 (FR, 2007), the EPA adopted controls on gasoline, passenger vehicles, and portable fuel containers (primarily gas cans) that were intended to reduce emissions of benzene and other hazardous air pollutants or MSATs. Benzene is a known human carcinogen, and mobile sources are responsible for the majority of benzene emissions. The other MSATs are known or suspected to cause cancer or other serious health effects. With this rule, the EPA provided for the following:

- Limiting the benzene content of gasoline to an annual refinery average of 0.62 percent by volume, beginning in 2011 with a maximum average standard for refineries of 1.3 percent by volume beginning July 1, 2012;
- Limiting exhaust emissions of hydrocarbons from passenger vehicles when they are operated at cold temperatures. This standard will be phased in from 2010 to 2015;
- For passenger vehicles, requiring evaporative emissions standards that are equivalent to those currently in effect in California; and
- Implementing a hydrocarbon emissions standard for portable fuel containers, beginning in 2009. This will reduce evaporation and spillage of gasoline from these containers.

These controls are intended to significantly reduce emissions of benzene and other MSATs such as 1,3-butadiene, formaldehyde, acetaldehyde, acrolein, and naphthalene, and also provide for reductions in emissions of particulate matter from passenger vehicles. The final rule became effective April 17, 2007.

3.5.6.3 Control of Emissions of Air Pollution from Locomotive Engines and Marine Compression-Ignition Engines Less than 30 Liters per Cylinder

By rule published June 30, 2008 (FR, 2008b), the EPA promulgated requirements for the reduction of air pollution from locomotives and marine diesel engines. These requirements apply to all types of locomotives, including line-haul, switch, and passenger, and all types of marine diesel engines below 30 liters per cylinder displacement, including commercial and recreational, propulsion, and auxiliary. The near-term emission standards for newly built engines phased in beginning in 2009. These rules also include new emission limits for existing locomotives and marine diesel engines that apply when they are remanufactured, and take effect as soon as certified remanufacture systems are available, as early as 2008. The long-term emissions standards for newly built locomotives and marine diesel engines are based on the application of high-efficiency catalytic after-treatment technology. These standards begin to take effect in 2015 for locomotives and in 2014 for marine diesel engines. The EPA estimates particulate matter reductions of 90 percent and NO_x reductions of 80 percent from engines meeting these standards, compared with engines meeting the current standards. This rule became effective July 7, 2008.

3.5.6.4 Control Air Emissions from Oceangoing Vessels

On October 9, 2008, the 168 Member States of the International Maritime Organization (IMO) adopted new standards to control exhaust emissions from engines that power oceangoing vessels. The IMO is the United Nations agency concerned with maritime safety and security and the prevention of marine pollution from ships. The international air pollution standards are found in Annex VI to the International Convention on the Prevention of Pollution from Ships (MARPOL). The MARPOL Convention is the main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causes. It is a combination of two treaties adopted in 1973 and 1978, respectively, and also includes the Protocol of 1997 (Annex VI).

Under the new standards, ships operating in areas with air quality problems, designated as Emission Control Areas (ECAs), are required to meet tighter emission limits. Amendments to Annex VI of the MARPOL Convention (regulations for the prevention of air pollution from ships) to establish the North American Emission Control Area became effective August 1, 2012 (IMO, 2012). As of August 1, 2012, the sulfur content of the fuel oil used onboard ships operating in this ECA may not exceed 10,000 ppm (IMO, 2012). Beginning in 2015, new and existing ships operating in ECAs will be required to use fuel with no more than 1,000 ppm sulfur. Beginning in 2016 new ships operating in ECAs must also have advanced-technology engines designed to decrease emissions of ozone-forming NO_x by roughly 80 percent.

Emissions from ships operating outside of designated ECAs will be reduced through engine and fuel standards. Beginning in 2020, oceangoing vessels everywhere will be required to use fuel with at most 5,000 ppm sulfur, pending a fuel availability review in 2018. The engine standards will apply to new engines and existing engines as certified low-emission kits become available, beginning in 2011.

The new international standards apply to all new marine diesel engines above 175 horsepower and all marine diesel fuels. For vessels flagged and registered in the United States, EPA’s clean diesel engine and fuel standards will apply for all but the very largest new marine diesel engines (those above 30 liters per cylinder displacement). For engines above 30 liters per cylinder and for residual fuels, the new Annex VI standards will apply.

Appendix VII to MARPOL Annex VI contains the definition and boundaries with the full coordinates of the North American ECA. The extent of the ECA is generally the area within 200 nautical miles of the North American coastline as shown in Figure 3.5-1.

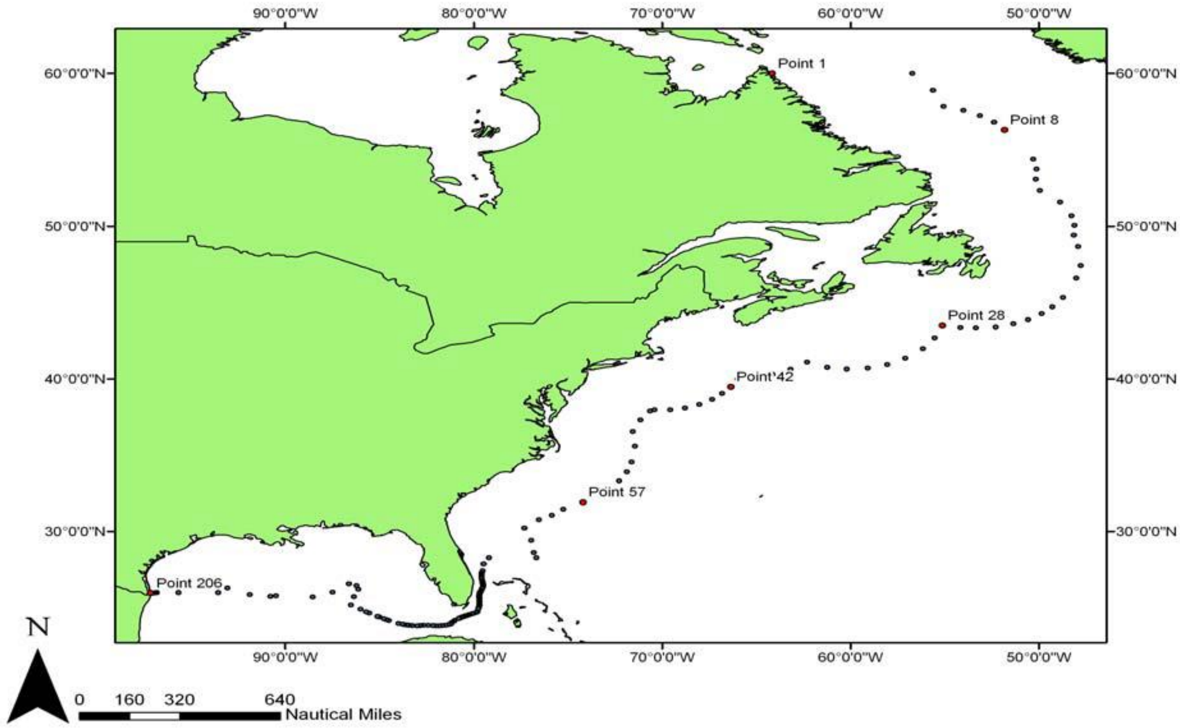


Figure 3.5-1
Emission Control Areas (IMO, 2010)

3.5.6.5 Control of Emissions from New Marine Compression-Ignition Engines at or Above 30 Liters per Cylinder

By rule published April 30, 2010 (FR, 2010b), the EPA finalized emission standards for new marine diesel engines with per-cylinder displacement at or above 30 liters (called Category 3 marine diesel engines) installed on U.S. vessels and for marine diesel fuels produced and distributed in the U.S. These emission standards are equivalent to those adopted in the amendments to Annex VI to the International Convention for the Prevention of Pollution from Ships. These emission standards apply in two stages: near-term standards for newly built engines will apply beginning in 2011; and long-term standards requiring an 80 percent reduction in NO_x emissions began in 2016. With this rule, the EPA allowed for a change to the diesel fuel program for the production and sale of 1,000 ppm sulfur fuel for use in Category 3 marine vessels. In addition, the new fuel requirements would generally forbid the production and sale of other fuels above 1,000 ppm sulfur for use in most waters of the U.S., unless alternative devices, procedures, or compliance methods are used to achieve equivalent emissions reductions. This final rule became effective June 29, 2010.

3.5.7 Greenhouse Gas Emissions and Climate Change

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 (CO_2) and methane (CH_4), 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 GHGs.

Earth's average temperature is predicted to change between 1.1°C to 6.4°C from the year 1990 to 2100 [Intergovernmental Panel on Climate Change (IPCC), 2007a]. 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.

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 CO_2 are from burning coal, oil, natural gas, and wood.

CH_4 is a flammable gas and is the main component of natural gas. A natural source of CH_4 is the anaerobic decay of organic matter. Geological deposits, known as natural gas fields, also contain CH_4, 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 N_2O include agricultural sources, industrial processing, fossil fuel-fired power plants, and vehicle emissions.

The combustion of fuel in highway and off-road vehicles, locomotives, and oceangoing vessels will result in an increase in GHG emissions that could contribute to global climate change. To date, specific thresholds to evaluate adverse impacts pertaining to GHG emissions have not been established by local decision-making agencies, the state, or the Federal government. The CEQ has published "Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions," February 18, 2010 (CEQ, 2011). The draft guidance suggests that the impacts of projects directly emitting GHGs in excess of a reference point of 25,000 metric tons or more of CO_2e GHG emissions on an annual basis be considered in a qualitative and quantitative manner. However, the guidance stresses that, given the nature of GHGs and their persistence in the atmosphere, climate change impacts should be considered on a cumulative level. In December 2014, the CEQ published "Revised Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions" (CEQ, 2014). The revised draft guidance added the suggestion for NEPA documents to include the impacts of climate change on a proposed action. On August 1, 2016, the CEQ published "Final NEPA Guidance on Consideration of the Effects of Climate Change and

Greenhouse Gas Emissions" (CEQ, 2016) for all new proposed agency actions when a NEPA review is initiated.

3.6 NOISE

3.6.1 Fundamentals and Technology

Noise is defined as unwanted sound that disrupts or interferes with normal activities or that diminishes the quality of the environment. Noise is usually caused by human activity and is added to the natural, or ambient, acoustic setting of an area. Individuals respond to similar noise events differently based upon various factors, including existing background level, noise character, level fluctuation, time of day, the perceived importance of the noise, the appropriateness of the setting, and the sensitivity of the individual.

The human ear senses sound when a source emits oscillations through an elastic medium, such as air. The vibrations produce alternating bands of dense and sparse particles of air. This movement of the particles creates a fluctuation in the normal atmospheric pressure known as sound waves. Sound is characterized by two magnitudes: frequency and amplitude. The frequency of a sound corresponds to the human sensation of pitch and is measured in hertz. The amplitude of a sound corresponds to the human sensation of loudness. Human reaction to loudness, or sound pressure, is measured in terms of sound pressure levels, and expressed in terms of decibels (dB). Decibels are measured on a logarithmic scale in order to compress the wide range between the human hearing threshold and the threshold of pain. A sound level of 0 dB is the approximate lower threshold of human hearing. Normal speech at a distance of about 1 yard has a sound level of approximately 65 dB. Sound levels of approximately 120 dB begin to be felt inside the ear as discomfort, which increases to pain at higher levels (EPA, 1976).

Sounds of the same pressure but different frequencies are not perceived by the human ear as equally loud. The human ear is less sensitive to low frequencies and extremely high frequencies, and most sensitive to the mid-range frequencies that correspond with human speech. Therefore, in order to measure sound in a manner similar to human perception, an adjustment known as "A-weighting" is used. Regulatory agencies involved in assessing community noise or establishing noise standards typically require that measurements and analysis be performed using the A-weighted sound level (dBA).

Although A-weighted sound measurements indicate the level of environmental noise at any given time, community noise levels vary constantly. Typical noise environments consist of numerous noise sources, which vary and fluctuate over time. Because of the varying noise levels within a community, a descriptor called the equivalent sound level (L_{eq}) is typically used. L_{eq} describes the average sound level, in dB, for any time period under consideration.

Another measurement descriptor of the total noise environment is the Day-Night Sound Level (L_{dn}), which is the A-weighted L_{eq} for a 24-hour period with an additional 10 dB weighting imposed on the L_{eq} occurring during nighttime hours (10:00 PM to 7:00 AM). For example, an environment that has a measured daytime L_{eq} of 60 dBA and a measured nighttime sound level of 50 dBA, would have a weighted nighttime sound level of 60 dBA (50 + 10), and an L_{dn} of 60 dBA. Numerous Federal agencies, including the DoD, HUD, DOT/Federal Aviation Administration (DOT/FAA), DOT/Federal Transit Administration (FTA), and DOT/Federal Railroad Administration have adopted this descriptor when assessing environmental impacts. The DOT/FHWA uses a 1-hour L_{eq} when evaluating motor vehicle traffic noise. Studies have found that outdoor noise environments across the U.S. range from approximately 40 L_{dn} in rural residential areas, nearly 60 L_{dn} in older urban residential areas, and to as much as 90 L_{dn} in congested urban settings (EPA, 1974).

Federal agencies have developed criteria to determine whether noise attributable to a project or source would affect residential areas. These criteria are only applied to projects requiring an action by that particular Federal agency.

- FAA Criteria (FR, 2004) – Day-Night Average Sound Level (DNL) of 65 dBA or greater caused by airport/aircraft activities;
- FHWA Criteria (FR, 2010c) – Hourly L_{eq} of 67 dBA or greater caused by motor vehicles;
- HUD Criteria (FR, 1996) – DNL of 65 dBA or greater in a HUD-financed community; and
- FTA Criteria (FTA, 2006) – Existing noise level plus 10 dBA or more caused by trains or transit sources.

3.6.1.1 Existing Noise Environment

Noise-sensitive receptors are facilities or areas where excessive noise may disrupt normal human activity or cause annoyance. Land uses such as residential, religious, educational, recreational, and medical facilities are more sensitive to increased noise levels than commercial and industrial land uses. Noise-sensitive receptors in the vicinity of the Project area are located in the City of Gulfport. The existing noise environment of the City of Gulfport is affected by a number of sources, most of which are transportation-related (e.g., railways, roadways). Waterborne transportation activities that currently contribute to the region’s ambient noise environment include ship traffic, barges, commercial fishing/shrimping vessels, sport and recreation boats, and maintenance dredging. Other sources that contribute to the existing noise environment of these communities include activities at nearby commercial enterprises, such as restaurants, marinas, commercial fishing and shrimping businesses, and light industrial uses. Noise studies at other ports have documented noise levels generated from port activities ranging between 55 and 70 dBA at a distance of 1,100 feet (Port of Los Angeles, 2008). The effect of port/industrial activities on the noise level at a particular noise-sensitive site is highly variable, and depends on ambient noise sources at the site, the distance between the site and port noise sources, and characteristics of the noise propagation path between the noise sources and the sensitive site.

The land uses commonly evaluated by Federal agencies that have established noise impact criteria include residential, institutional (e.g., schools and churches), and recreational. The residential area nearest to the proposed Project site is located approximately 2,300 feet north-northwest of the site on 11th Street. The nearest school, Covenant Christian School, is approximately 2,300 feet north of the site. The nearest church, St. Matthew Evangelical Lutheran Church, is located 3,000 feet northeast of the site. The nearest recreational area is Harbor Square Park, which is located 2,100 feet east-northeast of the site.

Ambient noise levels were measured at 24 residential receptor locations along the Project corridor. Receptors were selected to represent a range of population densities along the length of the rail line to effectively assess the regions of influence (ROIs) for vehicle and rail traffic. Receptor locations, sample times, and L_{eq} and calculated L_{dn} are provided in Appendix J. Noise levels were measured from June 2 to June 4, 2014, with SoundProDL1 Datalogging sound level meters (serial numbers BLN050002 and BLG06004), encased in a Quest 2900 outdoor monitoring kit. The meters were calibrated at the beginning of each sampling day in accordance with manufacturer instructions. Noise was measured (in accordance with Option 4 for residential land uses identified in Appendix D of the 2006 FTA "Transit Noise and Vibration Impact Assessment") for a one-hour period between 7:30 a.m. and 5:30 p.m. The L_{eq} that was measured during that period was converted to L_{dn} by subtracting two dB from the L_{eq}. As documented by FTA, this method results in a moderate underestimation of the computed L_{dn}.

Two general areas of existing noise conditions were identified along the Project corridor according to similarities in ambient conditions and average noise levels. These included the developed areas of Gulfport and Hattiesburg at the north and south ends of the KCS rail line, and the rural/small town areas between.

The Gulfport and Hattiesburg noise environment includes two segments on each end of the KCS line. The Gulfport segment extends from the southern terminus of the KCS line to Clark Drive, located just north of the KCS line/I-10 intersection. The Hattiesburg segment extends from the KCS line/Highway 98 intersection to the northern terminus of the line. Common ambient noise sources in these predominantly urban and suburban areas included vehicular traffic, rail traffic, aircraft, and human voices/activity. The average L_{dn} within these segments was 53 dBA.

The rural/small town segment includes the portion of the line between the Gulfport and Hattiesburg segments. Ambient noise sources in these predominantly rural areas included vehicular traffic, rail traffic, barking dogs, and birds. The average L_{dn} within these segments was 50 dBA. Noise data and location information for existing conditions are provided in Appendix J.

3.6.1.2 Noise Regulations

The Noise Control Act of 1972 (PL 92-574) and several other Federal laws require the Federal government to set and enforce uniform noise standards for aircraft and airports, interstate motor carriers and railroads, workplace activities, medium- and heavy-duty trucks, motorcycles and mopeds, portable air compressors, Federal highway projects, and Federal housing projects. The Noise Control Act also requires Federal agencies to comply with all Federal, state, and local noise requirements.

No state noise ordinances would be applicable to this Project. Existing state ordinances are limited to specific activities (e.g., requiring mufflers on automobiles, placing restrictions on locating shooting ranges). The State of Mississippi delegates the “power to make all needful police regulations necessary for the preservation of good order and peace of the municipality and to prevent injury to, destruction of, or interference with public or private property" to "the governing authorities of municipalities" (Mississippi Code of 1972, § 21-19-15).

Local noise regulations or requirements relevant to the proposed Project activities include the following (excerpted from the Code of Ordinances for the City of Gulfport, Mississippi 1963, § 17-19; Ord. No. 2133, §§ IV–XII, 3-17-98):

> (c) *Specific noises interfering with enjoyment of property or public peace and comfort enumerated.* The following acts, among others, are declared to create loud and raucous noises, and shall be deemed a violation of this section, but such enumeration shall not be deemed to be exclusive:
>
> > (1) The sounding of any horn or signal device on any motor vehicle, motorcycle, or motorboat, except as a danger signal, as required by state law.
> >
> > (4) The use of any motor vehicle, motorcycle, or motorboat so out of repair which emits or creates loud, raucous, or rattling noises.
> >
> > (6) The discharge into the open air of the exhaust of any stationary steam engine, stationary internal combustion engine, or motor boat engine, except through a muffler, or other device which will effectively and efficiently prevent loud and raucous noises.
> >
> > (7) The discharge into the open air of the exhaust from any motor vehicle, motorcycle, or motorboat, except through a muffler, or other device, which will effectively and efficiently prevent loud and raucous noises.
>
> (e) *Use of bell, siren, compression, or exhaust whistle on motor vehicles, motorcycles, and motorboats.* Except as specifically authorized or permitted elsewhere in this section, no person shall use upon a motor vehicle, motorcycle, or motorboat any bell, siren, compression or exhaust whistle, except that motor vehicles, motorcycles, and motorboats operated in the performance of any emergency work or in the performance of any duty by law enforcement officers, fire department, and ambulances may attach and use a bell, siren, compression or exhaust whistle.
>
> (g) *Exemptions.* The following are exempt from the provisions of this section:
>
> > (7) Noises from construction and demolition activities for which a building permit has been issued by the city are exempt from this section between the hours of 7:00 AM and 9:00 PM, provided that mufflers on construction equipment shall be maintained.
> >
> > (8) Interstate railway locomotives and motor vehicles, aircraft, trucks, or other motor vehicles in interstate commerce, or those which are in all respects operated in accordance with or pursuant to applicable Federal laws or regulations.

Assuming that the requirements of applicable Federal laws are met, Project activities would either be exempt from or would comply with the City of Gulfport noise-related ordinances.

3.6.2 Ground-Borne Vibration

3.6.2.1 Fundamentals and Technology

Ground-borne vibration (GBV) can be a serious concern for residents or at facilities that are vibration-sensitive, such as laboratories or sound recording studios. The effects of GBV include perceptible movement of building floors, interference with vibration sensitive instruments, rattling of windows, and shaking of items on shelves or hanging on walls. Additionally, GBV can cause the vibration of room surfaces resulting in ground-borne noise (GBN). GBN is typically perceived as a low frequency rumbling sound.

Vibration consists of rapidly fluctuating motions. However, human response to vibration is a function of the average motion over a longer (but still relatively short) time period, such as one second. The root mean square (RMS) amplitude of a motion over a one second period is commonly used to predict human response to vibration. For convenience, decibel notation is used to describe vibration relative to a reference level. In this section, vibration decibels (VdB) relative to a reference of 10^{-6} inches per second (1 μin/sec) are used. VdB is the unit of measurement adopted in the FTA impact assessment procedure.

In contrast to airborne noise, GBV is not a phenomenon that most people experience every day. The background vibration level in residential areas is usually 50 VdB or lower. This is well below the threshold of perception for humans, which is around 65 VdB. Levels at which vibration interferes with sensitive instrumentation such as nuclear magnetic resonance equipment and other optical instrumentation can be much lower than the threshold of human perception. Most perceptible indoor vibration is caused by sources within a building, such as the operation of mechanical equipment, movement of people, or slamming of doors. Typical outdoor sources of perceptible GBV are construction equipment, steel-wheeled trains, and traffic on rough roads.

Vibration, as it relates to railway movement, is generally caused by uneven interactions between the wheels of the train and the railway surfaces. Examples of this include wheels rolling over rail joints and flat spots that are not true. These uneven interactions result in vibration that travels through the adjacent ground. This vibration can range from barely perceptible to very disruptive.

3.6.2.2 FTA Vibration Criteria

The FTA recognizes three land use categories for assessing general vibration impacts.

Land Use Category 1 - High Vibration Sensitivity: This category includes environments where low ambient vibration is essential for building operations. Acceptable levels of vibration in these environments are well below the levels associated with human annoyance. Typical Category 1 land uses include vibration-sensitive research and manufacturing facilities, hospitals, and university research operations. Land Use Category 1 also includes special land uses, such as concert halls, television and recording studios, and theaters, which can be very sensitive to vibration and GBN. The FTA has developed special vibration criteria for these land uses.

Land Use Category 2 – Residential: This category includes all residential land uses and any building where people sleep, such as hotels and hospitals.

Land Use Category 3 – Institutional: This category includes schools, churches, other institutions, and quiet offices that do not have vibration-sensitive equipment, but still have the potential for activity interference.

FTA identifies separate criteria for both GBV and GBN. GBN is often masked by airborne-noise; therefore, GBN criteria are primarily applied to subway operations in which airborne noise is negligible. The GBV and GBN criteria used in this assessment are shown in Table 3.6-1. These are the criteria adopted in the FTA impact assessment procedures when evaluating potential vibration impacts. The FTA recommends that the frequent-event criterion be applied to line-haul freight trains because of the lengthy vibration event caused by the rail cars.

The frequent event vibration impact threshold is lower than the other event vibration impact thresholds for occasional or infrequent events, and thus represents the most conservative case scenario.

3.6.2.3 Existing Conditions

The KCS rail line is currently utilized infrequently; maximum current usage is about six trains per day. As shown on Table 3.6-2, the General Vibration Assessment identified 60 Land Use Category 2 receptors that are currently within the GBV impact contour. In addition, two Land Use Category 3 receptors (camp-grounds) are currently within the GBV impact contour. All receptors that fall within the GBV impact contour under existing conditions are located between Dedeaux Road and milepost 65 (i.e., the 49 mph speed zone).

As shown on Table 3.6-3, the maximum distance for GBN impacts is 20 feet, in the 49 mph speed zone between mileposts five and 65. No receptors were identified within the GBN impact contours.

Table 3.6-1
Ground-Borne Vibration and Ground-Borne Noise Impact Criteria

Land Use Category	Ground Borne Vibration Impact Levels (VdB re 1 Micro-inch/second)			Ground Borne Noise Impact Levels (dB re 20 Micro pascals)		
	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]
Category 1: Buildings where vibration would interfere with interior operations	65 VdB[4]	65 VdB[4]	65 VdB[4]	NA	NA	NA
Category 2: Residences and buildings where people normally sleep	72 VdB	75 VdB	80 VdB	35 dBA	38 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use	75 VdB	78 VdB	83 VdB	40 dBA	43 dBA	48 dBA

dB = decibels

VdB = vibration decibels

dBA = A-weighted sound level

NA = Not Applicable

Source: FTA. "Transit Noise and Vibration Assessment" (May 2006) (FTA-VA-90-1103-06) page 8-3

Note: If the building will rarely be occupied when the trains are operating, there is no need to consider impact.

1. "Frequent events" is defined as more than 70 vibration events per day.
2. "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day. Most commuter trunk lines have this many operations.
3. "Infrequent Events" is defined as fewer than 30 vibration events of the same source per day. This category includes most commuter rail branch lines.
4. This Criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research would require detailed evaluation to define acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC system and stiffened floors.
5. Vibration-sensitive equipment is generally not sensitive to ground-borne noise.

Table 3.6-2
Existing Ground-Borne Vibration (GBV) Impact Contour Distances and Number of Receptors

Train Speed (mph)	10	20	49
Impact Distance (feet)	30	50	125
Number of Receptors	0	0	60

mph = miles per hour

Note: 75 vibration decibels (VdB) was used as the GBV impact level based on the current infrequent use of the track.

Table 3.6-3
Existing Ground-Borne Noise (GBN) Impact Contour Distances and Number of Receptors

Train Speed (mph)	10	20	49
Impact Distance (feet)	<20	<20	20
Number of Receptors	0	0	0

mph = miles per hour

Note: 40 vibration decibels (VdB) was used as the GBN impact level based on the current infrequent use of the track.

3.7 PHYSIOGRAPHY, TOPOGRAPHY, AND BATHYMETRY

3.7.1 General Physiography

The study area is situated in the East Gulf Coastal Plain Physiographic Region of the Coastal Plain Province (U.S. Geological Survey [USGS], 2003). The East Gulf Coastal Plain extends from the eastern parishes of Louisiana, across Mississippi, and to the western panhandle of Florida. Its southern and western physiographic boundaries are the Gulf and the Mississippi Alluvial Valley, respectively. To the north are the highlands of the Interior Low Plateaus and southern Appalachians. To the east is the South Atlantic Coastal Plain at the Alabama-Georgia border.

The East Gulf Coastal Plain is characterized by flat to rolling topography dissected by numerous streams and river bottoms. Uplands consist primarily of pine mixed with hardwoods. Along the west and east sides of the study area are two marine embayments: St. Louis Bay and Biloxi Bay. Embayments are large, protected, low-energy, subtidal areas that are enclosed on three sides by land.

The Mississippi Sound and the Gulf are also within the study area. The Mississippi Sound is an arm of the Gulf which runs east-west at distance of approximately 90 miles along the southern coasts of Mississippi and Alabama. The GIWW is located within the Mississippi Sound and is bordered on the south by a series of narrow barrier islands named Cat, Ship, Horn, Petit Bois, and Dauphin. These islands have broad, sandy beaches to the north with sand dunes located along the southern Gulf side. Surface elevations in the islands rarely exceed 5 feet above msl.

Main rivers draining into Mississippi Sound include the Pascagoula, Pearl, and Mobile. The study area coastal cities of Pass Christian, Long Beach, Gulfport, and Biloxi are located on Mississippi Sound.

3.7.2 Topography

Mapping by the USGS indicates the surface topography of the study area is flat to gently sloping towards the south (USGS, 1970). In general, the topography in Harrison County consists of two distinct areas: one being a low, level strip of coastal lowlands (Flatwoods) and the other being rolling uplands of the interior. The boundary between these two areas is marked by an abrupt rise in the land (Soil Conservation Service [SCS], 1975).

The Flatwoods form an irregular belt along the southern boundary of the county that is about 5 miles wide. This belt extends from north of Back Bay in Biloxi for 1 to 2 miles and then westward to about 1 mile north of the Wolf River and St. Louis Bay into Hancock County, west of Harrison County. Scattered within the Flatwoods are a series of wet, poorly drained depressions amongst higher and well-drained areas. Many of the broad, shallow valleys in the area are dissected by streams and small drainageways that are a few feet above msl. Surface elevations range from sea level to less than 50 feet (SCS, 1975).

Broad areas of coastal prairies, terraces, woodlands, pastureland, and farmland occur inland from the Gulf. The most common coastal features are bays, estuaries, marshes, beaches, dunes, and mudflats (see Section 3.15). Besides coastal bays, many estuarine lakes and ponds occur along the coast and are very shallow. Some of the larger estuarine lakes in the study area include Little Big Lake, Big Lake, and Mullet Lake, which are located west of Biloxi Bay. A variety of marsh types, ranging from salt to freshwater, occur within the study area (see Section 3.16). Intertidal salt, brackish, and tidal freshwater marshes occur along the coast and barrier islands, including lowland flats located along mouths of streams and bays. Just inland from the normal tidally influenced areas are beaches, dunes, pine flatwoods, nontidal swamps, and freshwater marshes. South of Biloxi Bay on the east end of Deer Island is salt pannes, where the transition from mid to high marsh zones occurs (Mississippi Department of Wildlife, Fisheries, and Parks [MDWFP], 2005).

3.7.3 Bathymetry

Gulfport is located on the south shore of Harrison County. South of the harbor is the FNC, which extends approximately 22 nautical miles offshore into the Gulf, crossing the GIWW and passing immediately west of Ship Island. The FNC is located between Cat Island and Ship Island through Ship Island Pass. The islands are separated by about 5 miles of open water, which overlie a shallow sand bottom and/or bar (USACE, 1976). A naturally scoured channel exists off the western edge of Ship Island near the FNC. This scoured channel is more than 30 feet deep (Figure 3.7-1). Strong tidal currents near the barrier islands transport sand to the western edges of the islands and erode the eastern ends. As the islands move slowly west, the naturally scoured channel also moves west (USACE, 2009a).

The FNC is maintained by the USACE. The Bar Channel (outer channel) is 10 miles long by 400 feet wide and 38 feet deep and extends from the Gulf across the Ship Island bar into Mississippi Sound. The Sound Channel (inner channel) from Ship Island to the Port (10.6 miles long by 300 feet wide) is maintained at a depth of 36 feet. A turning basin and small-boat harbor are located at the Port. The turning basin is approximately 1,320 feet wide and 2,640 feet long with a maintained depth ranging from 32 to 36 feet. Maintenance dredging is required due to shoaling in Mississippi Sound and Ship Island Pass. Dredged materials are deposited into open-water sites on either side of the FNC along the majority of its length (USACE, 1975, 2009b). Dredged material from the Sound Channel is placed primarily in open water sites west of the FNC; dredged material from the Bar Channel and southward is placed within the Gulfport Western ODMDS. Sandy material dredged from a small area located within the littoral zone of the barrier islands is placed within an open water site southeast of Cat Island. The Commercial Small Craft Harbor and Channel on the west side of the Port are maintained by the Port. The Gulfport Small Craft Harbor and Channel on the east side of the Port is maintained by the City of Gulfport.

Mississippi Sound consists of two regions with different bathymetric features (Blumberg et al., 2000). The northern half of the Sound has natural water depths of about 13 feet or less, whereas depths in the southern half range from about 13 to 20 feet. South of Ship Island in the Gulf, natural depths range from about 20 to 35 feet in the vicinity of the FNC (USACE, 2009c).

Bathymetry of the area in the vicinity of the Project footprint is shown on Figure 3.7-2. The majority of the Project area is located within the Mississippi Sound and Gulf; however, the northern portion of the Project area (Gulfport) is developed and consists primarily of residential and commercial properties. A narrow strip of sand beach occurs next to the Mississippi Sound. In general, this area is gently sloping to the south with surface elevations ranging from 0 to 5 feet above msl. There are no major streams, lakes, or rivers located within the Project area. Depths range from 30 to 36 feet within the FNC, and from 5 to 15 feet outside the channel. On either side of the FNC is a broad, relatively flat sea floor that continues to slope toward the south.

3.8 COASTAL GEOLOGIC PROCESSES

The study area lies entirely within the East Gulf Coastal Plain, which is a continuous coastal plain of the Floridian Coastal Plain, the Sea Island Coastal Plain, and the Mississippi Alluvial Plain (USGS, 2003). The East Gulf Coastal Plain consists of level and nearly level floodplains that extend to areas of foothills bluffs, which form a crescent at the eastern edge of the plain. The Gulf Coastal Plain consists of relatively low-lying areas of water-deposited sediments bordering the Gulf (MDEQ, 2008; USGS, 2011a).

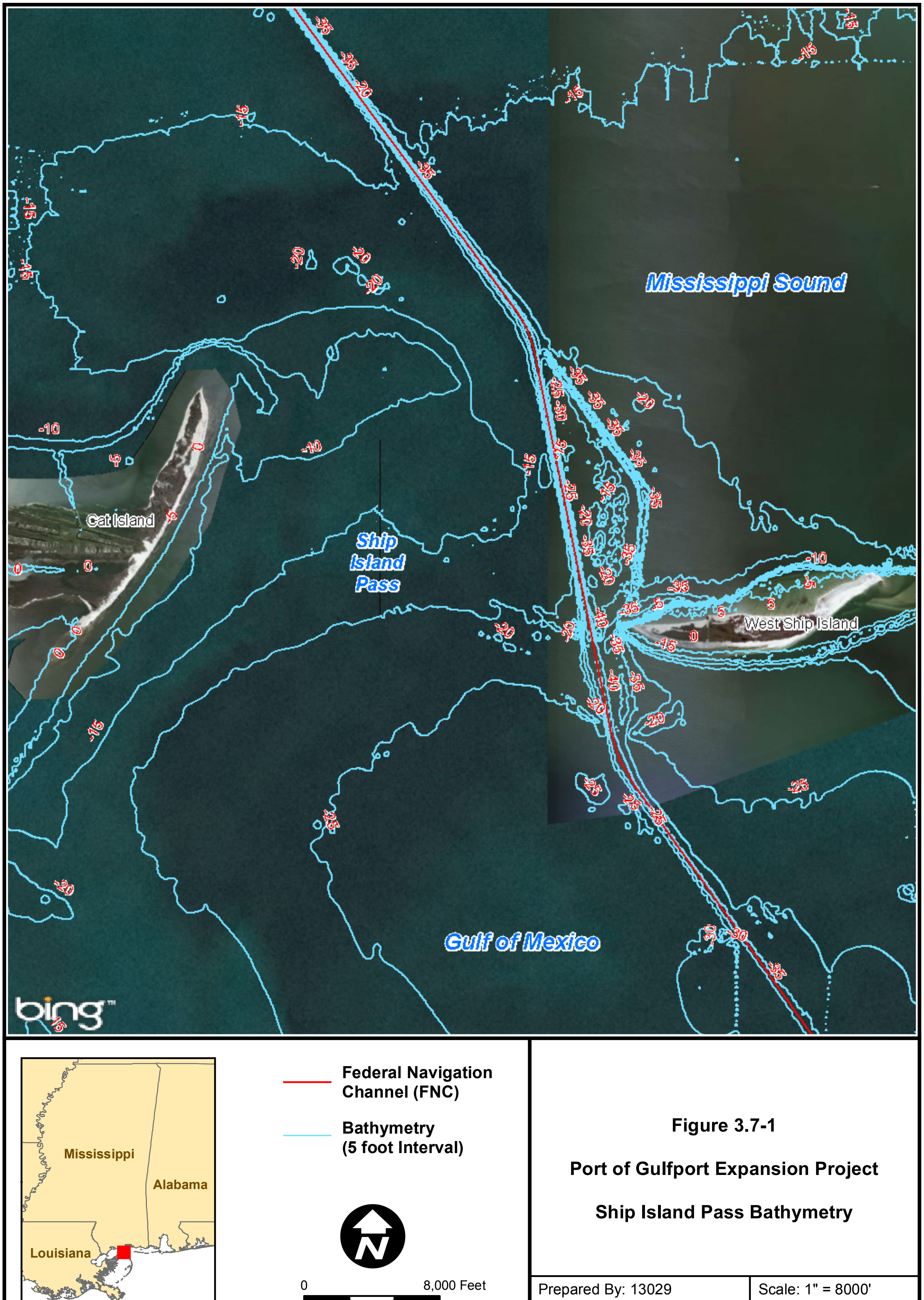


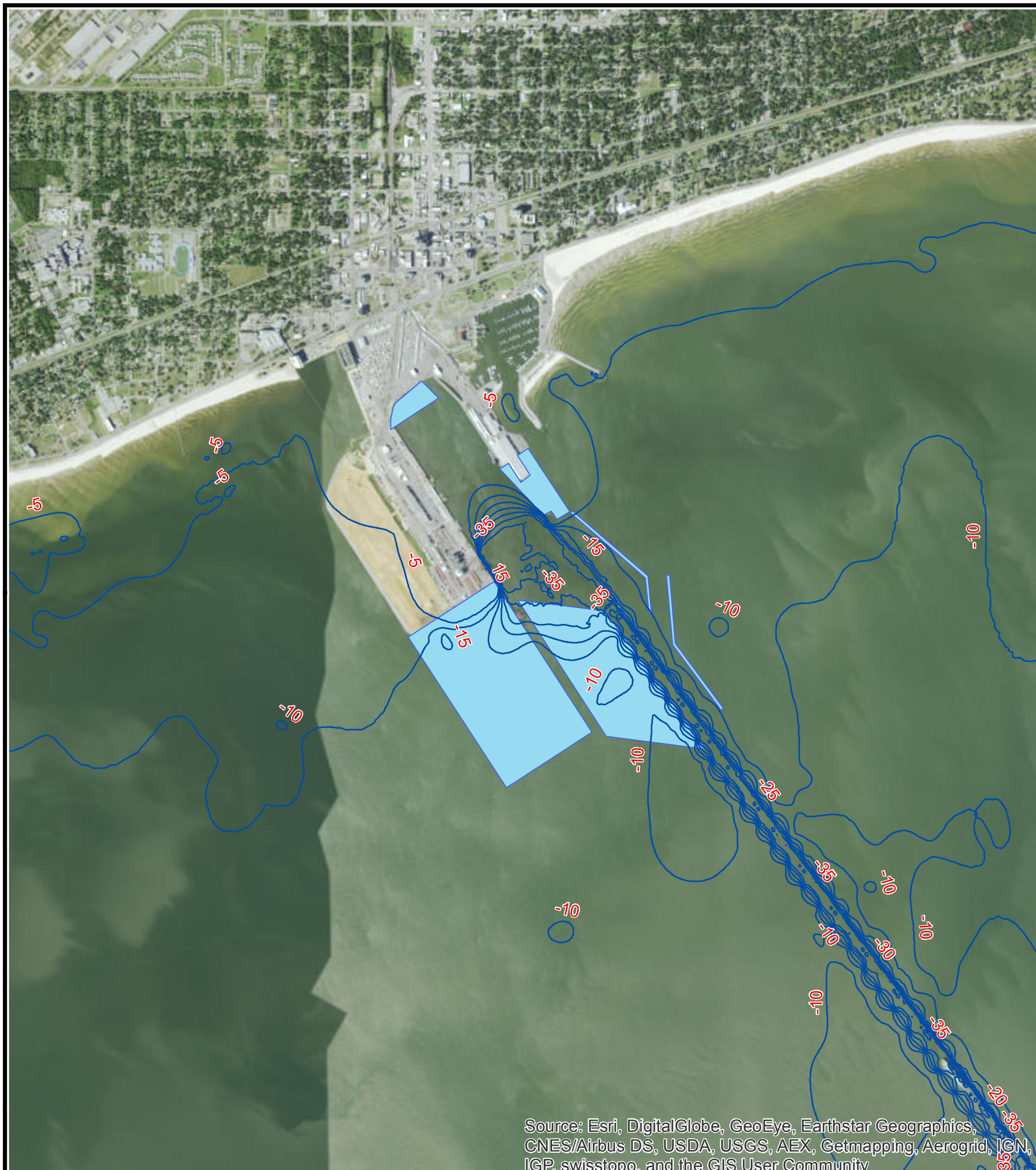
Figure 3.7-1

Port of Gulfport Expansion Project

Ship Island Pass Bathymetry

Prepared By: 13029	Scale: 1" = 8000'
Job No.: 100018536	Date: Sept. 24, 2015

N:\Clients\M_N\Mississippi_State_Port_Authority\100018536\geospatial\Figs_EIS\2015_Revisions\PGEP_EIS_Figure_3_7_1__Ship_Island_Pass_Bathymetry_092415.mxd



Proposed Project Features

Bathymetry (5 foot Interval)

0 3,000 Feet

Figure 3.7-2

Port of Gulfport Expansion Project

Expansion Footprint Bathymetry

Prepared By: 13029	Scale: 1" = 3000'
Job No.: 100018536	**Date: July 22, 2015**

N:\Clients\M_N\Mississippi_State_Port_Authority\100018536\geospatial\Figs_EIS\2015_Revisions\PGEP_EIS_Figure_3_7_2_Expansion_Footprint_Bathymetry_150722.mxd

During different geologic times, the coastal and alluvial plains within Mississippi have been submerged by seawater on several occasions. The geological rocks and sediments present on the surface reflect this history of intermittent sea level increases and decreases. Some of the sediments forming the local geology were deposited during periods of inundation, creating thick units. During sea level declines, sediments were deposited in swamps, along large and small streams, at the mouths of rivers (deltaic deposits), and along the shorelines as beach deposits. The delta region of northwestern Mississippi resulted from centuries of sediment depositions from the deltaic advances of the young Mississippi River into the prehistoric Mississippi embayment and from the flow and ebb of the Mississippi and Yazoo rivers as they have seasonally flooded into the lowlands of their floodplains and dropped their sediment loads in the coastal areas (Thomson, 2009).

The study area is composed of Miocene, Pliocene, Pleistocene, and Holocene geologic formations, which have comparable lithologies or other similar properties. These formations consist of southward-dipping sedimentary deposits that parallel the topographic contours of the shorelines, coastal plains, and the continental shelf of the Gulf (Thomson, 2009; USGS, 2011a).

3.8.1 Miocene Epoch: Hattiesburg and Pascagoula Formations

The geologic formations occurring in the study area from the Miocene Epoch are the Hattiesburg and Pascagoula. These formations are characterized by sand beds deposited as lenses and laterally extensive silt and clay beds that were deposited in a combination of fluvial, estuarine, and marine environments (USGS, 2011b). These formations were named after the Mississippi towns of Hattiesburg and Pascagoula because of well-exposed outcrops. These formations occur where fluvial and coastal sediments are deposited in coastal and marine environments without major modifications. Parallel stratification within these formations shows periods of steady sedimentation affected by sea level changes and delta migration (MDEQ, 2008; USGS, 2011b).

3.8.2 Pliocene Epoch: Citronelle Formation

The Citronelle Formation originated from fluvial processes that occurred as a response to more-recent sea level changes. Its thickness is up to 160 feet. Fluvial cross-bedding, red sands, brown chert gravels, and milky quartz can be found throughout the formation. The chert present in the formation is a major source of gravel for the State of Mississippi (USGS, 2011a). The Citronelle Formation is present mainly as caps to hill tops in the study area and has been eroded and re-deposited by streams creating Holocene to Pleistocene fluvial terraces that characterize the landscape.

3.8.3 Pleistocene Epoch: Prairie, Biloxi, and Gulfport Formations

During the Pleistocene Epoch, sedimentary units composed of fluvial deposits were formed, such as level floodplains and the ridge-forming Gulfport coastal barrier formations. It includes deposits from the nearshore Gulf, bay, and lagoonal settings (Otvos, 2001a). These recent formations are located in the study area and include the Prairie, Biloxi, and Gulfport formations. These formations are part of the recent coastal deposits and form a wide belt of beach ridges representing the most recent sea level rise along the Gulf shoreline. The formations consist of fine to medium sands, which are often highly organic. Soils generated by these young sediments are a dark brown to black organic-rich (Otvos, 2001b).

3.8.4 Holocene Epoch: Coastal Deposits

The Holocene Epoch is the modern day geologic age that started around 10,000 years ago. The sea level rise that has taken place over the last 8,500 years has gradually inundated the coastal river valleys and prevented coarser stream sediments from directly reaching the coast. Holocene sediments have filled in the coastal estuaries and built up locally wide marshlands. These deposits consist mostly of sandy fine-grained silts and clays with organic material (marshes). Coastal deposits (beaches and dunes) are primarily formed through the erosion of sandy parent material and by longshore drift along the barrier islands. The barrier islands are less than 5,000 years old and are nurtured by sand carried along the shore by wave transport from northwest Florida and Alabama. Beach sand deposits tend to be light in color and represent a mix of continental and coastal marine deposits. The barrier islands and their beach deposits generally shift westward through erosion on their east end and accretion on their west end (Otvos, 1991).

About 4,000 years ago, sea level stabilized at its current level and the formation of the Mississippi St. Bernard Delta, south of Mississippi, surrounded and trapped the western barrier islands along Mississippi and Louisiana. These barrier islands were created as tidal marshes and protected by the delta, which are now affected by the lack of new sediments and erosion created by their exposure to open waters (Otvos, 2001a). Sediment filled the river trenches and the bays of the Mississippi coast that were formed during this era. Most of the area now occupied by Mississippi Sound was a marine system, and the shore area around the mouth of the Pearl River is brackish. From 2,300 and 3,000 years ago, the St. Bernard Delta sediments from the Mississippi River migrated into the Gulf and settled onto the sea bottom about 2.0 to 12.5 miles south of the current location of Cat, Ship, and Horn islands. As the river migrated west, the Chandeleur Islands and the wetlands of St. Bernard Parish were created. On Cat Island, these sediments reduced wave energy from the west and stopped sediment accretion. After the St. Bernard Delta sediments no longer flowed into the Gulf and the Mississippi River changed course; erosion of existing delta sediments led to the erosion of the Mississippi coast marshlands (USACE, 2009c).

Coastal subsidence is affecting the southern areas of Mississippi and is more dramatic westward and southward toward the thick, abandoned Mississippi delta lobes in Louisiana. Fine-grained, highly saturated deposits (marshes) also have a stronger tendency towards subsidence, which has resulted in the encroachment of coastal waters and erosion of the marshlands (Otvos, 2001a). Alabama coastal marshes have experienced considerably less subsidence; apart from severe shore erosion along their bayward edge and the encroachment from sea level rise, they are nearly stable. In areas with thick Holocene deposits, subsidence is offset where new sediments replenish the system. Reduction in sediment supply to the coastal depositional systems, however, has resulted in a trend towards drowned coastal areas and shoreline erosion (Schmid and Otvos, 2011).

Shoreline erosion is extremely important as a geologic process in the region. Currently, shoreline erosion rates in the Gulfport area range from –2.3 to –3.3 feet per year, representing a major concern to the Port since there is a limited sediment supply to the longshore sedimentary processes. Hurricanes and storms can accelerate the erosion and sedimentation process of Gulf shorelines. Storm surges, common during several months in the year, take large amounts of sediment from the beach, increasing the rates of shoreline erosion. The sediments eroded from the shorelines are normally deposited onto the continental shelf or to the backside of barrier islands. During the last 100 years, shoreline erosion has been the characteristic process that is controlling the shape of the Mississippi coast (Shabica et al., 2010).

3.8.5 Climate Change and Sea Level Rise

Mississippi has a humid subtropical climate with mild winters, extended hot summers, and rainfall evenly distributed throughout the year (Mississippi State University, 2013). Prevailing winds are from the south. The state experiences thunderstorms about 60 days throughout the year along with occasional spring tornadoes and rare hurricanes. The average annual coastal temperature is 68 degrees Fahrenheit (°F) (Table 3.8-1), and there are over 100 days a year with temperatures greater than 90 °F (U.S. Global Change Research Program, 2009). Temperatures drop to 32 °F along the coast during most winters. Coastal areas average 65 inches of rain each year (see Table 3.8-1). The National Climatic Data Center (NCDC) reports that in Gulfport, July typically has the greatest rainfall (average of 6.92 inches), while October typically has the lowest rainfall amount (2.85 inches) (NCDC, 2000). Snow and sleet are generally uncommon. Wind speed, wind direction, and air temperature are measured at the West Pier, Port, National Oceanic and Atmospheric Administration (NOAA) Station 8745651, and the Gulfport Outer Range, NOAA Station 8744707 (NOAA, 2011a).

Table 3.8-1
Average Monthly Rainfall and Temperature from 1971 through 2000 at the Gulfport Naval Center

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average Total Rainfall (inches)	6.5	5.5	6.0	5.1	5.7	5.0	6.9	5.8	6.2	2.8	4.8	4.8	65.2
Average Temperature (°F)	51.6	54.9	61.4	67.6	75.0	80.4	82.6	82.3	78.6	69.4	60.5	54.0	68.2

Source: U.S. Global Change Research Program (2009).
°F = degrees Fahrenheit

CO levels have reduced ocean surface pH by 0.1 pH standard unit since 1750; however, there have been no significant impacts documented by that change (Parry et al., 2007). The temperature of the sea's surface around the world has increased about 1.1 °F since 1950, and world-wide sea level rose about 0.07 inch from 1900 through 2000.

The U.S. Global Change Research Program coordinates research on changes in the environment including climate change. Mississippi is in the southeast U.S. study region, which has a climate described as, "…warm and wet, with mild winters and high humidity, compared with the rest of the continental United States"

(U.S. Global Change Research Program, 2009). The average annual temperature in the southeast region has risen about 2 °F since 1970 with most increased temperatures occurring during the winter. Increased winter temperatures are reflected in the drop in number of freezing days from an average of 11 freezing days to an average of 7 each winter. The number of days when the temperature has exceeded 95 °F and the number of nights exceeding 75 °F have both increased (National Climate Assessment and Advisory Development Committee [NCAADC], 2013). Rainfall during fall months has increased 30 percent in the southeast region since 1901. Since the mid-1970s, the area experiencing drought conditions has increased 12 percent during the spring and 14 percent during the summer. Even though fall rainfall increased since 1901, the area experiencing drought conditions during fall increased by 9 percent since the mid-1970s.

Climate models indicate temperatures will continue to increase in the southeast region of the U.S. during all seasons, with the greatest increases occurring during summers. By 2080, average temperatures in the region are expected to increase between 4.5 and 9.0 °F (U.S. Global Change Research Program, 2009), and the number of days exceeding 95 °F is expected to increase (NCAADC, 2013). Climate changes are predicted to increase hurricane peak wind speeds, rainfall intensity, and storm surge height and strength (U.S. Global Change Research Program, 2009; NCAADC, 2013).

Scientists agree sea level is rising (IPCC, 2007b). Sea level in the Gulf has risen over the past 150 years. Over the past 20,000 years, sea level has changed by more than 300 feet. Some data indicate it has risen over the past 4,000 years, while other research indicates it has dropped and risen multiple times in the past 4,000 years (USGS, 1999).

Sea level rise historically affected vegetative communities as shown by vegetation changes on Cat Island, where the Gulf shore of the island had "ghost forests of pine and oak extend more than 100 feet into the Gulf, and black, peaty soil, which could have been formed only in the marshes, is a conspicuous feature of the lower beach" (USGS, 1999).

A study was conducted to evaluate the area of land along the Mississippi Gulf shore that may be most affected by relative sea level rise (Titus and Richman, 2001). This analysis indicated that about 43,000 acres of Mississippi coast is less than 5 feet above msl, while about 204,000 acres are between 5 and 11 feet above msl.

Thieler and Hammar-Klose (2000) developed a system to evaluate the vulnerability of coastlines to sea level rise. Their system considers the shape of the shoreline, heights of tides and waves, and rates of relative sea level rise and shoreline erosion. The application of their system indicates that the Mississippi coast would be expected to have a "very high" risk of being impacted by sea level rise.

One factor contributing to relative sea level rise is sinking, or subsidence, of land along the coast. Shinkle and Dokka (2004) studied elevation benchmarks along the northern Gulf Coast. Their analysis of elevation benchmarks over the period from 1925 to 1995 suggested that land along the Mississippi coast was subsiding from 0 to 0.4 inch per year. NOAA tracks trends in mean sea level along the coast of the U.S. (NOAA, 2011b); however, there is not a site in Mississippi analyzed by this program. The closest site for which the trend in mean sea level has been identified is the Dauphin Island, Alabama gage (NOAA Station 8735180). Mean sea level at this site has risen 0.12 inch per year from 1966 through 2006. This rate of sea level rise is about 0.98 foot per hundred years. The speed of world-wide sea level rise has increased since 1993 at a rate of 0.1 inch per year (Solomon et al., 2007).

Sea level is measured every 6 minutes at the Bay Waveland Yacht Club in St. Louis Bay (NOAA Station 8747437). From 1983 to 2001, the mean tide range has been 1.52 feet with a maximum water level of 9.16 feet on October 28, 1985. Average sea level rose from 0.14 to 0.19 foot at five tide gages on the Mississippi coast when the period from 1960 to 1978 is compared with 1983 to 2001 (NOAA, 2011a).

Relationships between sediment transport, climate change, sea level rise, and coastal shorelines are complex and, it can be difficult to separate natural from man-made changes (Parry et al., 2007). If marshes grow at a rate similar to the rate of sea level rise, there may be no significant effect on shorelines. However, when sea level rises faster than marshes can grow, plants may drown and sediments become too salty for marsh plants.

For example, if sea level rise does not exceed the predicted 2.3-foot increase by the year 2100, Mississippi's Sandhill Crane National Wildlife Refuge, near the coast of Mississippi Sound about 15 miles east of Gulfport, is not expected to experience wetland changes (Gulf of Mexico Alliance [GOMA], 2011). Loss of episodically flooded marshes in the refuge is predicted to exceed 40 percent, and regularly flooded marshes would also be reduced in area if sea level rise exceeds 2.3 feet by 2100. These effects are difficult to reverse and can be unique to each part of the coast.

In a presentation to the International Conference on Sea-Level Rise in the Gulf (GOMA, 2011), Zimmerman and Minello (2010) reviewed extensive literature on the use of salt marshes by commercially and recreationally important fish and shrimp in the northern Gulf. They concluded:

- "Increasing sea level rise will accelerate wetland loss in the northern Gulf.
- As wetlands fragment and convert to open water, they temporarily increase in value for many fishery species due to an increase in edge habitat.
- Ultimately, wetland loss will result in losses to fish populations dependent upon these habitats (shrimp, crabs, red drum [*Sciaenops ocellatus*], spotted seatrout [*Cynoscion nebulosus*])."

There are no data or readily available scientific literature describing significant shoreline changes in the Project area. As described above, data suggest relative sea level is rising in the area at a rate of about 0.12 inch/year.

3.9 ENERGY AND MINERAL RESOURCES

The coastal areas of Harrison County, Mississippi have numerous natural resources, including oil and gas, sulfur, salt, clay, and sand. Among these, the most significant is oil and gas. The great abundance of clay, gravel, and sand resources is associated with the fluvial evolution of the coastal areas of Mississippi, where river deposition played a very important role in the evolution of the landscape. The coastal sediments have also contributed to important amounts of sandy deposits.

In 2008, Mississippi's nonfuel raw mineral production was valued at $261 million. This was an increase of $16 million, or 6.6 percent, from the State's total nonfuel mineral production value for 2007 of $245 million, which followed a nearly 10 percent decrease in 2006 (USGS, 2008).

As of 2008, construction sand and gravel continue to be Mississippi's leading nonfuel mineral, based on production value, accounting for 34 percent of the State's total nonfuel mineral production. This is followed by (in descending order of value) fuller's clays, Portland cement, ball clays, and bentonite. Mississippi continues to rank third in the quantities of ball clays and fuller's earth clay production, as compared with production in other states. Harrison County has remained active in the production of sand and gravel because of the construction projects and the rebuilding of New Orleans after Hurricane Katrina in 2005 (USGS, 2008).

Oil and gas are the most important resources associated with the structural framework of the general geology. Much of southern Mississippi lies in the Gulf Coast Region, an area having a long history of producing large amounts of petroleum, and has experienced a resurgence of interest in exploration for petroleum trapped around and underneath large subsurface salt structures (USGS, 2008).

Although there is no shallow gas or oil fields in Harrison County, the Mississippi State Oil and Gas Board's database shows that a number of oil wells are located in and next to Gulfport. The majority of the oil wells are inactive, plugged, or abandoned. One inactive well is located on the Port's property (Mississippi State Oil and Gas Board, 2013).

According to the Mississippi Oil and Gas Board (2013), Hancock County currently has two producing gas wells and zero producing oil wells, Harrison County has zero producing gas or oil wells, and Jackson County has zero producing gas wells and one producing oil well. Mississippi Department of Revenue (2011b) reported the total assessed value of oil and gas production for Hancock County to be $793,711. For Harrison and Jackson counties, the assessed value was $0.

Mississippi remains the nation's 13th-ranked producer of crude oil, with nearly 1,500 producing oil wells and 10 rotary rigs in operation. Small refineries near Gulfport include the A&M Petroleum and Clark Oil, but no major refineries are in proximity to the Port (Mississippi State Oil and Gas Board, 2013). However, several gas pipelines run nearby that are part of a large regional and state network. A crude oil pipeline (20-inch-diameter) located between Cat Island and West Ship Island crosses (trending southwest to northeast) the study area along the south end of the Sound Channel (USACE, 2001). Offshore in the Gulf, numerous oil and gas platforms and associated pipelines occur further south and east of the study area (Bureau of Ocean Energy Management, Regulation, and Enforcement, 2013).

The USGS has estimated that there is 113.7 trillion cubic feet (cu ft) of undiscovered natural gas, 690 million barrels of undiscovered oil, and 3.7 billion barrels of undiscovered natural gas liquids in onshore lands and State waters of the Gulf Coast (USGS, 2007). For that reason, new offshore platforms and onshore wells are predicted to be developed in the future for oil and natural gas production in Harrison County.

3.10 SOILS (PRIME AND OTHER IMPORTANT FARMLAND)

The majority of the soils in the study area were formed as part of the evolution of coastal deposits mostly inundated with saltwater from the Gulf and the local water table (Section 3.8). The mapping of the soil conditions and their classification was conducted by the SCS in 1971, and no changes or modifications to the classifications have been reported since that time (SCS, 1971).

The study area soils are well drained with loamy subsoil conditions. These soils parallel the shoreline of Mississippi in patterns that can be predicted according to their geomorphic and geologic evolution. These soils are part of the recent and old beaches and are largely extended along the entire coast of the Mississippi. The Eustis-Latonia-Lakeland association covers about 10 percent of Harrison County, where Gulfport is located. From this soil association, about 50 percent are Eustis, 23 percent are Latonia, and 5 percent are Lakeland (SCS, 1971).

Due to their beach origin, the Eustis soils are considered excessively drained and have a loamy sand surface and subsurface. They are located very close to the shorelines, sometimes combined with very recent sandy deposits carried by the wind and storm surges. Latonia soils are well drained that formed on sandy deposits. They are associated with the Holocene beaches and coastal sandy deposits and appear as small terraces away from the modern beach. These soils have a loamy sand surface and a sandy loam subsurface. Lakeland soils are well drained and have a fine sand surface and subsurface. The soils of this association have been used for residential, commercial, and industrial purposes since the soils tend to be stable and are located near the shorelines and US 90. This association would benefit lawn grasses and pine and oak trees since sandy conditions in combination with the high organic content allows for the development of the root systems in the plants (SCS, 1971).

The Eustis-Latonia-Lakeland soil association is used for industrial, commercial, and recreational areas. The high content of sand, the limited amount of expansive clays, and the high consistency that they tend to have in depth make these soils useful for infrastructure. It is common to see alternate routes, highways, pipelines, and underground cables on these soils. Where the parent material is exposed, the soils have been mined as sand sources. These soils are not used for irrigation purposes or water related projects since they tend to have high permeability. Construction on these soils is common and the soils are easy to manage and improve for these uses. However, the high acidity present in the soils makes them corrosive to uncoated steel and concrete (SCS, 1971).

3.10.1 Prime and Unique Farmlands

The Farmland Protection Policy Act of 1981 (FPPA, 7 CFR 658) requires that Federal agencies consider alternatives to projects that would result in conversion of agricultural land. The 1985 Farm Bill revised the

FPPA (PL 97–98, Sec. 1539–1549; 7 USC 4201, et seq.) to provide for limited enforcement of the requirements of the FPPA. According to 658.2a (FPPA Rule, 7 CFR 658), if a site is not designated as prime, unique, statewide, or local farmland, then the FPPA does not apply. Prime farmland is defined by the FPPA as land that is best suited for producing food, feed, forage, fiber, and oilseed crops and is not urban, built-up land, or water areas. The soil qualities, growing season, and moisture supply are appropriate for producing a sustained high yield of crops in an economic manner.

The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) maintains a national database of prime and other important farmlands, which is organized by county. Harrison County is the only county located within the study area. Prime and Other Important Farmland Soil Map units are listed in Table 3.10-1. In the study area, the Harrison County Soil Survey (NRCS, 2013) lists 11 mapping units as prime farmland, 2 as prime farmland, if drained, and 7 as farmland of statewide importance or other important farmland (see Table 3.10-1).

Table 3.10-1
Prime and Other Important Farmland in the Study Area

Map Symbol	Map Unit Name	Classification
Es	Escambia silt loam	Prime farmland
EtB	Eustis loamy sand, 0 to 5% slopes	Other important farmland
HlA	Harleston fine sandy loam, 0 to 2% slopes	Prime farmland
HlB	Harleston fine sandy loam, 2 to 5% slopes	Prime farmland
Hy	Hyde silt loam	Other important farmland
Lr	Lakeland fine sand	Other important farmland
Lt	Latonia loamy sand	Prime farmland
MlB	McLaurin fine sandy loam, 2 to 5% slopes	Prime farmland
MIC	McLaurin fine sandy loam, 5 to 8% slopes	Other important farmland
Nh	Nahunta silt loam	Prime farmland, if drained
PoA	Poarch fine sandy loam, 0 to 2% slopes	Prime farmland
PoB	Poarch fine sandy loam, 2 to 5% slopes	Prime farmland
PoC	Poarch fine sandy loam, 5 to 12% slopes	Other important farmland
RuA	Ruston fine sandy loam, 0 to 2% slopes	Prime farmland
RuB	Ruston fine sandy loam, 2 to 5% slopes	Prime farmland
RuC	Ruston fine sandy loam, 5 to 8% slopes	Prime farmland
RuD	Ruston fine sandy loam, 8 to 12% slopes	Other important farmland
SfB	Saucier fine sandy loam, 2 to 5% slopes	Prime farmland
SfC	Saucier fine sandy loam, 5 to 8% slopes	Other important farmland
St	Smithton fine sandy loam	Prime farmland, if drained

Source: NRCS (2013).

3.11 GROUNDWATER AND SURFACE WATER HYDROLOGY

3.11.1 Groundwater

The study area is located above the coastal lowlands aquifer system, which borders the shores of the Gulf. Moderately deep and deep wells are the principal sources of groundwater for both domestic and municipal uses in this area. The wells are located within the Pascagoula and Hattiesburg formations (Miocene) and Citronelle Formation (Pliocene) (MDEQ, 2010).

The Citronelle Aquifer is the shallowest source of groundwater in southern Mississippi, including the study area. This unit comprises many discontinuous and hydrogeologically independent aquifers and consists principally of sand and gravel with lenses and layers of clay; however, the extent of the Citronelle Formation is unclear in the immediate vicinity of Gulfport (Grubb, 1986).

The Mississippi Gulf Coast Regional Aquifer System includes regional aquifers of mostly Cenozoic-age sediments located in the Coastal Plain of Mississippi and additional areas offshore. Two aquifer systems have been identified: the Mississippi embayment aquifer system (Eocene age) and the coastal lowlands aquifer system (Miocene age and younger). These aquifer systems thicken thousands of feet Gulfward toward their downdip limits, and are composed of several individual aquifers and confining units.

The Mississippi embayment aquifer system is present in about 90 percent of the state. It exceeds 5,000 feet in thickness in the southwestern portion of the state (Grubb, 1986). There are seven aquifers and three confining units in this system. Water in this system is moderately saline to very saline in most of southwestern Mississippi (USGS, 2011c).

The coastal lowlands aquifer system is present in the southern one-third of the state, including the study area. The greatest thickness occurs in southern Hancock County, west of Gulfport, where it is about 5,000 feet thick (Grubb, 1986). There are five aquifers and two confining units in the coastal lowlands aquifer system. Water in this system is moderately saline to very saline in parts of the three coastal counties in south Mississippi (USGS, 2011c).

Typically, aquifers at depths of more than 500 feet maintain sufficient artesian pressure to support flowing wells except where head pressure has lowered by nearby pumping. Recharge areas are located several miles north of Gulfport; recharge occurs by infiltration of rain that falls on sandy outcrops. Water-bearing units have high transmissivity horizontally and low transmissivity vertically (Barraclough and Wade, 1986).

The artesian pressure in Gulf Coast aquifers has declined significantly during the last 100 years. The first flowing artesian well in the area is reported to have been drilled in 1884 (Colson and Boswell, 1985). Prior to that time, water levels in the aquifers varied according to the season, but remained fairly constant from year to year. In the study area, water levels have declined as much as 100 feet in several aquifers along the coast since the area was first developed. Large withdrawals from the aquifer system have caused cones of depression around pumped wells. These cones have deepened, expanded, and overlapped over time to form troughs of depressed water in several layers of the Miocene aquifer system along the coast. As a result, the depressed potentiometric surfaces in these layers have allowed saline water to move toward the pumping centers (Barraclough and Wade, 1986; Colson and Boswell, 1985).

About 9,600 mgd of groundwater was pumped from the regional aquifers during 1980. More recently, USGS data from a well located 3 miles west of Gulfport shows that groundwater levels in the area have been increasing from –28.0 feet in 1998 to –20.8 feet in 2010, which shows signs of water recovery. This well was established on the coastal lowlands aquifer system and lies within the Hattiesburg Formation (USGS, 2011a-b).

The groundwater near the coast of Gulfport is generally hard but is low in total dissolved solids. According to the MDEQ, the USGS has sampled water wells in Mississippi since the early 1900s. These sampling efforts helped determine that most of the groundwater in the immediate vicinity of Gulfport can be characterized as a soft sodium or calcium bicarbonate type (MDEQ, 2010).

3.11.2 Surface Water

Streams located along the Mississippi coast consist of three general types: tidal marsh creeks, coastal tidal creeks, and riverine estuary bayous. Tidal marsh creeks primarily drain estuarine marshes, whereas coastal tidal creeks serve as minor passages for freshwater discharge from surrounding uplands. Riverine estuary bayous serve as interdistributary channels within riverine estuaries (MDWFP, 2005). In Harrison County, three principal rivers drain the area. The Wolf River drains the western part of the county starting at Sellers Bridge in the northwestern corner and flows to the southeast, turning to the southwest into St. Louis Bay. Little and Big Biloxi creeks flow from the north-central part of the county in a southeasterly direction and meet to form the Biloxi River, which drains into Biloxi Bay. The Tchoutacabouffa River begins along the east side of the county, flowing west, and eventually empties into Back Bay of Biloxi (SCS, 1975). There are only small creeks near Gulfport discharging water on the shorelines. Brickyard Bayou is located north of Gulfport, paralleling the shorelines of the Gulf and connecting with Bernard Bayou, which discharges their waters with Big Lake. The nearest surface source is Turkey Creek, which is located approximately 2 miles north of Gulfport flowing toward the east-northeast, eventually discharging into Bernard Bayou. There are no other creeks or surface sources that drain immediately adjacent to the Port.

3.12 HAZARDOUS MATERIAL

A review and evaluation of the available public information relating to the hazardous material issues within the study area was conducted. The objective of this preliminary assessment was to identify the existence of, and potential for, hazardous, toxic, and radioactive waste (HTRW) contamination, which could impact or be impacted by the proposed Project. The evaluation included the Port and the adjacent area (the search radius for specific types of potential contamination sources is provided in Appendix K). The assessment consisted of a review of recent and historic aerial photographs and regulatory agency database information (Environmental Data Resources, Inc. [EDR], 2011, 2015). Additionally, a DMMP prepared for this EIS (Anchor QEA LLC, 2017, Appendix F) queried EPA's Envirofacts website and the USCG's National

Response Center (NRC) website to assess previous spills or events that may have contributed to the contamination of sediments at the Port. 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. This section also summarizes data obtained from recent sediment sampling activities within the Project site.

3.12.1 Aerial Photographic Review

Aerial photographs of the Project area were obtained to examine the historic usage of the study area (EDR, 2015). The photographs depict the study area as it appeared in 1952, 1975, 1978, 1982, 1987, 1992, 1996, 2005, 2007, 2009, 2010, and 2012.

- The earliest aerial photography available for the Project area was taken in 1952. The 1952 photograph shows the Port containing very few buildings or structures, while roads, buildings, and houses located within the portion of the City of Gulfport north of the Port, appear to be very well established at this date.
- Between the years 1952 and 1975, numerous new buildings and roads were constructed at the Port. It is apparent that fill was brought in and shoring was established along the Port in many areas. The City of Gulfport shows an increase in industrial and commercial construction during this same time period.
- Very little change is noticed in the photos between 1975 and 1978.
- No major changes to the Port are apparent between the years 1978 and 1982.
- Significant changes can be seen in the 1987 photograph, particularly on the northwest end of the Port where a large parking/staging area was constructed and paved. In addition, new buildings and improvements can be seen throughout the Port. A new barrier was constructed to protect the boat dock area on the west side of the Port.
- Very little change to the Port is apparent between the 1987 and 1992 photographs.
- In the 1996 photograph, some new buildings and improvements are present at the northwest corner of the Port and a substantial amount of new fill is apparent on the west side of the Port. This fill appears to have been used to expand the parking or cargo staging area.
- The 2005 photograph illustrates the damages the Port incurred from Hurricane Katrina in August 2005. The effects of the hurricane can be seen throughout the entire Port and in the urban, industrial, and commercial areas immediately north of the Port. Some structures are missing and the boats previously staged at the docks are no longer visible. What appears to be a large boat or vessel is visible in the large parking area near the northwest corner of the Port. The 2005 photograph also shows a new road connection to US 49 located at the northeast end of the Port. In addition, between 1996 and 2005, a significant amount of additional fill was brought in to the west side of the Port apparently to enlarge the parking or cargo staging area.
- The 2007 photograph shows that much of the Port area had been repaired, with numerous truck trailers and cargo containers noted in the Port parking facilities.

- Aerial photographs taken in 2009 and 2010 indicate that most of the damaged structures and scattered debris shown in the 2005 photograph have been repaired or removed. Several new buildings, including a large casino and several parking areas have been recently constructed next to the Port along US 90. Harbor Square Park and Jones Park, located next to US 90 at the northeast corner of the Port, appeared to be under construction. Recent photographs show that many improvements have been made to the Port's interior roads, parking areas, and structures.
- As of 2012, the aerial photos showed the Port with significant cargo loading and unloading activity, including parking areas and staging areas full of truck trailers and cargo containers. Large and small ships were also noted docked at the East Pier.

3.12.2 Regulatory Agency Records Review

The scope of the regulatory information search included more than 60 databases and records, as described in Appendix K. A new regulatory database search was conducted in 2015, and the information was updated in Appendix K.

It is important to note that the search identified only five listed sites located within the Port area south of the US 90 corridor. Two of the sites are Emergency Response Notification System (ERNS) sites, one site is a Facility Index System (FINDS) facility known as the Old Copa Casino, and the other two sites are State Hazardous Waste Sites (SHWS), both of which have an Inactive status. The nearby USCG Station at 991 23rd Avenue (0.343 mile east of the Port), is the location of a Resource Conservation Recovery Act (RCRA)-Conditionally Exempt Small Quantity Generator site and 13 ERNS sites. The vast majority of the sites revealed in the search area are located north of the Port and north of US 90, east along US 90, or west along US 90.

On the basis of the results of the regulatory database searches, the type and number of sites located within the study area and range of distances from the Port are presented in Table 3.12-1.

Information obtained from the EPA Envirofacts website indicated that no sites occurred on the waterway or in close proximity to the surrounding upland areas that would adversely affect the sediments at the Port. The NRC website provides access to a comprehensive database of reported incidents involving potential hazardous releases into the environment. Data reports for a 14-year period (2001 to 2015) were reviewed for incidents occurring in Gulfport, Mississippi, at the Port. The majority of incidents reported were due to sheen, discharge from a docked vessel (presumably bilge), or mechanical failure of a vessel.

The DMMP (Appendix F) also included a query of the Navigation Data Center website to evaluate the cargo of vessels operating out of the Port. In the early 1900s, the Port's initial use was for the export of raw and finished wood products. Transitioning into the 1960s, the Port's import and export activities expanded to include refrigerated containers of tropical fruits. Currently, along with these, titanium dioxide is another major commodity handled by the Port facility. Based on data from the NRC, no spills of any cargo of any type occurred during the period of review.

Table 3.12-1
Regulatory Database Search Summary from 2001 to 2015

Type	Number Recorded	Range of Distance from Port (miles)
Underground Storage Tank Database	31	0.034–0.700
Aboveground Storage Tank Database	1	0.636
Leaking Underground Storage Tank Listing	16	0.120–0.981
Resource Conservation and Recovery Act (RCRA)-Small Quality Generator	0	Not applicable
RCRA-Conditionally Exempt Small Quality Generator	16	0.122–0.724
RCRA Non-Generator	4	0.142–0.603
Emergency Response Notification System (ERNS)	33	0.066–0.449
Facility Index System (FINDS)	29	0.034–0.496
State Hazardous Waste Sites (SHWS) records	19	0.033–1.433
Solid Waste Facilities/Landfill	0	Not applicable
Voluntary Evaluation Program	1	0.238
Solid Waste Disposal/Recycling Facilities	1	0.560
Department of Defense (DoD)	1	0.993
Integrated Compliance Information System	3	0.122–0.470
Hazardous Materials Incident Report System	0	Not applicable
Manufactured Gas Plants	1	0.523

Source: EDR (2015).

3.12.3 Port Area Sediment Sampling Data

In May 2015, sediment cores and samples were collected from the area immediately south of the East Pier as part of the (unrelated) Port of Gulfport Spool Base project, which includes dredging to -36 feet MLLW in a limited area (Thompson Engineering, 2015). The samples were collected to determine the disposal options for the sediment, including the possibility of beneficial reuse at a marine site. Two sediment cores were advanced to the depth of -36 MLLW and sampled for analysis of VOCs, semivolatile organic compounds (SVOCs), polycyclic aromatic hydrocarbons (PAHs), organochlorine pesticides, polychlorinated biphenyls (PCBs), dioxins and furans, and 20 priority metals constituents. Analysis also included general chemistry for total cyanide, total sulfide, total volatile solids, acid volatile sulfides/simultaneously extracted metals, and total organic carbon (TOC). The results of the sample analyses were compared to Federal threshold effects levels (TELs) and probable effects levels (PELs) and to MDEQ Tier 1 Target Remediation Goals (TRGs). Sediment toxicity screening was also performed.

No detectable concentrations of volatile organics or pesticides were identified in the samples. Multiple semivolatile organics, PCBs, dioxins and furans, and metals were detected in the samples. The sediment analyses found only one constituent (acenaphthene – a semivolatile organic) at concentrations greater than Federal TELs and PELs; however, the concentrations were less than the MDEQ TRGs. Specific dioxins and furans had concentrations that exceeded their MDEQ TRGs for unrestricted soil but were less than their

TRGs for restricted soil. Total concentrations for dioxins and furans were less than the MDEQ Level I TRGs. The arsenic concentrations in both sediment samples exceeded the MDEQ TRGs and the TEL, but were less than the PEL. All other detectable constituent concentrations were either less than their TELs, PELs, and MDEQ TRGs or were less than the MDEQ TRGs and between their TELs and PELs. The effects of the ten-day sediment toxicity test identified no significant mortality in the organisms tested.

The sediment sampling data determined that the sediments to be dredged from the immediate vicinity south of the East Pier would not be suitable for beneficial reuse at a marine site. However, no hazardous concentrations of contaminants (defined as hazardous waste) were identified. The sediment sampling data indicated that the sediments could be disposed at a MDEQ-approved Upland Spoil Disposal Site. Based on the proximity of the East Pier (Spool Base) project to the overall PGEP, it could be expected that any sediment encountered during dredging activities as part of the proposed Project would exhibit similar sediment quality to those sediments sampled as part of the Spool Base project. There would be a reasonable expectation that such sediments would be suitable for disposal at an Upland Spoil Disposal Site, but may not be suitable for beneficial reuse.

Appendix G provides results from additional sediment sampling and testing conducted by MSPA for all sediment that would be dredged as part of the proposed Project according to requirements of Section 103 of the MPRSA. This comprehensive sampling process satisfies the requirements of EPA, MDMR, USACE New Orleans District, MDEQ, and LDNR for the placement of dredged material in either an ODMDS or BU site.

3.13 WATER AND SEDIMENT QUALITY

3.13.1 Water Exchange and Inflows

Mississippi Sound extends from the mouth of the Pearl River on its western end to Mobile Bay on its eastern end and south to five natural barrier island-bounded passes connecting the sound to the near-shore Gulf (Orlando et al., 1993). The Mississippi state line extends about 3 miles south of Mississippi Sound into this portion of the Gulf (MDEQ, 2012a).

The system receives saline waters from the Gulf and freshwater inflows from the Pearl and Pascagoula Rivers (Wilson et al., 2009). Both rivers contribute significant freshwater inflow to Mississippi Sound (Orlando et al., 1993). The median daily average flow of the Pearl River (water years 1939 through 2012 at Bogalusa, Louisiana) is 4,480 cubic feet per second (cfs) (USGS, 2013a). The Pascagoula River's median daily average flow is 4,550 cfs (water years 1994 through 2012 at Graham Ferry, Mississippi) (USGS, 2013b). The Mississippi Coastal Streams Basin, located between the Pearl and Pascagoula Rivers, also introduces freshwater into the estuary. The Coastal Streams Basin includes the Wolf, Jourdan, Little Biloxi, Big Biloxi, and Tchoutacabouffa Rivers, as well as Biloxi Bay and St. Louis Bay (Wilson et al., 2009). The Coastal Streams Basin, along with the Pearl and Pascagoula Rivers, drain approximately 20,000 square miles of Mississippi (MDEQ, 2004). Total freshwater inflow into Mississippi Sound from the Pearl and Pascagoula Rivers and Mississippi coastal basin streams averaged approximately 43,600 cfs (EPA, 1999).

Tidal exchange with the Gulf occurs through the natural passes south of Mississippi Sound (Orlando et al., 1993). The average tidal range in Mississippi Sound at Gulfport Harbor is 1.4 feet (University of Southern Mississippi [USM], 2011). The average tide at the passes between Mississippi Sound and the near-shore Gulf is about 1.7 feet (USM, 2013).

Patterns of circulation within Mississippi Sound are primarily controlled by tides altered by wind, bathymetry, freshwater inflow, and basin geometry. When winds are less than 10 feet per second (7 mph), tides dominate circulation in Chandeleur Sound. Pearl River provides most of the freshwater to Chandeleur Sound except when there are releases of Mississippi River floodwaters through the Bonnet Carré spillway. The deepest portions of Chandeleur Sound are along the north end of Chandeleur Islands. Wind causes an eastern circulation during westward winds and a westward circulation during eastern winds. South winds push Mississippi Sound's water against the mainland, while north winds push water out of Mississippi Sound and into the Gulf (Orlando et al., 1993).

3.13.2 Water Quality

3.13.2.1 Data Analysis

Water quality was analyzed from EPA's National Coastal Assessment (NCA) database for the 5-year period from 2000 to 2004 (EPA, 2013a). Information was obtained from 63 sites in and around the study area crossing from Mississippi Sound (58 sites) into Chandeleur Sound (5 sites) (Figure 3.13-1). Field water quality measurements of temperature, salinity, pH, turbidity, and dissolved oxygen (DO) were taken between 0.3 and 20 feet. Water quality samples for laboratory analysis were taken at depths from 1 to 57 feet. All data were collected during summer from July through September.

In 2004, the USACE took 48 measurements across 15 sampling stations (see Figure 3.13-1) in the FNC. The depth of the samples ranged from 0 to 39 feet, with an average sampling depth of 15.8 feet. Field measurements included temperature, salinity, DO, turbidity, and pH. Samples were taken at the top, middle, and bottom of the water column (USACE, 2006a).

Water quality was measured at 48 locations in and around the study and Project areas on April 3 and 5, 2012 (Appendix L) (see Figure 3.13-1). Measurements were collected near the surface and near the bottom at each location. Water depths ranged from 4 to 31 feet.

Ahsan et al. (2002) evaluated influence of wind, bathymetry, freshwater inflow, temperature, and salinity of surrounding waters on circulation patterns, temperature, and salinity in Mississippi Sound and the near-shore Gulf south of the Sound's barrier islands. Modeling suggested bathymetry is a major factor affecting circulation and temperature in the Sound near Gulfport. The same modeling effort indicated winds along with salinity of the nearby Gulf affect water temperature in waters extending into the Gulf beyond the Mississippi Sound.

Figure 3.13-1

Port of Gulfport Expansion Project

Water and Sediment Quality Sampling Locations

File: N:\Clients\M_N\Mississippi_State_Port_Authority\100018536\geospatial\Figs_EIS\2015_Revisions\PGEP_EIS_Figure_3_13_1_WaterandSediment_Quality_Samp_Locations_092315.mxd

3.13.2.1.1 Water Temperature

Temperature is the most commonly measured water quality parameter, and it can influence several other water quality parameters. For example, DO solubility decreases as water temperature and salinity increase. Water temperature also influences biological processes such as photosynthesis and respiration.

Water temperatures in the study area ranged between 81.3 °F and 90.5 °F, with a mean of 85.6 °F (EPA, 2013b) for 316 measurements. According to Mississippi water quality standards, the temperature in any coastal or estuarine waters should not exceed 90.0 °F (MDEQ, 2012a). Of 316 measurements in the study area, 3 (1 percent) exceeded MDEQ criteria; however, the highest temperature was only 0.5 °F higher than the water quality standard of 90.0 °F. The 2012 water quality assessment (MDEQ, 2012b) indicated 98 percent of temperature measurements in Mississippi Sound and the near-shore Gulf met water quality criteria.

Water temperature measurements taken by the USACE during July and August 2004 ranged from 77.8 to 88.1 °F, with an average temperature of 84.2 °F (USACE, 2006a). In early April 2012, water temperatures ranged from 65.1 to 76.3 °F, with higher temperatures near the surface and lower temperatures near the bottom (see Appendix L).

3.13.2.1.2 Salinity

Mississippi Sound’s salinity levels are a function of the mixing of saline waters from the Gulf and freshwater inflows from the 20,000-square-mile watershed. Gulf waters enter the Sound through deep passes between the barrier islands. In the Gulfport area, surface and bottom water salinities average 10 to 15 parts per thousand (ppt) February to April. During the typically drier months of August to October, surface and bottom waters offshore Gulfport average 20 to 25 ppt (Orlando et al., 1993).

Salinity in the study area ranged from 14.1 ppt to 32.9 ppt, with an average of 24.3 ppt over 317 measurements (EPA, 2013b). In the data collected by the USACE, salinity levels ranged from 19.9 to 33.1 ppt, with an average of 27.8 ppt at 17 sites (USACE, 2006a). Data collected in April 2012 found salinity ranging from 4.1 to 33.9 ppt and averaging 15.3 ppt over 96 measurements (Appendix L).

Bottom water salinity was higher than surface water salinity at the same locations. Salinities appear consistent with the salinity characterization for western Mississippi Sound by Orlando et al. (1993) in that salinities generally range between 10 to 30 ppt, with lowest values typically occurring in the winter to spring months, and higher values in late summer into fall.

Modeling conducted by Ahsan et al. (2002) indicated winds and freshwater inflow into the Sound play important roles in determining salinity of the near-shore Gulf in the southern end of the study area. The same modeling also showed that freshwater inflow and bathymetry are major factors affecting salinity in the study area crossing Mississippi Sound.

3.13.2.1.3 Dissolved Oxygen

DO enters the water column both through mixing with the atmosphere and through photosynthesis. Photosynthesis can occur via phytoplankton, benthic algae or seagrass, all of which are photosynthetic organisms. The State of Mississippi has a DO standard that states that values should not fall below 5.0 milligrams per liter (mg/L) as a daily average or below 4.0 mg/L at any time (MDEQ, 2012b).

The mean value for 62 surface measurements in the study area was 7.6 mg/L and there were no concentrations less than 5.3 mg/L. Six percent of 192 mid-water measurements had oxygen levels less than 4.0 mg/L. While DO levels below 4 mg/L occurred at depths shallower than 17.7 feet, no values below the MDEQ standard of 4 mg/L were found in mid-water samples shallower than 6.6 feet in depth. Thirty percent of the 63 measurements made near the bottom had oxygen below 4.0 mg/L (EPA, 2013b).

Bricker et al. (2007) suggest that low DO conditions may be more frequent with increasing salinity and distance offshore. During times of peak freshwater inflow, low levels of DO are frequently found in the deeper dredged channels, due likely to density-driven stratification (Orlando et al., 1993). Mississippi's most recent water quality assessment (MDEQ, 2012a) indicated that 99 percent of measurements in Mississippi Sound and the near-shore Gulf met water quality criteria.

EPA (1999) estimated that one-fifth of the Breton/Chandeleur Sound which contains the southern portion of the study area, experienced oxygen levels below 2 mg/L in bottom waters. DO of 2 mg/L or less is generally referred to as a hypoxic (inadequate oxygen) condition, which can be stressful for bottom-dwelling organisms.

In the USACE (2006a) data, DO levels ranged from 0.31 to 10.29 mg/L, with an average of 4.66 mg/L. Of the 48 samples taken, 20 fell below the MDEQ standard of 4.0 mg/L. It should also be noted that the DO levels within the Port (Stations GH04-01, GH04-02, and GH04-03) were close to zero at depths greater than 30 feet. As in the EPA NCA data set, areas shallower than approximately 15 to 20 feet were above 4 mg/L, while DO was lower in deeper areas.

DO in April 2012 in the surface layer averaged 8.0 mg/L with a low of 6.1 mg/L and high of 9.4 mg/L. Bottom water DO averaged only 4.9 mg/L and was below the MDEQ standard of 4.0 mg/L at 20 of 48 locations (Appendix L).

3.13.2.1.4 Total Suspended Solids

Total suspended solids (TSS) refer to the amount of material suspended in the water column. Increased amounts of TSS can enter a waterbody via a variety of human activities, including stormwater runoff from urban land uses, runoff from agricultural lands, runoff from roads and parking lots, as well as increased stream bank erosion associated with high flows (which themselves can be brought about via increased impervious features). Unnaturally elevated levels of TSS over long periods of time can diminish the health and productivity of aquatic ecosystems (EPA, 2006a).

Mississippi has not established specific water quality criteria for TSS; however, its water quality standards state TSS should not be elevated by human activities to levels harming the environment. Mean TSS from the EPA NCA data set for 121 surface and mid-water samples in the study area was 19.8 mg/L with minimum and maximum values of 6.0 and 68.0 mg/L, respectively (EPA, 2013b).

3.13.2.2 Nutrients

Nutrients such as nitrogen and phosphorus are important in the maintenance and growth of plants within estuaries although excessive nutrient additions can give rise to deleterious conditions such as algal blooms, decreased water clarity, and low levels of DO, which can lead to fish kills (Bricker et al., 2007). If nutrient levels cause excessive growth of phytoplankton, the decay of algal blooms by oxygen-consuming microbes could decrease DO to levels harmful to marine life (Turner et al., 2006). Fifty-eight of 100 fish kills investigated by MDEQ from January 2006 through December 2010 were attributed to low DO. At present, the State of Mississippi does not have water quality standards for nitrogen, phosphorus, or chlorophyll-*a* (an indicator of phytoplankton biomass).

Based on EPA NCA data, the mean chlorophyll-*a* concentration in the study area was 3.4 micrograms per liter (µg/L). Minimum and maximum concentrations of chlorophyll-*a* were 0.07 and 17.0 µg/L, respectively, over 121 samples (EPA, 2013b). Chlorophyll-*a* in Chandeleur Sound, the southern portion of the study area, was generally lower, with an average of 2.6 µg/L for 15 measurements (EPA, 2013b) than chlorophyll-*a* in Mississippi Sound.

Bricker et al. (2007) concluded chlorophyll-*a* in the portion of Mississippi Sound around the study area is generally low and consequently eutrophication is also relatively low in the area.

Bricker et al. (2007) suggested moderate-to-high nitrogen levels were entering the near-shore area of the western Mississippi Sound. Nutrient concentrations in the study area are illustrated in Table 3.13-1.

There are limited data to evaluate eutrophication in the study area extending beyond Mississippi Sound. Those limited data suggest chlorophyll-*a* levels are periodically elevated particularly in the portion of the study area past Mississippi Sound (Bricker et al., 2007). Bricker et al. (1999) conducted a similar analysis of data from the same area and concluded that occasional low DO episodes in that portion of the near-shore Gulf probably resulted from eutrophication.

Table 3.13-1
Nutrients in Water Samples from the Study Area

Parameter	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Average (mg/L)
Ammonium (NH_4)	182	<0.005	0.890	0.080
Nitrate	182	<0.005	0.310	0.010
Nitrite	182	<0.005	0.122	0.008
Total Kjeldahl nitrogen[1]	38	0.330	1.200	0.700
Orthophosphate	182	<0.002	0.909	0.055
Total phosphorus[2]	76	0.030	0.300	0.070

Source: EPA (2013b).
mg/L = milligrams per liter
[1]Total Kjeldahl nitrogen data are from 2003.
[2]Total phosphorus data are from 2002 and 2003.

3.13.2.3 Bacteria

The applicability of bacteria criteria to a particular waterbody depends upon its designated use. Criteria are established to protect water quality commensurate with the most stringent designated use assigned to each waterbody (MDEQ, 2012b).

Within the study area, MDEQ collects samples from various stations and tests for fecal coliform bacteria and enterococci bacteria through their beach monitoring program. Enterococci bacteria are considered appropriate indicators of human and/or other mammal fecal contamination (EPA, 2006a). Within Mississippi Sound, 16 beach monitoring stations have been sampled since January 6, 2000 (MDEQ, 2011) (Figure 3.13-2).

Mississippi water quality standards for bacteria have been updated recently (MDEQ, 2012b). Within Mississippi Sound, appropriate uses designated by Mississippi include recreation, fish and wildlife, and shellfish harvest. Areas adjacent to beach monitoring stations 5, 6, 7, 13A, and 14 (see Figure 3.13-2) are classified for shellfish harvesting. MDEQ (2012b) water quality standards for each of these classifications are listed below.

Recreation Standards

Fecal coliform shall not exceed a geometric mean of 200 colony-forming units per 100 milliliter (mL) based on a minimum of five samples taken over a 30-day period with no less than 12 hours per 1,000 mL more than 10 percent of the time. For both marine and estuarine coastal recreational waters, enterococci shall not exceed a seasonal (May–October and November–April) geometric mean of 35 per 100 mL based on a minimum of 20 samples collected during the season (MDEQ, 2012b).

0 5 Miles

Study Area

Mississippi Department of Environmental Quality (MDEQ) Beach Monitoring Stations

Source: MDEQ (2011)

Figure 3.13-2

Port of Gulfport Expansion Project

MDEQ Beach Monitoring Stations

Prepared By: 13029	Scale: 1" = 4.5 miles
Job No.: 100018536	Date: September 23, 2015

File: N:/Clients/M_N/Mississippi_State_Port_Authority/100018536/geospatial/Figs_EIS/Figure_3_13_2.mxd

Water contact is discouraged on Mississippi's public-access bathing beaches along the shoreline of Jackson, Harrison, and Hancock counties when enterococci exceed 104 colonies per 100 mL and in all other coastal recreational waters when enterococci exceed 501 colonies per 100 mL. When enterococci counts exceed 104 per 100 mL at the public access beaches, water contact advisories are issued by Mississippi's Beach Monitoring Task Force (MDEQ, 2012b).

Fish and Wildlife Standards

From May through October, when water contact recreation activities may be expected to occur, fecal coliform shall not exceed a geometric mean of 200 per 100 mL based on a minimum of five samples taken over a 30-day period with no less than 12 hours between individual samples, nor shall the samples examined during a 30-day period exceed 400 per 100 mL more than 10 percent of the time. From November through April, when incidental recreational contact is not likely, fecal coliform shall not exceed a geometric mean of 2,000 per 100 mL based on a minimum of five samples taken over a 30-day period with no less than 12 hours between individual samples, nor shall the samples examined during a 30-day period exceed 4,000 per 100 mL more than 10 percent of the time (MDEQ, 2012b).

Shellfish Harvesting Standards

The median fecal coliform Most Probable Number (MPN) shall not exceed 14 per 100 mL, and not more than 10 percent of the samples shall ordinarily exceed an MPN of 43 per 100 mL in those portions or areas most probably exposed to fecal contamination during most unfavorable hydrographic and polluted conditions (MDEQ, 2012b).

Analyses were performed on data obtained from MDEQ (2011) beach monitoring for both fecal coliform bacteria and enterococci measurements taken at all the stations within the study area and results were compared with state water quality standards.

In summary, a total of 5,423 samples were taken across all 16 stations from January 2000 through May 2011 for fecal coliform bacteria (see Figure 3.13-2). For recreational use designations, only 1 of 16 stations exceeded the fecal coliform bacteria criteria of 200 colonies per 100 mL at all times. In contrast, 2 of 16 stations exceeded the criteria more than 50 percent of the time during the May to October time period. Seven stations exceeded the fecal coliform criteria less than 50 percent of the time. Six stations did not exceed the criteria. The stations closest to Gulfport, 8 and 9, exceeded the criteria 17 and 38 percent of the time, respectively, during the May to October time frame (MDEQ, 2011).

From May to October, an average of 20.4 percent of all samples collected exceeded the 400 colonies per 100 mL guidance criteria for fecal coliform bacteria. One station did not exceed the criteria. Stations closest to Gulfport, 8 and 9, exceeded the criteria 18 and 20 percent, respectively, from May to October (MDEQ, 2011).

Based on the above described results, bacteria levels exceeded the more-restrictive shellfish harvesting standards for fecal coliform bacteria (14 colonies per 100 mL) more than 50 percent of the time at all stations where this standard is applicable (stations 5, 6, 13A, and 14) (MDEQ, 2011).

For enterococci bacteria, there were a total of 6,628 samples taken at 15 of the stations (station 12 was not sampled) between January 2000 and June 2009. Samples were analyzed during the two seasons of May to October (3,581 samples) and November to April (3,047 samples). Of the May to October samples, 202 samples did not meet the minimum required 20 samples per season, but 249 samples exceeded the criterion of 35 colonies per 100 mL during that season. Of the November to April samples, 143 samples did not meet the minimum required 20 samples per season but 466 samples exceeded the criteria during that season. Enterococci samples were also compared with the less stringent criterion of 104 colonies per 100 mL, which triggers a beach advisory in Jackson, Harrison and Hancock counties. Of the samples taken, a total of 942 samples exceed this criterion (MDEQ, 2011).

3.13.2.4 Metals-in-Water

Metals (arsenic, copper, nickel, selenium, and zinc) and ammonia were sampled from the study area at eight locations in April 2012 (see Appendix L). All measurements were below water quality standards set by MDEQ (2012b; EPA, 2013c).

3.13.2.5 USACE – Elutriates

In 2004, the USACE sampled 15 sites (see Figure 3.13-1) in and around the FNC. Several elutriate scenarios were run for each sampling site, and each scenario was given a letter to attach to the sample site identification in order to identify which scenario was run. These scenarios include M – Maintenance Dredging (No-Action Alternative), W – Channel Widening Alternative, D – Deeping of the Existing Channel Alternative, and DW – Deeping and Widening of the Existing Channel Alternative. Of the various analyses run, water quality characteristics were quantified 13 times for various analysis scenarios (USACE, 2006a).

In the category of general chemistry, only ammonia and cyanide exceeded MDEQ water quality criteria (MDEQ, 2012b). The analytical results are for total cyanide, while Mississippi water quality standards are for free cyanide, because only free cyanide is considered to be a biologically meaningful expression of cyanide toxicity (Eisler, 1991). The relationship between total cyanide and free cyanide in natural waters varies with receiving-water condition, types of cyanide compounds present, degree of exposure to daylight, and presence of other chemical compounds. Comparing total cyanide values to free cyanide benchmarks is a very conservative approach. Given the low levels present, and the oxygenated and high electrolyte marine environment, this finding is not considered significant. One sample exceeded Mississippi's acute threshold criteria for cyanide and 10 ammonia samples exceeded Mississippi's acute threshold criteria. Since the sediment and water samples used to prepare elutriates are from grab samples from a marine environment, the acute criteria are more appropriate than chronic criteria for comparison.

In the category of metals, none of the metals tested (aluminum, antimony, arsenic, chromium, lead, nickel, selenium, thallium, and zinc) exceeded the acute Mississippi water quality standards. For total polychlorinated bi-phenyls (PCBs) tested, no samples exceeded Mississippi's acute or chronic threshold criteria (MDEQ, 2012b). None of the assayed chlorinated pesticides DDT (dichloro-diphenyl-trichloroethane) [2,4' and 4,4' DDT], dieldrin, endosulfan II, and endrin, exceeded Mississippi or EPA acute threshold criteria (MDEQ, 2012b; EPA, 2013c). However, four samples for dieldrin, and two for endrin exceeded chronic criteria set by Mississippi (MDEQ, 2012b). Dieldrin and endrin are pesticides that were banned from use in the United States in the mid-1980s; although EPA still allowed dieldrin to be used for subsurface control of termites, the chemical is no longer registered for use (ATSDR, 2002; ATSDR, 1996). Exposure to dieldrin is greatest for those who live in homes that were once treated for termites using the chemical, even years after application as dieldrin is resistant to degradation in the environment. The persistence of endrin in the environment varies with local conditions. Exposure to endrin in air, water, or soil is likely limited to those living near hazardous waste sites. Within the SVOC category, only phthalate was assessed. Levels of phthalate did not exceed either chronic or acute threshold guidance criteria from EPA (EPA, 2013c). Mississippi has not established water quality criteria specifically for phthalate (MDEQ, 2012b). Three sites were sampled for dioxin and furan and values were relatively low (USACE, 2006a).

Elutriate for selected metals in 2012 (see Appendix L), showed arsenic at several locations and zinc at one location were above channel water concentrations. However all measurements were below water quality standards set by MDEQ (2012b; EPA, 2013c).

3.13.3 Sediment Quality

The EPA analyzed surface sediment from 63 stations throughout the study area from 2000 to 2004 (EPA, 2013b). Percent silt/clay (fine sediments), percent sand (medium to large sediments), and percent TOC were measured. Silt/clay is important because fine sediments have more surface area than medium-large-grain-size sediments. Sediments dominated by fine-grained silt and clay, rather than sand, may adsorb and retain contaminants entering the system (Miller et al., 2005).

The USACE sampled 15 sites (see Figure 3.13-1) in 2004 for the FNC sampling. Several scenarios were run for each sampling sediment core site and each scenario was given a letter to attach to the sample site identification in order to qualify which scenario was run. These scenarios include M – Maintenance Dredging, W – Channel Widening, D – Deeping of the Existing Channel, and DW – Deeping and Widening of the Existing Channel. Of the various analyses run, sediment characteristics were quantified 15 times for various analysis scenarios (USACE, 2006a).

Selected metals and organic compounds were sampled at seven locations (see Figure 3.13-1 and Appendix L).

In addition, in May 2015 sediment cores and samples were collected from the area immediately south of the East Pier as part of the proposed (unrelated) Port of Gulfport Spool Base project (see Section 3.12.3). Lastly, Appendix G provides results from sediment sampling and testing conducted by MSPA for all sediment that would be dredged as part of the proposed Project according to requirements of Section 103 of the MPRSA. This comprehensive sampling process satisfies the requirements of EPA, MDMR, USACE New Orleans District, MDEQ, and LDNR for the placement of dredged material in either an ODMDS or BU site.

3.13.3.1 Sediment Grain Size Composition

3.13.3.1.1 EPA NCA Data

Sediment composition varied considerably by sample locations in the study area. Based on 63 samples, the average silt/clay composition was 54.0 percent with minimum and maximum silt/clay values of 0.5 and 99.0 percent, respectively. The minimum and maximum percent sand ranged from 0 to 99.5 percent and averaged 45.0 percent. The average TOC content was 0.9 percent with a minimum of 0 and maximum of 2.6 percent (EPA, 2013b). In general, sediments nearer shore in Mississippi Sound tended to have higher proportions of silt/clay, while the proportion of sand tended to increase with distance from the Mississippi shoreline.

According to the EPA's 2012 National Coastal Conditions Report, TOC, along with sediment toxicity and sediment contamination, can be used to rank an area's sediment quality (EPA, 2012). High levels of TOC in sediment may indicate human sources have contributed organic material to the sediment. Bacterial respiration of TOC in sediments may depress oxygen concentrations in bottom waters. Of the 63 samples taken in the study area, 59 (94 percent) were "good" (TOC <2 percent of sediment) and the remaining 4 were "fair" (TOC <2 percent but >5 percent of sediment).

3.13.3.1.2 USACE Data

Percent physical characteristics and specific gravity were run for sediment characteristics. Averages from directly within the Port area (GH04-01, GH04-02, and GH04-03; see Figure 3.13-1) were compared with averages for all samples (Table 3.13-2).

3.13.3.1.3 Supplemental Data

Sediment was sampled from 47 locations in April 2012 (see Appendix L). Fine sand made up most of the sediment, ranging from 3-99 percent of the sediment in the samples (Table 3.13-3). Percentages of clay and silt were lower, ranging from 0 to 52 percent and less than 1 to 56 percent, respectively, in individual samples. Larger particles like gravel or shell hash were usually absent from samples.

Table 3.13-2
U.S. Army Corps of Engineers (USACE)
Data Sediment Physical Characteristics

Parameter	Port Stations Average	All Stations Average
Gravel (%)	0.5	0.3
Sand (%)	44.0	41.0
Silt (%)	15.0	17.0
Clay (%)	40.0	42.0
Silt+Clay (%)	55.0	59.0
Moisture Content (%)*	75.0	88.0
Solids (%)*	57.0	55.0
Specific Gravity	2.55	2.56

Source: USACE (2006a).

*In some samples the reported moisture content exceeded 100%, which caused the sum of moisture content (%) and solids content (%) at some locations to exceed 100%.

Table 3.13-3
Sediment Composition Average Values for Percent Composition of Sediment

Location	Number of Samples	Gravel	Sand	Silt	Clay
Study area	18	0.4	48	29	22
Project area	9	0.2	51	27	22
East Pier Expansion area	3	4.2	31	33	31
North Harbor Fill area	2	1.4	69	16	14
Turning Basin Expansion area	6	0.5	39	27	34
West Pier Expansion area	9	0.2	56	20	23

See Appendix L.

3.13.3.2 Organic Contaminants

3.13.3.2.1 EPA NCA Sediment Data

Sediment was analyzed for 72 different organic compounds at the 63 stations within the study area. These compounds included pesticides, PAHs, DDT and its derivatives, and PCB and its congeners. These compounds have anthropogenic origins and enter water and sediment through runoff, sewage, and other sources (EPA, 2012).

NOAA published Screening Quick Reference Tables (SQuiRTS) that provide screening concentrations for estuarine and marine sediments (Buchman, 2008). While NOAA has stated SQuiRTS are intended for internal use only, they provide a gauge for understanding concentrations that may trigger concern for aquatic and human life. SQuiRTS screening values also help identify compounds possibly needing additional site specific testing. There are no enforceable sediment quality criteria or standards with which to compare concentrations in the sediment. However, there are several different guidelines that are used to look for a cause for concern in sediment samples, one of which is the Effects Range Low (ERL). ERLs were developed by a technique that demonstrates no cause and effect from the chemicals in the data set, and when ERLs derived from sets of data from different areas are compared, the results are inconsistent (USACE, 1998b). Since the ERLs are not based on cause-and-effect data, they are used only to determine a possible “cause of concern.”

Thirty-four of the tested organic compounds have screening criteria established by NOAA. Four of those 34 compounds, 4,4'-DDE (dichlorodiphenyldichloroethylene), dieldrin, lindane, and total PCBs, exceeded one or more screening values. The first three compounds are organo-chlorine insecticides used primarily for agricultural purposes. Dieldrin was phased out starting in the 1970s, and banned from all use except the subsurface control of termites in 1985 (EPA, 2013c). Lindane has not been used in the U.S. since 2007 (EPA, 2013d). PCB refers to a class of organo-chlorine compounds used for industrial purposes, the manufacture of which was banned in 1979 (EPA, 2013e). 4,4'-DDE is a degradation or contamination by-product of the organo-chlorine pesticide, DDT, which was banned from use in the U.S. in the 1970s (EPA, 2013f). These four compounds are relatively resistant to degradation and their presence in sediments, decades after their last probable use, is expected (EPA, 2013d-f).

3.13.3.2.2 USACE Data

Analyses were conducted for the following PAHs: anthracene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, benzo(ghi)perylene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-CD)pyrene, phenanthrene, and pyrene. All of these PAHs were detected, but none of them exceeded EPA guidance for TELs or PELs. For PCBs, the category of “total PCBs” was below TEL thresholds (USACE, 2006a).

None of the chlorinated pesticides assayed, 2,4'-DDT, alpha-BHC, heptachlor epoxide, di-n-butyl phthalate, and phenol, exceeded EPA’s TEL or PEL guidance. Within the family of substances called dioxins and furans, 4 of 15 congeners were detected. Those dioxin and furan compounds detected, exceeded toxic equivalency factors (USACE, 2006a).

3.13.3.2.3 Supplemental Data

Dioxin and furan analyses on sediment samples were conducted at selected locations (see Appendix L). The range of un-normalized values, 2.9 to 14 picograms per gram (pg/g) dry-weight total Toxic Equivalent (TEQ) of 2,3,7,8-tetrachlorodibenzo-p-dioxin, are similar to those found in Florida’s Panhandle bays (1 to 78 pg/g TEQ) and 1.8 to 11 pg/g TEQ (EPA, 2006b). A number of PAHs and bis (2-ethylhexyl) phthalate were detected in sediments in seven sampling locations (see Appendix L).

3.13.3.3 Inorganic Contaminants

3.13.3.3.1 EPA NCA Data

Inorganic contaminants in sediment are mostly metals. There were 15 inorganic contaminants tested in sediments in the study area (EPA, 2013b). There are no NOAA SQuiRT levels for aluminum, iron, manganese, and selenium (Buchman, 2008). Antimony and mercury levels in all samples were below SQuiRT criteria for metals in marine sediments. Metals exceeding at least one criterion include arsenic (30 samples), cadmium (24 samples), chromium (25 samples), copper (3 samples), lead (5 samples), nickel (32 samples), silver (11 samples), tin (53 samples), and zinc (13 samples). The metals that exceeded relevant guidance criteria by the greatest amount (percent above criteria) were arsenic, cadmium, chromium, copper, nickel, and tin. Nickel and tin, in particular, exceeded guidance criteria more than other inorganic contaminants (EPA, 2013b). Cadmium, chromium, copper, nickel, and tin have been called “vessel-related” contaminants (Young et al., 1979), suggesting their occurrence could be due to the presence of shipping in general, rather than a specific land-based source of contamination.

3.13.3.3.2 USACE Data

Testing was done for 14 metals, all of which were detected in sediment samples. Arsenic exceeded its TEL in 1 of 3 samples. No other metals exceeded TELs. No exceedances of the higher PELs were found for those two metals. Values for aluminum, antimony, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc were below TEL thresholds (USACE, 2006a).

3.13.3.3.3 Supplemental Data

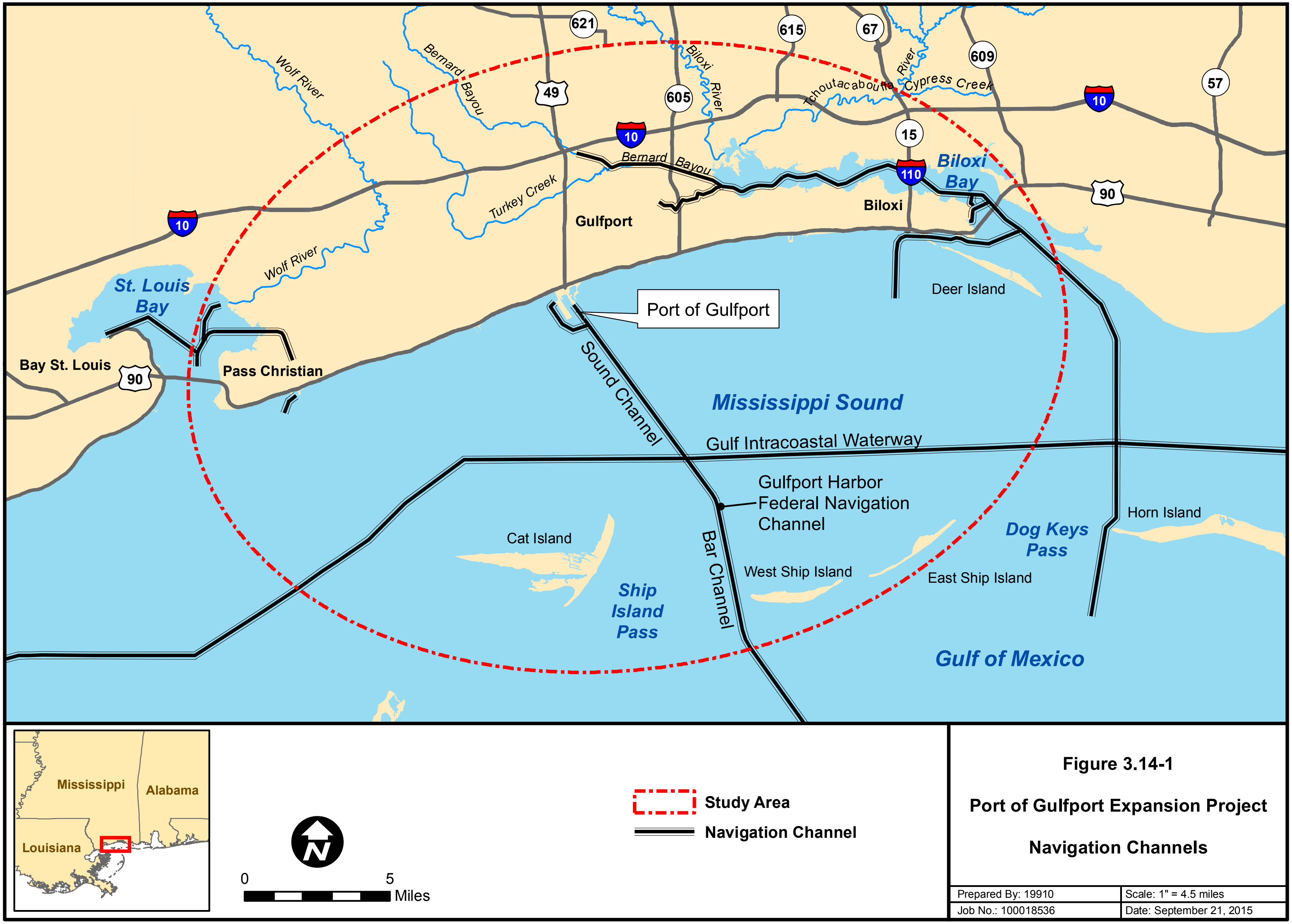
There are no enforceable sediment quality criteria or standards with which to compare concentrations in the sediment. However, there are several different guidelines used to look for a cause for concern in sediment samples, one of which is ERL. The arsenic ERL was exceeded at one location during Atkins 2012 sampling (see Appendix L).

3.14 COMMERCIAL AND RECREATIONAL NAVIGATION

3.14.1 Port of Gulfport and Gulf Intracoastal Waterway

The Port, a 204-acre bulk, break-bulk (general cargo), and container seaport, is known as the second largest importer of green fruit in the U.S. This deep-water seaport is positioned on the Mississippi Sound and the Gulf, midway between St. Louis Bay/Pass Christian and Biloxi. The Port is 5 miles from the GIWW and 16 miles from shipping lanes (Figure 3.14-1). One hour of sailing from Gulfport places ships within international waters.

The intermodal movement of cargo is accommodated on Port in the form of vessel-to-vessel, vessel-to-rail, and vessel-to-truck transfer. The Port has immediate and adjacent access to I-10 and the Gulfport-Biloxi International Airport.


Port of Gulfport
Mississippi Sound
Gulf Intracoastal Waterway
Sound Channel
Gulfport Harbor Federal Navigation Channel
Bar Channel
Gulf of Mexico
St. Louis Bay
Biloxi Bay
Bay St. Louis
Pass Christian
Gulfport
Biloxi
Deer Island
Cat Island
West Ship Island
East Ship Island
Horn Island
Ship Island Pass
Dog Keys Pass
Wolf River
Bernard Bayou
Turkey Creek
Biloxi River
Tchoutacabouffa River
Cypress Creek
10
110
90
49
605
621
615
67
609
57
15
Mississippi
Alabama
Louisiana
0
5
Miles
Study Area
Navigation Channel
Figure 3.14-1
Port of Gulfport Expansion Project
Navigation Channels
Prepared By: 19910
Scale: 1" = 4.5 miles
Job No.: 100018536
Date: September 21, 2015
File: N:/Clients/M_N/Mississippi_State_Port_Authority/100018536/geospatial/Figs_EIS/Figure_3_14_1.mxd

The Port accommodates bulk cargo unloading, storage at and off dockside, 400,000 square feet of covered warehouse space, open and break-bulk storage, and container storage with reefer (refrigeration) service. Dockside berthing accommodates 10 vessels from 525 to 750 feet long.

According to Port documentation, the Port handled over 2.2 million tons of cargo (216,000 TEUs in 2011), representing 3.2 percent growth over the preceding year (MSPA, 2013b). Data collected by the USACE Navigation Data Center (Table 3.14-1) outlines commodity traffic from 2007 to 2011 (USACE, 2013a). Cargo growth in 2011 is attributed to an increase in general containerized cargo and non-containerized bulk activity. Top import commodities handled at the Port include green fruit, garments, ilmenite (iron titanium oxide) ore, and hardwood lumber. Traditionally, Central America has been one of the main markets for the Port (MSPA, 2013b). The Port comprises a footprint of approximately 264 acres (not including the Turning Basin) and offers three active terminals, with configuration possible for a fourth.

The Intracoastal Waterway is a 3,000-mile inland waterway along the Atlantic and Gulf coasts of the U.S. It provides a navigable route away from the hazards of the open sea. The waterway runs for most of the length of the Eastern Seaboard, from its unofficial northern terminus at the Manasquan River in New Jersey, where it connects with the Atlantic Ocean at the Manasquan Inlet, then around the Gulf to Brownsville, Texas.

The GIWW is that portion of the Intracoastal Waterway located along the Gulf Coast of the U.S. It is a navigable inland waterway running approximately 1,050 miles from Carrabelle, Florida, to Brownsville, Texas. The GIWW provides a channel with a constant depth of at least 12 feet, designed primarily for barge and towboat transportation.

Mississippi Sound is part of the GIWW. Large portions of Mississippi Sound reach depths to 20 feet. The GIWW's route through the Sound, for the most part, is undefined with water depths exceeding the minimum project requirement. Two shallower sections, one west of Cat Island and one north of Dauphin Island require channel dredging and aids to navigation (ATON).

3.14.2 Shipping Channels

Cargo ships access the Port via shipping channels from international waters in the Gulf through the Mississippi Sound. Vessels traverse Mississippi Sound via the Sound Channel, then through the Ship Island Pass, between Ship Island and Cat Island. The Bar Channel provides access to the safety fairway south of the barrier islands. Soundings within the safety fairway are generally in excess of 40 feet. The USACE surveyed the Gulfport Harbor channels in late 2011 and early 2012; the results are listed in Table 3.14-2.

3.14.3 Vessel Traffic

The GIWW supports considerable commercial activity. It is also used extensively by recreational boaters, who with their shallow draft vessels enjoy nearly full access throughout Mississippi Sound without the need to navigate marked channels. The waterway also provides calmer waters to traverse when the open Gulf is rough.

Table 3.14-1
Port of Gulfport – Commodities Traffic, 2007 to 2011
All Traffic Types (Domestic and Foreign)
Measure: Short Tons (#)

Commodity	2011		2010		2009		2008		2007	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
Coal, Lignite, and Coal Coke	0	692	0	456	0	383	0	689	0	589
Petroleum and Petroleum Products	0	28,060	3,451	23,482	2,848	21,965	21,394	28,155	19,101	29,742
Chemicals and Related Products	27,167	51,814	15,632	51,381	8,333	27,601	11,006	23,025	7,352	24,047
Fertilizers	0	51	0	0	0	98	0	541	0	368
Forest Products, Wood, and Chips	929	537	643	5,253	993	443	2,503	7,572	7,346	1,581
Pulp and Waste Paper	0	5,482	0	6,010	0	5,359	0	13,420	0	3,242
Soil, Sand, Gravel, Rock, and Stone	224,931	517	76,862	652	133,614	318	110,142	130	69,054	411
Iron Ore and Scrap	10,923	0	29,001	0	0	0	0	0	0	0
Nonferrous Ores and Scrap	203,496	0	292,350	5,106	243,692	0	395,126	0	154,393	43
Sulphur, Clay, and Salt	0	9,426	0	10,274	0	4,377	0	13,709	0	14,866
Slag	1,681	0	0	0	6,689	0	0	0	3,641	0
Other Nonmetal. Min.	0	45	0	42	0	0	0	0	0	289
Paper Products	3,505	392,094	5,525	340,601	3,684	306,674	1,098	338,126	580	309,086
Lime, Cement, and Glass	105	536	63	283	40	724	1,846	328	5,117	845
Primary Iron, and Steel Products	4	503	0	1,676	6	357	7	3,160	30	2,057
Primary Nonferrous Metal Products	3,229	1,106	25,056	551	39,872	526	18,243	2,285	21,052	1,344
Primary Wood Products; Veneer	95	86	14	207	477	118	6	307	10	150
Fish	38	625	125	743	355	41	525	63	528	1,644
Grain	238	340	391	1,290	260	614	53	3,205	4	2,424
Oilseeds	1,433	266	3,040	110	4,410	1,287	66	149	1,609	43
Vegetable Products	4,012	2,440	1,213	2,437	7,003	2,471	14,167	2,031	7,189	1,210
Processed Grain and Animal Feed	83	3,795	14	3,612	59	6,153	52	8,931	1	8,318
Other Agricultural Products	784,151	87,086	682,766	108,278	732,681	82,980	729,462	80,086	685,984	69,790
Manufactured Equipment, Machinery, and Products	143,604	152,750	177,858	173,212	119,894	90,692	179,829	124,229	175,822	165,303
Unknown or Not Elsewhere Classified	344	2,780	18,192	11,845	6,079	3,748	874	6,974	2,529	6,697
All Commodities	1,409,968	740,980	1,332,196	747,501	1,310,989	556,831	1,486,399	656,574	1,161,342	643,721

Source: USACE (2013a).

Table 3.14-2
Gulfport Harbor Channels
Controlling Depths from Seaward in Feet at Mean Low Water

Name of Channel	Left Outside Quarter	Middle Half of Channel	Right Outside Quarter	Date of Survey	Project Width (feet)
Bar Channel, 38-Foot Project Depth	36.2	37.3	36.3	February 2015	400
Sound Channel, 36-Foot Project Depth	34.0	35.8	35.4	July 2015	300
Gulfport Anchorage Basin, Southern Reach 36-Foot Project Depth	36.0	32.8	35.2	July 2015	1,110–1,320
Gulfport Anchorage Basin, Northern Reach 32-Foot Project Depth	28.8	28.9	31.8	July 2015	1,110

Source: Pers. comm., Philip Hegji (USACE, 2015a).

The USACE Navigation Data Center collects data on cargo laden vessel traffic passing through Mississippi Sound to the shipping channels and through the Sound via the GIWW. Vessel traffic counts are measured as foreign and domestic cargo movements, outbound and inbound, by type of vessel and vessel draft. The data indicates that the vast majority of traffic uses the unmarked waters of the GIWW. Within this group, over 20 percent draft in less than 5 feet of water and 75 percent draft in 6 to 9 feet. The majority of the vessels by type are self-propelled dry cargo (46.6 percent), followed by nonself-propelled dry cargo (22 percent), nonself-propelled tanker liquid barge (14.3 percent), self-propelled towboat (17.1 percent), and self-propelled tanker (less than 1.0 percent) (USACE, 2013a).

Mississippi Sound navigation, not included as GIWW traffic, represents approximately 8.8 percent of the combined traffic of the GIWW and the Sound. Of this, roughly two-thirds draft at less than 5 feet and one-fourth at 6 to 9 feet. The remainder draft between 10 and 35 feet with the majority in the 18 to 29 feet range. Tables 3.14-3 and 3.14-4 and Figures 3.14-2 through 3.14-5 illustrate these conditions.

3.14.4 Charter Fishing Vessels and Recreational Boaters

Other traffic excluded from the USACE Navigation Data Center data is commercial (charter) fishing vessels and private recreational boaters. It is anticipated that this traffic would peak on weekends dropping off dramatically afterwards. Commercial fishing numbers are expected to be highest within Mississippi Sound. Similarly, recreational boaters, with their interests in watersports, fishing, and traveling to and from the barrier islands would be heaviest within Mississippi Sound.

Table 3.14-3
Mississippi Sound (Commercial) Trips by Draft/Vessel Type – 2011
All Traffic Types (Domestic and Foreign)
Included Mississippi Sound Channel, Ship Island Pass Channel,
and Gulfport Small Craft Harbor
Measure: Trips (number)

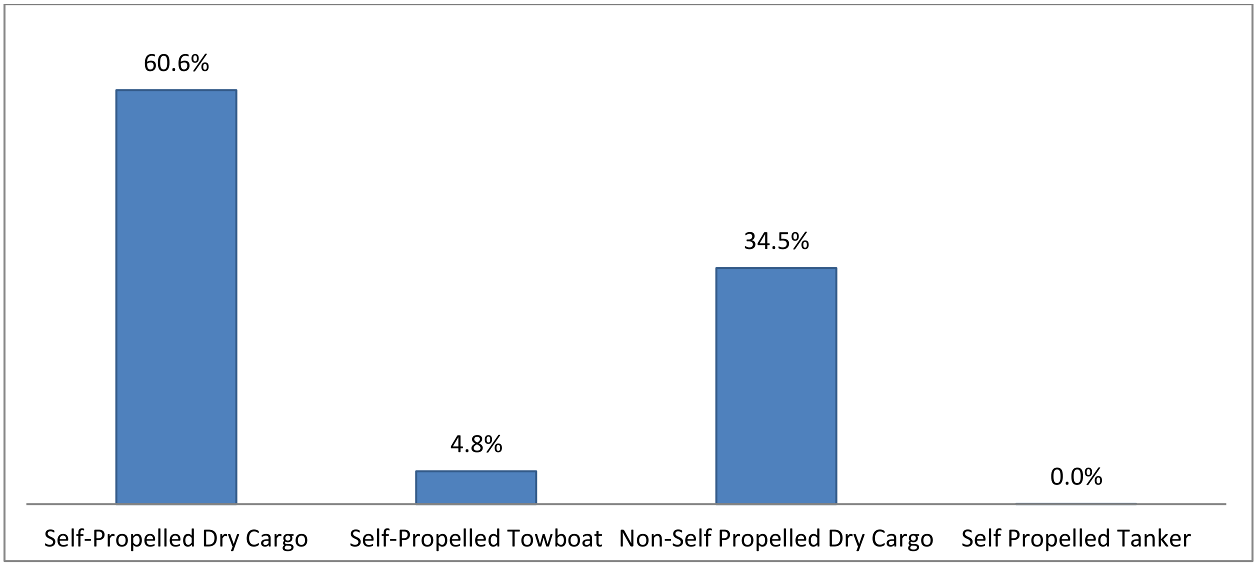
Draft (feet)	Total Trips	Percent by Draft	Self-Propelled Dry Cargo	Self-Propelled Towboat	Nonself Propelled Dry Cargo	Nonself Propelled Tanker
0–5	2,821	66.5	1,398	6	1,417	0
6–9	977	23.0	736	193	46	2
10–12	7	0.2	0	5	2	0
13–14	1	0.0	0	0	1	0
15–17	2	0.0	2	0	0	0
18–20	117	2.8	117	0	0	0
21–23	24	0.6	24	0	0	0
24–26	62	1.5	62	0	0	0
27–29	140	3.3	213	0	0	0
30–32	19	0.4	19	0	0	0
33–35	1	0.0	1	0	0	0
36–38	0	0.0	0	0	0	0
% by Vessel Type	100.0		60.6	4.8	34.5	0
All Drafts	4,244	100.0	2,572	204	1,466	2

Source: USACE (2013a).

Table 3.14-4
Gulf Intracoastal Waterway Commercial Traffic by Vessel Type – 2011
All Traffic Types (Domestic and Foreign)
Measure: Trips (number/draft)

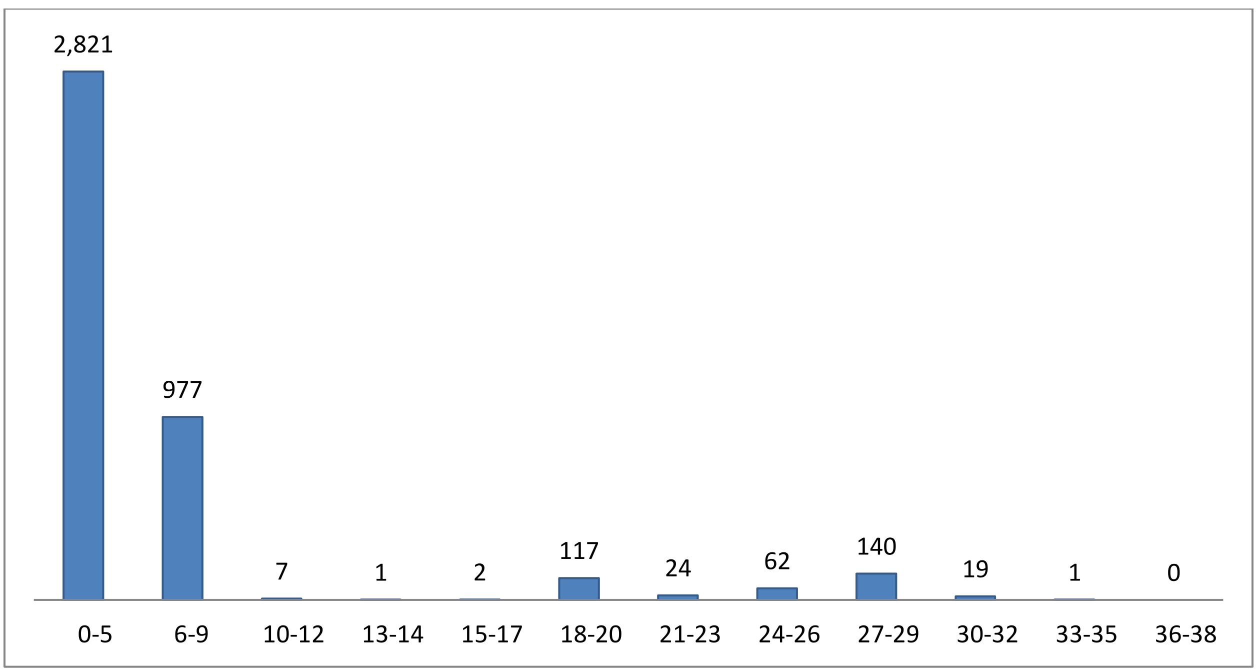
Draft (feet)	Total Trips	Percent by Draft	Self-Propelled Dry Cargo	Self-Propelled Tanker	Self-Propelled Towboat	Nonself Propelled Dry Cargo	Nonself Propelled Liquid Barge
0–5	8,911	20.2	662	0	317	4,612	3,320
6–9	33,146	75.1	19,902	0	6,447	4,393	2,374
10–12	1,990	4.5	0	1	762	694	527
13–14	88	0.2	3	0	2	11	75
15–17	0	0.0	0	0	0	0	0
% by Vessel Type	100		46.6	0	17.1	22.0	14.3
All Drafts	44,135	100.0	20,570	1	7,558	9,710	6,296

Source: USACE (2013a).



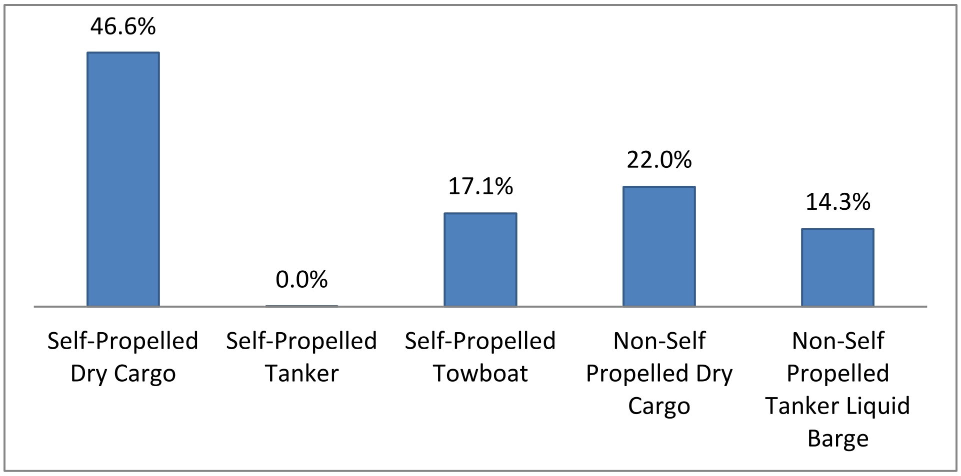
Source: USACE (2013a).

Figure 3.14-2
Mississippi Sound (Commercial) Trips by Vessel Type, 2011



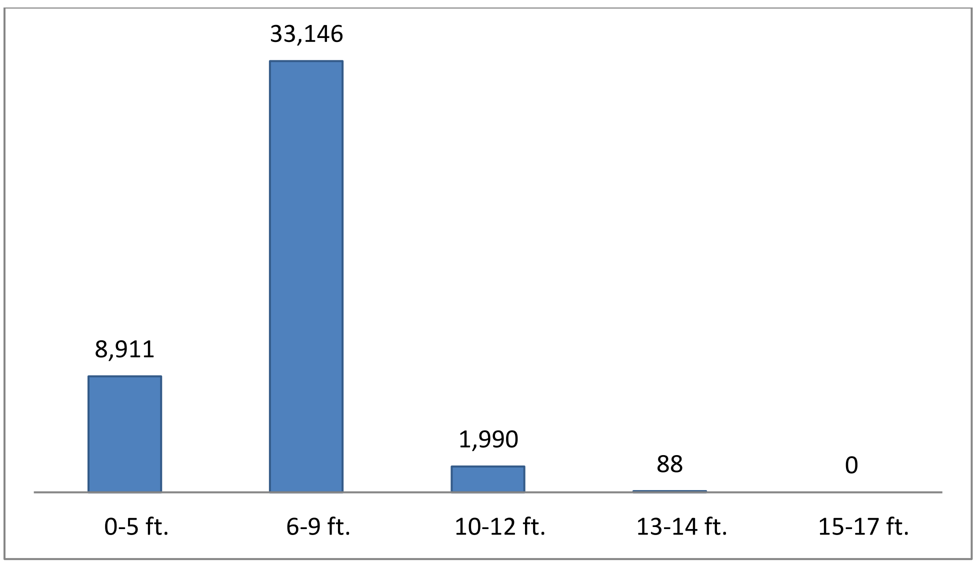
Source: USACE (2013a).

Figure 3.14-3
Mississippi Sound (Commercial) Trips by Draft (feet), 2011



Source: USACE (2013a).

Figure 3.14-4
Gulf Intracoastal Waterway 2011 Commercial Traffic by Vessel Type



Source: USACE (2013a).

Figure 3.14-5
Gulf Intracoastal Waterway 2011 Commercial Vessel Traffic by Draft (feet)

In 2010, there were over 191,000 registered boaters in Mississippi (Louisiana Department of Wildlife and Fisheries, 2010). Burrage et al. (1999) found that between 1992 and 1999 there was an overall 42 percent increase in boat registrations, with the majority of those registered in Jackson and Harrison counties. It is expected that from 1999 to the present, a similar growth trend could be expected. However, Hurricane Katrina had a devastating impact on Mississippi coastal communities causing dramatic changes to boating facilities. The Southern Mississippi Planning and Development District (2011a) conducted a post-Katrina inventory and assessment of public access sites in Hancock, Harrison, and Jackson counties, Mississippi.

Their findings indicate that there are 18 marina harbors, 31 public boat launches, and numerous other public access points along the coast adjoining Mississippi Sound. Additionally, it is expected that many private marinas are servicing the same area.

A review of the boating public access map reveals that the majority of boat harbors and ramps servicing the Mississippi Sound are not in the immediate vicinity of the Port, but rather located within the protected waters of Biloxi and St. Louis bays, far from the Port. This dispersal of access points, along with the generally deep water of Mississippi Sound, precludes the need to gather in marked channels. This indicates that recreational charter fishing boat traffic is likely well dispersed throughout the Sound. The actual number of boats in the water on any particular weekend day is estimated to be 60 to 70 percent of the total registered boats, with higher numbers on the major summer holidays. Weekday traffic is expected to be considerably less.

3.14.5 Ship Simulation

Vessels access the Port using a dredged channel approximately 22 nautical miles in length, which requires approximately 2 hours to transit (the FNC). In order to determine the largest-size cargo vessel that can safely navigate this channel, a ship simulation study was performed by the STAR Center (STAR, 2011). The study parameters and results are summarized in this section. A complete copy of the study is included in Appendix D.

3.14.5.1 Study Parameters

Key study parameters included:

A. The study was performed using a simulator located at the STAR Center’s facility in Dania, Florida. Two experienced pilots from the Port participated in the simulations during separate sessions. These pilots provided expertise and local area knowledge of channel configurations, winds, and currents.

B. Bathymetric data for the entrance channel and inner harbor were taken from current NOAA charts and survey data provided by CH2M HILL.

C. Three vessels were evaluated during the course of this study. The size of each vessel is provided in Table 3.14-5.

D. Wind speeds used in simulations ranged from calm to 25 knots.

E. Based on the experience of the participating local pilots, average currents of up to about 1 knot were used in the simulations.

Table 3.14-5
Vessel Particulars (feet)

Vessel Name	*Jutlandia*	*Dania Exporter*	*White Bay*
Overall length	964.6	649.4	833.1
Beam	105.6	105.6	105.6
Draft	34.3	31.2	36.1

Source: Appendix D.

F. The channel leading to the Port was divided into the following two segments.
   1. The outer channel (Gulfport Bar channel) at 400 feet wide, 10 miles in length, and 38 feet deep.
   2. The inner channel (Gulfport Sound channel) at 300 feet wide, 10.6 miles in length, and 36 feet deep.

G. Two tugboats were controlled by the ship handlers (local pilots) to assist with arrival and departure of each ship.

H. Transits of the 22-mile navigation channel were divided into shorter segments to better use ship simulator time and identify specific problem areas, if any.

3.14.5.2 Simulation Results

The *Jutlandia* was the first ship used in the simulation. It was selected to represent the type and size of the largest container vessel expected to routinely transit the navigation channel. Successful navigation of the channel would establish the normal and upper limits of conditions of wind and current that could be expected during transits. Results of the *Jutlandia* simulation were as follows:

A. Steering control difficulties and grounding problems were experienced in the outer channel. Under-keel clearances were low, making vessel heading control difficult even with minimum wind and tidal currents.

B. Attempts to minimize steering problems by increasing vessel speed decreased under-keel clearances even further.

C. Testing of the *Jutlandia* was stopped since "to continue testing of this vessel when insufficient channel depth was the major cause of concern seemed fruitless" (pages 8 and 9, Appendix D).

Because a combination of both vessel length and draft are major factors in determining the proper depth and width of the Gulfport channel, the *White Bay* was simulated. This vessel has a 1.8 feet deeper draft and is 131.5 feet shorter than the *Jutlandia*. The results of the simulation generated similar control and grounding problems as were found when testing the *Jutlandia*.

The *Dania Exporter*, which has a shorter length and shallower draft than the *Jutlandia*, was also simulated. This vessel was included after the test for the *Jutlandia* were stopped to determine a vessel size that the existing channel can accommodate. No problems were experienced with this vessel during the simulations.

3.14.5.3 Conclusions

Based on this simulation study, large container vessels such as the *Jutlandia* and the *White Bay* are not able to consistently and safely access the Port via the existing channel. Smaller, shallower draft vessels such as the *Dania Exporter* can safely access the Port via the existing channel.

3.15 ECOLOGICAL SETTING

Ecoregions are typically considered large geographic areas that are easily distinguished from adjacent regions by differing biotic and environmental factors or ecological processes. Fundamental differences between ecoregions often include changes in climate, physical geography, soils, and large-scale vegetative structure and composition. The study area is located within the East Gulf Coastal Plain ecoregion, as defined by The Nature Conservancy (TNC) and utilized by the MDWFP (TNC, 1999; Mississippi Museum of Natural Science [MMNS], 2005). The East Gulf Coastal Plain spans five states and over 42 million acres, extending from Georgia to Louisiana. It has a diverse assemblage of ecological systems, ranging from sandhills and rolling longleaf pine-dominated uplands to pine flatwoods and savannas, seepage bogs, and bottomland hardwood forests (MMNS, 2005).

The unique characteristics of the region result from the interaction of three forces—the subtropical climate, the oceanic regime, and the Mississippi River delta—all of which affect the physiography of the Gulf Coast (Gosselink, 1984). The region is characterized by level topography with little relief and soils derived largely from unconsolidated sands, silts, and clays resulting from the erosion and outwash of the Appalachian Mountains. This ecoregion experiences a warm-to-hot, humid maritime climate. Although a high percentage of this ecoregion occurs as wetlands, wildfire and soil geochemistry largely influence terrestrial ecosystems. Endemism is also reported to be moderately high. Additionally, coastal communities are frequently subjected to intense disturbance events from hurricanes or other storm systems (MMNS, 2005).

The MDWFP has identified 17 wildlife habitat types and 64 habitat subtypes across the state. Of these, all 17 wildlife habitat types and 55 subtypes occur within the East Gulf Coastal Plain. The study area occurs at sea level, within the Estuary and Mississippi Sound wildlife habitat type, and the Mississippi Sound (smooth bottom) subtype. Mississippi Sound is an estuarine/marine lagoon system occurring inside, or associated with, the barrier island complex (MMNS, 2005).

According to the MDWFP, most of the area immediately adjacent to the existing Port facility is considered urban and suburban land; most of the area exhibits impervious cover such as concrete or paving, or is heavily impacted by construction activities. As a result, minimal terrestrial vegetation occurs within the proposed Project area, particularly in areas of proposed construction or ground-disturbing activities. Terrestrial vegetation expected to occur within the proposed Project area would include ruderal annual species capable of colonizing highly disturbed industrial environments with few ecological resources. Those species are often considered exotic or invasive and do not typically form persistent terrestrial vegetation communities.

Wildlife habitat subtypes within the study area include estuarine bays, lakes, tidal reefs, estuarine marshes, salt pannes, shell middens, estuarine shrublands, and maritime woodlands to the north, along interior protected shorelines, and farther inland. Submerged aquatic vegetation (SAV)/seagrasses and mollusk reefs occur along the interior margin of Mississippi Sound. Manmade beaches and mainland natural beaches occur along the coastline. Barrier island beaches, barrier island passes, barrier island uplands, and barrier island wetland habitats occur in the southern region of the study area along the barrier islands (MMNS, 2005). These habitats are discussed below.

3.15.1 Estuarine Bays, Lakes, and Tidal Reefs

Estuarine bays are typically large, protected, low-energy, subtidal areas that are enclosed by land on three sides. Bays in Mississippi range in depth from 1 to 30 feet, and substrates range from muddy sand to sandy mud. Salinity levels and turbidity change frequently depending on tidal variation and weather systems. The muddy bottoms often support a diversity of benthic life forms, including polychaetes, mollusks, insects, and crustaceans, while offering foraging opportunities for numerous bird species (MDMR, 1999). Shallow coastal ponds and lakes contribute additional open-water estuarine habitat to the area and host similar floral and faunal assemblages to those in the bays. Tidal streams are generally classified as tidal marsh creeks, coastal tidal creeks, or riverine estuary bayous. Tidal marsh creeks primarily drain estuarine marshes, while coastal tidal creeks convey freshwater discharge from surrounding uplands. Riverine estuary bayous serve as inter-distributary channels within riverine estuaries (MMNS, 2005). These habitat types are located in the eastern and western portion of the study area.

3.15.2 Estuarine Marshes

Estuarine marshes consist of intertidal salt, brackish, and tidal freshwater marshes, which create a fringe along the coast, barrier islands, and the mouths of streams and bays (Gosselink, 1984). Tidal marshes typically exhibit organic muck substrates interbedded with mineral horizons that were likely deposited during storm surges. Saltmarshes are characterized by their low geographic position within the tidal zone and their increased exposure to higher salinities. Saltmarsh vegetation varies depending on the elevation and proximity (zones) to open-water habitat. Lower zones located at sea level or slightly below are dominated by smooth cordgrass (*Spartina alterniflora*) communities along exposed shorelines and outer sections of tidal creeks and bays (MDMR, 1999). More inland marsh communities, located above the mean high water mark of the tidal zone, experience irregular flooding cycles and are typically dominated by black needlerush (*Juncus roemerianus*). Brackish marshes experience moderate salinity and are less affected by storm surges, thereby allowing for the development of a greater diversity of plant species. Tidal freshwater marshes often exhibit the most diverse assemblage of plant species, yet these communities cover less land area within the region than saltwater and brackish marsh communities (MMNS, 2005). Estuarine marshes are found in the western portion of the study area near St. Louis Bay and in the east-northeastern portion near Biloxi Bay.

3.15.3 Salt Pannes

Salt pannes, or flats, represent a zone of sandy hypersaline soil along the transition from intermediate to higher-elevation marsh zones. These flats are infrequently flooded and often exposed for long periods. During prolonged periods of exposure, surface water evaporates and soluble salts concentrate to toxic levels at the surface for most plant species (MDMR, 1999). Halophytic plant species including saltwort (*Batis maritima*), Virginia glasswort (*Salicornia depressa*), and saltgrass (*Distichlis spicata*) occasionally colonize these otherwise barren flats (MMNS, 2005). Salt pannes occur to the north, along the shoreline in the study area.

3.15.4 Shell Middens and Estuarine Shrublands

Shell midden habitats occur along intertidal marsh fringes and on small islands within marshes. These habitats often support a unique, and somewhat uncommon, shrub community. The weathering and decomposition of oyster shells on middens creates unique soil conditions that support a characteristic plant community dominated by southern red cedar (*Juniperus virginiana* var. *silicicola*), coral bean (*Erythrina herbacea*), Carolina buckthorn (*Frangula caroliniana*), red buckeye (*Aesculus pavia*), yucca (*Yucca* spp.), and pricklypear (*Opuntia* spp.). Estuarine shrubland communities occur as small linear patches parallel to the shoreline within a zone immediately above the salt marsh communities, or in other less tidally influenced zones. These communities often occur along bayou edges and adjoin upland communities, which may grade into maritime forests. Dominant plant species found in estuarine shrublands include eastern baccharis (*Baccharis halimifolia*), southern bayberry (*Morella caroliniensis*), and bigleaf sumpweed (*Iva frutescens*) (MMNS, 2005). These habitats occur in the study area to the north along the coastline.

3.15.5 Maritime Woodlands

Maritime woodlands include slash pine (*Pinus elliottii*) flatwoods and savanna communities, which typically form the dominant interior forest communities along the coastline. These woodlands occur on low shoreline beach ridges, inland flats, terrace levees of tidal creeks, and occasionally grade into needlegrass rush marshes. Coastal live oak (*Quercus virginiana*) woodlands are often components of maritime woodlands along coastal cheniers. Coastal pinelands overlay deep, poorly drained and slowly permeable soils of fine loamy textures. These soils are level to nearly level and are typically saturated during winter and spring. A seasonally high water table is located within several inches of the ground surface during wetter months, producing acidic, anoxic soil conditions. Slash pine, and the predominant understory shrub and herbaceous species, are tolerant of seasonally wet or saturated soils, including saturation due to periodic storm surges of brackish water (MDMR, 1999).

The maritime woodlands community is differentiated from other coastal slash pine woodlands by the dominance of marshhay cordgrass (*Spartina patens*) in the understory. Marshhay cordgrass becomes less pervasive farther inland, but can persist along creek channels and bayous. Live oak woodlands consist of native live oak and upland laurel oak (*Quercus hemisphaerica*), and may exhibit an understory dominated by saw palmetto (*Serenoa repens*). These woodlands most frequently occur on deep sand ridges. Southern bayberry, eastern baccharis, and yaupon (*Ilex vomitoria*) shrubs are common components of this community, as are purple bluestem (*Andropogon glaucopsis*), button eryngo (*Eryngium yuccifolium*), switchgrass (*Panicum virgatum*), Jamaica swamp sawgrass (*Cladium mariscus* ssp. *jamaicense*), and Gulf Coast swallow-wort (*Cynanchum angustifolium*). All of these communities are fire dependent and can become brushy and inaccessible to pedestrian traffic during long intervals between burns. Maritime woodlands, including maritime live oak forests, also provide essential habitat for neotropical migrant bird species preparing for southerly migrations in fall and upon their return in spring. Due to their location in highly urbanized coastal areas, maritime woodlands have been significantly depleted by widespread development in recent decades (MMNS, 2005). Maritime woodlands occur to the north and further inland in the study area.

3.15.6 Manmade Beaches and Mainland Natural Beaches

Manmade beaches are artificially constructed for recreational use. These areas are typically less than 200 feet wide and are unvegetated. Mainland natural beaches are narrow, linear intertidal areas that extend along bayous, bays, and tidal rivers. These beaches form the interface between subtidal areas and intertidal marshes, and occasionally directly adjoin uplands (MMNS, 2005). Natural beach substrates are muddy in texture due to heavy sediment deposition, although a few significant areas of sand or shell beach exist along the mainland and provide important nesting habitat for the Mississippi diamondback terrapin (*Malaclemys terrapin pileata*). Although natural beach communities provide significant habitat for aquatic wildlife species and microorganisms, these areas are typically unvegetated due to recurring tidal disturbance (MDMR, 1999). These habitat types occur to the north, along the shoreline, in the study area.

3.15.7 Barrier Island Beaches, Passes, Uplands, and Wetlands

Barrier island uplands consist of dry to mesic meadows and inland dune complexes. Soils within these communities are typically well-drained, deep windblown sand. Areas directly adjacent to beaches are frequently eroded by storm surge and wind, which limits the amount of vegetative cover. Vegetated swales and dune ridges occur slightly more inland from the shore, which parallel the coastline. These dune complexes, commonly referred to as the fore-island dune fields, frequently shift through erosive forces, contributing to an ever-changing landscape (Britton and Morton, 1989). Behind the dune field, in areas referred to as back-beaches, semistable dunes commonly support a sparse vegetative community of grasses, including Gulf bluestem (*Schizachyrium maritimum*), Le Conte’s flatsedge (*Cyperus lecontei*), sea oats (*Chasmanthium latifolium*), panicgrass (*Panicum* spp.), dropseed (*Sporobolus* spp.), and umbrella-sedge (*Fuirena* spp.). Common herbs include squareflower (*Paronychia erecta*), poorjoe (*Diodia teres*), pineland scalypink (*Stipulicida setacea*), dixie sandmat (*Chamaesyce bombensis*), camphorweed (*Heterotheca subaxillaris*), coastal sand frostweed (*Helianthemum arenicola*), and beach morning glory (*Ipomea imperati*). Dry meadows also occur in more-stable interior locations of barrier islands and are typically dominated by southern umbrella-sedge (*Fuirena scirpoidea*), torpedograss (*Panicum repens*), broomsedge bluestem (*Andropogon virginicus*), needlepod rush (*Juncus scirpoides*), panicgrass, and marshhay cordgrass. Relatively stable dunes, referred to as relict dunes, are dominated by shrubby species such as wild rosemary (*Conradina canescens*), woody goldenrod (*Chrysoma pauciflosculosa*), pricklypear, saw palmetto, and occasionally sand live oak (*Quercus geminata*) (MMNS, 2005).

Barrier island wetlands include freshwater marshes, saltmarshes, salt meadows, estuarine shrublands, and slash pine woodlands located on flats, low depressions, swales, ponds, and intertidal zones (MMNS, 2005). These wetlands most frequently occur along the seashore or between dune ridges. These habitat types occur to the south-central portion along the barrier islands in the study area. Wetland vegetation communities are further discussed in Section 3.16.1.

3.16 WETLANDS AND SUBMERGED AQUATIC VEGETATION

3.16.1 Wetlands

Wetlands are transitional lands between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is covered by shallow water. Under the USACE regulations, wetlands are defined as:

> *Those areas that are inundated or saturated by surface water 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.* (USACE, 33 CFR 328.3)

Based on this definition, wetlands contain three basic environmental characteristics: hydrophytic vegetation, hydric soils, and wetland hydrology. The presence of all three of these criteria qualifies an area to be considered a jurisdictional wetland. The USFWS National Wetland Inventory (NWI) classifies wetlands based on the types of plants, soils, and frequency of flooding, and are divided into five systems: Marine, Estuarine, Riverine, Lacustrine, and Palustrine (Cowardin et al., 1979). Although not considered wetlands, both the NWI (USFWS, 2011a) and Cowardin et al. (1979) include data on deep-water habitats (e.g., lakes, open bays and oceans, ponds, etc.).

The study area encompasses inland (terrestrial), estuarine, and marine areas (i.e., the Mississippi Sound). Marine or open-water portions of the study area are mapped as deep-water marine and estuarine habitats (USFWS, 2011a). Mississippi Sound is considered a lagoon of marine origin, whereas embayments are likely drowned river valleys (MMNS, 2005). A chain of barrier islands, collectively included as part of the Gulf Islands National Seashore, serves as the outer boundary of Mississippi Sound. Inland, beyond tidal influences, freshwater or palustrine wetlands occur. Estuarine wetlands occur where tides have influence on hydrology, and the saltwater is diluted with freshwater. Tidal wetlands can be further classified as subtidal (where “substrate…is continuously submerged”) or intertidal (where “substrate [is] exposed and flooded by tides”) (Cowardin et.al., 1979).

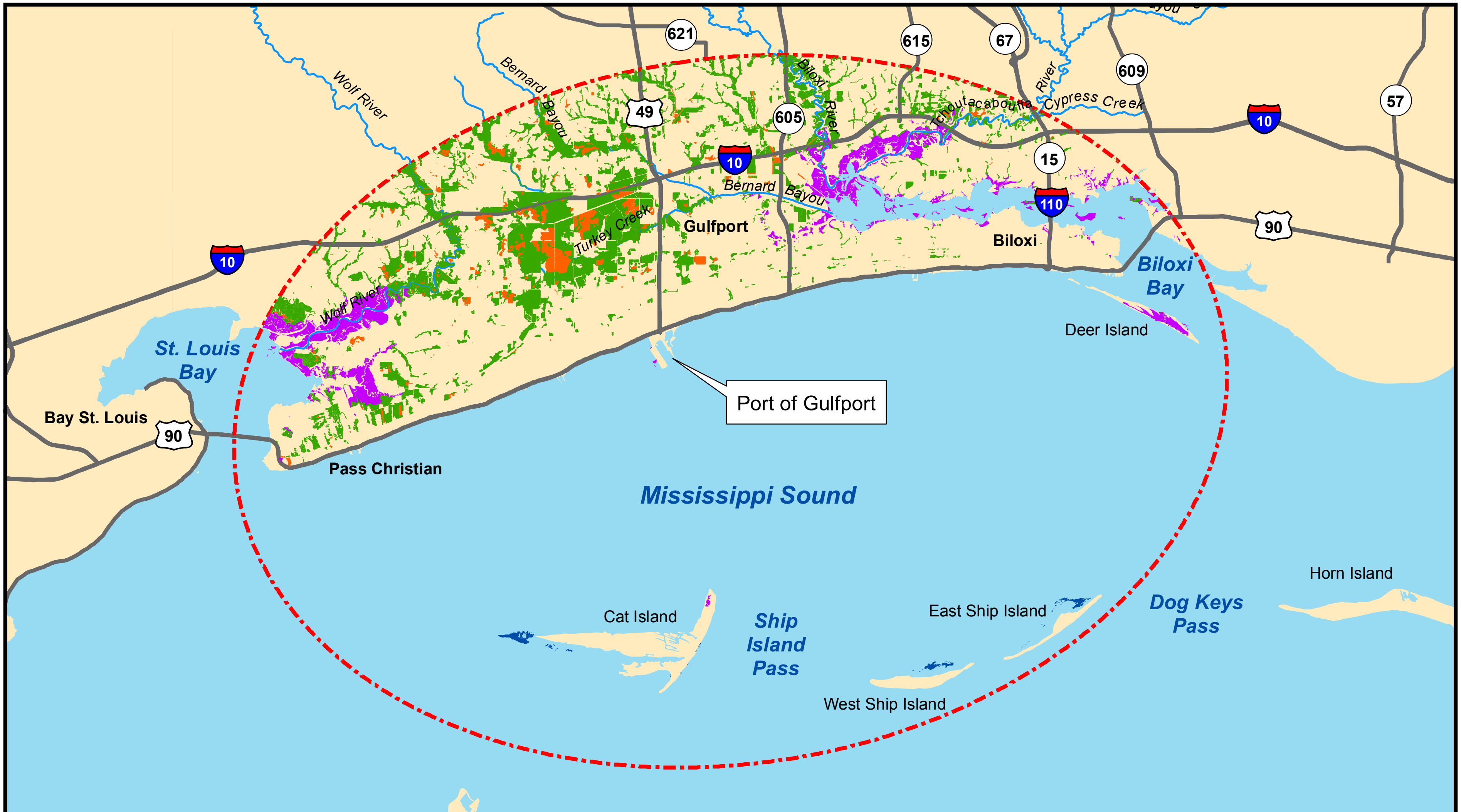
Palustrine and estuarine wetlands occur in the study area, inland and at immediate coastal margins, respectively (Figure 3.16-1). Wetlands inland encompassed by the study area include three palustrine (or freshwater) wetland types: (1) wetlands with emergent (or herbaceous) vegetation, (2) scrub-shrub wetlands, and (3) forested wetlands. Estuarine emergent and scrub-shrub tidal wetlands occur in the study area, but most are associated with Biloxi Bay or St. Louis Bay, which are several miles from the Project area. The single wetland that is mapped by the USFWS's NWI within the proposed Project area is 5.45 acres and is identified as a persistently inundated intertidal emergent estuarine wetland. Historically, this area was a man-made stormwater retention pond that facilitated wetland vegetation growth over time. According to recent aerial imagery, this wetland feature was previously incorporated into a Port restoration area and no longer exists within the proposed Project area. Therefore, no wetland or SAV habitat occurs within the Project area.

The following sections generally describe each of the wetland types found within the study area. The wetland acreage estimates provided are based on the USFWS NWI remote sensing data and are meant to provide approximate acreage calculations.

3.16.1.1 Estuarine Wetlands

Most estuarine wetlands within the study area occur within estuaries of St. Louis Bay and Biloxi Bay and are mapped as estuarine emergent and estuarine scrub-shrub (USFWS, 2011a). The lower estuarine marshes are generally at the lowest elevations and are frequently inundated tidally. The dominant species in the low salt marshes is smooth cordgrass and, in areas of similar elevations but higher freshwater influx, black needlerush, and wild rice (*Zizania aquatica*). On an intermediate elevation, black needlerush occurs in saltier zones, whereas bulrush (*Scirpus* spp.) and saltgrass occur in fresher zones. Estuarine scrub-shrub wetlands occur at the highest elevations and are rarely tidally inundated. Common plants include marshhay cordgrass, false-willow (*Baccharis* spp.), southern wax myrtle (*Myrica cerifera*), bigleaf sumpweed, the exotic invasive tamarisk (*Tamarix* spp.), and bushy seaside tansy (*Borrichia frutescens*) (MDMR, 1999).

Approximately 6,875 acres of estuarine emergent wetlands and 160 acres of estuarine scrub-shrub wetlands occur inland within the study area (USFWS, 2011a) and one estuarine wetland occurs within the Project area (see Figure 3.16-1). The single wetland that is mapped by the USFWS's NWI within the proposed Project area is 5.45 acres and is identified as a persistently inundated intertidal emergent estuarine wetland. However, according to recent aerial imagery, this wetland feature was previously incorporated into a port restoration area and no longer exists within the proposed Project area.



0 5 Miles

Source: USFWS (2011a)

Study Area

Wetlands

- Estuarine Emergent and Scrub-Shrub
- Palustrine Emergent
- Palustrine Forested and Scrub-Shrub
- Seagrass

Figure 3.16-1

Port of Gulfport Expansion Project

Wetlands and Submerged Aquatic Vegetation in the Study Area

Prepared By: 25913	Scale: 1" = 4.5 miles
Job No.: 100018536	Date: September 22, 2015

File: N:\Clients\M_N\Mississippi_State_Port_Authority\100018536\geospatial\Figs_EIS\2015_Revisions\PGEP_EIS_Figure_3_16_1_Wetlands_and_Submerged_Aquatic_Veg_092115.mxd

3.16.1.2 Palustrine Emergent or Herbaceous Wetlands

Emergent or herbaceous wetlands are mapped by NWI as palustrine emergent. Freshwater marshes may occur in the area and would fall into the category of palustrine emergent (MDMR, 1999). Common species found in palustrine emergent wetlands include spikerushes (*Eleocharis* spp.), flatsedges (*Cyperus* spp.), rushes (*Juncus* spp.), smartweeds (*Polygonum* spp.), arrowheads (*Sagittaria* spp.), and cattails (*Typha* spp.). Approximately 4,318 acres of palustrine emergent wetlands occur inland within the study area; however, none occur within the Project area (USFWS, 2011a) (see Figure 3.16-1).

3.16.1.3 Palustrine Scrub-Shrub Wetlands

Palustrine scrub-shrub wetlands are generally associated with riverine systems or in isolated depressional areas (e.g., swales). Palustrine scrub-shrub wetlands in the study area may include woody species such as buttonbush (*Cephalanthus occidentalis*), false-willow, southern wax myrtle, and young trees like black willow (*Salix nigra*), green ash (*Fraxinus pennsylvanica*), water oak (*Quercus nigra*), willow oak (*Quercus phellos*), water tupelo (*Nyssa aquatica*), and the invasive Chinese tallow (*Sapium sebiferum*) (MDMR, 1999). Approximately 4,151 acres of palustrine scrub-shrub wetlands occur inland within the study area, but none occur within the Project area (USFWS, 2011a) (see Figure 3.16-1).

3.16.1.4 Palustrine Forested Wetlands

Palustrine forested wetlands in the study area include swamps. Typical trees found within palustrine forested wetlands include bald cypress (*Taxodium distichum*), black willow, water oak, willow oak, water tupelo, green ash, and the invasive Chinese tallow. A specific type of forested wetland that occurs in the study area (and is unique to the region) is called a wet-pine savannah (MDMR, 1999). These areas are typically composed of slash pine, crimson pitcher plants (*Sarracenia leucophylla*), pipeworts (*Eriocaulon* spp.), and palmettos (*Sabal* spp.). Approximately 26,504 acres of palustrine forested wetlands occur inland within the study area, but none occur within the Project area (USFWS, 2011a) (see Figure 3.16-1).

3.16.2 Submerged Aquatic Vegetation

SAV is a unique group of vascular plants that have adapted to live underwater and can range from marine seagrasses to freshwater angiosperms. Typically, SAV refers to coastal seagrass beds. Coastal seagrass beds are highly productive compared with other ecosystems, perform a number of vital ecological functions in chemical cycling and physical modification of the water column and sediments, and provide food and shelter for commercially and ecologically important organisms (Orth et al., 2006).

Mississippi coastal waters contain three SAV community types: (1) barrier island seagrass, (2) widgeon-grass (*Ruppia maritima*) beds, and (3) American wildcelery (*Vallisneria americana*) beds (MMNS, 2005). Barrier island seagrass communities historically hosted four species of seagrasses: shoalgrass (*Halodule wrightii*), turtlegrass (*Thalassia testudinum*), clovergrass (*Halophila engelmannia*), and manateegrass

(*Syringodium filiforme*); however, the extent of these communities, as well as particular species, has declined considerably in recent decades (MDMR, 1999).

Widgeongrass beds occur in shallow and moderately turbid waters that are lower in salinity, such as bays, along bayous, on mudflats, and occasionally in barrier island ponds. American wildcelery occurs in freshwater or oligohaline waters and is often found on muddy substrates in the upper reaches of estuarine bayous and streams flowing into coastal bays and the Mississippi Sound (MMNS, 2005).

In Mississippi Sound, SAV coverage has historically been declining. Forty years ago, an estimated 20,000 acres of SAV were documented in Mississippi Sound, and by 1998, only 2,000 acres were documented (Moncreiff et al., 1998; Handley et al., 2007). Declines in SAV result from both natural and anthropogenic causes. Primary reasons for the disappearance of SAV are most likely an overall decline in water quality, extended periods of depressed salinities, and physical disturbances, such as tropical storms and hurricanes. Physical loss of habitat and decreased light availability, coupled with declining water quality, are the most visible features that directly affect SAV (USACE, 2009a).

Currently, SAV is sparse in the Mississippi Sound region (USACE, 2015b). Figure 3.16-1 shows the distribution of SAV in Mississippi Sound. However, based on a recent report prepared for the Mississippi Coastal Improvements Program (MsCIP) Barrier Island Restoration Project, the acreage of mapped SAV has increased slightly from 3,614 acres in 2010 to 3,822 acres in 2014. Additionally, recent surveys of Cat Island showed an increase of 338 acres of SAV in 2014 compared to 2010. The overall distribution of SAV in 2014 was similar to the distribution from the 2010 survey along with other surveys that were used to compare historical SAV coverage in the report. The report noted some changes in the spatial coverage of SAV boundaries; however, the general distribution of SAV was reported to be mostly stable (USACE, 2015b). No seagrasses occur within the Project area.

3.17 TERRESTRIAL WILDLIFE

As defined by TNC (1999), the study area is located within the East Gulf Coastal Plain Ecoregion and has a diverse assemblage of ecological systems, ranging from sandhills and rolling longleaf pine-dominated uplands to pine flatwoods and savannas, seepage bogs, and bottomland hardwood forests (see Section 3.15). Given the heterogeneity of habitat provided in the study area, which includes “piney woods,” the natural levees, wetlands, bottomland hardwood forests, marshes, dunes, beaches, barrier islands, and streams and rivers, it is likely that a variety of species occur within the study area, with the exception of those species that are designated threatened or endangered (see Section 3.19). However, because of the urbanization and industrialization of the Project area, many of the species requiring “natural” habitat are not likely to be present; only the most common, generalist species are described below.

Coastal Alabama and Mississippi are home to 39 species of snakes, 10 species of lizards, 23 species of turtles, and 1 crocodilian. Reptiles are ubiquitous to the study area and common species of snakes such as the garter snake (*Thamnophis sirtalis*) are likely to occur in the Project area. Common anoles and skinks such as the green anole (*Anolis carolinensis*) and the common five-lined skink (*Plestiodon fasciatus*) are also likely to occur in the Project area. Terrestrial turtles like the box turtle (*Terrapene carolina*) may be found in the Project area in small numbers, but suitable burrowing habitat is lacking (USACE, 2009a).

Eighteen species of salamanders and 22 species of frogs and toads are known to occur in coastal Alabama and Mississippi. Salamanders in general require moist environments, some being fully aquatic, some intermittently aquatic, and some terrestrial (USACE, 2009a). Although likely to occur in the study area, the need for a constant source of salt-free moisture makes it unlikely that they occur in any significant numbers in the Project area. Although it is less likely that frogs are found in the Project area, common species of toads such as *Anaxyrus* spp. are likely found in the Project area as well as throughout the study area. Common tree frogs (*Hyla* spp.) such as the green tree frog (*Hyla cinerea*) may also be found in the Project area if adequate moisture is available.

One species of marsupial, the Virginia opossum (*Didelphis virginiana*) is common throughout the study area (USACE, 2009a). It is unlikely that the opossum resides in the Project area because of the lack of suitable habitat, but it may use portions of the area to feed.

Approximately 57 species of mammals are known to occur in coastal Mississippi (USACE, 2009a). Moles, shrews, and bats are common inhabitants of coastal Mississippi. The nine-banded armadillo (*Dasypus novemcinctus*) is common as well as the eastern cottontail (*Sylvilagus floridanus*) and the swamp rabbit (*Sylvilagus aquaticus*). The swamp rabbit is known to inhabit Horn Island. Rodents, including squirrels (*Sciurus* spp.) and various mice and rats occur throughout coastal Mississippi. Beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), nutria (*Myocastor coypus*), and river otters (*Lontra canadensis*) are present where there is suitable aquatic habitat. Carnivores such as coyotes (*Canis latrans*) and red and gray fox (*Vulpes vulpes* and *Urocyon cinereoargenteus*) are known to occur throughout Mississippi and likely occur in the study area, as well as raccoons (*Procyon lotor*) and the striped skunk (*Mephitis mephitis*). Even-toed ungulates such as white-tailed deer (*Odocoileus virginianus*) and feral pigs (*Sus scrofa*) are likely to occur within the study area; feral pigs have been reported on Horn Island in the past (Jones and Carter, 1989). Although most of the mammal species are likely to occur in the study area, the Project area is devoid of suitable habitat for most mammals with the exception of the most common such as mice and rats and possibly bats. Some mammals such as rabbits (*Sylvilagus* spp.), coyotes, and armadillos may traverse the Project area.

Numerous avian species are found within the study area. Mississippi is situated in the eastern portion of the Mississippi Flyway. Although the alluvial valley of northwestern Mississippi hosts the most waterfowl and neotropical migrants, it is likely that the study area holds moderate numbers of overwintering waterfowl, especially wood ducks (*Aix sponsa*) and mallards (*Anas platyrhynchos*) (Turcotte and Watts, 1999). Migratory birds such as the neotropical migrants, colonial-nesting birds, and shorebirds are protected under the Migratory Bird Treaty Act of 1918, as amended.

Neotropical migrants typically cross the Gulf from the Yucatan Peninsula to Texas through Florida along the Gulf Coast. Most are the perching birds such as finches (*Carpodacus* sp.), warblers (*Dendroica* sp., *Vermivora* sp., *Wilsonia* sp.), buntings (*Passerina* sp.), and sparrows (*Passerculus* sp., *Spizella* sp., *Wilsonia* sp., *Zonotrichia* sp.), but also include ruby-throated hummingbirds (*Archilochus colubris*) and yellow-billed cuckoos (*Coccyzus americanus*) (Moore et al., 1990; Turcotte and Watts, 1999; Mississippi Coast Audubon Society, 2010). The bottomland hardwoods, maritime forests, and shrub-scrub associated with the coastal zone and barrier islands provide the last foraging opportunity before crossing the Gulf and the first potential landfall upon return. Neotropical migrants known to use the coastal fringe and barrier islands in Mississippi include the veery (*Catharus fuscescens*), Swainson's thrush (*Catharus ustulatus*), wood thrush (*Hylocichla mustelina*), vireos (*Vireo* spp.), tanagers (*Piranga* spp.), blue grosbeak (*Passerina caerulea*), rose-breasted grosbeak (*Pheucticus ludovicianus*), and orchard oriole (*Icterus spurius*) (Moore et al., 1990; Turcotte and Watts, 1999; Mississippi Coast Audubon Society, 2010; NatureServe, 2011).

Habitat in the study area is also conducive for use by colonial-nesting birds. Colonial-nesting birds are defined by commonalities (USFWS, 2002). They tend to nest in large colonies and consume mostly fish and aquatic invertebrates. They are usually divided into two groups based on where they feed: colonial seabirds and colonial-wading birds. Colonial seabirds feed primarily in saltwater habitats. In Mississippi, these include the American white pelican *(Pelecanus erythrorhynchos*), brown pelican (*Pelecanus occidentalis*), magnificent frigatebird (*Fregata magnificens*), double-crested cormorant (*Phalacrocorax auritus*), gulls such as Bonaparte's gull (*Chroicocephalus philadelphia*), ring-billed gull (*Larus delawarensis*), and laughing gull (*Leucophaeus atricilla*), and terns such as gull-billed tern (*Gelochelidon nilotica*), caspian tern (*Hydroprogne caspia*), common tern (*Sterna hirundo*), and royal tern (*Thalasseus maximus*) (Turcotte and Watts, 1999).

Colonial-wading birds primarily feed in fresh and brackish water, either by wading or standing still while catching prey. In Mississippi, these include the American bittern (*Botaurusle ntiginosus*), least bittern (*Ixobrychuse xilis*), great blue heron (*Ardea herodias*), great egret (*Ardea alba*), snowy egret (*Egretta thula*), little blue heron (*Egretta caerulea*), tricolored heron (*Egretta tricolor*), reddish egret (*Egretta rufescens*), cattle egret (*Bubulcus ibis*), green heron (*Butoridess virescens*), black-crowned night heron (*Nycticorax nycticorax*), yellow-crowned night heron (*Nycticorax violacea*), white ibis (*Eudocimus albus*), glossy ibis (*Plegadis falcinellus*), and roseate spoonbill (*Platalea ajaja*) (Turcotte and Watts, 1999).

Within the study area, the Gulf Barrier Islands and Coastal Marshes Ecoregion provides habitat required for shorebird migration, roosting, and nesting. Shorebirds inhabit shallowly flooded coastal and freshwater wetlands, intertidal mudflats, shallowly flooded agricultural fields, dry grasslands, and sandy coastal beaches (Helmers, 1992). Six species of shorebirds are known to breed in the Gulf region and almost 40 species occur during migrational or wintering periods (Turcotte and Watts, 1999). The snowy plover (*Charadrius alexandrinus*), Wilson's plover (*Charadrius wilsonia*), killdeer (*Charadrius vociferus*), willet (*Tringa semipalmata*), black-necked stilt (*Himantopus mexicanus*), and American oystercatcher (*Haematopus palliatus*) breed in the northern Gulf region on coastal beaches, barrier island beaches, salt marshes, and dredged material islands. Wintering populations include the threatened piping plover (*Charadrius melodus*) and other plovers such as the black-bellied plover (*Pluvialis squatarola*), snowy plover, and killdeer; the long-billed curlew (*Numenius americanus*); various small sandpipers such as sanderlings (*Calidris alba*), western sandpiper (*Calidris mauri*), and least sandpiper (*Calidris minutilla*); medium sandpipers such as the threatened red knots (*Calidris canutus*), short-billed dowitchers (*Limnodromus griseus*), and snipes (*Gallinago* spp.); marbled godwit (*Limosa fedoa*); various yellowlegs (*Tringa* spp.); turnstones (*Arenaria interpres*), avocets (*Recurvirostra americana*); and Wilson's phalaropes (*Phalaropus tricolor*).

Within the study area, the western half and southern tip of Cat Island, West Ship Island, and East Ship Island are part of the Gulf Islands National Seashore and are managed by the NPS. The rest of Cat Island is privately owned. In April 2011, British Petroleum purchased a portion of the eastern beach to aid in cleanup from the Deepwater Horizon oil rig explosion and oil spill (Nelson, 2011). These barrier islands provide critical habitat for colonial-nesting birds, including threatened and endangered birds (see Section 3.19), as well as a stop-over for neotropical migrants. Also within the study and Project areas, the National Audubon Society has established an Important Bird Area that stretches from Biloxi Beach west to Pass Christian and provides beach habitat used by breeding least terns (*Sternula antillarum*) and black skimmers (*Rynchops niger*). The Gulfport Important Bird Area supports a large number of breeding pairs. Between 1983 and 1994, the Gulfport Important Bird Area annually supported from 2,000 to more than 3,000 pairs; however, nesting pairs have been steadily declining (National Audubon Society, 2011). Least terns were observed nesting on the Port facility in 2012. In 2013, the least terns returned to the Port facility but were only observed in one small area (pers. comm., Elizabeth Calvit, CH2M HILL, November 12, 2013).

3.17.1 Commercially and Recreationally Important Terrestrial Species

Many species of wildlife that occur within the study area provide human consumptive benefits through hunting and trapping. However, hunting and trapping is not allowed in the Project area.

White-tailed deer (*Odocoileus virginianus*) is one of the most sought after game species in the study area and the eastern wild turkey (*Meleagris gallopavo silvestris*) is also an important game species. Although waterfowl distribution and abundance is concentrated in the Mississippi Delta Valley (MDWFP, 2009) outside of the study area, some hunting occurs in the study area with the primary species being mallards and wood ducks. Small game in Mississippi includes squirrels, rabbits, bobwhite quail (*Colinus virginianus*), and mourning doves (*Zenaida macroura*). In addition to the aforementioned species, bobcat (*Lynx rufus*), red and gray fox, raccoon (*Procyon lotor*), opossum, and coyote are also taken by hunting in the study area (MDWFP, 2011a).

Furbearers of economic and recreational importance are known to occur in the study area and are generally more abundant in woodlands, especially bottomland forests. Species such as mink (*Neovison vison*), raccoons, muskrat, red and gray foxes, bobcats, opossum, otter (*Lontra canadensis*), eastern spotted skunk (*Spilogale putorius*), striped skunk, coyote, weasels (*Mustela frenata*), nutria, and beaver are trapped (Hunt and Hutt, 2010).

3.18 AQUATIC ECOLOGY

3.18.1 Aquatic Communities

Mississippi Sound is a coastal plains lagoon estuary that receives freshwater from the Pearl and Pascagoula Rivers, as well as several small coastal rivers. A string of barrier islands (Cat, Ship, Horn, and Petit Bois) to the south acts as a permeable barrier that helps hold freshwater flowing from the north and allows saltwater in through the passes, which creates a mixing zone. Open-water areas in Mississippi Sound consist of a variety of unvegetated bottom habitats including clay/mud bottom, sand, and shell fragments with very little hard bottom substrate such as oyster reefs (MMNS, 2005).

Open-water habitats support communities of benthic organisms and corresponding fisheries populations. Phytoplankton (microscopic algae) are the major primary producers (plant life) in the open-bay, taking up carbon through photosynthesis and nutrients for growth. Phytoplankton are fed upon by zooplankton (such as small crustaceans, mollusks, and annelid worms), fish, and benthic consumers. In Mississippi Sound, phytoplankton species composition changes seasonally with maximum abundance occurring in winter and minimum occurring in summer, dominated by diatoms (Molina and Redalje, 2010).

Zooplankton are important because they form the basis of the food chain and are the source of food for larval and juvenile fish, including the federally threatened Gulf sturgeon. Zooplankton are most abundant during spring, with less production occurring in fall. Zooplankton are limited by turbidity (which limits the phytoplankton production, and therefore food availability) and currents, which can carry them out to sea and away from concentrated food masses (Valiela, 1995). Nekton assemblages (organisms that swim freely in the water column) consist mainly of secondary consumers feeding on zooplankton or juvenile and smaller nekton. Mississippi Sound supports a diverse nekton population, including fish, shrimp, and crabs, with at least 152 species of fish (Rakocinski et al., 1996). Some of these species are resident species, spending their entire life in Mississippi Sound, whereas others are migrant species, spending only a portion of their life cycle in the estuary.

The communities of fishes that occur in Mississippi Sound are inshore nekton, inshore demersal (bottom dwelling) resident, inshore demersal transient, offshore pelagic, and offshore demersal. The inshore demersal community is the most abundant (31 percent), followed by the inshore demersal resident community (25 percent), whereas, the offshore demersal and pelagic communities both make up approximately 19 and 16 percent of the species composition, respectively. The dominant ecological groups inhabiting Mississippi Sound are drum, various flat fishes, and cusk eels. The most common species found in one survey of the Mississippi Sound were Atlantic croaker (*Micropogonias undulatus*), speckled worm eel (*Myrophus punctatus*), and southern flounder (*Paralichthys lethostigma*). Species composition changes with the seasons with a continual turnover of peak abundances of species (Rakocinski et al., 1996).

3.18.1.1 Recreational and Commercial Fisheries

The main commercial species in Mississippi Sound are blue crab (*Callinectes sapidus*), southern flounder, Gulf menhaden (*Brevoortia patronus*), striped mullet (*Mugil cephalus*), eastern oyster (*Crassostrea virginica*), red snapper (*Lutjanus campechanus*), brown shrimp (*Farfantepenaeus aztecus*), pink shrimp (*Farfantepenaeus duorarum*), and white shrimp (*Litopenaeus setiferus*). The top three commercial species are Gulf menhaden, shrimp, and eastern oysters. Commercial fishing in Mississippi accounts for the lowest income ($113 million) and employment (6,400 jobs) of all Gulf states (NMFS, 2010).

In the recent past, two events have had an impact on the fishes of Mississippi Sound: Hurricane Katrina and the Deepwater Horizon oil rig explosion and oil spill. Hurricane Katrina pushed a large amount of saltwater up into the rivers and freshwater marshes of Mississippi. Low DO caused numerous fish kills along the coast and near the mouths of the rivers. Changes in the community structure of the lower Pascagoula River was observed immediately after the hurricane, and some of these changes have persisted because of hurricane-induced habitat changes. Longer-term sampling (multiple years) is necessary to assess recovery of fish communities closer to the Gulf (Schaefer et al., 2006).

On May 25, 2010, U.S. Commerce Secretary Gary Locke declared a fishery resource disaster for affected fisheries in waters off Louisiana, Mississippi, and Alabama due to the Deepwater Horizon oil rig explosion and oil spill (Locke, 2010). The incident resulted in discharges of oil and other substances from the rig and submerged wellhead into the Gulf. As a result of the oil spill, 95 percent of Mississippi State waters were closed to commercial and recreational fishing. All Mississippi state waters were reopened in July 2010, after the well-head was capped and oil stopped flowing into the Gulf (Upton, 2011). Although the fisheries are open, the impact of these two events is still being quantified and may not be known for years.

Mississippi remains a key coastal recreational fishery destination on the Gulf Coast. The most common species include Atlantic croaker, southern kingfish (*Menticirrhus americanus*), Gulf kingfish (*Menticirrhus littoralis*), sand seatrout (*Cynoscion arenarius*), silver seatrout (*Cynoscion nothus*), spotted seatrout, sheepshead (*Archosargus probatocephalus*), red drum, red snapper, sharks, southern flounder, and striped mullet. The most sought after recreational species are sand, silver, and spotted seatrout and Atlantic croaker. Recreational fishermen spent $700,000 on fishing equipment and trips in 2009 (NMFS, 2010).

The following discussion of the life cycles of important recreational and commercial aquatic species is included to facilitate understanding of how and when these species utilize estuarine habitat in the Project area.

Eastern Oysters. Eastern oysters spawn in spring. Rising temperatures and chemical cues stimulate the release of sperm into the water column by males. When this occurs, the female oysters release their eggs into the water. Larval oysters prefer estuarine conditions. They will remain as plankton in the water column for 2 or 3 weeks before settling onto a hard substrate and eventually transforming into an adult (Britton and Morton, 1989).

Blue Crabs. Female blue crabs mate and migrate to the higher salinity areas of the estuary (near tidal inlets or just offshore) where they lay their eggs. These eggs are attached to the underside of their abdomen and are brooded in this capacity for about 2 weeks. Prior to egg hatching, females move seaward and hatch offshore. The larvae pass through several larval stages in the marine plankton before they begin to move back into the estuary with the surface plankton. Female blue crabs occur in Mississippi Sound year round, but peak in June and July, whereas males remain in the lower salinity portions of the sound throughout their life (Britton and Morton, 1989).

Shrimp. Brown, pink, and white shrimp all have similar life cycles. All spawning occurs in the Gulf. Male shrimp transfer sperm to the female, who carries it around until she releases the eggs to be fertilized by the sperm. Eggs hatch into the larval stage within 24 hours and remain in the Gulf, undergoing various larval stages for several weeks. Post larvae are carried by the currents into the shallow areas of the estuary, tidal creeks, and marshes to mature. Here the shrimp increase in size and soon move to the deeper waters of the estuary, eventually moving offshore in the Gulf to spawn. Peak spawning season for brown shrimp occurs from September to May, and for pink and white shrimp, March to September (Britton and Morton, 1989).

Southern Flounder. Adult southern flounder leave Mississippi Sound for offshore waters to spawn during late fall and early winter. Eggs and sperm are randomly released into the water column for fertilization. Immediately after spawning, adults return to the estuaries and rivers. Larval flounder remain offshore in the plankton for 4 to 8 weeks, then metamorphosis begins and the larvae are carried into the estuaries. Juvenile southern flounder begin migrating to low-salinity water up rivers where, according to some researchers, juvenile and young adults remain for the first 2 years. Once they reach sexual maturity (2 years), they begin migrating to the Gulf to spawn (Daniels, 2000; Pattillo et al., 1997).

Atlantic Croaker. Eggs and sperm of the Atlantic croaker are randomly released into the water column for fertilization. Spawning occurs nearshore in the Gulf, near passes, from September to May. Early larval stages are found offshore in plankton and are carried by currents inshore to estuarine areas. Juvenile Atlantic croaker move into rivers and creeks where they spend 6 to 8 months. Adults migrate offshore in March and April (Pattillo et al., 1997).

Sheepshead. Sheepshead spawn offshore during March and April. Eggs and sperm are randomly released into the water column for fertilization. The larvae move into the seagrass beds of the estuary. They remain in this planktonic stage for 30 to 40 days, then metamorphose into juveniles. The juveniles “settle out” in the seagrass beds becoming substrate-oriented, then move to nearshore reefs where they mature. Sheepshead reach sexual maturity by age 2 (Pattillo et al., 1997).

Striped Mullet. Striped mullet spawning occurs offshore near the water’s surface from October to March. Eggs and sperm are randomly released into the water column for fertilization. The eggs and larvae remain offshore where they develop into prejuveniles, then enter the bays and estuaries to mature. Sexual maturity occurs at 3 years of age; adults remain near inshore waters during their life (Pattillo et al., 1997).

Sand Seatrout. Sand seatrout migrate to the Gulf in late fall or winter to spawn. Eggs and sperm are randomly released into the water column for fertilization. Larvae are carried into the estuary by the currents and migrate to the upper areas of the estuary, preferring channels, small bayous, and shallow marshes to develop. Adult sand seatrout reach sexual maturity at 12 months (Pattillo et al., 1997).

Spotted Seatrout. Spotted seatrout spawn generally from March to October. Eggs are pelagic or demersal depending on salinity; initially, larvae are pelagic and become demersal after 4 to 7 days. Juveniles and adults are demersal, completing their entire life cycle in inshore waters. Adult seatrout migrate very little with most movements occurring seasonally in association with thermal and salinity tolerances, and with spawning activates (Pattillo et al., 1997).

Gulf Menhaden. Gulf menhaden spawning in the wild has not been observed. Most spawning probably occurs off the Mississippi and Atchafalaya river deltas from nearshore to about 60 miles offshore. Spawning season usually runs from October through March. This is an estuary-dependent, marine migratory species. Eggs and larvae spend 3 to 5 weeks in offshore waters as currents carry them into estuaries. The Gulf menhaden do not exhibit an extensive migratory pattern. Adults and maturing juveniles migrate from estuaries to open Gulf waters to overwinter or spawn (Pattillo et al., 1997).

Red Snapper. Red snapper spawn in summer and fall in the Gulf and usually show partial sexual maturity at 1 year and full maturity at 2 years. They spawn primarily away from reefs over a firm sand bottom with little relief at depth of 15 to 121 feet. Adult red snapper exhibit little movement during cooler months and move closer to shore in summer months (Moran, 1988).

3.18.1.2 Estuarine Mud and Sand Bottoms

Benthic organisms are divided into two groups: epifauna, such as crabs and smaller crustaceans, which live on the surface of the bottom substrate, and infauna, such as mollusks and polychaetes, which burrow into the bottom substrate (Green et al., 1992). Mollusks and some other infaunal organisms are filter feeders that strain suspended particles from the water column; whereas, other organisms, such as polychaetes, feed by ingesting sediments and extracting nutrients. Many of the epifauna and infauna feed on plankton, and are then fed upon by numerous fish and birds (Armstrong et al., 1987; Lester and Gonzales, 2001).

The Mississippi Sound bottom includes flat areas consisting of mud, fine-to-coarse sand, and shell fragments that contribute large quantities of nutrients and food, making them one of the most important components of this habitat type. The distribution of the benthic macroinvertebrates is primarily influenced by bathymetry and sediment type (Calnan et al., 1989). Benthic macroinvertebrates found in the sediments of Mississippi Sound are primarily polychaetes, bivalves, gastropods, and crustaceans (Appendix L; Ross et al., 2009; Wilber et al., 2006).

Mississippi Sound consists of 25 percent nearshore habitat, less than 6.6 feet deep, and 75 percent offshore habitat (MMNS, 2005). The medium-to-coarse sand in the Mississippi Sound is populated with macro-benthic organisms (Ross et al., 2009). Zooplankton consumes only 50 to 60 percent of the net phytoplankton (diatoms, dinoflagellates, and other algae) production, leaving a significant portion available to the benthic fauna (Nybakken and Bertness, 2005).

Bivalves found in estuarine mud and sand bottoms include the blood ark (*Anadara ovalis*), incongruous ark (*Anadara brasiliana*), southern quahog (*Mercenaria campechiensis*), giant cockle (*Dinocardium robustum*), disk dosini (*Dosinia discus*), pen shells (*Atrina serrata*), common egg cockle (*Laevicardium laevigatum*), crossbarred venus (*Chione cancellata*), tellins (*Tellina* spp.), and the tusk shell (*Dentalium texasianum*). One of the most common species occurring in the shallow estuarine mud and sand bottoms is the sand dollar (*Mellit quinquiesperforata*), followed by several species of brittle stars (*Hemipholis elongata*, *Ophiolepis elegans*, and *Ophiothrix angulata*). Many gastropods are common, including the moon snail (*Polinices duplicatus*), ear snail (*Sinum perspectivum*), Atlantic auger (*Terebra dislocata*), Salle's auger (*Terebra salleano*), scotch bonnet (*Phalium granulatum*), distroted triton (*Distrosio clathrata*), wentletraps (*Epitonium* sp.), and whelks (*Busycon* spp.). Crustaceans inhabit these waters, including white and brown shrimp (both commercially caught species), rock shrimp (*Sicyonia brevirostris*), blue crabs, mole crabs (*Albunea* spp.), speckled crab (*Arenaeus cribrarius*), box crab (*Calappa sulcata*), calico crab (*Hepatus epheliticus*), and pea crab (*Pinotheres maculatus*). The most abundant infaunal organisms with respect to the number of individuals are the polychaetes (Capitellidae, Orbiniidae, Magelonidae, and Paraonidae) (Britton and Morton, 1989).

Benthic samples analyzed as part of the EPA NCA database were obtained from 69 different stations within the study area (see Figure 3.13-1). According to the EPA NCA database, the dominant species that occur in Mississippi Sound are polychaetes (*Mediomastus ambiseta*) and ribbon worms (*Menertea* sp.) (EPA, 2011a).

Table 3.18-1 shows the representative species that occur in the study area. The data in the table are separated into three general habitat types: nearshore, mid-shore, and passes. Nearshore is the habitat dominated by mud/clay substrate and is located between 0 and 3 miles from shore. Mid-shore habitat has some mud but also has various grain sizes of sand and is located between 3 and 6 miles from shore. The passes are characterized by mostly medium-to-coarse sand and are located between 6 and 12 miles from shore.

Table 3.18-1
Representative Benthic Macroinvertebrates that Occur in the Study Area*

Scientific Name	Common Name	Description
Nearshore (within 3 miles of the shoreline):		
Ogyrides alphaerostris	Estuarine long eyed shrimp	Crustacean
Paraprionospio pinnata	Pinnated spionid pinnata	Polychaete worm
Phoronis spp.	Phoronids	Horseshoe worms (filter feeding lophophore)
Pinnixa spp.	Gulfweed crab	Decapod crustacean
Prionospio perkinsi	No common name	Polychaete worm
Parandalia americana	No common name	Polychaete worm
Polydora	Mud worm	Polychaete worm
Mid-shore (3 to 6 miles from shore):		
Cossura delta	No common name	Polychaete worm
Acanthohaustorius sp.	No common name	Amphipod
Acteocina canaliculata	Channeled barrel-bubble	Gastropod
Edwardsia	Ivell's sea anemone	Sea anemone
Passes (approximately 6 to 12 miles from shore):		
Cyclaspis varians	No common name	Crustacean
Brania wellfleetensis	No common name	Polychaete worm
Chione cancellata	No common name	Bivalve (clam)
Ancistrosyllis sp.	No common name	Polychaete worm
Mediomastus sp.	No common name	Polychaete worm
Unid. ophiuroidea	No common name	Brittle star

Source: EPA (2011a).

*Common names and groups are according to World Register of Marine Species (2011).

A benthic habitat assessment was conducted to satisfy NMFS concern for potential Project-related impacts to the Gulf sturgeon and fish habitat in the study area (Appendix L). This habitat assessment included a benthic habitat characterization with benthic samples being collected from 48 locations within the study area. Benthic organisms were dominated by polychaetes, with *Leitoscoloplos fragilis* and *Mediomastus ambiseta* representing the most abundant organisms collected (see Appendix L). Ross et al. (2009) also recorded the same two species, though much less abundant, as well as Florida lancelets (*Branchiostoma floridae*) and sand dollars (*Mellita quinquiesperforata*) (see Appendix L).

Results of the benthic habitat assessment indicated that the Project footprint and Project areas had similar relative abundance, species diversity, and number of species. However, when comparing the Project footprint, Project area, and study area, the study area exhibited higher diversity and number of species than the Project footprint and Project area. It is possible that existing operations at the Port facilities, such as routine maintenance dredging and placement activities, may have an effect on the ambient condition surrounding the facility (see Appendix L).

3.18.1.3 Oyster Reef

Eastern oysters are present in Mississippi Sound and provide ecologically important functions. Oyster reefs are formed where a hard substrate and adequate currents are plentiful. Currents carry nutrients to the oysters and take away sediment and waste filtered by the oyster. Most oyster reefs are subtidal or intertidal and found near passes and cuts, and along the edges of marshes. Oysters can filter water 1,500 times the volume of their body per hour, which, in turn, influences water clarity and phytoplankton abundance (Lester and Gonzalez, 2001; Powell et al., 1992). Due to their lack of mobility and their tendency to bioaccumulate pollutants, oysters are an important indicator species for determining contamination (Lester and Gonzalez, 2001).

While oysters can survive in salinities ranging from 5 to 40+ ppt, they thrive within a range of 10 to 25 ppt where pathogens and predators are limited. The low-salinity end of the range is critical from an osmotic balance perspective. Oysters can survive brief periods of salinities less than 5 ppt by remaining tightly closed. Oysters will remain closed until normal salinities are reestablished or until they deplete their internal reserves and perish. In contrast, predators, such as oyster drills, welks, and crabs reduce oyster populations during long periods of high salinities (Cake, 1983). *Perkinsus marinus* (Dermo) is the most common and deadly oyster pathogen in the bays bordering the Gulf. It is a primary factor affecting habitat suitability.

Many organisms, including mollusks, barnacles, crabs, gastropods, amphipods, polychaetes, and isopods, can be found living on the oyster reef, forming a very diverse community (Sheridan et al., 1989). Oyster reef communities are dependent upon food resources from the open bay and marshes. Many organisms feed on oysters, including fish such as black drum, crab, and gastropods such as the oyster drill (*Thais haemastoma*) (Lester and Gonzales, 2001; Sheridan et al., 1989). When oyster reefs are exposed during low tides, shore birds will use the reef areas as resting places (Armstrong et al., 1987).

In Mississippi Sound, oyster reefs occur in shallow waters that rapidly change in temperature and salinity. Oyster reefs cover approximately 10,000 to 10,999 acres (Gulf of Mexico Fisheries Management Council [GMFMC], 2004). Approximately 97 percent of the commercially harvested oysters in Mississippi come from the reefs in western Mississippi Sound, primarily from Pass Marianne, Telegraph, and Pass Christian reefs. The MDMR manages 17 natural oyster reefs and 6 private leases ranging in size from 5 to 100 acres in these areas (MDMR, 2011a). In western Mississippi Sound, most oyster reefs are subtidal (>6 feet deep), but some intertidal reefs exist in eastern Mississippi Sound (GMFMC, 2004). Based on information from the MDMR, no oyster reefs occur within the study or Project area.

3.18.1.4 Artificial Reefs

In the Gulf, two types of artificial reefs exist: those structures placed to serve as oil and gas production platforms and those intentionally placed to serve as artificial reefs (GMFMC, 2004). The more than 4,500 oil and gas structures in the Gulf form unique reef ecosystems that extend throughout the water column, providing a large volume and surface area, dynamic water-flow characteristics, and a strong profile (Ditton and Falk, 1981; Dokken, 1997; Stanley and Wilson, 1990; Vitale and Dokken, 2000). Fish are attracted to oil platforms because these structures provide food, shelter from predators and ocean currents, and a visual reference, which aids in navigation for migrating fishes (Bohnsack, 1989; Duedall and Champ, 1991; Meier, 1989; Vitale and Dokken, 2000). The size and shape of the structure affect community characteristics of pelagic, demersal, and benthic fishes (Stanley and Wilson, 1990). Many scientists feel that the presence of oil platform structures allows fish populations to grow, which increases fishery potential (Scarborough-Bull and Kendall, 1992).

Artificial reefs are colonized by a diverse array of microorganisms, algae, and sessile invertebrates, including shelled forms (barnacles, oysters, and mussels), as well as soft corals (bryozoans, hydroids, sponges, and octocorals) and hard corals (encrusting, colonial forms). These organisms (referred to as the biofouling community) provide habitat and food for many motile invertebrates and fishes (GMFMC, 2004).

Species associated with the platforms that are not dependent on the biofouling community for food or cover include the red snapper, Atlantic spadefish (*Chaetodipterus faber*), lookdown (*Selene vomer*), Atlantic moonfish (*Selene setapinnis*), Creole-fish (*Paranthias furcifer*), whitespotted soapfish (*Rypticus maculatus*), gray triggerfish (*Balistes capriscus*), and lane snapper (*Lutjanus synagris*), all transients (move from platform to platform), and resident species (always found on the platforms), including large tomtate (*Haemulon aurolineatum*) and some large groupers. Other resident species that are dependent upon the biofouling community for food or cover include numerous species of blennies, sheepshead, and small grazers (butterflyfishes, Chaetodontidae). Highly transient, large predators associated with these structures include barracuda (*Sphyraena barracuda*), almaco jack (*Seriola rivoliana*), hammerhead sharks (*Sphyrna* spp.), cobia (*Rachycentron canadum*), mackerels (Scombridae), other jacks (*Caranx* spp.), and the little tunny (*Euthynnus alletteratus*) (GMFMC, 2004).

Mississippi has 15 permitted offshore reefs encompassing 16,000 acres of water bottom and 69 permitted nearshore artificial reef sites (MDMR, 2015). These reefs range in size from 3 to 10,000 acres. The material used for offshore reefs consists of concrete rubble, steel-hull vessels (including barges), armored personnel carriers, and materials of design, such as Florida Limestone Pyramids and Reef Balls. The materials of the nearshore reefs consist of limestone, concrete rubble (when water depth allows), crushed concrete, and oyster shells (MDMR, 2011b). Five nearshore reefs are located within the Project area (MDMR, 2015).

Mississippi's Rigs to Reef Program offers conservation-minded alternatives for the platform, as opposed to onshore disposal with no subsequent habitat value. The average platform jacket can provide from to 2 to 3 acres of hard-bottom habitat for marine invertebrates and fishes, and these submerged platform jackets currently provide habitat for thousands of marine species. The program includes 8 permitted reef sites with 14 platform jackets, none of which are located within the study area (MDMR, 2011b).

3.18.2 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 the 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 above-mentioned act and identified consultation requirements.

EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." 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); subtidal 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). Adverse effect to EFH is defined as, "any impact, which reduces quality and/or quantity of EFH…" and may include direct, indirect, site specific or habitat impacts, including individual, cumulative, or synergistic consequences of actions.

Within areas identified as EFH, Habitat Areas of Particular Concern (HAPC) may be designated in order to focus conservation priorities on areas that are important to the life cycles of federally managed species and may warrant more targeted protection measures. Designation of specific HAPCs are based on ecological function, habitats sensitive to human-induced environmental degradation, stressors of development activities, and habitat rarity (Dobrzynski and Johnson, 2001). No HAPCs are designated in the study area (NOAA, 2013).

NMFS and the GMFMC identified the Project area as EFH for brown shrimp, pink shrimp, white shrimp, blacknose shark (*Carcharhinus acronotus*), spinner shark (*Carcharhinus brevipinna*), finetooth shark (*Carcharhinus isodon*), bull shark (*Carcharhinus leucas*), blacktip shark (*Carcharhinus limbatus*), Atlantic sharpnose shark (*Rhizoprionodon terraenovae*), scalloped hammerhead shark (*Sphyrna lewini*), great hammerhead shark (*Sphyrna mokarran*), cobia (*Rachycentron canadum*), greater amberjack (*Seriola dumerili*), almaco jack (*Seriola rivoliana*), red snapper, gray snapper (*Lutjanus griseus*), lane snapper, vermilion snapper (*Rhomboplites aurorubens*), red drum, king mackerel (*Scomberomorus cavalla*), Spanish mackerel (*Scomberomorus maculatus*), and gray triggerfish (*Balistes capriscus*). The categories of EFH that occur within the Project area include the estuarine water column and estuarine mud and sand bottoms (unvegetated estuarine benthic habitats). Additionally, EFH located adjacent to the Project area include estuarine emergent marsh, seagrasses, oyster reefs, and artificial reefs. Upland habitats as well as fresh water habitats that are not connected to tidal waters or are not tidally influenced were not considered EFH categories.

Due to the size of the PGEP and the nature and extent of potential direct and indirect impacts to EFH, NMFS requested that an expanded EFH consultation be conducted (see NMFS letter dated May 11, 2010, Appendix E-2). As a result of this request, a separate EFH Assessment was prepared and is presented in Appendix M. The EFH Assessment provided detailed information on EFH habitat/community types, life-history characteristics of federally managed species, and impacts associated with the Proposed Project Alternative. Coordination with NMFS and GMFMC regarding the EFH assessment and recommendations is discussed in Section 4.18.6.

3.18.3 Invasive Species in Ballast Water

Ballast water is loaded on empty ships to provide weight and stability while traveling from one port to the next. There are thousands of marine species that can be carried from port to port in ballast water, which may ultimately result in the introduction of unwanted aquatic species from foreign ports of origin (Global Ballast Water Management Programme, 2014). As a consequence, invasive, exotic species have been introduced into United States waters through ballast water. Ballast water is the largest single vector for nonindigenous species transfer. The EPA has compiled a list of invasive species that have the potential to be unintentionally introduced in Mississippi, although not necessarily through ballast water alone (Table 3.18-2) (EPA, 2001).

The USCG, under the provisions of the National Invasive Species Act, has implemented a program that consists of a suite of mandatory ballast water management protocols. All vessels, foreign and domestic, equipped with ballast water tanks that operate within U.S. waters are required to comply with 33 CFR Part 51 regarding management protocols. This includes submitting a ballast water exchange report to the National Ballast Information Clearinghouse (NBIC) to ensure compliance with the management requirements (USCG, 2011b).

According to the NBIC (2011) ballast water–reporting database, between January 1, 2004, and January 1, 2011, 1,648 ballast water exchange reports were submitted for the Port. Of these, 104 had a discharge location of Gulfport and all of them were empty/refills exchanges where the ballasted tank is emptied then refilled with ocean water.

Table 3.18-2
Current and Potential Aquatic Species that Pose a Threat to Mississippi

Scientific Name	Common Name	Potential/Current Threat
Shrimp Viruses		
Taura Syndrome Virus	shrimp virus	C
White Spot Syndrome Virus	shrimp virus	C
Coelenterates		
Craspedacusta sowerbyi	freshwater jellyfish	C
Drymonema larsoni	pink meanie	C
Phyllorhiza punctata	spotted jellyfish	P
Roundworms (phylum Nematoda)		
Anguillicola crassus	eel parasite	P
Boccardiella ligerica	spionid worm	C
Mollusks		
Corbicula fluminea	Asian clam	C
Crassostrea gigas	Japanese (or Pacific giant) oyster	C
Dreissena polymorpha	zebra mussel	P
Perna perna	brown mussel	P
Pomacea canalicula	channeled applesnail	C
Crustaceans		
Callinectes bocourti	Bocourt swimming crab	C
Carcinus maenus	green crab	P
Charybdis helleri	marine swimming crab	P
Daphnia lumholtzi	water flea	C
Eriocheri sinensis	Chinese mittencrab	P
Macrobranchium rosenbergii	Malaysian prawn	C
Mesocyclops pehpeiensis	no common name	C
Penaes monodon	Asian tiger shrimp	C
Fishes		
Alosa sapidissma	American shad	C
Carassuis auratus	goldfish	C
Cichlasoma cyanoguttatum	Rio Grande cichlid	C
Ctenopharyngodon idella	grass carp	C
Hypophthalmichthys molitrix	silver carp	C
Hypophthalmichthys nobilis	gighead carp	C
Mylopharyngodon piceus	black carp	P
Morone saxiatilis	striped bass	C
Neogobius melanostomus	round goby	C
Oreochromis aureus	blue tilapia	C
Oreochromis mossambicua	Mozambique tilapia	C
Piaractus brachypomus	red bellied pacu	C
Salmo salar	Atlantic salmon	C
Amphibians		
Eluetherodactylus plainirostris	greenhouse frog	C
Mammals		
Myocastor coypus	nutria	C

Table 3.18-2, cont'd

Scientific Name	Common Name	Potential/Current Threat
Algae		
Aureoumbra lagunensis	brown tide algae	C*
Vascular Plants		
Alternathera philoxeroides	alligatorweed	C
Eichhornia crassipes	water hyacinth	C
Myriophyllum spicatum	Eurasian watermilfoil	C
Hydrilla verticillata	hydrilla	C
Ipomoea aquatica	waterspinach	P
Lythrum salicaria	purple loosestrife	P
Panicum repens	torpedograss	C
Pistia stratiotes	waterlettuce	C
Salvinia minima	common salvinia	C
Salvinia molesta	giant salvinia	C
Semi-Aquatic Vascular Plants		
Imperata cylindrica	cogongrass	P
Pueraria montana	kudzu	C
Sapium sebiferum	Chinese tallow tree	C

Source: EPA (2001); USGS (2011b); Ray (2005).

P = Potential Threat; C = Current Threat

* Cryptogenic (a species whose status as indigenous or nonindigenous remains unresolved).

3.19 THREATENED AND ENDANGERED SPECIES

The ESA of 1973, as amended, was enacted to provide a program for the preservation of threatened and endangered species and to provide protection for the ecosystems upon which the species depend for their survival. All Federal agencies are required to implement protection programs for these designated species and use their authorities to further the purpose of the Act. The USFWS and NMFS are the primary agencies responsible for implementing the ESA. The USFWS is responsible for terrestrial flora and fauna, including freshwater species, while the NMFS is responsible for nonbird marine species.

The USFWS and NMFS have identified 22 federally listed threatened and endangered species as potentially occurring in the study area (Table 3.19-1). The ESA defines a threatened species as "a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range" and an endangered species as "a species that is in danger of extinction throughout all or a significant portion of its range" (50 CFR 424.02; USFWS, 2010a).

Table 3.19-1
Federally and State-Listed Threatened and Endangered
Wildlife Species with the Potential to Occur in the Study Area[1]

Common Name[2]	Scientific Name[2]	Federal Status[3]	State Status[4]	May Occur within Project Area
PLANTS				
Louisiana quillwort	*Isoetes louisianensis*	E		No
BIRDS				
Red-cockaded woodpecker	*Picoides borealis*	E	LE	No
Mississippi sandhill crane	*Grus canadensis pulla*	ECH	LE	No
Piping plover[5]	*Charadrius melodus*	TCH	LE	Yes
Southeastern snowy plover[1]	*Charadrius nivosus tenuirostris*		LE	Yes
Rufa red knot	*Calidris canutus rufa*	T		Yes
Bald eagle[6]	*Haliaeetus leucocephalus*		LE	No
Brown pelican	*Pelecanus occidentalis*		LE	Yes
Bewick’s wren	*Thryomanes bewickii*		LE	No
Peregrine falcon	*Falco peregrinus*		LE	No
MAMMALS				
West Indian manatee	*Trichechus manatus*	E	LE	Yes
Louisiana black bear	*Ursus americanus luteolus*	T	LE	No
Blue whale	*Balaenoptera musculus*	E		Yes
Fin whale	*Balaenoptera physalus*	E		Yes
Humpback whale	*Megaptera novaeangliae*	E		Yes
Sei whale	*Balaenoptera borealis*	E		Yes
Sperm whale	*Physeter microcephalus*	E		Yes
AMPHIBIANS				
Dusky gopher frog	*Rana sevosa*	ECH	LE	No
One-toed amphiuma	*Amphiuma pholeter*		LE	No
REPTILES				
Alabama red-bellied turtle	*Psuedemys alabamensis*	E	LE	No
Hawksbill sea turtle	*Eretmochelys imbricata*	E	LE	Yes
Kemp’s ridley sea turtle	*Lepidochelys kempii*	E	LE	Yes
Leatherback sea turtle	*Dermochelys coriacea*	E	LE	Yes
Green sea turtle	*Chelonia mydas*	T	LE	Yes
Loggerhead sea turtle	*Caretta caretta*	T	LE	Yes
Gopher tortoise	*Gopherus polyphemus*	T	LE	No
Eastern indigo snake	*Drymarchon couperi*		LE	No
Yellow-blotched map turtle	*Graptemys flavimaculata*	T	LE	No
Black pine snake	*Pituophis melanoleucus lodingi*	C	LE	No
Rainbow snake	*Farancia erytrogramma*		LE	No
Southern hognose snake	*Heterodon simus*		LE	No

Table 3.19-1, cont'd

Common Name[2]	Scientific Name[2]	Federal Status[3]	State Status[4]	May Occur within Project Area
FISHES				
Gulf sturgeon	*Acipenser oxyrhynchus desotoi*	TCH	LE	Yes
Alabama shad[7]	*Alosa alabamae*	SOC		No
Dusky shark[7]	*Carcharhinus obscurus*	SOC		No
Sand tiger shark[7]	*Odontaspis taurus*	SOC		No
Speckled hind[7]	*Epinephelus drummondhayi*	SOC		No
Warsaw grouper[7]	*Epinephelus nigritus*	SOC		No
Crystal darter	*Crystallaria asprella*		LE	No
Ironcolor shiner	*Notropis chalybaeus*		LE	No
Pearl darter	*Percina aurora*	C	LE	No
CORAL				
Ivory tree coral[7]	*Oculina varicosa*	SOC		No

[1]According to USFWS (2012a); Mississippi Natural Heritage Program (MNHP, 2011); MNHP letter dated December 10, 2015 (see Appendix E-2).

[2]Nomenclature and taxonomic orders follow USFWS (2013a-h), Integrated Taxonomic Information System (2011); MMNS (2011).

[3]E = Endangered; T = Threatened; C = Candidate; SOC = Species of Concern; ECH or TCH = Listed with Critical Habitat.

[4]LE = Listed Endangered.

[5]Critical Habitat for piping plover occurs on barrier islands and in certain areas of coastal counties.

[6]Although delisted, nesting bald eagles and their nest trees are protected by law under the Bald and Golden Eagle Act. As population numbers increase, eagles may be found throughout the state.

[7]Species has been designated a "Species of Concern" by the NOAA Fisheries (NMFS), but is not afforded any "any procedural or substantive protections" under the ESA (NMFS, 2013a).

When a species is listed as threatened or endangered, the ESA requires the designation of critical habitat unless designation would not be prudent or the critical habitat is not determinable. Critical habitat is defined as "(1) the specific areas within the geographical area currently occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (i) essential to the conservation of the species, and (ii) that may require special management considerations or protection, and (2) specific areas outside the geographical area occupied by a species at the time it is listed upon a determination by the Secretary [Secretary of the Interior or the Secretary of Commerce] that such areas are essential for the conservation of the species" (USFWS, 2010a). Federal agencies are required to consult with the USFWS or NOAA about the effect of actions they authorize, fund, or carry out on designated critical habitat. Critical habitat has been designated in the vicinity of the study area for the threatened piping plover (*Charadrius melodus*) and the threatened Gulf sturgeon.

Candidate species (C) are plants or animals for which the USFWS has sufficient information on their biological status and threats to propose them as threatened or endangered under the ESA, but for which development of a proposed listing regulation is precluded by other higher priority listing activities. When sufficient information is developed to make a well-documented, biologically sound determination about a species, the USFWS recommends the species for candidate status. Transition from candidate to threatened or endangered status is based on a listing priority system that ranks species from 1 to 12 based on the magnitude of threats they face, the immediacy of the threats, and their taxonomic uniqueness (USFWS, 2011b). Species at greatest risk (priority 1 through 3) are generally proposed for listing first.

For the NMFS, a Species of Concern (SOC) is a species the NMFS has concerns regarding status and threats, but there is insufficient information available to indicate a need to list the species under the ESA. SOCs are identified to initiate proactive measures to gather further data, increase public awareness, and encourage voluntary protection and research efforts from concerned parties. Factors used by the NMFS to identify and list SOCs include abundance and productivity, genetic diversity, distribution, life-history characteristics, and threats (NMFS, 2013a).

The Mississippi Natural Heritage Program (MNHP) maintains a continuously updated inventory of plants and animals that are rare or imperiled at the state level. The database includes threatened and endangered species listed under the ESA, the Mississippi State Nongame and Endangered Species Act, and additional rare species not listed officially. A total of 80 species and subspecies of plants and animals were officially recognized as endangered in 2003 (MNHP, 2011), of which 27 species may possibly occur within the study area based on the updated database. On December 10, 2015, the MNHP provided information regarding occurrences of State- or federally listed species and species of special concern that occur within 2 miles of the site of the Project area (see Appendix E2).

While State-listed species and federally designated candidate species and SOCs were considered during project planning and addressed in this assessment, only those species identified by the USFWS and/or NMFS as threatened or endangered are afforded Federal protection under the ESA.

3.19.1 Flora

There is one federally listed endangered plant species known to occur in the study area (see Table 3.19-1).

Louisiana quillwort (*Isoetes louisianensis*)

Louisiana quillwort is a federally listed endangered seedless plant that is closely related to ferns. Plants typically appear sedge-like with weak and droopy leaves that are arranged in whorls radiating from a central point. Leaf length appears to be dependent upon water depth and varies in length from 5.9 to 15.7 inches. It is known to occur along shallow, blackwater streams in riparian and bayhead pine forests (NatureServe, 2010). The Louisiana quillwort is not likely to occur in the Project area due to lack of suitable habitat.

3.19.2 Wildlife

Wildlife species whose geographic range includes the study area and that are considered threatened or endangered by USFWS and NMFS are listed in Table 3.19-1. It should be noted that inclusion on the list does not imply that a species is known to occur in the Project area, but only acknowledges the potential for occurrence. The following paragraphs present distributional data concerning each federally listed species, along with a brief evaluation of the potential for the species to occur in the Project area. Threatened and endangered species considered in this analysis were identified from county species lists provided by USFWS, NOAA, and MNHP.

3.19.2.1 Birds

There is one federally listed endangered bird species, one federally listed endangered species with critical habitat, one federally listed threatened species, one federally listed threatened species with critical habitat, and an additional five State-listed endangered bird species known to potentially occur in the study area (see Table 3.19-1).

Red-cockaded woodpecker (*Picoides borealis*)

The red-cockaded woodpecker is a federally and State-listed endangered species known to occur in Harrison and Jackson counties (USFWS, 2013a; MMNS, 2011). The red-cockaded woodpecker excavates nests and roost sites in living pine trees and lives in small family groups. They require mature longleaf pine forests (80 to 120 years old) or loblolly pine forests (70 to 100 years old). Although known to occur in the study area, it is unlikely that they occur in the Project area because of the lack of required mature pine forests.

Mississippi sandhill crane (*Grus canadensis pulla*)

The Mississippi sandhill crane is listed as a federally endangered with critical habitat and State endangered and is known to occur in Jackson County (USFWS, 2012a; MMNS, 2011) and Harrison County (MMNS, 2011). The Mississippi sandhill crane is a large bird standing 3 to 4 feet tall with a wingspan of up to 8 feet when fully grown. This species can be found in open savannas, swamp edges, young pine plantations, and wetlands along edges of pine forests; associated trees and shrubs include longleaf pine, slash pine, bald cypress, gallberry (*Ilex* sp.), wax myrtle, black gum (*Nyssa sylvatica*), sweetbay (*Magnolia uirginiana*), and yaupon (USFWS, 1991).

Critical habitat has been designated for the Mississippi sandhill crane in southern Jackson County, Mississippi, that extends from the Pascagoula River west to the Jackson County line. The Mississippi Sandhill Crane National Wildlife Refuge is also located in Jackson County. There is no critical habitat located within the study area (Figure 3.19-1). Thus, it is highly unlikely that the species occurs in the Project area.

Figure 3.19-1

Port of Gulfport Expansion Project

Critical Habitat in the Action Area/Study Area

File: N:\Clients\M_N\Mississippi_State_Port_Authority\100018536\geospatial\Figs_EIS\2015_Revisions\PGEP_EIS_Figure_3_19_1_Critical_Habitat_in_the_Study_Area_120516.mxd

Rufa red knot (*Calidris canutus rufa)*

The rufa red knot (*Calidris canutus rufa*) is listed as a federally threatened species (USFWS, 2014). The rufa red knot is a medium-sized shorebird about 9 to 11 inches in length. The red knot is recognized during the breeding season by its distinctive red feathers. There is a prominent stripe above the eye, with the breast, and upper belly being a rich red to a brick or salmon red. They will sometimes have a few scattered light feathers mixed in (USFWS, 2014). The red knot migrates on an annual basis between its breeding grounds in the Canadian Arctic and several wintering regions, which include the Southeast United States, the Northeast Gulf of Mexico, northern Brazil, and Tierra del Fuego at the southern tip of South America; the red knot is an uncommon to rare winter resident or visitor in Mississippi. Rufa red knots utilize specific key stopover areas in Mississippi during both the spring and fall migrations for resting and feeding. It has been documented mainly on the offshore islands but has been recorded on all major islands from Cat Island east to Petit Bois Island, with only five birds at Horn Island observed during the peak winter months. The peak count of 74 birds at Long Beach occurred in January 1986 (USFWS, 2014). Although known to occur in the study area, it is unlikely that rufa red knots occur in the proposed Project area as most documented occurrences have been on the barrier islands.

Piping plover (*Charadrius melodus*)

The piping plover is federally listed as threatened with critical habitat and State-listed as endangered. It is known to occur in Hancock, Harrison, and Jackson counties (USFWS, 2012a; MMNS, 2011). Piping plovers breed in the northern Great Plains of the U.S. and Canada, along beaches of the Great Lakes, and along the Atlantic coast. Following the breeding season, this species migrates to the southern U.S. Atlantic coastline, the Gulf coastline, and to scattered Caribbean islands. Thus, piping plovers are potential winter residents (November to March) and spring and fall migrants in the study area. This species can be found on ocean beaches or on sand or algal flats in protected bays, mostly on sandflats, sandy mudflats, and sandy beaches in areas of high habitat heterogeneity (USFWS, 1996).

Critical habitat has been designated for the piping plover along the Mississippi coast, including portions of the study area. Critical habitat units in the study area include Mississippi units 02–06 (along the coast), 12 (Deer Island), and 14 (Cat, East Ship Island, and West Ship Island) (see Figure 3.19-1). Mississippi Unit MS-04 is directly west of Gulfport harbor and Unit MS-05 is directly east of the harbor. Piping plovers are likely to be present in the study area and a BA of the potential impact to piping plover from the proposed Project will be prepared due to the close proximity of the Project area to the designated critical habitat units mentioned above (Appendix N).

Southeastern snowy plover (*Charadrius nivosus tenuirostris*)

The southeastern snowy plover is State-listed as endangered and is known to occur on barrier islands and occasionally on mainland beaches in Harrison County (MNHP, 2011). The snowy plover is a small shorebird with gray and whitish feathers. The legs are relatively short and pale grey. It was previously included within *C. alexandrines*; however, *C. alexandrinus* is on average slightly darker and has slightly longer and darker legs. It is known to occur throughout the study area and has been documented utilizing areas adjacent to the Project area (see MNHP letter dated December 10, 2015, Appendix E-2).

Bald eagle (*Haliaeetus leucocephalus*)

The bald eagle has been delisted as a federally threatened species. Although delisted, nesting bald eagles and their nest trees are protected by law under the Bald and Golden Eagle Protection Act (USFWS, 2012a). The bald eagle is still listed as endangered in Mississippi, but the list is outdated (MNHP, 2011). As population numbers increase, bald eagles may be found throughout Mississippi and are known to occur in the study area. However, it is unlikely that suitable nest trees are located within the Project area, and no nests have been reported within the Project area.

Brown pelican (*Pelecanus occidentalis*)

The brown pelican has been removed from the Federal list of threatened and endangered species; however, it is on MNHP's list of endangered species of Mississippi (MNHP, 2011). It is known to occur throughout the study area and may be present in the Project area.

Bewick's wren (*Thryomanes bewickii*)

Listed on MNHP's list of endangered species of Mississippi, the Bewick's wren is known to occur in Harrison and Jackson counties (MNHP, 2011). It is unlikely that the wren is present in the Project area because there are no remaining population strongholds and it appears to be absent as a breeder east of the Mississippi River (NatureServe, 2010).

Peregrine falcon (*Falco peregrinus*)

Listed on the MNHP's list of endangered species of Mississippi, the peregrine falcon is known to occur in Jackson County within the study area but not in the vicinity of the Project area (MNHP, 2011).

3.19.2.2 Mammals

There are seven federally listed threatened or endangered mammals, two of which are also Stated listed as endangered, known to potentially occur in the study area (see Table 3.19-1).

West Indian manatee (*Trichechus manatus*)

The West Indian manatee is a federally and State-listed endangered aquatic mammal (MMNS, 2011; MNHP, 2011; USFWS, 2012a). It is also protected under the Marine Mammal Protection Act of 1972 (16 USC Chapter 31 as amended). It inhabits marine, estuarine, and freshwater environments, preferring large, slow-moving rivers, river mouths, and shallow coastal areas such as coves and bays (Lefebvre et al., 1989; USFWS, 2013b). Manatees are opportunistic herbivores, feeding on a wide variety of submerged, floating and emergent marine, estuarine, and freshwater plants (O'Shea and Ludlow, 1992). The manatee is more common in the warmer waters off of coastal Mexico, the West Indies, and Caribbean to northern

South America (NatureServe, 2010). Outside of Florida, manatees are mainly migratory species during the warmer months and sightings in Mississippi have increased (O'Shea and Ludlow, 1992; Mississippi-Alabama Sea Grant Consortium, n.d.). During summer months, manatees may migrate as far north as coastal Virginia on the east coast and as far west as the Louisiana coast on the Gulf. Manatees are known to migrate through the study area, and in May 2011, two fishermen reported hooking a manatee around Katrina reef near Deer Island, just off the Mississippi coast (Raines, 2011). According to USFWS (2013b), the manatee may potentially occur in coastal waters off of Hancock, Harrison, and Jackson counties, whereas, MMNS (2011) shows the manatee only occurring in coastal waters off of Harrison County. Thus, the West Indian manatee could occur within the Project area, but likely as a transient and not as a resident.

Louisiana black bear (*Ursus americanus luteolus*)

The Louisiana black bear is federally listed as threatened throughout its historic range (FR, 1992). It is also a State-listed endangered species (MMNS, 2011). Currently, the Louisiana black bear population is concentrated in Louisiana but known to be present in the study area (MNHP, 2011; Young, 2006; USFWS, 2012a). This subspecies of black bear historically inhabited east Texas, Arkansas, Louisiana, and southern Mississippi, but is now confined to small numbers in Mississippi, close to the Mississippi River, and two reproducing sub-populations in the Tensas River Basin and Atchafalaya River Basin in Louisiana (FR, 1990; Young, 2006). Until recently, black bears in Mississippi were predominantly males that had dispersed from core populations in surrounding states but have now established reproducing populations in three areas within Mississippi: the Gulf Coast, the Loess Bluffs of southwest Mississippi, and the Mississippi River Delta (Young, 2006; MDWFP, 2011b). Based on reported black bear occurrences in Mississippi from 1996 to 2006 and 2008, no bears have been sighted in the study area (Young, 2006; MDWFP, 2011b). It is highly unlikely bears are present in the Project area due to the urban nature of the Project area.

Blue whale (*Balaenoptera musculus*)

The blue whale is listed as endangered under the ESA. Blue whales are known to inhabit subpolar and subtropical latitudes, but will migrate toward the poles in the spring to feed and are commonly observed off the coast of Canada. They are considered more coastal than the humpback whale (*Megaptera novae-angliae*) and migration is driven mostly by food availability. The southernmost range of the North Atlantic population of blue whales is thought to be Massachusetts; however, it has been reported that blue whales will occasionally stray into the Gulf or Caribbean, although rare (NMFS, 2013b). The blue whale is not expected to occur in the study area due to lack of food availability and water depth in Mississippi Sound.

Fin (or finback) whale (*Balaenoptera physalus*)

The finback or fin whale is listed as endangered under the ESA. Fin whales inhabit deep waters offshore of all major oceans, but are uncommon in the tropics. Much is unknown about the migration of the fin whale, but it is thought to move in and out of high latitude feeding areas. Known residents of fin whales occur in the Gulf of California, the East China Sea, and the Mediterranean Sea (NMFS, 2012a). The finback whale is not expected to occur in the study area.

Humpback whale (*Megaptera novaeangliae*)

Humpback whales are listed as endangered under the ESA. Humpback whales can be found in all major oceans from the equator to subpolar latitudes. Humpbacks prefer to feed along the eastern coast of the U.S. during spring, summer, and fall in cold, productive waters. During migration, feeding, and calving humpbacks will stay close to the surface. Calving typically occurs at offshore reef systems, islands, or continental shores (NMFS, 2013c). Humpback whales are not known to calf in the Gulf and are not expected to occur in the study area.

Sei whale (*Balaenoptera borealis*)

The Sei whale is currently designated as an endangered species under the ESA. The Sei whale is found in subtropical to subpolar regions, typically located on the edge of the continental shelf and slope, far from shore. This species is found in temperate, subtropical, and subpolar waters, but is known to prefer the temperate waters at midlatitudes. The overall distribution of Sei whales is unknown, but they are commonly found in the Gulf of Maine and on Georges Bank and Stellwagen Bank in the western North Atlantic during summers (NMFS, 2012b). The Sei whale is not expected to occur in the study area.

Sperm whale (*Physeter macrocephalus*)

The sperm whale is endangered throughout its range due mostly to overexploitation from commercial whaling during the past 2 centuries. Sperm whales inhabit deep waters and are rarely found in water with a depth less than 984 feet or surface temperature less than 59°F. Their distribution is dependent on their food source and suitable conditions for breeding, and varies with the sex and age composition of the group. The Gulf is home to a population of over 1,000 sperm whales year-round, but sightings are most common in the summer (NMFS, 2013d). In the Gulf, their habitat is located between 1,640 and 6,562 feet isobaths (Davis et al., 1998). Recent information suggests that the sperm whale population in the northern Gulf may be a Distinct Population Segment unique to the Gulf itself. The potential for additional protections under the ESA as a distinct population is currently being analyzed by NMFS. The sperm whale is not expected to occur in the study area due to the lack of water depth in Mississippi Sound and in the Project area, but it should be noted that this species is susceptible to ship strikes and disturbance by anthropogenic noise due to shipping activity (NMFS, 2013d).

3.19.2.3 Amphibians

There is one federally listed and one State-listed amphibian known to potentially occur in the study area (see Table 3.19-1).

Dusky gopher frog (*Rana sevosa*)

The dusky gopher frog is federally and State-listed as endangered with critical habitat and is known to occur in Harrison and Jackson counties (USFWS, 2009). It is medium-sized, large-headed frog and is considered a Distinct Population Segment of the gopher frog (USFWS, 2012b). Its range extends along the coastal plains region from the Florida Parishes of Louisiana to the Mobile River in Alabama (MMNS, 2001). In 2012, the USFWS designated a total of 6,477 acres as critical habitat for the dusky gopher frog spanning Louisiana's St. Tammany Parish and Mississippi's Forrest, Harrison, Jackson, and Perry counties (USFWS, 2012b) just outside the study area. Natural communities in these counties continue to be altered for agricultural, residential, and commercial purposes, most of which result in habitat fragmentation and/or habitat that is no longer suitable for the dusky gopher frog. Fire suppression of occupied habitat continues to be an ongoing concern (USFWS, 2009). The dusky gopher frog is not likely to occur within the Project area.

One-toed amphiuma (*Amphiuma pholeter*)

The one-toed amphiuma is State-listed as endangered. It is a slender aquatic salamander with one toe on each of its four tiny legs. The dark reddish brown salamander ranges from 3.5 to 12.4 inches in length. Its range is spotty for the east Gulf coastal plain in the southeastern U.S. It is known from the Panhandle of Florida, Georgia, Alabama, and one collection in Mississippi, on the Mississippi Sandhill Crane National Wildlife Refuge (MMNS, 2001). This species is not likely to occur within the Project area.

3.19.2.4 Reptiles

There are four federally listed endangered reptiles, four federally listed threatened reptiles, one candidate species, and three additional State-listed endangered reptiles known to potentially occur in the study area (see Table 3.19-1).

Alabama red-bellied turtle (*Pseudemys alabamensis*)

The Alabama red-bellied turtle, a freshwater to brackish pond turtle or terrapin, is a federally and State-listed endangered species (Leary et al., 2008; MMNS, 2011; MNHP, 2011; USFWS, 2012a). Carapace length averages 8 to 12 inches and is characterized by an orange to reddish plastron from which its common name arises (USFWS, 2013c). It prefers quiet backwaters with dense submersed aquatic vegetation (preferred food source and for basking) and also river channels but rarely in brackish or saltmarsh areas closer to the coast (NatureServe, 2010). Nesting occurs on sand dredged material banks and natural river and tributary levees. Until recently, the turtle was known to occur only in Alabama but has recently been reported in Mississippi and is believed to be endemic. In Mississippi, the turtle has been found in the Pascagoula River and in Back Bay of Biloxi watersheds in Harrison and Jackson counties (Leary et al., 2008). Although the turtle may be present in the study area, it is highly unlikely that it occurs in the Project area because of the extreme rarity of the turtle and lack of suitable habitat.

Hawksbill sea turtle (*Eretmochelys imbricate*)

The hawksbill sea turtle is a federally and State-listed endangered species (MMNS, 2011; MNHP, 2011; USFWS, 2012a). It is a small to medium-sized marine turtle notable for having overlapping scutes on its carapace, two claws in each of its flippers, and a distinctive hawk-like beak from which it gets its name. Adults may reach a length of 3 feet and weigh up to 300 pounds, but typically they average 2.5 feet in carapace length and weight around 176 pounds or less. The hawksbill is seldom seen in deep water and typically frequents rocky areas, coral reefs, and shallow coastal areas where it feeds primarily on sponges and other invertebrates. The distribution of the hawksbill sea turtle is circumtropical with regular occurrences in the Caribbean Sea and Gulf, especially southern Florida and Texas. In contrast to all other sea turtle species, hawksbills nest in low densities on scattered small beaches. Within the U.S., hawksbills are most common in Puerto Rico, where critical habitat has been designated on Isla Mona, Culebra Island, Cayo Norte, and Island Culebrita (USFWS, 2012c). While the hawksbill has been recorded in all of the Gulf states, observations in Mississippi state coastal waters are very rare (MMNS, 2001), and therefore it is unlikely to occur within the Project area.

Kemp's ridley (*Lepidochelys kempii*)

The Kemp's ridley sea turtle is a federally and State-listed endangered species (MMNS, 2011; MNHP, 2011; USFWS, 2012a). It is the smallest of the sea turtles, inhabiting shallow coastal and estuarine waters, usually over sand or mud bottoms. Adults are primarily restricted to the Gulf, although juveniles may range throughout the Atlantic Ocean and have been observed as far north as Nova Scotia (Musick, 1979) and in coastal waters of Europe (Brongersma, 1972). Almost the entire population of Kemp's ridleys nests on an 11-mile stretch of coastline near Rancho Nuevo, Tamaulipas, Mexico, approximately 190 miles south of the Rio Grande. Kemp's ridleys do not nest in Mississippi, but juveniles are regularly seen in both Mississippi Sound and around the barrier islands in crab-rich shallow waters (MMNS, 2001). The Institute for Marine Mammal Studies (IMMS) released 6 satellite-tagged Kemp's ridleys in November 2010 in the Mississippi Sound and released 10 in April 2011, of which 6 were satellite tagged off the coast of Cedar Key, Florida. The majority of these sea turtles were captured by fisherman in Waveland, Mississippi, outside the study area, just west of Bay St. Louis (IMMS, 2011). This species is likely to occur within the study area and possibly within the Project area.

Leatherback sea turtle (*Dermochelys comacea*)

The leatherback sea turtle is a federally and State-listed endangered species (MMNS, 2011; MNHP, 2011; USFWS, 2012a). It is probably the most wide-ranging of all sea turtle species. It occurs in the Atlantic, Pacific, and Indian oceans; as far north as British Columbia, Newfoundland, Great Britain, and Norway; as far south as Australia, Cape of Good Hope, and Argentina; and in other waterbodies such as the Mediterranean Sea (National Fish and Wildlife Laboratory, 1980). The leatherback is mainly pelagic, inhabiting the open ocean, and seldom approaches land except for nesting (Eckert, 1992) or when following concentrations of jellyfish (Texas Parks and Wildlife Department, 2006). It dives almost continuously, often to great depths. Leatherbacks nest primarily in tropical regions and only sporadically in some of the Atlantic and Gulf states of the continental U.S., with one nesting reported as far north as North Carolina (Schwartz, 1976). In the Atlantic and Caribbean, the largest nesting assemblages occur in the U.S. Virgin Islands, Puerto Rico, and Florida (NMFS, 2013e). No nests of this species have been recorded on Mississippi beaches or barrier islands. In Mississippi waters, the leatherback is observed sporadically. A group of at least six was observed feeding on jellyfish near Petit Bois Island in 2000 (MMNS, 2001). Leatherback sea turtle are pelagic but are sporadically observed in Mississippi water. They are unlikely to occur in the study area except on rare occasions.

Green sea turtle (*Chelonia mydas*)

The green sea turtle is a federally listed threatened species and a State-listed endangered species (MMNS, 2011; MNHP, 2011; USFWS, 2012a). It is a circumglobal species in tropical and subtropical waters. In U.S. Atlantic waters, it occurs around the U.S. Virgin Islands, Puerto Rico, and continental U.S. from Massachusetts to Texas. Major nesting activity occurs on Ascension Island, Aves Island (Venezuela), Costa Rica, and in Surinam. Relatively small numbers nest in Florida, with even smaller numbers in Georgia, North Carolina, and Texas (Hirth, 1997; NMFS and USFWS, 1991). The green turtle inhabits shallow bays and estuaries where its principal foods, the various marine grasses, grow (Bartlett and Bartlett, 1999). While green turtles prefer to inhabit bays with seagrass meadows, they may also be found in bays that are devoid of seagrasses. The turtles are not known to nest on the Mississippi coast or barrier islands, but may be attracted to seagrass beds as a food source in nearshore waters (Gunter, 1981; McKay et al., 2001). While green sea turtles have not been documented in the study area, because of their migratory behavior they could possibly occur in the Project area.

Loggerhead sea turtle (*Caretta caretta*)

The loggerhead sea turtle is a federally listed threatened species and a State-listed endangered species (MMNS, 2011; MNHP, 2011; USFWS, 2012a). It is widely distributed in tropical and subtropical seas, being found in the Atlantic Ocean from Nova Scotia to Argentina, the Gulf, Indian, and Pacific oceans (although it is rare in the eastern and central Pacific), and the Mediterranean Sea (Iverson, 1986; Rebel, 1974; Ross, 1982). In the continental U.S., loggerheads nest along the Atlantic coast from Florida to as far north as New Jersey (Musick, 1979) and sporadically along the Gulf Coast, including Mississippi. The loggerhead prefers shallow inner continental shelf waters, occurring only very infrequently in the bays. It is often seen around offshore oil rig platforms, reefs, and jetties. Loggerheads are probably present year-round but are most noticeable in the spring, when one of their food items, the Portuguese man-o-war, is abundant. The loggerhead occasionally nests on Mississippi's offshore barrier island. One nest was documented on Round Island at the mouth of the Pascagoula River in 1999, and rarely a nest will be placed on the mainland beach (MMNS, 2001). The loggerhead sea turtle is likely to pass through the study area, but would not be a resident of Mississippi Sound.

Gopher tortoise (*Gopherus polyphemus*)

The gopher tortoise is a federally listed threatened species and a State-listed endangered species (MMNS, 2011; MNHP, 2011; USFWS, 2012a). The terrestrial tortoise is large, reaching shell lengths of 15 inches and grayish-black in color (USFWS, 2013d). They excavate deep burrows for protection from temperature extremes and predation (NatureServe, 2010). Studies have also shown commensalism with other protected species such as the eastern indigo snake (*Drymarchon couperi*) and dusky gopher frog (*Rana sevosa*), providing shelter and habitat heterogeneity, as well as a food source for the gopher tortoise commensal scarab beetle (*Onthophagus polyphemi polyphemi*) (MMNS, 2011; NatureServe, 2010). Habitat preferred by the tortoise consists of a well-drained, sandy substrate with an ample food source, mostly in sandhill communities (NatureServe, 2010). Sunlit areas are required for nesting. The tortoise may be present in the study area but because of specific burrow and nesting requirements, it is highly unlikely that the tortoise occurs in the Project area.

Eastern indigo snake (*Drymarchon couperi*)

The eastern indigo snake is a State-listed endangered species (MNHP, 2011). The longest North American snake (average adult size is 60 to 74 inches), the eastern indigo is a nonvenomous colubrid species with a blue-black coloration that gives it its name. The species is no longer federally listed in Mississippi as occurrences are limited to Alabama, Florida, and Georgia (USFWS, 2013e), and there have been no verified records in Mississippi for over 25 years (USFWS, 2010b). Preferred habitat is sandhill regions and is frequently found in association with gopher tortoise burrows, which provide shelter and nesting areas (NatureServe, 2010). Although it may be present in the study area, it is highly unlikely it would be present in the Project area.

Yellow-blotched map turtle (*Graptemys flavimaculata*)

The yellow-blotched map turtle is a federally listed threatened species and a State-listed endangered species (MNHP, 2011; USFWS, 2012a). It is not known to occur in Hancock or Harrison counties. An aquatic turtle, it is only known to occur in the Pascagoula River system (NatureServe, 2010; USFWS, 2013f)). The Pascagoula River system is outside of the study and Project area.

Black pine snake (*Pituophis melanoleucus* ssp. *lodingi*)

The black pine snake is currently a candidate for Federal listing and known to occur in Harrison County and possibly in Jackson County (USFWS, 2012a). It is also a State-listed endangered species (MNHP, 2011). Endemic to upland longleaf pine forests, black pine snakes were once common throughout the southeastern U.S. (NatureServe, 2010). Historically it was known to occur in 1 parish in Louisiana, 14 counties in Mississippi, and 3 counties in Alabama west of the Mobile River Delta (USFWS, 2010a). Surveys and trapping indicate that it has been extirpated from Louisiana and four counties in Mississippi. Mississippi populations are concentrated in the DeSoto National Forest. Preferable habitat consists of conditions found in longleaf pine forests such as well-drained sandy soil, a fire-suppressed mid-story, and dense herbaceous ground cover (NatureServe, 2010; USFWS, 2013g). The DeSoto National Forest is outside of the study area and it is unlikely that the black pine snake occurs is the study area and is not expected to occur in the Project area.

Rainbow snake (*Farancia erytrogramma*)

Although the rainbow snake is not federally listed as a threatened or endangered species, the State of Mississippi lists it as endangered (MNHP, 2011). The rainbow snake is listed as imperiled and known to occur in Hancock and Jackson counties (MMNS, 2011). It is an iridescent black-to-violet snake with three red longitudinal stripes. It is semi-aquatic and primarily found near rivers, swamps or open marshes (fresh and brackish) with suitable sand for burrowing (NatureServe, 2010; Virginia Department of Game and Inland Fisheries, 2010). It may be present in the study area but it is unlikely that it is present in the Project area because of the lack of preferable habitat.

Southern hognose snake (*Heterodon simus*)

The southern hognose snake is listed as endangered within the State of Mississippi. Habitat preferences are sandhill pine, flatwood and coastal dune habitats. Prior to the snake's decline in 1999, its range extended from North Carolina to Southern Mississippi. There have been no reports of the southern hognose snake within the State of Mississippi or Alabama in the last 20 years, but its fossorial, underground lifestyle decreases encounters and may be partially responsible for lack of reports (Tuberville, 2000). It is unlikely that this species will be encountered within the Project area due to lack of suitable habitat.

3.19.2.5 Fish

There is one federally listed fish species that is threatened with critical habitat, five Federal SOCs, two State-listed endangered species, and one Federal candidate species that is also State-listed as endangered known to potentially occur in the study area (see Table 3.19-1).

Gulf sturgeon (*Acipenser oxyrhynchus desotoi*)

The Gulf sturgeon (*Acipenser oxyrinchus desotoi*) is a primitive anadromous fish, which means it breeds in freshwater after migrating up rivers from marine and estuarine environments. It is identified by its bony plates or scutes and is nearly cylindrical in form. The head ends in a hard, extended snout; the mouth is inferior and protrusible and is preceded by four conspicuous barbels. The tail (caudal fin) is distinctly asymmetrical, the upper lobe is longer than the lower lobe (heterocercal). Adults range from 4 to 8 feet in length, with adult females larger than males (50 CFR Part 226). In the late nineteenth and early twentieth centuries, the Gulf sturgeon supported commercial fisheries, and was harvested for caviar, flesh for smoked fish, and other products. Overfishing of the species caused its numbers to decline throughout most of the twentieth century. Habitat loss associated with the construction of in-water structures such as dams and sills also resulted in declining population numbers (50 CFR Part 226).

The Gulf sturgeon was listed on September 30, 1991, by the USFWS, as a threatened species under the ESA (16 U.S.C. 1531 et seq.) (56 FR 49653). The 1991 listing identified other potential threats that included modifications to habitat associated with dredged material disposal, desnagging (removal of trees and their roots), and other navigation maintenance activities; incidental take by commercial fishermen; poor water quality associated with contamination by pesticides, heavy metals, and industrial contaminants; aquaculture and incidental or accidental introductions; and the Gulf Sturgeon's slow growth and late maturation (50 CFR Part 226). The Gulf Sturgeon Recovery/Management Plan (USFWS and Gulf States Marine Fisheries Commission [GSMFC], 1995) provides more information on the species decline and threats.

Critical habitat is a term used in the ESA to refer to specific geographic areas that are essential for the conservation of a threatened or endangered species and that may require special management and protection. Critical Habitat was designated for the federally threatened Gulf sturgeon on March 19, 2003 (68 FR 13369 13495). There are 14 Designated Critical habitat units. The Project area is located in Gulf Sturgeon Critical Habitat Unit 8. The specific area of Unit 8 where the Proposed Project Alternative is located includes the following description excerpt from 50 CFR Part 226:

The Mississippi Sound includes adjacent open bays including Pascagoula Bay, Point aux Chenes Bay, Grand Bay, Sandy Bay, and barrier island passes, including Ship Island Pass, Dog Keys Pass, Horn Island Pass, and Petit Bois Pass. The northern boundary of the Mississippi Sound is the shorelines of the mainland between Heron Bay Point, Mississippi and Point aux Pins, Alabama. Critical habitat excludes St. Louis Bay, north of the railroad bridge across its mouth; Biloxi Bay, north of the US 90 bridge; and Back Bay of Biloxi.

The primary constituent elements (PCEs) essential for the conservation of Gulf sturgeon are those habitat components that support feeding, resting, and sheltering, reproduction, migration, and physical features necessary for maintaining the natural processes that support these habitat components. Impacts to these PCEs are discussed in Section 4.19.2.4.

The PCEs include:

1. Abundant prey items within riverine habitats for larval and juvenile life stages, and within estuarine and marine habitats and substrates for juvenile, subadult, and adult life stages;
2. Riverine spawning sites with substrates suitable for egg deposition and development, such as limestone outcrops and cut limestone banks, bedrock, large gravel or cobble beds, marl, soapstone or hard clay;
3. Riverine aggregation areas, also referred to as resting, holding, and staging areas, used by adult, subadult, and/or juveniles, generally, but not always, located in holes below normal riverbed depths, believed necessary for minimizing energy expenditures during fresh water residency and possibly for osmoregulatory functions;
4. A flow regime (i.e., the magnitude, frequency, duration, seasonality, and rate-of-change of fresh water discharge over time) necessary for normal behavior, growth, and survival of all life stages in the riverine environment, including migration, breeding site selection, courtship, egg fertilization, resting, and staging; and necessary for maintaining spawning sites in suitable condition for egg attachment, egg sheltering, resting, and larvae staging;
5. Water quality, including temperature, salinity, pH, hardness, turbidity, oxygen content, and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages;
6. Sediment quality, including texture and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages; and

7. Safe and unobstructed migratory pathways necessary for passage within and between riverine, estuarine, and marine habitats (e.g., a river unobstructed by any permanent structure, or a dammed river that still allows for passage).

Gulf sturgeon is under the joint jurisdiction of the USFWS and NMFS. The USFWS maintains primary responsibility for recovery actions and NMFS assists in and continues to fund recovery actions pertaining to estuarine and marine habitats. The USFWS is responsible for all critical habitat consultations in riverine units. Responsibility for the estuarine units has been divided based on the action agency involved. The NMFS is responsible for all consultations regarding Gulf sturgeon and critical habitat in marine units. The NMFS has jurisdiction over the Gulf sturgeon for this Project based on the nexus with the USACE and the location of critical habitat units involving the Project within marine units.

A benthic habitat assessment of the proposed PGEP Project area and study area was conducted in 2012 (Appendix L). Results showed that similar habitat characteristics occur in the project footprint, Project area, and study area that were documented at locations where adult Gulf sturgeon were repeatedly located. Preferred habitat is described as shallow water (<13 feet) over sandy substrate with water quality characteristics such as high DO content (>7.2 mg/L) that also contained two or three organisms known to occur in adult diets. Preferred habitat was located in the North Harbor fill, West Pier Expansion, and west of the West Pier Expansion (Appendix L).

Historically, Gulf sturgeon occurred in rivers from the Mississippi River to the Tampa Bay, and in bays and estuaries from Florida to Louisiana, including the Pearl River and Pascagoula River (USFWS and GSMFC, 1995). Gulf sturgeon have been documented to inhabit coastal rivers from Louisiana to Florida during the warmer months and overwinters in estuaries, bays, and the Gulf. In Florida, Gulf sturgeon have been documented to spend summer months near the mouth of springs and cool water rivers in the Suwannee River (USFWS and GSMFC, 1995). Fox et al. (2002) found that Gulf sturgeon occupied the shoreline areas of Choctawhatchee Bay, Florida, in 7 to 10 feet over sand substrate.

Immature and mature Gulf sturgeon participate in freshwater migration. Studies have shown that subadults and adults spend 8 to 9 months each year in rivers and 3 to 4 of the coolest months in the estuaries or Gulf waters (USFWS and GSMFC, 1995).

Gulf sturgeon are found in rivers, bays, and estuaries along the Mississippi Gulf coast. Ross et al. (2009) and Heise et al. (2004) conducted an extensive tagging and tracking study from 1997 to 2004 where they followed individual fish throughout the Pascagoula and Pearl rivers, Mississippi Sound, and in Breton Sound. In Mississippi Sound, the majority of the tracking effort was near the barrier islands and concentrated in the central and eastern portion of Mississippi Sound. Gulf sturgeon from both the Pearl and Pascagoula Rivers are known to use the coastal Mississippi including the barrier islands, for migration and foraging. Rogillio et al. (2007) and Ross et al. (2009) located tagged adult Gulf sturgeon among Cat, Ship, Horn, and Petit Bois islands from October through March.

The U.S. Army Engineer Research and Development Center (ERDC) is conducting an ongoing Gulf sturgeon monitoring effort at Ship Island in association with the MsCIP. The study's objective is to define the seasonal occurrences and movements of Gulf sturgeon around Ship Island and within Camille Cut. This research has shown that between September 2011 and June 2012 a total of 13,720 detections from approximately 14 Gulf sturgeon originating from 5 rivers (Pearl, Pascagoula, Escambia, Blackwater, and Yellow) were found in their study area (ERDC, 2012).

Comparatively, between September 2012 and June 2013, they logged 94,244 detections from 21 Gulf sturgeon originating from the Pearl, Pascagoula, Escambia, Blackwater, Yellow, Choctawhatchee and Brothers rivers. The greatest number of Gulf sturgeon for the 2011-2012 sampling period occurred during November and December followed by decreasing monthly numbers for January through March; whereas, the greatest number of fish documented in the array for 2012-2013 occurred in December with similar numbers through March. They noted a significant decrease in Gulf sturgeon activity in April, while the greatest number of detections was recorded in December and January. The fewest number of detections per month were reported for October and April (ERDC, 2013). The summary for the 2014 deployment period had not been submitted to the USACE yet.

Havrylkoff et al. (2012) used automated telemetry receivers to monitor Gulf sturgeon in the Pascagoula River and associated estuary. They observed that Gulf sturgeon appear to prefer the eastern distributary upriver from Bayou Chemise as their primary travel corridor between freshwater habitats and marine feeding grounds in the area studied. In their study, the western distributary of the Pascagoula River appeared to represent the main entrance point by Gulf sturgeon to the Pascagoula River (Havrylkoff et al., 2012). Prolonged and extensive use of the Pascagoula River mouth and immediate adjacent coastal habitats associated with the western distributary by Gulf sturgeon was observed in April and May within the arrays during seasonal migrations. Previous manual tracking activity within this system had not documented Gulf sturgeon within the coastal nearshore environment between April and September. Findings by Havrylkoff et al. (2012) were supported by research conducted by Peterson et al. (2015) that documented Gulf sturgeon in the Mississippi Sound during May (Appendix O). Recent tagging efforts led by Mark S. Peterson of the University of Southern Mississippi, Gulf Coast Research Laboratory, and William T. Slack of the ERDC have shown that adults spend more time in the Mississippi Sound than previously thought (Peterson et al., 2015, Appendix O).

Gulf sturgeon monitoring was conducted in the Mississippi Sound, between West and East Ship Islands, and around the proposed Project area (Peterson et al., 2015, Appendix O; Peterson, 2015) from fall 2012 to fall 2014. The monitoring study was conducted using a network of telemetry receivers in the area surrounding the proposed Project (Gulfport array) and further east (east gate) and west (west gate) between the Port and the Pascagoula and Pearl Rivers, respectively, to determine the use of near shore and the proposed Project area by Gulf sturgeon (Peterson et al., 2015, Appendix O). Key results from this study are summarized below; detailed results are provided in Appendix O.

- Adult Gulf sturgeon are mainly from the Pascagoula and Pearl drainages but there were some eastern population fish [Escambia, Choctawhatchee and Blackwater (recaptured fish) drainages] that appeared in the Gulfport array.
- Overall, Gulf sturgeon occurrence appears to be more concentrated on the east gate and eastern portion of the Gulfport array compared to the west gate and western portion of the array.
- Total detections were markedly lower in the year 2 data set than year 1, with four individuals (two from each drainage) returning to the array over the 2 years of this study. These data suggest some level of consistent and repeatable regional-scale movement patterns for Gulf sturgeon from the western Gulf drainages.
- The number of detections per fish and time within the array varied greatly among all the detected Gulf sturgeon, with individuals taking both transitory paths through the array, and localized movements within the entire array.
- Gulf sturgeon from each life stage category (adult, sub-adult, juvenile) were detected during the study; however, the adults, unexpectedly, had the greatest number of occurrences and detections. Juveniles and sub-adults life history stages may experience restricted movements away from natal rivers as young fish, and only begin to expand their range later with age based on the relative low occurrence of detections of those two life history stages. Thus, adults have been documented within the Project area during pre- and post-migratory periods. The data suggest that the habitat monitored as part of the study serves as a corridor for Gulf sturgeon between other habitat types, drainages, feeding zones, or is used as a pre-/post-migratory acclimation zone.

Alabama shad (*Alosa alabamae*)

The Alabama shad is a Federal SOC (MMNS, 2011; NMFS, 2013f). An anadromous fish, it requires medium-to-large flowing rivers for spawning (NMFS, 2013f; NatureServe, 2010). Historically, the species ranged from the Suwannee River, Florida, to the Mississippi River, and is known to use the Tombigbee, Pearl and Pascagoula river drainages, but is thought to be extirpated from all drainage basins except the Pascagoula River system (Ross, 2001; Mickle et al., 2009). Ross (2001) also mentions that although this species has not been collected from coastal rivers, it is likely that it uses some of the larger coastal streams. Although this species is thought to be extirpated from the Pearl River, it is still found in Lake Pontchartrain, which is west of the Project area, the Pascagoula River (east of the Project area), and utilizes Mississippi Sound to complete its life history. The majority of the research to date in Mississippi has been conducted in the Pascagoula River and focuses on the freshwater phase of its life history (Mickle et al., 2009). Based on this information, the Alabama shad is not likely to occur in the study area or Project area.

Dusky shark (*Carcharhinus obscurus*)

The dusky shark is a Federal SOC (MMNS, 2011; NMFS, 2013g). The dusky shark is a large shark with a wide-ranging distribution in warm-temperate and tropical continental waters. They are coastal and pelagic in their distribution, occurring from the surf zone to well offshore (NMFS, 2013g), and reaching depths of 1,300 feet. Because it apparently avoids areas of lowest salinities, it is not commonly found in estuaries (Compagno, 1984). The dusky shark is not likely to occur in the Project area.

Sand tiger shark (*Odontaspis taurus*)

The sand tiger shark is a Federal SOC (MMNS, 2011; NMFS, 2013h). Sand tiger sharks have a broad inshore distribution. In the western Atlantic, this shark occurs from the Gulf of Maine to Florida, in the northern Gulf, in the Bahamas, and Bermuda. A cool temperate species, it is more common north of Cape Hatteras (Hoese and Moore, 1998). They are generally coastal and are usually found in the surf zone down to depths of 75 feet. They may also be found in shallow bays around coral reefs, and to depths of 600 feet on the continental shelf. They usually live near the bottom, but may be found throughout the water column. Their biggest threat is overfishing (NMFS, 2013h). Habitat for this species may exist in the study area; however, they are uncommon in the Gulf and are not likely to occur in the study or Project area (Hoese and Moore, 1998).

Speckled hind (*Epinephelus drummondhayi*)

The speckled hind is a Federal SOC (MMNS, 2011; NMFS, 2013i). The speckled hind inhabits warm, moderately deep waters from North Carolina to Cuba, including Bermuda, the Bahamas, and the Gulf. The preferred habitat is hard-bottom reefs in depths ranging from 150 to 300 feet, where the temperatures are from 60 to 85°F (NMFS, 2013i). Habitat for this species does not exist in the Project area.

Warsaw grouper (*Epinephelus nigritus*)

The Warsaw grouper is a Federal SOC (MMNS, 2011; NMFS, 2013j). The Warsaw grouper is a very large fish found in the deepwater reefs of the southeastern U.S. This fish ranges from North Carolina to the Florida Keys and throughout much of the Caribbean and Gulf to the northern coast of South America. This species inhabits deepwater reefs on the continental shelf break in waters 350 to 650 feet deep (NMFS, 2013j). Habitat for this species does not exist in the Project area.

Crystal darter (*Crystallaria asprella*)

The crystal darter is a State-listed endangered species (MMNS, 2011). A freshwater species, it was historically known to inhabit the Pearl River basin in Hancock County and may still exist in small numbers. Preferred habitat is clear to slightly turbid, small-to-medium rivers without mud, and clay or submersed vegetation with clean sand or gravel (NatureServe, 2010; Ross, 2001). The only occurrences of the crystal darter in coastal counties of Mississippi were in the Pearl and Pascagoula river drainages (Ross, 2001). It is extremely unlikely that the species occurs in the study or Project area.

Ironcolor shiner (*Notropis chalybaeus*)

The ironcolor shiner is a State-listed endangered species (MMNS, 2011). A freshwater minnow, it prefers acidic creeks and small coastal rivers with sandy substrate, inhabiting pools and slow runs with submersed aquatic vegetation, and clear but tannin-stained water (Ross, 2001; NatureServe, 2010). Historically, the ironcolor shiner occurred along coastal streams of the Biloxi, Jourdan, and Wolf rivers, as well as in the Pascagoula River drainage (Escatawpa River) (Ross, 2001). A thorough survey of historical localities of this species in Mississippi was done and a single specimen was collected in the Escatawpa River. The species may be present in the northern portion of the study area, where suitable habitat is present but it is extremely unlikely that the species occurs in the Project area.

Pearl darter (*Percina aurora*)

The pearl darter is a Federal candidate species and State-listed as an endangered species (USFWS, 2013h; MMNS, 2011). A small, nondescript, freshwater fish, it is known only in Louisiana and Mississippi and historically inhabited rivers within the Pascagoula and Pearl River drainages. It is now assumed that both Louisiana and Mississippi populations in the Pearl drainage are extirpated, but recent survey efforts have documented its continued existence in the Leaf, Chickasawhay, Chunky, Bouie, and Pascagoula Rivers (MMNS, 2001). The species is likely present in the Pascagoula River in Jackson County where it has been known to occur in rapids or riffles over gravel or bedrock substrata in slow-to-moderate currents. It is extremely unlikely that the species occurs in the study or Project area.

3.19.2.6 Coral

There is one coral Federal SOC known to potentially occur in the study area (see Table 3.19-1).

Ivory tree coral *(Oculina varicosa*)

Colonies of ivory tree coral are found to depths of 500 feet on substrates of limestone rubble, low-relief limestone outcrops, and high-relief, steeply sloping prominences (NMFS, 2013k). The Project area is not located within the historical range for this species, nor does suitable habitat exist in the Project vicinity. Therefore, ivory tree coral is not likely to occur within the study or Project area.

3.19.3 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 take could result from elevated underwater noise from proposed Project construction activities (e.g., dredging, pile driving) resulting in instantaneous death, latent death soon after exposure, or death several days later. Indirect take 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 construction activities may occur from pile installation. Underwater pile driving activities have the potential to produce high intensity sound pressure underwater, which could cause injurious or lethal impacts to fish (Caltrans, 2001; Hastings and Popper, 2005; Popper and Hastings, 2009). Underwater sounds with a sharp sound pressure peak occurring in a short interval of time can affect fish with swim bladders, such as sturgeon (Caltrans, 2001). 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, 2001).

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 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 to protect listed fish species that are larger than 2 grams, and less than 183 dB cSEL for fish species that are smaller than 2 grams (FHWG 2008).

3.20 CULTURAL RESOURCES

3.20.1 Cultural Overview

The following provides a general overview of the cultural history of the Project area. Discussion is divided into the prehistoric and historic periods. Section 3.20.2 provides discussion specific to shipwrecks and nautical concerns.

3.20.1.1 Prehistoric Period

The earliest generally accepted culture in the Americas, the Paleoindian (10,000 Before the Common Era [B.C.E.] to 7000 B.C.E.), appears to have extended over most, if not all, of North America by the end of the Pleistocene epoch. The period was characterized by a cooler and drier climatic regiment. The coastline extended some 100 miles south of its present location. The Gulfport area was located well in the interior and consisted mostly of open grasslands and scattered stands of fir and spruce. Paleoindian occupation of the modern Mississippi coast is evidenced by recovery of lanceolate projectile points, including Clovis, Cumberland, Quad, and Redstone, from mainly isolated contexts (Giardino, 2011). Groups were organized as small migratory bands following the grazing patterns of the period prey species and collecting wild plants.

The warmer and drier climate at the beginning of the Holocene period gave rise to adaptations in human culture known as the Archaic (8000 to 1000 B.C.E.). Subsistence strategies were characterized by an intensified exploitation of a wide range of local resources. The Archaic has been divided into three subperiods: Early, Middle, and Late. Early Archaic groups are believed to have migrated seasonally, like the Paleoindian cultures. Lithic production exhibits an increase in the variety of types and styles, and likely reflects a shift to smaller species of game. Middle Archaic sites increase along the coast and are often associated with shell middens, an important indication of subsistence activities during this period. The Middle Archaic is also characterized by the emergence of territorialism, as seen in the use of flexed burials, and a more-regional diversity in artifact assemblages. During the Late Archaic human population increased significantly and began following a more-sedentary lifestyle. A greater level of social integration is observed as band-level societies gave way to more-complex tribal types (Baker and Britt, 1992). This is evidence by the construction of earthen mounds, the introduction of pottery making, and the development of organized regional exchanges and formal trade networks (Giardino, 2011). Poverty Point is the regional expression of the Late Archaic in southern Mississippi Valley and Gulf Coast.

The Woodland period (1000 B.C.E to Common Era [C.E.] 700) is defined by the rise of horticulture, larger, more-permanent villages with increased use of burial mounds and the introduction of temple mounds, and expansion in pottery styles and decorations. Like the Archaic, the Woodland period is divided into three similarly named subperiods. Along the coast, the Early Woodland appears as a continuation of Late Archaic traditions, but is distinguished from the former period by the introduction of Tchula style pottery (Baker and Britt, 1992). The Middle Woodland is marked by the arrival of Hopewellian culture. Earthwork construction reached its peak, and recorded sites contain a variety of exotic trade goods (Giardino, 2011). The Late period is characterized as a time of decline with few indications of cultural refinement beyond the development of the bow and arrow (Baker and Britt, 1992).

The Mississippian period (C.E. 700 to 1500) represents the last cultural period before European contact. The period is characterized by an increase in population and expansion of ceremonial complexes. Warfare is indicated by evidence of traumatic burials and construction of palisaded villages. Ceramics are tempered with crushed shells and show a wide variety of forms and greater ranges in size (Baker and Britt, 1992). However by C.E. 1400, populations began to decline and construction of mound complexes slowed. The arrival of Europeans at the beginning of the sixteenth century hastened that decline through disease and violence.

3.20.1.2 Historic Period

The coastal region of Mississippi was first investigated by Spanish explorers during the early sixteenth century. Alonso Álvarez de Piñeda was commissioned by Francisco de Garay, the governor of Jamaica, to explore between Mexico and Florida for a supposed water route to Asia. This expedition, which left Jamaica in 1519, was the first to chart the northern Gulf Coast and document the Mississippi River (Weddle, 1985).

Spanish settlement in North America was concentrated in Mexico and a small garrison on the east coast of Florida. The central Gulf Coast would receive little European attention until the end of the seventeenth century. During that period, the French sought to establish a colony in the lower Mississippi River valley to further expand their interests in North America. Their first attempt, conducted by René Robert Cavelier, Sieur de La Salle in 1685, missed its intended Mississippi River destination and ended up at Matagorda Bay in Texas. A lack of crucial supplies due to shipwreck, disease, and ultimately a massacre by Native Americans resulted in the loss of the colony and nearly all of its inhabitants (Weddle, 2011).

The French returned to the region in 1699. In that year, Pierre LeMoyne, Sieur D'Iberville, with three frigates, explored the northern Gulf for a site for a new colony. After encountering the Spanish at a newly settled Pensacola, D'Iberville briefly reconnoitered Mobile Bay before discovering the exceptional anchorage on the north side of Ship Island off the Mississippi coast (Elliot, 1999). With a natural water depth of between 25 and 40 feet, Ship Island offered one of the only protected, deep-water harbors on the northern coast of the Gulf besides Pensacola. A small settlement and fort were eventually established on Biloxi Bay in the vicinity of present Ocean Springs. The colony was moved to Mobile 2 years later. The new location served as a counter to English interests in the southeast and offered economic and defensive benefits with the Spanish in Pensacola. However, the Mobile settlement never prospered, and when a hurricane filled the harbor with sand off Dauphine Island at the mouth of Mobile Bay, the French transferred the colony back to Biloxi Bay in 1720. Biloxi's tenure as the capital of French Louisiana was short lived. In 1723, the colonial capital was relocated a third and final time to New Orleans.

France's priorities were always with the Mississippi valley, and with the founding of New Orleans in 1718, development fully shifted in that direction. As a result, the Gulf Coast settlements languished. From a peak population that may have reached as high as 2,500 in the years 1720 to 1722, less than 800 inhabitants could be found along the Mississippi Coast by the beginning of the nineteenth century. France put so little regard into the potential of the region that it only assigned a garrison of seven men to protect the entire coastline. This garrison appears to have been withdrawn sometime during the 1730s (Elliot, 1999).

For the next 100 years, very little of consequence occurred in the region except for changes in ownership. At the conclusion of the Seven Years War in 1763, the French lost all of its North American possessions. Those lands east of the Mississippi River, excluding New Orleans, passed into English hands, while those to the west of the river were ceded to Spain. After the American War of Independence, the Mississippi Coast fell into Spanish hands and became part of West Florida. Spain showed little interest in governing the territory and constant raids by Native Americans eventually forced the United States to annex the region in piecemeal between 1810 and 1812.

The Mississippi coast saw little direct action during the American Civil War. Ship Island was seized by the Union Navy in September 1861 after it was abandoned by Confederate forces. Construction of a masonry fort, Fort Massachusetts, first begun by the USACE in 1859 as part of the United States Third System of Coastal Fortifications, continued through the war, but was not fully completed until 1871 (Irion, 1989; MDMR, 2005). Ship Island, with its naturally deep harbor and central location on the northern Gulf, served as a staging area for Union forces in their assaults on New Orleans in 1862 and Mobile in 1864. The island and fort also functioned as a prison for captured Confederate soldiers and a detention center for Confederate sympathizers from New Orleans (MDMR, 2005). The red-brick fort has survived numerous hurricanes, and now serves as a recreational and cultural destination for residents and tourists (Pan Isles Inc., 2011).

The establishment of Gulfport was the result of the region's vast timber resources and the extension of rail connections. In the 1880s, William H. Hardy purchased the Gulf and Ship Island Railroad. His goal was to provide a link between the pine forests of the interior and the coast (Mistovich, 1987). As neither Biloxi nor Pascagoula could accommodate deep-draft vessels Hardy intended to establish a new city that could take advantage of the natural harbor at Ship Island. Land for the new city was purchased and divided into lots, but Hardy's enterprise went bankrupt in 1892 with the railroad still 20 miles from the coast.

The railroad was purchased by Joseph T. Jones in 1895 and within 5 years it had reached Gulfport, established just 2 years prior. Completion of the line led to an explosion in the timber industry. Prior to completion, 18 sawmills were in operation along the Gulf and Ship Island's tracks, but by 1902, that number grew to 60 mills, producing some 300,000,000 board feet per year. Jones's interests also lay in developing port facilities for the city. In addition to lobbying the Federal government to dredge a navigation channel and anchorage basin, Jones and his Bradford Construction Company initiated the construction of harbor facilities. As the city lay along a stretch of exposed coastline Jones constructed a protected harbor by building two long piers into Mississippi Sound to bracket the intended anchorage area (Mistovich, 1987). The harbor was protected on its seaward side by a timber-and-stone breakwater.

Gulfport quickly became the largest lumber exporting city in the nation. Other cargoes leaving its docks included naval stores, cotton, and cottonseed. Depletion of the pine forests by the end of the second decade of the twentieth century led to a decline in timber exports. However, a new product quickly replaced lumber in the Port's revenue stream. In 1919, the first banana boat arrived in Gulfport. Handling facilities for the fruit were soon constructed by Standard Fruit and United Brands. By mid-century, Gulfport had become one of the leading banana importers in the nation.

Development of the city and harbor were integrally tied to water depths through Mississippi Sound. Shallow waters in the Sound meant that large vessels had to stop at the Ship Island anchorage and lighter goods to shore. Timber was either barged to Ship Island to waiting ships or towed there via rafts. Shallow water over the bar at the entrance to the anchorage also limited the size of vessels that could call on the Port. Lobbying on behalf of the city and its vested commercial interests spurred Congress to authorize improvements for the harbor. The Rivers and Harbors Act of 1899 authorized the dredging of a channel 19 feet deep and 300 feet wide from the newly created Port to Ship Island. The act also provided for the creation of an anchorage 2,640 by 1,320 feet along the Gulfport shoreline (Mistovich, 1987). A separate provision authorized a 26-foot deep channel through the Ship Island Bar.

However, shoaling was a constant problem in Mississippi Sound. A USACE report noted in 1919 that the FNC shoaled at a rate of 2.6 mcy per year. As a consequence, the Gulfport channel had to undergo periodic maintenance dredging to maintain the authorized depth. In an effort to reduce maintenance costs as a result of shoaling, the channel across the bay was reduced in width from 300 to 220 feet and the channel over the bar was relocated 5,000 feet west, providing a shorter and more direct route into the harbor. To accommodate ever-increasing ship sizes, the River and Harbors Act of 1930 increased the channel depths to 27 feet from the outer bar to Ship Island and 26 feet deep through Mississippi Sound to Gulfport. This was further increased to 32 feet over the bar and 30 feet in the Gulfport channel and harbor in 1948 (Mistovich, 1987).

3.20.2 Shipwreck Potential

3.20.2.1 Previous Investigations

A review was conducted of previous cultural resource studies in the vicinity of the Port. The goal of that research was to identify potential submerged cultural resource sites that may occur in proximity to the proposed Project area, including previously recorded sites that are listed, or eligible for listing in the National Register of Historic Places (NRHP). The review identified three previous remote sensing investigations, including ones from 1917, 1968, and 2007. The earliest survey (H04000) was conducted from the Port to Chandeleur Island in 1917. The next hydrographic survey (H08925) was conducted of the Port and its approaches (Patrick and Gilden, 1968). Finally, Burke et al. (2007) conducted a survey of the Mississippi Sound from Long Beach to Biloxi, including the Project area.

3.20.2.2 Shipwreck Review

The potential for shipwrecks located within the Project area was researched by conducting a literature review and examining existing studies concerning the region. Coastal Mississippi has a rich maritime history spanning more than 300 years. Possible shipwrecks in the Project area could include sailing vessels employed in the exploration and colonization of the Mississippi Coast by the French during the turn of the eighteenth century to today's modern pleasure and fishing craft. Probability studies conducted for the Bureau of Ocean Energy Management, Regulation, and Enforcement, previously the Minerals Management Service (Garrison et al., 1989; Pearson et al., 2003), indicate that there were few shipwrecks in the Gulf prior to 1750. That number remained low until the last quarter of the nineteenth century, a period which reflects the growth of the major commercial cities along the rim of the Gulf and the heyday of steam power. Vessel losses continued to increase into the twentieth century but expanded dramatically after 1950. That increase is correlated with the growth of pleasure craft and vessels engaged in fishing, both commercial and private.

Two comprehensive studies have been conducted to determine the potential for shipwreck resources in the vicinity of Gulfport, the harbor, and the anchorage at Ship Island. The first was performed by Mistovich (1987) of OMS Archaeological Consultants, Inc., in preparation of planned navigational improvements of Gulfport Harbor and its FNCs. The study noted that there were no known historic shipwrecks within Gulfport or the FNCs.

The second study was conducted by Pearson and Forsyth (2006) to develop protocols for the USCG for protecting historic shipwrecks during debris removal operations after Hurricane Katrina. The area of concern stretched along the entire Mississippi coastline and extended 4 miles off the coast. Data collected were compiled into a geographic information system (GIS) database. The results of the research identified a total of 52 locations of known or potential historic shipwrecks. An examination of those results indicated that one potential wreck and two objects classified as "other" may be located in the Project area.

Examination of the NOAA Automated Wreck and Obstruction Information System (AWOIS) database for the Gulfport/Ship Island vicinity revealed four submerged resources/objects currently listed within the Project area (Figure 3.20-1). Two of those resources are listed as shipwrecks, and are situated approximately 1,800 feet southeast of the proposed turning basin. Both wrecks were noted as modern vessels, dating after 1983. Neither could be relocated upon further investigation. Though the exact locations of these two wrecks have not been verified, their charted proximity to the project area could pose a hazard during construction activities.

In addition to the shipwrecks noted above, two obstructions are listed in the AWOIS database within the Project area. Specifically, they are located within 900 feet of the entrance to Gulfport Harbor. These obstructions are mostly modern debris such as stakes, piles, chain, and dredge pipe, and each is a potential hazard to navigation and dredging. The positional accuracy for these obstructions is unreliable.

Additional historical research suggests that there could be another historic shipwreck in the Project area (Table 3.20-1). This wreck was derived from secondary and tertiary sources, such as Bruce D. Berman's *Encyclopedia of American Shipwrecks* (1973), Robert F. Marx's *Shipwrecks in the Americas* (1987), and background research conducted during other previous cultural resource surveys (Irion, 1989; Mistovich, 1987). As can be seen in the table, this loss cannot be specifically placed within the Project area. Locational information provided by such sources is typically general in nature and frequently inaccurate. Undoubtedly, an unknown number of vessels have been lost in the Project area but do not appear in the historical record.

Table 3.20-1
Potential Historic Shipwrecks in the Project Area

Name	Year Lost	Type	Location
Ludlow	5/27/1925	Schooner	Burned, Gulfport, Mississippi

Sources: Berman (1973); Marx (1987); Irion (1989); and Mistovich (1987).

Contact with the Mississippi Department of Archives and History (MDAH) for information concerning the current project and other previous construction activities at the Port indicate that the Project area contains no cultural resources listed in the NRHP nor is Project-related construction likely to impact prehistoric or historic sites potentially eligible for inclusion in the NRHP.

The results of historical research and the literature review indicate that the potential for historic shipwrecks in the Project area is low.

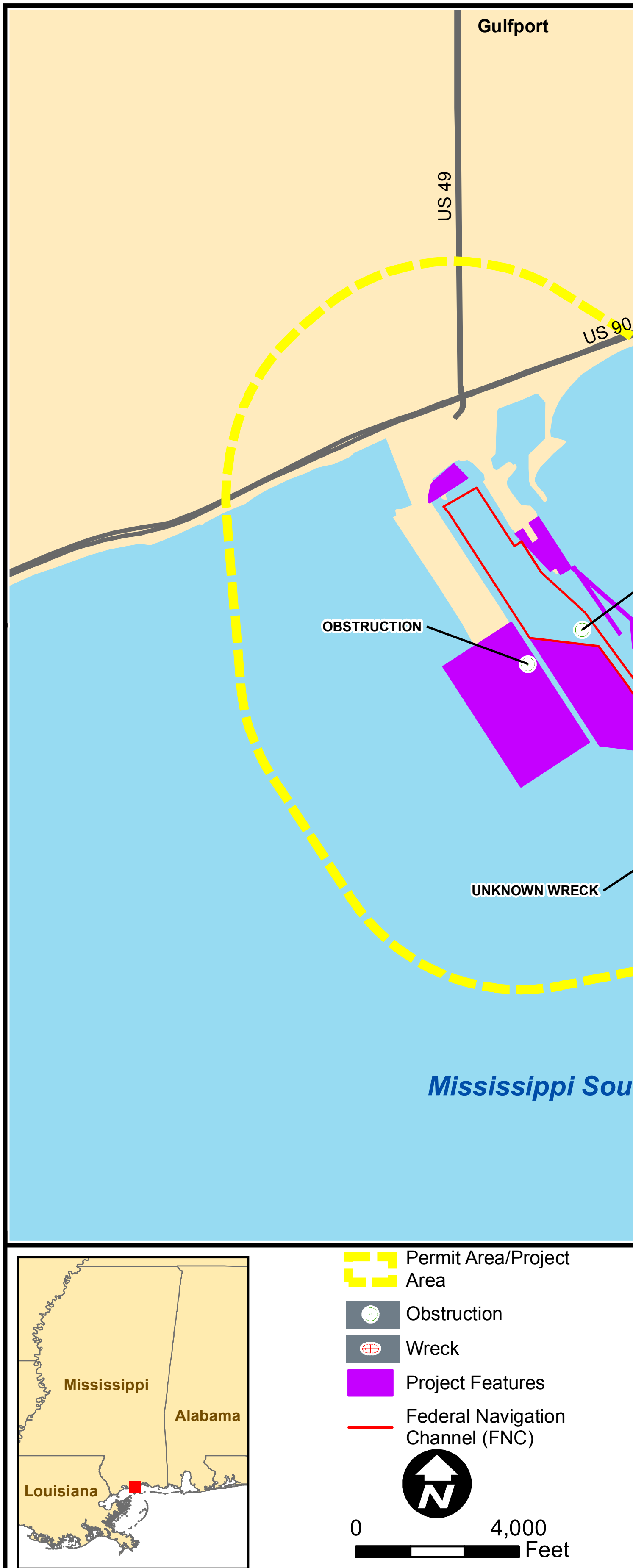


Figure 3.20-1

Port of Gulfport Expansion Project

Wrecks and Submerged Resources in the Permit Area/Project Area

Prepared By: 25913	Scale: 1" = 4,000'
Job No.: 100018536	Date: Dec. 5, 2016

File: N:\Clients\M_N\Mississippi_State_Port_Authority\100018536\geospatial\Figs_EIS\2015_Revisions\PGEP_EIS_Figure_3_20_1_Wrecks_and_Submerged_Resources_120516.mxd

This page intentionally left blank.

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 LAND USE/RECREATION/AESTHETICS

4.1.1 Land Use

4.1.1.1 No-Action Alternative

Under the No-Action Alternative, the Port and surrounding coastline area would continue on the present course of moderate growth. Residential, commercial, and public land uses in the region would likely increase proportionately to population trends discussed in Section 3.3. The Port would not expand its physical footprint, but industrial properties would be modified over time to accommodate up to 1.0 million TEUs annual throughput. Physical limitations of the Port would not stimulate the economic growth that would potentially induce more urban and industrial development in the region to the degree expected with the action alternative. Without the expansion of the Port to include additional acreage of storage and ship capacity, increased transportation costs and operational limitations related to large vessels would continue. As a result, economic stimulus associated with Port operation and its impact on the surrounding area would occur but be limited under the No-Action Alternative.

Over time, annual throughput at the Port is expected to increase to up to 1.0 million TEUs by 2060. These increases in throughput would logically be expected to result in changes to land use resulting from changes to truck and rail traffic (see Section 4.4 for detail regarding changes to truck and rail traffic). KCS completed an EA in August 2011 to upgrade their track from Gulfport to Hattiesburg, Mississippi. The EA projected no anticipated induced development or changes in land uses as a result of increased cargo traffic. The railway corridor has been in use continuously since the 1890s, and no structure relocations or alterations would change land uses or demographic character along the track. However, the EA does anticipate operational impacts on adjacent land uses, due to a slight increase in frequency of use of the existing railway (KCS, 2011). The KCS Improvements Project has since been completed. Therefore, an increase of throughput at the Port should have a minimal impact to land uses at the site itself or adjacent to associated infrastructure. It is possible that an increase of throughput may lead to the potential demand for land uses to support ancillary businesses such as port- and shipping-related support industries, transportation centers, or distribution warehouses. Many of these already exist adjacent to the Port; therefore, changes would be consistent with existing trends.

4.1.1.2 Proposed Project Alternative

The Proposed Project Alternative includes the expansion of the Port facilities through the dredging and filling of open-water bottom habitat in Mississippi Sound. The Proposed Project Alternative configuration includes a proposed 4,000-foot, 18-acre breakwater along the existing FNC, a 155-acre expansion to the West Pier, a 14.5-acre expansion to the East Pier, and a future 9-acre fill site at the North Harbor. The Proposed Project Alternative also calls for the creation of an 85-acre addition to the turning basin. The increase in Port capacity would be expected to have a positive impact on the local economy. These improvements would stimulate job growth and increase demand for housing and services, which will be discussed further in Section 4.3. Projected traffic volumes as a result of an increase in container terminal activity associated with the Proposed Project Alternative are presented in Section 4.4. The expansion of the Port would increase the industrial land uses of the greater Gulfport metropolitan area. This increased port capacity would have potential impacts on adjacent land uses as truck and rail traffic increases. However, no major changes in land use to, or adjacent to, the Port are anticipated; the Port resides in a I-2 Heavy Industrial District, as zoned by the City of Gulfport (Municode, 2013), and is already surrounded by heavy manufacturing and related commercial activities, as well as highways, railway lines, and waterways. It is possible that an increase of throughput may lead to the potential development of secondary or ancillary industries, such as private-sector commercial support businesses. These could include port- and ship-related service industries, transportation centers, and distribution warehouses. Many of these already exist adjacent to the Port, and any additional increase would be consistent with existing trends. However, any growth in these land uses can still expected to be greater than the No-Action Alternative due to increased throughput of up to 1.7 million TEUs annually. See Section 4.4 for projected traffic volumes generated by container terminal activity for the No-Action and Proposed Project Alternatives.

4.1.2 Recreation

4.1.2.1 No-Action Alternative

Under the No-Action Alternative, the Port and surrounding coastline area would continue on the present course of moderate growth. Residential, commercial, and public land uses in the region would likely increase proportionately to population trends discussed in Section 3.3. These increases would also include a greater demand for recreational land uses. The Port would gradually expand its industrial properties, which in turn would stimulate modest economic growth that would potentially induce more urban and industrial development in the region. In the No-Action Alternative, TEU throughput would increase to 1.0 million by 2060. It would be anticipated that this increase would happen at a gradual rate (see Appendix C). Demand for additional acreage of storage and ship capacity could be managed over the next four decades to not interfere with recreational land uses.

The Gulfport Small Craft Harbor is a large recreational land use adjacent to the east of the Port. The No-Action Alternative will not include the construction of the proposed 4,000-foot breakwater, which would provide increased protection for the harbor. The No-Action Alternative would not impact recreational land uses significantly; however, it would not provide any beneficial impacts when compared to the Proposed Project Alternative.

4.1.2.2 Proposed Project Alternative

The Proposed Project Alternative should have a minimal impact on recreation. The Gulfport Small Craft Harbor, located just east of the Port facilities, shares the deep-water access of the existing main navigation channel. Although some disruptions of access to the main channel may occur during construction of the proposed 4,000-foot, 18-acre breakwater, these impacts should be temporary and short term. However, once in place, the breakwater would provide increased protection for recreational watercraft within the channel and boat basin. The breakwater could therefore be considered beneficial in the long term. The other amenities and buildings associated with the Gulfport Small Craft Harbor, including Gulfport Yacht Club, a marina, Harbor Square Park, a recreational beach, parking, Urie Pier, USCG Station Gulfport, and a mix of retail and recreational facilities, are all on the mainland and would not be affected by the expansion proposed under the Proposed Project Alternative.

Barrier islands associated with Gulf Islands National Seashore, including East Ship Island, West Ship Island, and Cat Island, are at a sufficient distance from Gulfport, approximately 11 miles south of the Port, that recreational access to them and Fort Massachusetts would not be impacted by the expansion of the Port.

Impacts to recreational boating would be nominal. The dredge and fill of waters for the Port expansion would have an impact on recreational fishing boaters moving along the coastline. Boaters would be required to move farther out into the Sound to circumvent Port structures, and it would therefore take more time than currently to navigate around the Port.

Recreational beaches east and west of the Port would not be impacted by the Port expansion proposed in the Proposed Project Alternative nor would access to these beaches be affected. Consequently, beach recreation activities such as sunbathing and swimming would not be affected by this Project.

4.1.3 Aesthetics

4.1.3.1 No-Action Alternative

Under the No-Action Alternative, the Port and surrounding coastline area would continue on the present course of moderate growth. Residential, commercial, and public land uses in the region would likely increase proportionately to population trends discussed in Section 3.3. The Port would experience gradual growth in TEU throughput to the projected 1.0 million annually by 2060. The projected throughput would involve additional acreage of storage, increased transportation, and operational land uses. As a result, the No-Action Alternative would have a moderate impact on the aesthetic value of the area.

Although the Port has been in operation since 1902, much of the surrounding coastline to the east and west is made up of recreational beaches with vistas of the Gulf. As a protrusion outwards from the coastline into the Mississippi Sound, the Port can be considered a significant aesthetic impact to the immediate area. Existing structure heights vary at the Port between 100 feet to over 170 feet; however, the visual impact is lessened by the placement of structures in relation to the viewer. Additionally, the visual impact has been in place for over 100 years, and residents have become relatively accustomed to the physical Port facilities and associated shipping operations.

The No-Action Alternative would include a gradual development of the Port, which would lessen the impact. Under the No-Action Alternative, the Port would be implementing an extensive landscaping project to better integrate the northern edges of the Port into the surrounding community. According to the master plan for the new landscaping approach, there would be decorated concrete primary fencing in 12-foot-high sections, metal picket secondary fencing, mature trees, a steel structure with the Port logo, signage, and flags reaching a height of 83 feet near the main entry (Port of Gulfport, 2014). The master plan also indicates that the water tower would be moved closer to Highway 90 and upgraded to look like a lighthouse. These changes would increase the aesthetic quality of the Port. The Proposed Project Alternative includes planned lengthening and expansions of the Port that are not currently planned for the No-Action Alternative (see following section). Therefore, the No-Action Alternative would have less impact to aesthetic resources in comparison to the Proposed Project Alternative.

4.1.3.2 Proposed Project Alternative

The Proposed Project Alternative would have a moderate impact on the aesthetic value of the area. The Port has been in operation since 1902, thus the visual impact has been in place for over 100 years, and residents have become relatively accustomed to the physical Port facilities and associated shipping operations. The expansion to the Port that would take place under the Proposed Project Alternative would significantly lengthen the Port's reach into the Mississippi Sound (by approximately 3,600 feet), which would add to the existing aesthetic impact. Additionally, the West Pier Expansion would add a 155-acre area that is 11 feet higher than the existing Port elevation; the Restoration Project allowed for the Port to be up to +14 feet above msl, whereas the additional West Pier Expansion would be up to +25 feet above msl. Under the Proposed Project Alternative, the rail lines used for the three existing RMG cranes along the West Pier would also be extended along the entire length of the West Pier expansion footprint, thereby further adding to the existing aesthetic impact.

The 14.5-acre East Pier Expansion and the construction of an approximately 4,000-foot breakwater would have a lasting and permanent aesthetic impact to residents and visitors alike. However, as an active and heavily industrial Port facility operating near a centralized urban area, much of the surrounding land uses directly to the north in the City of Gulfport are commercial. Much of the land use adjacent to the beaches to the east and west, by comparison, is residential. Because the Port expansion would be upgrading an existing industrial facility, the Proposed Project Alternative would remain consistent with the current aesthetic landscape of the study area and any additional aesthetic impact would be minor compared with the existing visual impact of the Port facilities.

From a broader perspective, the Proposed Project Alternative may have a slightly larger aesthetic impact due to the increased throughput at the Port (for a projected total of up to 1.7 million TEUs annually by 2060). The proposed expansion would allow for more plentiful ships to dock at the facility, which would affect the frequency of ship calls and could affect the viewing pleasure of Gulfport residents and visitors. However, any increased activity would remain consistent with the current aesthetic landscape of the Project area, and any additional aesthetic impact should be negligible compared with the existing visual impact of the Port facilities.

4.2 COMMUNITY INFRASTRUCTURE AND MUNICIPAL SERVICES

4.2.1 Utilities

4.2.1.1 No-Action Alternative

Under the No-Action Alternative, the study area would likely continue on its present course of economic development, population growth trends, and residential and industrial development patterns. The No-Action Alternative assumes the permit for expansion is denied, that no construction requiring a USACE permit is performed, and that the Port would remain at its current physical size. The demand for community facilities and services would only increase in response to the projected growth of the Gulfport area, as described in Section 4.3. Growth in throughput at the Port would be achieved by increased efficiencies with changes in tenant configuration and automation, as well as improved economic conditions. Throughput could increase from the range of 250,000 to 400,000 TEUs annually, up to 1.0 million TEUs annually by 2060. However, it is not expected that the change in throughput would require further infrastructure improvements or municipal services from the City of Gulfport.

4.2.1.2 Proposed Project Alternative

The proposed expansion areas would require access to utilities needed for operation and maintenance. Utility services to the existing Port facilities include water supply, wastewater collection and treatment, telephone, fiber optic service, natural gas, and electricity, which would all need to be expanded at the site to include the additional 155-acre West Pier Expansion, 14.5-acre East Pier Expansion, and 9-acre North Harbor fill. The Project site is located in the Gulfport metropolitan area, and the addition of the proposed expansion is not expected to result in major short- or long-term impacts on service levels within the metropolitan area. Wastewater from the Port is treated at the Gulfport South Waste Water Treatment Plant, which operates at an average daily flow of 8.22 mgd with a peak flow capacity of 40 mgd, so there is ample capacity for additional wastewater (HCUA, 2011b). Currently available information regarding existing utilities is described in Section 3.2.1. The expected maximum increase in annual throughput capacity compared to the No-Action Alternative would be 700,000 TEUs, thus demand for utilities would be higher. Detailed studies regarding the ability of current utility systems to provide the needed facilities would be performed during the design phase of the Project. Some realignment or removal of existing utility structures may be required in order to best accommodate the expansion.

4.2.2 Public Safety and Health Services

4.2.2.1 No-Action Alternative

Under the No-Action Alternative, the study area would likely continue on its present course of economic development, population growth trends, and residential and industrial development patterns. The No-Action Alternative assumes the proposed Project would not be implemented and no construction requiring a USACE permit would be performed; the Port would gradually expand and further infrastructure improvements or municipal services from the City of Gulfport would be related to the throughput demands of the Port. Growth in throughput at the Port would be achieved by increased efficiencies with changes in tenant configuration and automation, as well as improved economic conditions. Throughput would be projected to increase from the range of 250,000 to 400,000 TEUs annually, up to 1.0 million TEUs annually by 2060 (see Appendix C). This increase would create additional jobs and could increase demand for public safety and health services; however, any additional nonlocal workers brought in on a permanent basis would add only minute demand for services. The U.S. Customs and Border Protection are authorized to inspect and accept entries of merchandise, as well as collect duties on imports received at the Port (U.S. Department of Homeland Security, 2011). The additional throughput at the Port could slightly increase strain on U.S. Customs to monitor all imports received and the USCG to enforce safety and security provisions for vessels operating in waters of the U.S. (USCG, 2011a). However, the gradual build-up of TEU throughput capacity would enable time for the City and Port to adequately manage demand and services. Therefore, the No-Action Alternative would not have a significant impact to public safety and health services.

4.2.2.2 Proposed Project Alternative

The Proposed Project Alternative would result in minor temporary impacts, or no impacts, to local community facilities and services such as police, fire, security, and health services. The City of Gulfport has adequate infrastructure and community services to meet the additional needs of nonlocal workers both during construction and operation that would be needed for the proposed expansion under the Proposed Project Alternative. The City of Gulfport Fire Department operates 11 fire stations strategically located throughout Gulfport, the Gulfport Police Department employs 293 personnel, and both currently serve a population of over 80,000 residents and service population of 144,000 (City of Gulfport, 2013b, 2013c; U.S. Census Bureau, 2013a). Any additional nonlocal workers brought in during the expansion construction phase or on a permanent basis would add only minute demand for services. In addition, the Port has a fire protection and fire suppression system already in place (MSPA, 2010b). Some construction-related demands on community services may occur, such as an increase in police enforcement and emergency medical services to treat injuries resulting from construction activities. Additionally, the increased throughput at the Port could slightly increase the strain on U.S. Customs and Border Protection to monitor all imports received and the USCG to enforce safety and security for provisions for vessels operating in waters of the U.S.

4.2.3 Schools and Libraries

4.2.3.1 No-Action Alternative

Under the No-Action Alternative, the study area would likely continue on its present course of economic development, population growth trends, and residential and industrial development patterns. The No-Action Alternative assumes the proposed Project would not be implemented and no construction requiring a USACE permit would be performed; the Port would gradually expand and further infrastructure improvements or municipal services from the City of Gulfport would be related to the throughput demands of the Port. Throughput could increase from the range of 250,000 to 400,000 TEUs annually, up to 1.0 million TEUs annually by 2060. These increases would result in additional jobs, which could be filled by locals, as the unemployment rate in the Gulfport-Biloxi-Pascagoula MSA in 2014 was 7.5 percent. Additionally, the city has a housing vacancy of over 16 percent, this vacancy could easily absorb any out of area workers without increasing demand for schools and libraries.

4.2.3.2 Proposed Project Alternative

The Proposed Project Alternative would generate a 1.7 million annual TEU throughput capacity by 2060, which in turn would generate more jobs and possible changes in population; however, it is anticipated that most of the jobs would be filled by locals. The Proposed Project Alternative would be similar to the No-Action Alternative and would not have an impact on schools and libraries. Although schools would serve as storm shelters (Harrison County School District, 2013), the additional nonlocal workforce required for the construction and operation of the Proposed Project Alternative can be considered inconsequential compared with the existing overall population of the study area. Similarly, because only a minimal number of nonlocal workers are anticipated, the additional stress on the library system would be slight, and no impacts to libraries are expected from the Proposed Project Alternative. The city is currently experiencing a 16 percent vacancy in housing, which indicates that the city could easily handle any increase in demand for schools and libraries associated with the Proposed Project Alternative.

4.2.4 Aviation

4.2.4.1 No-Action Alternative

Under the No-Action Alternative, there would be no impacts to aviation resources in the study area. The Port is at a sufficient distance from all aviation operations, including the Gulfport-Biloxi International Airport, Gulfport Jail Heliport, and Keesler Air Force Base, and the takeoff slope from each aviation base should not be affected by the No-Action Alternative. The projected 2060 throughput of up to 1.0 million TEUs annually anticipated under the No-Action Alternative would not interfere with aviation within the study area.

According to FAA Regulations, Part 77 (FAA, 2010), notification of construction of a proposed transmission line or other vertical structures would be required if structure heights exceed the height of an imaginary surface extending outward and upward at a slope of 100 to 1 for a horizontal distance of 20,000 feet from the nearest point of the nearest runway of a public or military airport having at least one runway longer than 3,200 feet. If a runway is less than 3,200 feet, notification would be required if structure heights exceed the height of an imaginary surface extending at a slope of 50 to 1 for a distance of 10,000 feet. Notification is also required for structure heights exceeding the height of an imaginary surface extending outward and upward at a slope of 25 to 1 for a horizontal distance of 5,000 feet from the nearest point of the nearest landing and takeoff for heliports. Based on preliminary calculations, structures would have to be approximately 184 feet in height to trigger notification to the FAA.

Under the No-Action Alternative no structures on the Port facility would be 184 feet in height. The tallest structures at the Port are three RMG cranes that stand at 100 feet tall; however, these cranes can lift cargo up to 170 feet (MSPA, 2014). As a result, notification to the FAA would not be necessary. Although throughput would increase, it is not anticipated that container stacks or other facilities would exceed 100 feet in height. Even with the raised elevation of up to 14 feet, this is well below 184 feet in height. Therefore, no further impacts to aviation are expected.

4.2.4.2 Proposed Project Alternative

The Proposed Project Alternative should have no impact on aviation. Impacts from the Proposed Project Alternative would be similar to those of the No-Action Alternative. See Section 4.2.4.1 for a more-detailed discussion.

4.3 SOCIOECONOMICS RESOURCES

The proposed Project is located within Harrison County, Mississippi; however, the communities potentially affected by the proposed Project are located in Hancock and Jackson counties (located to the west and east of Harrison County, respectively). The socioeconomic and demographic analysis focused on the Gulfport-Biloxi-MSA and the communities located (or partially located) within this MSA. The Gulfport-Biloxi MSA was expanded in 2013 to include Pascagoula (OMB, 2013). Data presented prior to 2013 will be for Gulfport-Biloxi MSA and data presented after 2013 will be for Gulfport-Biloxi-Pascagoula MSA.

4.3.1 Labor Force and Employment

This section analyzes employment and income impacts associated with the No-Action and Proposed Project Alternatives. The analysis below is based on Appendix C, as applicable.

4.3.1.1 No-Action Alternative

The No-Action Alternative assumes that the existing Port operations would continue, but does not include the proposed PGEP; therefore, the potential for impacts to the existing employment and income associated with the proposed Project would not occur. In 2014, the Gulfport-Biloxi-Pascagoula MSA had an unemployment rate of 7.5 percent, and the available labor force has decreased since 2000. In addition, the existing declining economy of the Project area over the past several years has begun to recover (see Section

3.3.1). Future employment and income opportunities associated with the No-Action Alternative would be expected to remain consistent with historic trends of the local economy. Unemployment rates within the Project area would continue as described in Section 3.3.1, with slight fluctuation as they have historically. Under the No-Action Alternative, because new employment and income opportunities would not be created by the PGEP, these trends would be expected to continue until new development occurs in the area to create additional employment opportunities.

As presented in Section 2.8.1, the No-Action Alternative would assume that the Port would have an annual throughput between 250,000 and 400,000 TEUs, which would grow up to 1.0 million TEUs annually by 2060. The economic impact analysis estimated that Port operations would require 4.758 employees per 1,000 TEUs (see Appendix C). Therefore, the No-Action Alternative would provide jobs for 4,758 employees by 2060 (Table 4.3-1). While the No-Action Alternative would have some benefit to the area labor force, it would have less positive impact to labor force and employment compared to the Proposed Project Alternative.

As discussed in Section 3.3.1, the leading economic sectors in the study area are accommodation services, retail trade, heath care, and manufacturing. Each of these sectors would continue to grow at the traditional pace under the No-Action Alternative to support the projected 2060 throughput of 1.0 million TEUs annually. However, under the No-Action Alternative the construction sector would not benefit from the monies associated with the proposed Project, which are estimated at $949,765,000 in 2009 dollars (without contingency) (see Appendix C).

4.3.1.2 Proposed Project Alternative

Current study area unemployment rates are similar in Harrison County as compared with the state of Mississippi and the labor force is declining across many counties, including the Gulfport Biloxi-Pascagoula MSA. Jobs created by the Proposed Project Alternative would provide opportunities for those currently unemployed, and increased throughput capacity at the Port could attract workers to the area. Project-related expenditures would have both direct and indirect impacts, as project money would be put back into the local economy.

The construction sector would be most impacted by the Proposed Project Alternative. It is estimated that a majority (94.4 percent) of the estimated construction cost for the proposed Project ($949,765,000) would be spent in the construction industry (see Appendix C). It is anticipated that the construction sector would be strengthened by the proposed Project through job creation. The Proposed Project Alternative would be expected to create approximately 2,767 construction-related jobs annually over the course of 5 years (see Appendix C).

Because of current high construction-sector unemployment in the area, it is likely that most of the construction jobs would be filled locally, resulting in a minor positive impact to the local labor force and unemployment rates. However, some of the work for the proposed Project would require specialized skills for dredging and placement of materials. These activities can only be conducted by few companies within the U.S. Thus, this work would have virtually no effect on local employment rates.

Additionally, the Proposed Project Alternative would result in increased TEU throughput, which would enable an increase for transportation and Port operation employment sectors. The Proposed Project Alternative would have a maximum throughput of up to 1.7 million TEUs annually by 2060, which would potentially require 8,089 employees (see Table 4.3-1). Or put another way, the Proposed Project Alternative would generate 3,331 more jobs than the No-Action Alternative, of which 875 would be Port jobs.

Overall, the Proposed Project Alternative would have a benefit on all economic sectors and would have greater overall benefits on labor force, employment, and industrial sectors than the No-Action Alternative.

Table 4.3-1
2060 Annual Full-time Employee Equivalent

		2010	No-Action Alternative		Proposed Project Alternative	
	Labor Requirement per 1,000 TEU	217,950 TEU	1.0M TEU	Change from 2010	1.7M TEU	Change from No-Action Alternative
In Port Activity	1.25	272	1,250	978	2,125	875
Warehousing/Distribution	2.65	575	2,650	2,075	4,505	1,855
Other Off Port Support	0.858	186	858	672	1,459	601
Total FTEs	4.758	1,032	4,758	3,726	8,089	3,331

Source: Appendix C.
TEU = twenty-foot equivalent unit
FTE = full-time equivalent job
M = million

4.3.2 Population and Social Characteristics

This section analyzes potential population and social characteristic impacts associated with the No-Action and Proposed Project Alternatives. The analysis below is based on Appendix C, as applicable.

4.3.2.1 No-Action Alternative

The No-Action Alternative does not include the proposed PGEP; therefore, the potential for impacts to the existing population and social characteristics associated with the proposed Project would not occur. As discussed in Section 3.3 (and as shown in Table 3.3-5), the study area counties are expected to experience increases in population without the Project. Between 2010 and 2025, it would be expected that Hancock County's population would increase by 16.2 percent, Harrison County by 17.1 percent, and Jackson County by 11.9 percent. The state's population is expected to increase by 8.8 percent during the same time period (Mississippi Institutions of Higher Learning, Center for Policy Research and Planning, 2012). Under the No-Action Alternative, no changes to this forecasted growth would occur.

4.3.2.2 Proposed Project Alternative

The primary potential impact to population from the Proposed Project Alternative would be the in-migration of construction and operation workers because of the Port expansion. The Proposed Project Alternative would be expected to create approximately 2,767 construction-related jobs annually over the course of 5 years. However, because of high construction-sector unemployment in the area, it is likely that most of the construction jobs would be filled locally, and the construction of the Proposed Project Alternative would not greatly affect study area population or social characteristics.

The economic impact analysis estimated that Port operations would require 4.758 employees per 1,000 TEUs. It is estimated that this would create direct employment of 8,089 workers. The projected jobs would include 2,125 in-port activity jobs, 4,505 warehousing/distribution jobs, and 1,459 other off-port support activity jobs (see Table 4.3-1). Jobs created for operation of the Port may cause some in-migration of workers, but any increase in population resulting from the influx of workers would be minimal, given the 7.5 percent unemployment rates in study area counties and the Gulfport-Biloxi-Pascagoula MSA. No substantial impacts to population and social characteristics are expected as a result of the Proposed Project Alternative.

4.3.3 Personal Income

This section analyzes potential personal income impacts associated with the No-Action and Proposed Project Alternatives. All dollars presented below are in 2011 dollars. The analysis below is based on Appendix C, as applicable.

4.3.3.1 No-Action Alternative

Under the No-Action Alternative, the Port would continue to gradually increase throughput based on market demand. The projected throughput would increase up to approximately 1.0 million TEUs annually by 2060. Wage earning results from this change in throughput are expected to total $385,375,354 in 2060 (Table 4.3-2). Throughput increase in the No-Action Alternative would result in additional revenue and increased personal income. However, the No-Action Alternative would not have the wages generated by construction-related activities; wage earnings are estimated at $553,229,909 (in 2011 dollars) over the course of the 5-year construction period for the proposed Port expansion (see Appendix C). Therefore, the No-Action Alternative would provide less benefit to personal income level than the Proposed Project Alternative (see Table 4.3-2).

Table 4.3-2
Direct, Indirect, and Induced Wage Earnings for 2020 and 2060 (dollars[1])

	2010 Baseline	No-Action Alternative		Proposed Project Alternative	
Throughput	217,950 TEU	1.0M TEU		1.7M TEU	
	2010	2020	2060	2020	2060
Direct	21,043,617	64,631,259	224,577,712	109,523,918	381,782,110
Indirect	20,680,523	25,852,504	89,831,085	43,809,567	152,712,844
Induced	7,100,948	20,423,478	70,966,557	34,609,558	120,643,147
Total Wages	48,825,088	110,907,240	385,375,354	187,943,043	655,138,101
Difference from 2010		62,082,152	336,550,265	139,117,955	606,313,012

Source: Appendix C.
[1]2011 dollars
TEU = twenty-foot equivalent unit

4.3.3.2 Proposed Project Alternative

The Proposed Project Alternative would generate $553,229,909 in wage earnings over the course of the 5-year construction period. Wage earnings resulting from increased container capacity are expected to increase gradually, reaching approximately $655,138,101 in total (this includes direct, indirect, and induced wage earnings). This total would be $269,762,747 more than the No-Action Alternative.

As discussed in Section 3.3.3, the study area populations generally have lower incomes, and additional wages entering the local economy resulting from the Proposed Project Alternative are expected to benefit personal income levels. The overall benefits from the Proposed Project Alternative would be greater than the No-Action Alternative.

4.3.4 Tourism

This section analyzes potential tourism impacts associated with the No-Action and Proposed Project Alternatives.

4.3.4.1 No-Action Alternative

Under the No-Action Alternative, tourism activities would continue as they do currently, with no additional changes from general Port operation.

4.3.4.2 Proposed Project Alternative

Tourism in the study area is largely centered on casinos, of which one is located in Gulfport and eight in Biloxi (see Table 3.3-4). This is a growing industry and an important part of the study area economy. Potential impacts to tourism could include obstruction of access to tourism facilities, or the deterioration of enjoyment of facilities through aesthetic impacts (see Section 4.1.3). However, the only casino in proximity to the Port is the Island View Casino Resort. The remaining casinos are located in Biloxi, approximately 13 miles east of the Port.

Construction activities would be limited to the footprint of the Port and should not interfere with access to the Island View Casino Resort. During operations, additional truck traffic may result from increased container throughput. Truck traffic from operation of the Port would pass directly by the casino (see Section 4.4). The truck traffic is not anticipated to impact tourism, because there is an elevated pedestrian walkway that crosses Beach Boulevard and connects the Island View Casino Resort to the beach. Additionally, there is a signalized intersection at ground level at Island View Casino Resort that allows pedestrian to safely cross Beach Boulevard. Therefore, tourism access would not be substantially impacted by the Proposed Project Alternative.

Aesthetically, the Port expansion would be consistent with current uses and the overall look of the area would not diminish views from any recreational/tourism areas. For further information on aesthetics impacts, see Section 4.1.3. Also, as stated in Section 4.1.2.2, recreational activities such as boating and beach going would not be impacted.

4.3.5 Public Finance

This section analyzes potential public finance impacts, such as loss of tax revenue, associated with the No-Action and Proposed Project Alternatives. The analysis below is based on Appendix C, as applicable. Dollar amounts presented below are in 2011 dollars unless otherwise noted.

4.3.5.1 No-Action Alternative

Under the No-Action Alternative, the Port would continue to operate at current capacity, with no added employment or construction tax revenue from the proposed Project. The Port would continue to grow at the traditional pace under the No-Action Alternative to support the projected 2060 throughput of up to 1.0 million TEUs annually. The No-Action Alternative would be anticipated to result in increases to State and local tax revenues starting at $449,935 in 2020 and growing to $2.7 million by 2060. This would benefit public finances for the study area; however, it would generate significantly less revenue than the Proposed Project Alternative.

Increased Port throughput under the No-Action Alternative would result in increased needs for security, Emergency Medical Services (EMS), and fire services; all of which are funded by public finance. Although additional services would be required under the No-Action Alternative, those requirements on public services would be less than those under the Proposed Project Alternative.

4.3.5.2 Proposed Project Alternative

The Proposed Project Alternative would generate additional public finance through taxes on construction and increases in throughput. Construction costs are estimated to provide $47.7 million in state and local tax revenues over the 5-year construction period (Appendix C). No construction taxes would be generated under the No-Action Alternative.

The increase in container throughput expected with the Proposed Project Alternative would be anticipated to result in increases to state and local taxes, growing to $13.2 million. This would benefit public finance for the study area communities.

Increased Port throughput would result in increased needs for security, EMS, and fire services; all of which are funded by public finance. Although the Proposed Project Alternative would place greater demands on public services, these demands would be ameliorated by the increased tax revenue resulting from Project construction and increased container throughput. Therefore, the overall benefit from the Proposed Project Alternative would be greater than the No-Action Alternative.

4.3.6 Housing

This section analyzes potential housing impacts associated with the No-Action and Proposed Project Alternatives.

4.3.6.1 No-Action Alternative

As discussed in Section 4.3.2 (and as shown in Table 3.3-5), the study area counties are expected to experience increases in population without the Project. The demand for housing under the No-Action Alternative would be consistent with the projected population increases. Overall, little change to the housing demands would be anticipated under the No-Action Alternative and would be less than under the Proposed Project Alternative.

4.3.6.2 Proposed Project Alternative

Potential increases in the demand for housing, past the point of current housing availability, could occur as a result of the Project, if a majority of the new workers in-migrated to the study area. As discussed in Section 3.3.2, current vacancy rates in the study area counties range from 16.5 to 19.0 percent, with Gulfport-Biloxi MSA's vacancy rate at 16.8 percent (U.S. Census Bureau, 2010). The number of building permits issued in the study area peaked between 2007 and 2008 and has been steadily declining since that time (HUD, 2011). However, it would be anticipated that most of the jobs created by the Project would be filled locally and any migration that could occur would be accommodated by the existing infrastructure, as numerous vacancies currently occur in the Project area. Overall, little change to the housing demands would be anticipated as a result of implementation of the Proposed Project Alternative. Therefore, potential impacts to housing are not anticipated to be substantial.

4.3.7 Oil and Gas Production

This section analyzes potential oil and gas production impacts associated with the No-Action and Proposed Project Alternatives.

4.3.7.1 No-Action Alternative

Hancock County is the only study area county that currently has any assessed value associated with its oil and gas wells. The No-Action Alternative would not affect oil and gas production in Hancock County.

4.3.7.2 Proposed Project Alternative

Hancock County is the only study area county that currently has any assessed value associated with oil and gas wells. The Proposed Project Alternative would not affect oil and gas production in Hancock County.

4.3.8 Community Values and Environmental Justice

This section analyzes potential impacts related to community values and EJ issues associated with the No-Action and Proposed Project Alternatives.

Secondary source data were collected to identify current and historic population characteristics and trends, including total population, age, race, and ethnicity. Data were used to assess past trends and current populations. Specifically, sources consulted include:

- U.S. Census 2010, 2012
- American Community Survey

In addition, extensive public outreach (with guidance from EPA Region 4) was conducted to support an impact assessment of the proposed Project on the community, which culminated in the preparation of an expanded EJ assessment (a CIA), which is included as Appendix H. Section 12.0 has specific information regarding the various public outreach efforts conducted for this project.

To address Presidential Executive Order (EO) 13166, *Improving Access to Services for Persons with Limited English Proficiency* and EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, a specific EJ analysis was conducted. The EJ analysis specifically utilized 2010 U.S. Census data at the block group level for race and ethnicity and 2012 U.S. Census tract level for median household incomes, poverty levels, and limited English proficiency. This initial analysis was the first step in identifying the presence and percentage of minority, low-income, or children living within the Project area. The specific demographic information obtained for evaluation includes total population, white population, black population, Hispanic/Latino population, American Indian or Alaska Native, or Asian population, persons below the poverty level, and median income.

The percentage of minority and low-income populations was calculated for each of the block groups/census tracts within the zone of potential impact. The zone also considers block groups adjacent to US 49, thus the analysis includes the communities of Turkey Creek and North Gulfport. The study area ends at the block group at the intersection of US 49 and I-10. This information was used to develop a threshold for comparing potential EJ populations and conducting a disproportionate effect analysis. The objective of the analysis was to determine whether the alternatives could have a disproportionately high and adverse effect on minority and low-income populations. Also, data on the percentage of children under the age of 18 were collected in order to determine whether alternatives could have a disproportionately high and adverse effect on children to comply with EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*. The analysis compared the block group and census track percentages to the state, the county (Hancock, Harrison, and Jackson), and the City of Gulfport.

A disproportionately high and adverse effect on minority and low-income populations means that an adverse effect would be predominantly borne by a minority population and/or a low-income population or would be suffered by the minority population and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that would be suffered by the nonminority population and/or non-low-income population.

A CIA (Appendix H) was used to evaluate how the PGEP would affect the community and its quality of life, and specifically addresses the EJ communities within the area. The CIA evaluates the overall potential effects of the Project (both direct and temporary) on the people, institutions, community, organizations, and the social and economic setting of the City of Gulfport, Mississippi, with regard to the area's low-income and minority populations. Persons that are protected by the two EJ EOs are the focus of the CIA.

The CIA was based on an earlier iteration of the proposed Project and presented four Project alternatives, the No-Action Alternative and three Action Alternatives. The Proposed Project Alternative evaluated in this document was developed from the previous alternatives (see Section 2.0) that were presented to the community leaders during the development of the CIA. The comments and concerns of the community and their impressions of the previous alternatives would apply to the No-Action Alternative and the Proposed Project Alternative. Therefore, the findings of the CIA are consistent with the two alternatives that are being evaluated in this document.

The following data sources provided useful information in understanding existing conditions and likely trends:

- U.S. Census Bureau data, American Community Survey, Mississippi Institutions of Higher Learning, Center for Policy Research and Planning population projections
- Interviews with community leaders, nonprofits and a business owner
- MDA
- Field visits on May 20–22, 2013; February 19–20, 2014
- Secondary sources as identified in Section 7 of Appendix H

The selected interviewees were deemed likely to have extensive knowledge of their respective areas and capable of providing critical information on local concerns, community interests, opinions, and issues of targeted groups. Interviews were conducted with the municipal staff, and field visits were conducted within the study area to gain an understanding of existing conditions and how the Project could affect the community. Appendix H documents the entities contacted for interview and provides a summary of the contact efforts or the interview dates. Appendix H also documents the questions asked and provides summaries of information received.

Background information and data obtained during the interviews and field visits were then used to support a qualitative impact assessment on the community with a specific focus on the minority and low-income populations within the City of Gulfport and Harrison County.

The CIA focused on population characteristics of the City of Gulfport, such as, race, ethnicity, and age from an EJ perspective. It also addressed important issues, such as income and employment, traffic, air quality, noise, and community cohesion all from an EJ perspective. During the CIA, interviewees described the City of Gulfport as a small town, without much money, but with people that have pride in their community. For example, Hurricane Katrina in 2005 proved that the people of Gulfport are willing to help each other regardless of their race or financial means. The interviewees further stressed that Gulfport, as a community, lacks lower-skilled employment opportunities. Although they expressed pride in Gulfport, there is recognition that the City is somewhat of a struggling community.

The potential impacts anticipated from the PGEP to income and employment would be beneficial. The EJ Community of Gulfport would have the opportunity to benefit from increased employment. One of the comments presented during the interviews was that the Port would require technically skilled labor. Interviewees felt that the local population would be capable of fulfilling those roles and with specialized job training a higher percentage of local residents would excel in those future roles.

Traffic is currently an issue in the City of Gulfport's communities. Background and unrelated Port traffic have contributed to the current traffic conditions in the City of Gulfport. As part of the roadway traffic analysis prepared for this EIS (Appendix I), background traffic growth attributed to regional population and employment growth was determined using the most recent official traffic forecasts from the GRPC which were obtained in September 2012. Traffic growth levels for study area roads from these forecasts were then used to determine future traffic levels in 2020, 2040, and 2060 for use in this study. The impact of Port traffic on surrounding transportation facilities is determined using traffic analysis procedures derived from the HCM as discussed previously in Section 3.4.4. These performance measures are then compared to the standardized performance thresholds, LOS, to determine whether the level of performance is within acceptable limits. The worst acceptable LOS tolerated in urban areas in this study is LOS D, thus, road segments operating at LOS E or F would be considered unacceptable. All of the roadways that were analyzed for this EIS showed that traffic in 2012 was predominately LOS D, which is normally the worst tolerated in urban areas. The one intersection that came out to a LOS E, which represents traffic volumes near capacity, is located in a census tract block group with a minority population percentage greater than the city average of 43.1 percent.

The No-Action Alternative and the Proposed Project Alternative would generate impacts to traffic in census tract block groups with a higher minority percentage than the city population. For the 2040 No-Action and 2040 Proposed Project Alternatives, 1.6 miles of the 40.2 directional miles studied are deficient and operate at LOS E or F. The two road segments that have an LOS worse than D are two of the approaches to the intersection of Canal Road and 28th Street. For the 2060 No-Action Alternative, 4.6 miles of 40.2 directional miles studied are deficient. The results indicate that background traffic growth and growth associated with the No-Action Alternative increase demand such that a section of US 49 and a longer section of 28th Street experience LOS worse than D. For the 2060 Proposed Project Alternative, 5.0 of 40.2 directional miles studied are deficient and operate at LOS E or F. The results indicate that background traffic growth and growth associated with the Proposed Project Alternative increase demand such that, in addition to previously noted LOS deficiencies, a longer length of US 49 and a portion of 30th Avenue also experience LOS worse than D. Because the differences in traffic counts for the Proposed Project Alternative compared to the No-Action Alternative are only marginally different under the 2060 forecast scenarios, the LOS is not expected to change and any unacceptable conditions would be caused by background growth not associated with the proposed PGEP. This is further discussed in Section 4.4.

Furthermore, the majority of potential impacts to traffic for the Proposed Project Alternative will not be felt immediately due to the expected gradual increase in TEU throughput. As a result, there would be sufficient time to address the potential issues associated with the No-Action and Proposed Project Alternatives; these issues would therefore be mitigated before being considered impacts. The mitigation measures are presented in Section 6.2 and in Appendix I. The CIA also presents mitigation measures that would ensure that the beneficial impacts from the PGEP, increased jobs and economic growth, are maximized.

Due to the limited duration of construction activities associated with the Proposed Project Alternative, emissions from these construction activities are not expected to adversely impact the long-term air quality in the area. Additionally, operation of the Proposed Project Alternative would result in a relatively small increase in air contaminant emissions above those from existing sources in Harrison County; the largest being for emissions of NO_X and CO_2e primarily due to the increase in truck, railroad, and container ship traffic. It is expected that air contaminant emissions resulting from the increase in container volume traffic may result in a corresponding increase in impacts to air quality in the immediate vicinity of the Project area, diminishing as emissions are dispersed over the county.

In response to comments from the EPA on the DEIS, air dispersion modeling (as discussed in Appendix P) was performed to provide information about potential hot-spot impacts due to the additional line haul locomotive and container truck activity in the No-Action and Proposed Project Alternatives. More specifically, the air quality modeling provided an estimate of the projected near-road and near-rail impacts on ambient air quality from line haul locomotives and container trucks operating off-property from the Port traveling north to Creosote Road, just south of I-10. The impact of emissions of CO, NO_x, PM_{10}, and $PM_{2.5}$ were predicted for the No-Action and Proposed Project Alternatives. The model shows impacts being below the NAAQS threshold and impacts being dispersed throughout Harrison County. The air quality analysis indicates that there would not be disproportionate adverse impacts to EJ communities.

The noise and vibrational technical report prepared for the EIS (Appendix J) concluded that noise from construction and dredging activities would not disproportionately impact any EJ communities. The noise study indicated that there would be similar impacts to EJ and non-EJ neighborhoods from both the No-Action and Proposed Project Alternatives. Therefore, it would not be considered a disproportionate impact or borne predominately by EJ communities. Noise mitigation measures indicated in Section 4.6.1.6 would apply to all communities. Additionally, changes in traffic volumes resulting from the implementation of the Proposed Project Alternative would result in very small increases in traffic volumes, as compared with back ground traffic. The change in noise resulting from this small increase in traffic when compared to the No-Action Alternative would not be perceptible to the human ear. Noise from the Proposed Project Alternative would be similar to that of the No-Action Alternative. This will be further discussed in Sections 4.4 and 4.6.

The changes in throughput anticipated at the Port under the No-Action Alternative (up to 1.0 million TEUs annually by 2060) combined with the shift in transport of goods to and from the Port using rail facilities would be expected to result in potential increased delays at railroad crossings. These delays are likely to be at the southern limits of the line approaching the Port because of slow speeds required through town and anticipated longer train lengths.

With the line improvement, the KCS rail line handles double stacked container freight, thus expanding the cargo load to 4 TEUs per rail car. According to the KCS Railway Environmental Assessment Traffic Study Technical memorandum, trains up to 2,400 feet in length will travel at 10 mph from US 90 to the Gulfport Rail Yard. North of the Gulfport Rail Yard, train lengths will increase up to 3, 900 feet and the train speed will increase and eventually reach up to 49 mph. Under previous conditions, train lengths were limited to 2,940 feet, or about 45 rail cars. With the line improvements, 2,400-foot trains with approximately 37 railcars from US 90 to the Gulfport Rail Yard and 3,900-foot trains with 60 rail cars north of the Gulfport Rail Yard can be accommodated. Under current conditions, the Port only generates one freight train every day either departing with TEUs or returning with empty cargo. Under the No-Action Alternative, the number of train trips between (to or from) the Port and the Gulfport Rail Yard is expected to expand to 28 per day by 2060. Under the Proposed Project Alternative, up to 47 train trips per day are expected between (to or from) the Port and the Gulfport Rail Yard by 2060. North of the Gulfport Rail Yard, nearly 18 train trips per day are expected in 2060 under the No-Action Alternative, and 29 train trips per day are expected under the Proposed Project Alternative. As with the No-Action Alternative, all Port rail traffic would operate between 10 P.M. and 7 A.M. to minimize extensive vehicular traffic delays at road/rail crossings.

The CIA found that the Proposed Project Alternative would not impact community cohesion. The proposed Project would change the face of the Port but not the sense of community. The City of Gulfport's EJ communities would be able to continue as they have and would not be adversely or disproportionately affected by the PGEP.

4.3.8.1 No-Action Alternative

The No-Action Alternative does not include the construction of the proposed Port expansion or any other construction requiring a USACE permit. The Port would continue to grow at the traditional pace under the No-Action Alternative to support the projected 2060 throughput of up to 1.0 million TEUs annually. The No-Action Alternative would be anticipated to result in 4,758 jobs by 2060. This would present employment opportunities for minority and low income populations. However, the additional employment associated with the No-Action Alternative would be less than that under the Proposed Project Alternative.

As stated in Section 4.4.5, by 2060 it is expected that train lengths would be 3,900 feet and that under the No-Action Alternative, the number of train trips between (to or from) the Port and the Gulfport Rail Yard is expected to expand to 28 per day by 2060. As indicated in Table 3.4-7, the average crossing closure time would be approximately 148 seconds, or about two and one-half minutes. Only the Landon Road crossing north of I-10 was expected to experience queues longer than the existing roadway could handle, but this area is not a minority or low income area. Also, the study concluded that crossing delays would decrease at 86 of 92 crossing locations due to the higher operating speed. Those six locations that experience an increase in delay are due to the combination of longer trains operating at locations where trains are not able to accelerate to the higher line operating speed, which could include the southern limits of the line in downtown Gulfport approaching the Port.

Results of the 2060 traffic evaluation indicate that a section of US 49 and a longer section of 28th Street would experience an LOS worse than D from the projected growth associated with the No-Action Alternative. Additionally, two other intersections (Canal Road and 28th Street and 28th Street at 30th Avenue) would experience LOS of E or F in 2060 (see Section 4.4.5).

The CIA (Appendix H) found that the No-Action Alternative would be consistent with the community values of the area and have the least impact, although it would not be consistent with the community's desire for increased economic growth, as it would have a smaller beneficial economic impact than the Proposed Project Alternative.

4.3.8.2 Proposed Project Alternative

As indicated in Table 3.3-12, none of the three block groups adjacent to the Port has minority populations greater than the city average (CT 14 BG1, CT 38 BG 1 and BG2). Minority populations for the block groups that are adjacent to the Port are lower than city, county, and state minority populations. Taking a wider survey of the 44 block groups found in the zone of potential impact, 21 have minority population percentages higher than that of the City of Gulfport as a whole. This indicates a zone of potential impact that has nearly equal minority and nonminority census block groups. Therefore, a disproportionate impact to minority populations would not be anticipated as a result of the proposed Project.

No income data were provided for the block group level; however, CT information was available to determine household income. None of the census tracts adjacent to the Port are categorized as either minority or low income (U.S. Census Bureau, 2013a). However, as indicated in Table 3.3-13, Zone of Potential Impact Median Household Income, 10 of the 15 census tracts have median household income below that of the City of Gulfport as a whole. The lowest is CT 18, with a median household income of $18,967 for 2011. Both CT 18 and CT 26 fall below the HHS 2014 poverty guideline for a family of four ($23,850) (HHS, 2014). CT 18 and CT 26 could be impacted; however, they are further removed from the Port. They could feel the effects of the increased traffic congestion. However, they could also experience beneficial economic impacts such as increased direct, indirect, and induced jobs, as could the whole of the city and the region. This Project has the potential to support a regional job provider and become an economic engine for the Gulf Coast region.

Under the Proposed Project Alternative, the Port would generate up to 47 trains per day from the Port to the Gulfport Rail Yard, 19 more than the No-Action Alternative. 29 trains per day (11 more than the No-Action Alternative) would be anticipated from the Gulfport Rail Yard to the KCS railway northern terminus. However, impacts associated with changes in rail transport activities at the Port are expected to be the same as described for the No-Action Alternative. The additional throughput from the Proposed Project Alternative would not substantially change expected delays at railroad crossings (see Section 4.4).

Potential impacts to traffic under 2060 forecast scenarios for the Proposed Project Alternative would be essentially the same as described for the No-Action Alternative. Overall, the majority of impacts experienced in the vicinity of the Port would be caused by background traffic rather than Port-related traffic. Additionally, it should be noted that traffic forecasting and modeling included only those roadway improvements that have been approved and funded. Thus, it is likely that changes in roadway planning over time would alleviate many of the LOS issues identified.

Additional negative effects associated with the Proposed Project Alternative would be temporary, such as construction-related impacts. Whereas the benefits, such as jobs created and the resulting boost to the local economy, are long term. The CIA (Appendix H) found that the Proposed Project Alternative would be consistent with the community values of the area and would be consistent with the community's desire for increased economic growth, as it would have a greater beneficial economic impact than the No-Action Alternative.

In conclusion, the Proposed Project Alternative would not cause disproportionately high and adverse human health and environmental effects on any minority or low-income populations in accordance with EO 12898, or limited English proficiency populations in accordance with EO 13166.

4.4 ROADWAY AND RAIL TRAFFIC

This section describes transportation system impacts of the proposed action associated with the Proposed Project Alternative relative to the No-Action Alternative. Transportation impacts are assessed under existing 2012 conditions and under forecast conditions in the years 2020, 2040, and 2060. Only 2012 and 2060 results are provided below to compare baseline conditions to maximum throughput for the Proposed

Project Alternative and the No-Action Alternative. Other years are provided in the Roadway and Rail Traffic Analysis (Appendix I) and discussed here as necessary.

4.4.1 Project Study Area

The Project study area for roadway transportation impacts extends from Landon Road north of I-10 to US 90 on the south, and from US 49 on the east to Canal Road and 30th Avenue on the west. This study area covers all roadways that can be used by Port commuters and trucks that access intercity highways such as I-10 and US 49. This study area also fully encompasses MDOT's planned I-310 Project, and includes all roads that would be directly affected by its completion. MDOT's I-310 Project has been delayed, and it is unknown when the project will move forward. For evaluation purposes, it is assumed that the project would not be operational but cumulative effects of I-310 are assessed in Section 5.

4.4.2 Description of Alternatives

The Proposed Project Alternative consists of enlargement of the terminal facilities to provide additional berthing and cargo handling capacity. Also, the expanded portion of the Port facility would be elevated up to 25 feet msl to help protect the Port infrastructure from hurricane storm surges.

Freight and passenger demand forecasts are based on an independent economic assessment of potential growth in freight container shipping, consistent with that described in Section 1.4. The traffic evaluation conducted for this study considers the 2012 baseline condition, and the No-Action and Proposed Project Alternatives and forecast years.

4.4.3 Background Traffic Forecast

Background traffic growth attributed to regional population and employment growth was determined using the most recent official traffic forecasts from the GRPC. These forecasts were obtained in September 2012. Travel demand model forecasts were available for the years 2008 (calibration year), 2016, 2025, and 2035. Traffic growth levels for study area roads from these forecasts were used to determine future traffic levels in 2020, 2040, and 2060 for use in this study.

Previously assumed traffic generation from the Port was subtracted from the GRPC model traffic patterns so that those associated with the Port expansion alternative defined in this study could be added. Port traffic demand associated with the Proposed Project Alternative was then added to determine the total traffic and associated traffic impacts. Separate traffic patterns were assigned for both light vehicles (passenger cars and small trucks) and heavy trucks.

4.4.4 Freight and Passenger Traffic Forecasts

The following sections describe the derivation of traffic forecasts for the No-Action and Proposed Project Alternatives and the different forecast years.

4.4.4.1 Trip Generation

Background traffic forecasts (excluding Port traffic) were derived using a combination of traffic counts and the GRPC travel demand model for the study year of 2012 and the forecast years of 2020, 2040, and 2060. The following subsections provide a summary of the methodology. Port trip generation was based on rates derived from actual traffic counts taken at all Port entry roadways in 2012.

4.4.4.1.1 Freight Truck Forecasts

Freight tractor trailer truck forecasts were generated for the Port based on the anticipated throughput, average number of weekday vehicle trips, and the number of TEUs per truck trip. Forecasts also took into account the proportion of cargo expected to enter and leave the Port via rail. Despite reductions in truck mode share, the absolute number of truck trips is still expected to grow from 518 current trips to up to 2,030 trips in 2060 under the Proposed Project Alternative. Under the No-Action Alternative, freight truck trips are still expected to grow to 1,235 per day. Thus, the maximum growth scenario adds a maximum of 795 truck trips over the No-Action Alternative by 2060 (Table 4.4-1).

4.4.4.1.2 Freight Rail Forecasts

Freight rail forecasts were also generated for the Port. Freight rail handles all land-side freight transport not accommodated by truck. Forecasts were based on anticipated throughput, average weekday vehicle trips, and took into account recent changes on the track following the KCS Rail Improvements Project. This includes double-stacking and increased speeds. Under previous conditions, train lengths were limited to 2,940 feet, or about 45 rail cars. From the Port up to the Gulfport Rail Yard, with line improvements, a 2,400-foot-long train (about 37 rail cars) traveling 10 mph can be accommodated. North of the Gulfport Rail Yard a 3,900-foot-long train with 60 rail cars can be accommodated and speeds can increase from 10 mph up to 49 mph. Under current conditions, the Port only generates one freight train every 2 days. Under the No-Action Alternative, the number of train trips between (to or from) the Port and the Gulfport Rail Yard is expected to expand to 28 per day by 2060. Under the Proposed Project Alternative, up to 47 train trips per day are expected between (to or from) the Port and the Gulfport Rail Yard by 2060. North of the Gulfport Rail Yard, nearly 18 train trips per day are expected in 2060 under the No-Action Alternative, and 29 train trips per day are expected under the Proposed Project Alternative.

4.4.4.1.3 Passenger Car and Service Truck Forecasts

Passenger demand to and from the Port consists of employees, equipment specialists and other deliveries that are not directly associated with freight. Based on traffic counts conducted at all Port entry roads in 2012, it was determined that the Port generates the equivalent of 1.9 daily automobile and single unit truck trips per daily TEU. About 76 percent of these trips are passenger cars. The remaining 24 percent are single-unit trucks associated with deliveries, equipment maintenance, repairs, and other functions that do not directly involve freight transport. Table 4.4-1 summarizes the weekday traffic forecasts associated with the

Table 4.4-1
Port of Gulfport Weekday Traffic Forecasts by Alternative

			Truck Trips/ Weekday		Rail Cars/ Weekday		Transit/ Weekday		Auto/Truck Single Unit Volume	
	From	To	2012	2060	2012	2060	2012	2060	2012	2060
Distribution days/year			250	250	250	250	250	250	–	–
Truck/rail mode share			95/5	50/50	95/5	50/50	95/5	50/50	–	–
Load factor (TEU/truck trip)			1.7	1.7	2	4	2	4	–	–
Load factor (TEU/rail car)			–	–	2	4	2	4	–	–
Allowable train length	US 90	Gulfport Rail Yard	–	–	–	–	2,940	2,400	–	–
	Gulfport Rail Yard	North of the Gulfport Rail Yard	–	–	–	–	2,940	3,900	–	–
No-Action Alternative	US 90	Gulfport Rail Yard	518	1,235	23	525	0.5	14.2	1,762	7,977
	Gulfport Rail Yard	North of the Gulfport Rail Yard	518	1,235	23	525	0.5	8.8	1,762	7,977
Proposed Project Alternative	US 90	Gulfport Rail Yard	518	2,030	23	863	0.5	23.4	1,762	13,112
	Gulfport Rail Yard	North of the Gulfport Rail Yard	518	2,030	23	863	0.5	14.4	1,762	13,112
Rail cars/train	US 90	Gulfport Rail Yard	–	–	–	–	45	37	–	–
	Gulfport Rail Yard	North of the Gulfport Rail Yard	–	–	–	–	45	60	–	–

TEU = twenty-foot equivalent unit.

No-Action and Proposed Project Alternatives. The volume of passenger car and single unit truck traffic generated by the Port would be expected to grow from 1,760 vehicles per day in 2012 to 13,112 trips per day in 2060, based on the Proposed Project Alternative. This forecast conservatively assumes no improvements in productivity, which would normally reduce future traffic demand growth since fewer employees would be required per unit of freight processed.

4.4.4.2 Port Freight and Passenger Travel Patterns

Though Port commuters can use any of the roadways to access the Port, freight trucks are currently routed along 30th Avenue rather than US 49 through the Gulfport CBD. From 30th Avenue, either 25th or 28th Street are used to connect back to US 49 to complete the trip north to both I-10, and the US 49 highway extending north of Gulfport into central Mississippi. Table 4.4-2 shows the anticipated distribution of traffic by roadway.

4.4.4.3 Traffic Forecasts by Alternative

The assessment of Project impacts begins with a comparison of total daily traffic (TDT) demand (see Appendix I). The No-Action Alternative forecasts for the different forecast years indicate that background traffic growth produces most of the overall traffic growth. The majority of traffic growth for the Proposed Project Alternative is from increased background traffic (Table 4.4-3).

Table 4.4-3 also summarizes the length-weighted daily truck traffic (DTT) demand levels on each of the seven corridors in the study area affected by Port traffic demand. The maximum overall increase from the Proposed Project Alternative would be expected to occur on US 49, where the average volume of trucks anticipated increases by almost 680 per day in 2060 compared to the No-Action Alternative.

The impact of Port traffic on surrounding transportation facilities was determined using traffic analysis procedures derived from the Highway Capacity Manual (HCM). HCM procedures combine traffic forecasts with a description of the roadway and traffic control devices like traffic signals to estimate transportation performance measures such as speed, traffic density, and delay (LOS) (see Section 3.4).

The No-Action Alternative is the baseline of comparison against the Proposed Project Alternative. This baseline represents the level of growth expected to occur if the Port remains as approved by current permits and no additional work under the jurisdiction of the USACE is performed. Thus, only additional auto, truck, and train traffic associated with the Proposed Project Alternative are assessed as impacts. LOS is ranked from A to F, with A being the best service and F being the worst. As discussed in Section 3.4.4, LOS D or better was identified as the desirable level of service when evaluating whether traffic generated by the Proposed Project Alternative is significant compared to the No-Action Alternative; road segments operating at LOS E or F would be considered unacceptable.

Table 4.4-2
Distribution of Traffic by Roadway (Percent)

Traffic Type	Freight Truck	Passenger Car/ Service Truck
Main Distribution Roadways		
Interstate (I) 10E	42	22
I-10W	28	24
US 90E	–	16
US 90W	–	14
US 49N	20	10
Canal Road N	–	8
Creosote Road Route E of US 49	–	1
Main Port Access Roads		
30th Avenue	89	53
Copa Boulevard	2	16
Captain James McManus Drive	9	31

4.4.1 Traffic Analysis Results

The traffic analysis results presented are based on the existing plus committed configuration of all the roadways in the study area. The committed improvements consist of two projects affecting 28th Street. The first adds a two-way left-turn lane and minor intersection improvements from Canal Road to 30th Avenue. The second project widens 28th Street to four lanes with a two-way left-turn lane from 30th Avenue to US 49. Though there are other projects in the GRPC long-range transportation plan, these are the only ones in which funding has been confirmed, and thus, these represent the worst case development scenario. These two projects on 28th Street are expected to be completed by 2020. It should be noted that the GRPC long-range transportation plan is based on year 2035 traffic forecasts. Thus, the list of planned projects may not meet long-term transportation needs beyond that year. Since this study includes an evaluation of 2040 and 2060 traffic levels based on extrapolation of GRPC travel demand growth trends to 2035, results from this study are likely to identify additional transportation system improvement needs that are a result of long-term background traffic growth more than they are of Port related traffic growth.

Table 4.4-4 identifies which segments of each corridor would operate at LOS E or F in 2020 for the No-Action and Proposed Project Alternatives, and potential causes. Of 40.2 directional miles studied, 0.3 mile is deficient. The results indicate that neither the Proposed Project Alternative, nor background traffic growth through 2020 (No-Action Alternative) will cause other roadway segments in the study area to experience a LOS worse than D.

Table 4.4-3
Total Daily Traffic and Daily Truck Traffic Rates by Corridor

	I-10					
Alternative	**TDT**	**Change from No-Action**	**Count Increase from No-Action**	**DTT**	**Change from No-Action**	**Count Increase from No-Action**
Baseline (2012)	55,830			6,840		
No-Action Alternative (2060)	100,750			12,400		
Proposed Project Alternative (2060)	101,450	0.7%	700	12,700	2.4%	300

	US 49					
Alternative	**TDT**	**Change from No-Action**	**Count Increase from No-Action**	**DTT**	**Count Increase from No-Action**	**Count Increase from No-Action**
Baseline (2012)	33,240			1,860		
No-Action Alternative (2060)	61,550			3,600		
Proposed Project Alternative (2060)	63,940	3.9%	2,390	4,280	18.9%	680

	US 90					
Alternative	**TDT**	**Change from No-Action**	**Count Increase from No-Action**	**DTT**	**Count Increase from No-Action**	**Count Increase from No-Action**
Baseline (2012)	18,820			800		
No-Action Alternative (2060)	34,520			1,560		
Proposed Project Alternative (2060)	35,460	2.7%	940	1,840	17.9%	280

	Canal Road					
Alternative	**TDT**	**Change from No-Action**	**Count Increase from No-Action**	**DTT**	**Count Increase from No-Action**	**Count Increase from No-Action**
Baseline (2012)	10,650			600		
No-Action Alternative (2060)	20,310			1,080		
Proposed Project Alternative (2060)	21,590	6.3%	1,280	1,080	0.0%	-

	25th Street					
Alternative	**TDT**	**Change from No-Action**	**Count Increase from No-Action**	**DTT**	**Count Increase from No-Action**	**Count Increase from No-Action**
Baseline (2012)	14,240			1,140		
No-Action Alternative (2060)	25,700			2,040		
Proposed Project Alternative (2060)	25,840	0.5%	140	2,040	0.0%	-

	28th Street					
Alternative	**TDT**	**Change from No-Action**	**Count Increase from No-Action**	**DTT**	**Count Increase from No-Action**	**Count Increase from No-Action**
Baseline (2012)	11,260			540		
No-Action Alternative (2060)	21,080			980		
Proposed Project Alternative (2060)	22,020	4.5%	940	980	0.0%	-

	30th Avenue					
Alternative	**TDT**	**Change from No-Action**	**Count Increase from No-Action**	**DTT**	**Count Increase from No-Action**	**Count Increase from No-Action**
Baseline (2012)	10,920			500		
No-Action Alternative (2060)	21,600			940		
Proposed Project Alternative (2060)	23,800	10.2%	2,200	1,100	17.0%	160

Red numbers = largest percentage and absolute increases in total traffic due to Port expansion among all roads in the table.
Blue numbers = largest percentage and absolute increases in truck traffic among all roads.

Table 4.4-4
Roadway Corridor Level of Service (LOS) Values – 2020
No-Action Alternative and Proposed Project Alternative

Corridor Name	Corridor Limits	Potential Cause of LOS E–F
Interstate (I)-10 Freeway	All LOS D or better	No issues
US 49 (25th Avenue)	All LOS D or better	No issues
US 90 (Beach Blvd.)	All LOS D or better	No issues
Canal Road	All LOS D or better	No issues
25th Street	All LOS D or better	No issues
28th Street	AM LOS F, eastbound approaching Canal Road	Intersection capacity
30th Avenue	All LOS D or better	No issues

Results of the traffic analysis described in Appendix I indicate that the eastbound approach of 28th Street at Canal Road has a capacity issue in 2020. The west leg of this intersection carries a relatively high future traffic volume for a two lane roadway. Since virtually no Port traffic uses this road segment, the capacity deficiency is likely due to background traffic growth between 2012 and 2020.

The results also indicate that background traffic growth and growth associated with the No-Action Alternative increase demand such that two approaches to the intersection of Canal Road and 28th Street experience LOS worse than D by 2040. The same conclusion applies to 2040 conditions under the Proposed Project Alternative.

The two road segments that have LOS worse than D are two of the approaches to the intersection of Canal Road and 28th Street. There are unfunded GRPC long-range plan projects to add two-way left-turn lanes to both the west and north leg of this intersection; however, these improvements do not address the intersection capacity issue. The changes in LOS are mostly triggered by year 2040 background traffic growth. Port truck traffic would not use these roadways, and only 14 percent of Port employees access the Port via Canal Road and 28th Street. Impacts associated with the Proposed Project Alternative are similar to the No-Action Alternative impacts.

Because 2060 throughput and resulting traffic count projections present the “worst-case” scenario, the following sections discuss potential traffic impacts in 2060 for the No-Action and Proposed Project Alternatives. This allows for a comparison of the alternatives in a meaningful manner. Potential impacts associated with rail facilities are also discussed.

4.4.1.1 No-Action Alternative

Table 4.4-5 provides anticipated LOS values for 2060 under the No-Action Alternative. Results of 2060 traffic evaluation indicate that background traffic growth and growth associated with No-Action Alternative increase demand such that a section of US 49 and a longer section of 28th Street experience LOS worse than D. As was the case with 2040, the combination of 2060 background traffic growth and Port employee traffic from the No-Action Alternative further increase demand on the intersection of Canal Road and 28th Street such that four lane widening improvements would be needed to achieve a meaningful increase in intersection capacity, and the low-cost intersection channelization improvement would not provide sufficient relief. Additionally, two other intersections (Canal Road and 28th Street and 28th Street at 30th Avenue) would experience LOS of E or F in 2060.

Capacity issues on US 49 pertain to the segment between 25th Street and 28th Street. US 49 transitions from six lanes north of 28th Street to four lanes from south of 28th Street to US 90. Though the US 49 roadway south of 28th Street is six lanes wide, the right lane in each direction is currently dedicated to right turns and as a buffer for on-street angle or parallel parking. The third lane in each direction can be restored by restriping the existing pavement and removing the angle parking. This change is only required for the quarter mile segment from 28th Street to a point south of 25th Street. Sections of US 49 farther south toward the beach and CBD operate at an acceptable LOS with four lanes.

Table 4.4-5
Roadway Corridor Level of Service (LOS) Values – 2060
No-Action Alternative and Proposed Project Alternative

	No-Action Alternative		Proposed Project Alternative	
Corridor Name/Limits	LOS	Potential Cause	LOS	Potential Cause
Interstate (I)-10 Freeway	D	No issues	D	No issues
I-10-US49 Interchange/Westbound to southbound loop ramp	E	High traffic volume for loop ramp	E	High traffic volume for loop ramp
US 49/Northbound approaching 28th Street and southbound approaching 25th Street	F	Reduction in US 49 Traffic Lanes from 6 to 4 lanes at 28th Street	F	Reduction in US 49 Traffic Lanes from 6 to 4 lanes at 28th Street
US 49/Southbound approaching Creosotte Road	D	No issues	E	Intersection Capacity
US 90	D	No issues	D	No issues
Canal Road/Southbound approaching 28th Street	E	Intersection Capacity	E	Intersection Capacity
25th Street	D	No issues	D	No issues
28th Street/Eastbound and westbound approaching Canal Road	F	Intersection Capacity	F	Intersection Capacity
28th Street/Eastbound approaching 30th Avenue	F	Intersection Capacity	F	Intersection Capacity
30th Avenue/Northbound approaching 25th Street	D	No issues	E	Intersection Capacity
30th Avenue/Northbound approaching 25th Street	D	No issues	D	No issues

Finally, the volume of traffic using the I-10 westbound loop exit ramp to southbound US 49 results in LOS E operations during the PM peak hour in 2060, mostly due to background traffic growth. Loop ramps have less capacity than other single-lane ramps due to their lower operating speed, and due to weaving traffic at either end of the ramp at cloverleaf interchanges. There are planned projects that could address this issue, though they are not committed at this time for different reasons. One project is the I-310 that would divert much of the traffic from this ramp that is destined for the Gulfport CBD and Port. The other is a planned new I-10 interchange east of US 49 that would connect with Airport Road at the northeast end of the Gulfport-Biloxi International Airport. This interchange would also attract I-10 traffic from the US 49 interchange. Other options involve modifications to the I-10/US 49 interchange. One low-cost modification involves closing the loop ramp and adding two left-turn lanes from the existing westbound I-10 to northbound US 49 ramp such that this ramp can also be used for left turns via a new signalized ramp intersection on US 49. Potential mitigation measures are provided in Section 6.2.

At-grade railroad crossings were evaluated as part of a study conducted by Burk-Kleinpeter, Inc. et al. (2011) on June 14, 2011, as part of the EA for the KCS Railway Track Upgrade Project, Hattiesburg to Gulfport, Mississippi. Results indicated that although some delays would be experienced as a result of the proposed Project, those impacts are likely to be confined to the immediate vicinity of the rail line. Of the 92 rail grade crossings along the corridor, all but one can be accommodated within the existing transportation system with no improvements. Only the Landon Road crossing north of I-10 was expected to experience queues longer than the existing roadway could handle. Also, the study concluded, as seen in Table 4.4-6 that crossing delays would decrease due to the higher operating speed from the KCS rail line improvements, except for between 33rd Street and Polk Street, where crossing closure time may increase up to 66 seconds due to longer trains travelling north from the Gulfport Rail Yard. In the downtown Gulfport area, at each of the at-grade rail crossings between US 90 and 33rd Street, the KCS rail line improvements decrease the total crossing closure time by approximately 37 seconds. The KCS Improvements Project has since been completed.

Table 4.4-6
Crossing Delay Before and After KCS Rail Line Improvements Implemented

Existing Conditions	From	To	Allowable Train Length (feet)	Train Speed (miles per hour)	Train Speed (feet/second)	Track Clearance Time (seconds)	Total Crossing Closure Time (seconds)
Before KCS Rail Improvement	US 90	O'Neal Road	2,940	10	14.7	30	230
After KCS Rail Improvements	US 90	33rd Street	2,400	10	14.7	30	193
	33rd Street	Polk Street	3,900	10	14.7	30	296
	Polk Street	Dedeaux Road	3,900	20	29.3	30	163
	Dedeaux Road	O'Neal Road	3,900	49	71.9	30	84

The changes in throughput anticipated at the Port under the No-Action Alternative (up to 1.0 million TEUs by 2060) combined with the shift in transport of goods to and from the Port using rail facilities would be expected to result in potential impact to delays at railroad crossings. Delays in the southern limits of the line, from US 90 to 33rd Street (approximately the Gulfport Rail Yard) are expected to decrease by 37 seconds, due to train lengths being shortened from 2,940 to 2,400 feet. Between 33rd Street and Polk Street crossing times are expected to increase, as longer trains (3,900 feet) are capable of leaving to the Gulfport Rail Yard and travelling north. These trains eventually increase their speed to 20 mph at Polk Street and 49 mph at Dedeaux Road, according to the KCS Railway Environmental Assessment. Because of the increase in travel speed for trains north of the Gulfport Rail Yard, crossing delays may decrease by 67 to 146 seconds per crossing. By 2060 it is expected that under the No-Action Alternative there would be up to 28 train trips per day between (to or from) the Port and the Gulfport Rail Yard; north of the Gulfport Rail Yard, nearly 18 train trips per day are anticipated by 2060.

4.4.1.2 Proposed Project Alternative

Potential impacts to traffic under 2060 forecast scenarios for the Proposed Project Alternative would be essentially the same as described for the No-Action Alternative. This would be primarily because while additional trips are generated by the Proposed Project Alternative, the trips are distributed throughout the day and therefore do not significantly impact traffic peaks. Thus, LOS would not be expected to change and any unacceptable conditions would be caused by background growth not associated with the Proposed Project Alternative. Potential mitigation measures are provided in Section 6.2.

By 2060, it is expected that under the proposed Project conditions, there would be up to 47 train trips per day between (to or from) the Port and the Gulfport Rail Yard; nearly 29 train trips per day are anticipated north of the Gulfport Rail Yard by 2060. While additional train trips would be generated by the Port, the analysis projects the duration of delays and frequency of delays caused by the additional train trips generated by the Proposed Project Alternative should fall within the same thresholds as the No-Action Alternative. Therefore, impacts associated with changes in rail transport activities at the Port are expected to be the same as described for the No-Action Alternative. The slight changes in throughput would not substantially change expected delays at railroad crossings.

4.5 AIR QUALITY

The evaluation of impacts to air quality is based on the identification of air contaminants and estimated emission rates associated with the No-Action Alternative and Proposed Project Alternative. Air emissions are considered for Port expansion construction activities and placement of dredged material as well as emissions from vehicular traffic and maintenance dredging. Project emissions are estimated based on the construction and equipment schedule developed for the Proposed Project Alternative as well as associated increased truck, rail, and ship traffic rates.

The estimated air contaminant emissions, except O_3, are compared with the 2011 emissions inventory for Harrison County, which is discussed in Section 3.5. Construction equipment and marine vessels burn fuel that forms NO_x and VOCs. NO_x and VOCs are precursors to O_3. The burning of fuels on its own does not produce O_3 as a product of combustion and therefore, O_3 is not calculated as an air contaminant from the No-Action Alternative and the Proposed Project Alternative for comparison to the Harrison County emissions inventory. Assuming an increase in air emissions would result in a corresponding increase in the ambient air concentration for that air contaminant, the ratio of the estimated emissions to the existing 2011 emissions for that contaminant provides a relative indication of the potential increase in ambient concentrations for the air contaminant.

The emission estimates provided in this document represent the increase in criteria pollutant emissions that would result from the No-Action Alternative and the Proposed Project Alternative. For the purpose of this air impact assessment, the regional area is considered to include Harrison County; the Proposed Project Alternative is located at the southern end of Harrison County. The impact assessment addresses the projected incremental increase in air emissions associated with the No-Action Alternative and Proposed Project Alternative in the years 2020 and 2060, as representative years for analysis.

Emissions evaluated were those that would primarily result from off-road and on-road mobile sources associated with construction of the Proposed Project Alternative. There would also be regional emission increases from marine, rail, and roadway traffic traveling to and from the terminal site (i.e., off-site emissions) associated with the operation of the No-Action Alternative and Proposed Project Alternative. The off-site traffic would be distributed over the Gulfport urban area, primarily along US 49 between US 90 and I-10 and along the FNC leading up to the Port.

Air dispersion modeling was performed in response to comments from the EPA on the Draft Environmental Impact Statement (DEIS) and was meant to provide information about potential hot spot impacts due to the additional line haul locomotive and container truck activity in the No-Action Alternative and the Proposed Project Alternative. EPA’s comments specified the following NAAQS pollutants of concern for modeled impacts: CO, NO_2, PM_{10}, and $PM_{2.5}$. Concentrations of these criteria pollutants resulting from the operation of the No-Action Alternative and the Proposed Project Alternative were predicted using the AERMOD Dispersion Model. As discussed in Section 3.5, Harrison County is currently designated as attainment or unclassifiable with the NAAQS for all regulated pollutants. Detailed assumptions, model data, and calculations for emissions inventories and dispersion modeling are in the Air Quality Technical Memorandum (Appendix P).

4.5.1 No-Action Alternative

4.5.1.1 Construction Emissions Inventory

No construction or new operating emission sources are associated with the No-Action Alternative. Therefore, there would be no adverse impact to air quality from the construction of the No-Action Alternative. Impacts to global climate change are discussed in Section 4.5.3.

4.5.1.2 Operational Emissions Inventory

It would be expected that over time, the Port would achieve an annual throughput of up to approximately 1.0 million TEUs by 2060. Thus, it is expected that air contaminant emissions within the Project area would increase within the operational constraints on the existing system due to increased truck, rail, and ship traffic resulting both from growth of existing business and new business at the Port.

With the Restoration Project, the Port has implemented efforts to minimize impacts to air quality including the following:

- Use of Best Management Practices (BMPs) such as, but not limited to, the following to minimize air quality and dust impacts, where practicable, especially outside the Port:
  - Propane-generated forklifts
  - Electric reefer plugs
  - Provision of electric power to tugs and pilots when in port
  - Idling requirements of no more than 10 minutes for truckers
  - Replacement of diesel-powered cranes with electric cranes
- Use of newer vehicles with more fuel efficient engines, including bio-diesel trucks, if possible;
- Improved cargo handling practices, including the addition of a fourth container terminal site that would be operated as a semi-automated terminal utilizing RMG cranes;
- Use of hybrid rail engines, as available; and
- Use of a bus to transport employees during construction.

The Port intends to continue these efforts to minimize air emissions associated with normal Port activity. Day-to-day operations on the Port are expected to have minimal impact on air quality within the study area. However, potential changes in the transport of goods to and from the Port via truck, rail, and ship are expected to vary with changes in throughput. Therefore, the analysis of air emissions focuses on these aspects of operation rather than on emissions associated with general activity on the Port. Additionally, air emissions associated with maintenance dredging of the existing berths along the north and south harbor, the Commercial Small Craft Harbor, and the entrance channel are provided as a means of comparison with the maintenance dredging projected for the Proposed Project Alternative.

The estimate of air emissions for the No-Action Alternative was based on the assessment of potential growth in freight and container shipping as discussed in Appendix I. Under the No-Action Alternative scenario and with the previously permitted actions, an annual throughput of up to 287,732 TEUs is anticipated by 2020. It is expected that over time, improved economic conditions, improvements in Port efficiencies, changes in tenant configuration and automation, and other unforeseeable changes in Port practices or economic conditions would allow the Port to achieve an annual throughput up to 1,049,631 million TEUs by 2060. In this analysis, the estimate of emissions was based specifically on the anticipated freight truck, rail car, and employee and supplier traffic volumes projected for the No-Action Alternative for the years 2020 and

2060, as summarized in Table 4.5-1. As derived in Section 4.14, 600 TEUs per vessel trip was used to determined annual vessel trips from the projected throughput in TEUs. Detailed operational emissions calculations are in Appendix P.

Table 4.5-1
No-Action Alternative –Freight Truck, Rail Car, and Employee and Supplier Traffic Volumes – 2020 and 2060

	Annual Vessel Trips (round trip)		Daily Freight Truck (one way)		Daily Rail Car (round trip)		Daily Employee and Supplier (one way)	
Year	2020	2060	2020	2060	2020	2060	2020	2060
Projected Volume	480	1,750	508	1,235	72	525	2,187	7,977

Increases in air pollution would result from the equipment associated with operation of the No-Action Alternative. These air contaminant emissions would result from the use of marine vessel and land-based mobile sources during the operation of the Port, including:

- Trucks – trucks transporting the shipped containers;
- Railroad – line haul locomotive activity transporting the containers to, and north of, the Gulfport Rail Yard;
- Employee Vehicles – employees and suppliers commuting to and from the Port via cars and trucks; and
- Container/Tugboat – marine vessels for transporting containers such as container vessels and tugboats.

Other potential air pollution could come from the operation of switch locomotive engines and cargo handling equipment; however, since the Port would operate electric switch locomotives and cargo handling equipment, there would be no direct emissions from these activities. Additionally, air emissions associated with maintenance dredging of the existing berths along the north and south harbor, the Commercial Small Craft Harbor, and the entrance channel are provided as a means of comparison for the maintenance dredging projected for the No-Action Alternative and Proposed Project Alternative. As described in Section 2.9, maintenance dredging would require removal of 200,000 cy of material every 10 years under the No-Action Alternative.

A summary of the total estimated emissions in tons, with the exception of CO_2e which is presented in metric tons (MT), resulting from the operation of the No-Action Alternative for years 2020 and 2060 is presented in Table 4.5-2. A summary of the estimated emissions in tons resulting from one year of maintenance for the No-Action Alternative is shown in tons in Table 4.5-3.

Table 4.5-2: Estimated Operational Emissions by Source – No-Action Alternative

	VOCs (tons)	**PM_{10} (tons)**	**$PM_{2.5}$ (tons)**	**CO (tons)**	**NO_X (tons)**	**SO_2 (tons)**	**CO_2e (MT)**	**Total HAPs (tons)**
Year 2020								
Container Truck Emissions (on and off Port to Harrison County Boundary)	1.16	1.88	1.21	6.24	21.13	0.05	4791	0.14
Railroad Emissions (US 90 to Gulfport Rail Yard)	0.18	0.11	0.11	1.02	4.83	0.00	358	--
Railroad Emissions (North of Gulfport Rail Yard to Harrison County Boundary)	0.31	0.19	0.18	1.71	8.08	0.01	599	--
Employee Vehicle Emissions	4.00	1.93	0.41	165.57	12.89	0.10	13,097	0.23
Container/Tugboat Emissions	11.61	5.78	5.44	42.15	335.26	8.65	17,636	2.59
Subtotal	**17.26**	**9.89**	**7.35**	**216.69**	**382.19**	**8.80**	**36,481**	**2.97**
Year 2060								
Container Truck Emissions (on and off Port to Harrison County Boundary)	0.34	1.84	0.44	2.61	9.27	0.10	11,118	0.09
Railroad Emissions (US 90 to Gulfport Rail Yard)	0.25	0.09	0.09	7.63	5.96	0.03	2,700	--
Railroad Emissions (North of Gulfport Rail Yard to Harrison County Boundary)	0.41	0.15	0.14	12.44	9.72	0.05	4,403	--
Employee Vehicle Emissions	2.72	6.66	1.14	143.22	8.06	0.27	37,179	0.18
Container/Tugboat Emissions	41.01	20.19	19.00	213.15	797.14	30.45	61,895	9.11
Subtotal	**44.73**	**28.93**	**20.82**	**379.05**	**830.15**	**30.90**	**117,296**	**9.37**

CO = carbon monoxide
NO_x = nitrogen oxide
PM_{10} = particulate matter of 10 micrometers or less
$PM_{2.5}$ = particulate matter of 2.5 micrometers or less
SO_2 = sulfur dioxide
VOC = volatile organic compound
CO_2e = Carbon Dioxide Equivalent
HAP = hazardous air pollutant

Table 4.5-3: Estimated Maintenance Dredging Emissions – No-Action Alternative

Every Ten Years	VOCs (tons)	PM_{10} (tons)	$PM_{2.5}$ (tons)	CO (tons)	NO_X (tons)	SO_2 (tons)	CO_2e (metric tons)	Total HAPs (tons)
Maintenance Dredging Emissions	1.2	1.4	1.3	13.8	18.8	0.02	1,751	0.23

CO = carbon monoxide

NO_x = nitrogen oxide

PM_{10} = particulate matter of 10 micrometers or less

$PM_{2.5}$ = particulate matter of 2.5 micrometers or less

SO_2 = sulfur dioxide

VOC = volatile organic compound

CO_2e = Carbon Dioxide Equivalent

HAP = hazardous air pollutant

The total air contaminant emissions from the No-Action Alternative were compared to the 2011 emissions inventory for Harrison County by contaminant as described in Section 3.5. The comparison is presented in Tables 4.5-4 and 4.5-5.

Table 4.5-4
No-Action Alternative – Annual Estimated Traffic Emissions – 2020
Compared With Harrison County Emissions (2011)

Air Contaminant	Projected Emissions Totals (tons per year)	2011 Harrison County Emissions Inventory	Project Emissions % of Harrison County Emissions
NO_X	382.19	16,468	2.32
CO	216.69	62,403	0.35
PM_{10}	9.89	25,598	0.04
$PM_{2.5}$	7.35	4,892	0.15
VOCs	17.26	32,666	0.05
SO_2	8.80	32,925	0.03
CO_2e (MT)	36,579	5,356,551	0.68
HAPs	2.97	5,911	0.05

Notes: CO_2e is presented in metric tons (MT).
EPA 2015a, EPA 2015b.
CO = carbon monoxide
NO_x = nitrogen oxide
PM_{10} = particulate matter of 10 micrometers or less
$PM_{2.5}$ = particulate matter of 2.5 micrometers or less
SO_2 = sulfur dioxide
VOC = volatile organic compound
CO_2e = Carbon Dioxide Equivalent
HAP = hazardous air pollutant

Table 4.5-5
No-Action Alternative – Annual Estimated Traffic Emissions – 2060
Compared With Harrison County Emissions (2011)

Air Contaminant	Projected Emissions Totals (tons per year)	2011 Harrison County Emissions Inventory	Project Emissions % of Harrison County Emissions
NO_X	830.15	16,468	5.04
CO	379.05	62,403	0.61
PM_{10}	28.93	25,598	0.11
$PM_{2.5}$	20.82	4,892	0.43
VOCs	44.73	32,666	0.14
SO_2	30.90	32,925	0.09
CO_2e (MT)	122,964	5,356,551	2.30
HAPs	9.37	5,911	0.16

Notes: CO_2e is presented in metric tons (MT).
EPA 2015a, EPA 2015b.
CO = carbon monoxide
NO_x = nitrogen oxide
PM_{10} particulate matter of 10 micrometers or less
$PM_{2.5}$ = particulate matter of 2.5 micrometers or less
SO_2 = sulfur dioxide
VOC = volatile organic compound
CO_2e = Carbon Dioxide Equivalent
HAP = hazardous air pollutant

As shown in Tables 4.5-4 and 4.5-5, the No-Action Alternative would result in a relatively small increase in air contaminant emissions above those from existing sources in Harrison County by 2020 and 2060; the largest being for emissions of NO_X and CO_2e primarily due to the increase in truck, railroad, and container ship traffic. Criteria pollutant and HAP emissions from the No-Action Alternative would equal very small percentages of the total criteria pollutants and HAPs emitted in the study area. Impacts of criteria pollutants and HAPs from the operational inventory of the No-Action Alternative would be minor. Due to the anticipated short-term duration of the maintenance dredging activities once every ten years, emissions from these activities are not expected to adversely impact the long-term air quality in the area. Impacts of criteria pollutants and HAPs from the maintenance dredging of the No-Action Alternative would be minor.

It is expected that air contaminant emissions resulting from the increase in container volume traffic may result in a corresponding increase in impacts to air quality in the immediate vicinity of the Project area, diminishing as emissions are dispersed over the county. These localized impacts from air contaminants in the No-Action Alternative are analyzed and discussed in Section 4.5.1.3. Impacts to global climate change from GHG emissions are discussed in Section 4.5.3.

4.5.1.3 Air Dispersion Modeling

The purpose of the air quality modeling is to provide an estimate of the projected near-road and near-rail impacts on ambient air quality from line haul locomotives and container trucks operating off-property from the Port of Gulfport traveling north to Creosote Road, just south of I-10. Emissions factors from MOVES 2014a for container trucks and emissions factors for line haul locomotives from *Current Methodologies for Preparing Mobile Source Port-Related Emission Inventories* were used for the analysis (EPA 2009). AERMOD was run to predict the impact of emissions of CO, NO_x, PM_{10} and $PM_{2.5}$ for the No-Action Alternative in 2020 and 2060.

The AERMOD results of CO, NO_2, PM_{10}, and $PM_{2.5}$ concentrations and comparison to the NAAQS in 2020 and 2060 for the No-Action Alternative are shown in Tables 4.5-6 and 4.5-7, respectively. Detailed calculations, figures, and files are shown in Appendix P.

Table 4.5-6
AERMOD Modeling Results – 2020 No-Action Alternative

Pollutant	Averaging Period	NAAQS ($\mu g/m^3$)	Modeled Concentration ($\mu g/m^3$)
CO	8-hour	10,000	44.3
	1-hour	40,000	165.6
NO_2	Annual	100	14.7
	1-hour	188	161.5
PM_{10}	24-hour	150	1.8
$PM_{2.5}$	Annual	12	0.5
	24-hour	35	1.3

Note:

a. The maximum 1-hour NO_2 concentration includes ARM2 ratios of 0.2 to 0.9 and annual NO_2 includes the ARM ratio of 0.75.
b. Total predicted concentration for the 1-hour NO_2 standard is the average of the H8H (98 percentile) modeled over 5 years.
c. Total predicted concentration for the Annual NO_2 standard is maximum of five years modeled concentrations.
d. Total predicted concentrations for the 1-hour and 8-hour CO standards are the maximum modeled over 5 years.
e. Total predicted concentration for the 24-hour PM_{10} standard is the max of the H2H modeled over 5 years.
f. Total predicted concentration for the 24-hour $PM_{2.5}$ standard is the average of the H8H (98 percentile) modeled over 5 years.
g. Total predicted concentration for the Annual $PM_{2.5}$ standard is the five year average of the annual concentrations.

CO = carbon monoxide; NO_2 = nitrogen dioxide
PM_{10} = particulate matter of 10 micrometers or less
$PM_{2.5}$ = particulate matter of 2.5 micrometers or less
NAAQS = National Ambient Air Quality Standards

Table 4.5-7: AERMOD Modeling Results – 2060 No-Action Alternative

Pollutant	Averaging Period	NAAQS ($\mu g/m^3$)	Modeled Concentration ($\mu g/m^3$)
CO	8-hour	10,000	110.2
	1-hour	40,000	323.8
NO_2	Annual	100	7.0
	1-hour	188	135.6
PM_{10}	24-hour	150	1.0
$PM_{2.5}$	Annual	12	0.2
	24-hour	35	0.5

Note:

a. The maximum 1-hour NO_2 concentration includes ARM2 ratios of 0.2 to 0.9 and annual NO_2 includes the ARM ratio of 0.75.
b. Total predicted concentration for the 1-hour NO_2 standard is the average of the H8H (98 percentile) modeled over 5 years.
c. Total predicted concentration for the Annual NO_2 standard is maximum of five years modeled concentrations.
d. Total predicted concentrations for the 1-hour and 8-hour CO standards are the maximum modeled over 5 years.
e. Total predicted concentration for the 24-hour PM_{10} standard is the max of the H2H modeled over 5 years.
f. Total predicted concentration for the 24-hour $PM_{2.5}$ standard is the average of the H8H (98 percentile) modeled over 5 years.
g. Total predicted concentration for the Annual $PM_{2.5}$ standard is the five year average of the annual concentrations.

CO = carbon monoxide
NO_2 = nitrogen dioxide
PM_{10} = particulate matter of 10 micrometers or less
$PM_{2.5}$= particulate matter of 2.5 micrometers or less
NAAQS = National Ambient Air Quality Standards

As shown in Figures 4.5-1 and 4.5-2, the predicted NO_2 concentrations are higher along the railroad tracks and close to the Port than the locations along US 49. The concentrations drop quickly at receptor locations away from the railroad tracks. As shown in Tables 4.5-6 and 4.5-7, criteria pollutant concentrations resulting from the operation of the No-Action Alternative would not exceed the applicable NAAQS.

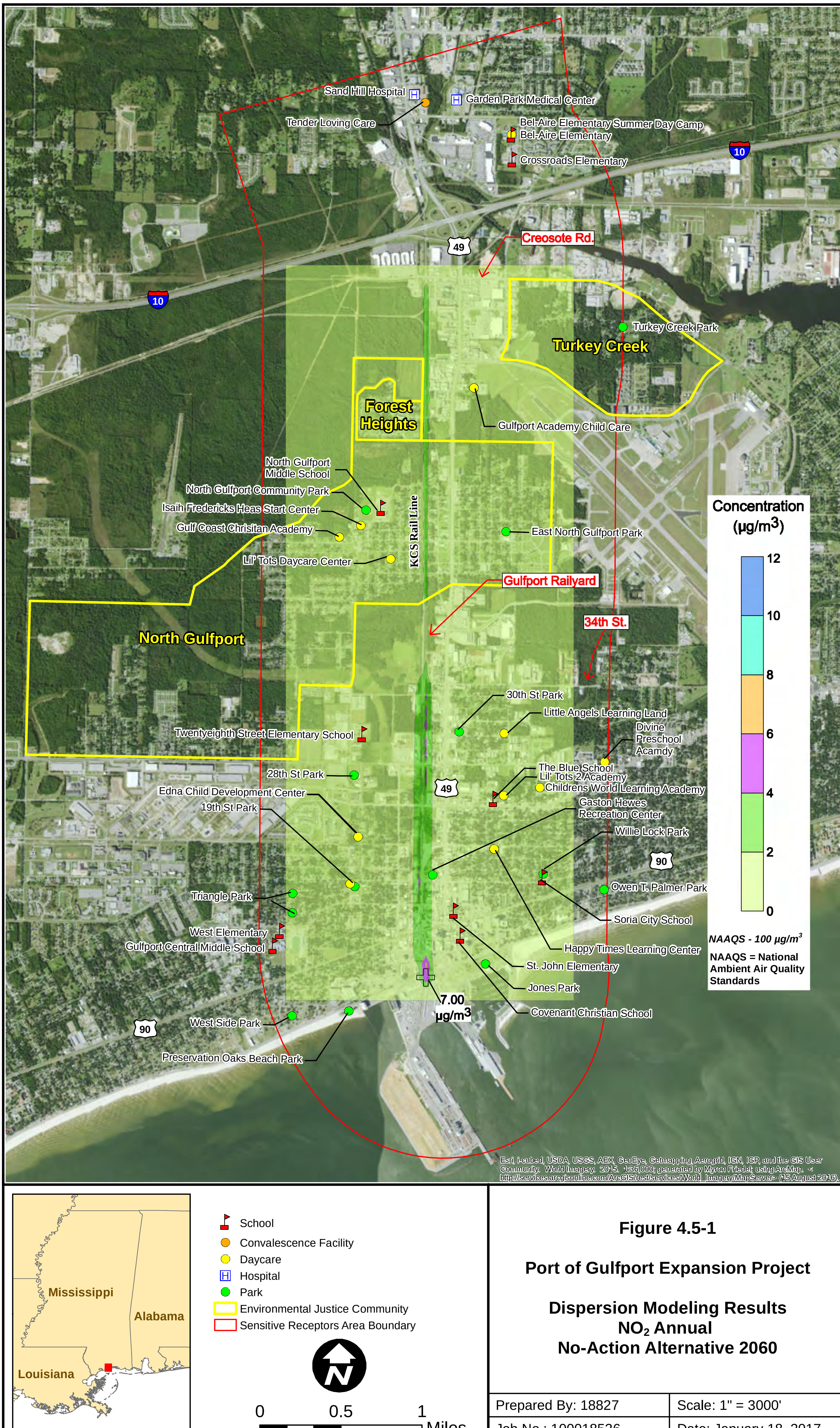


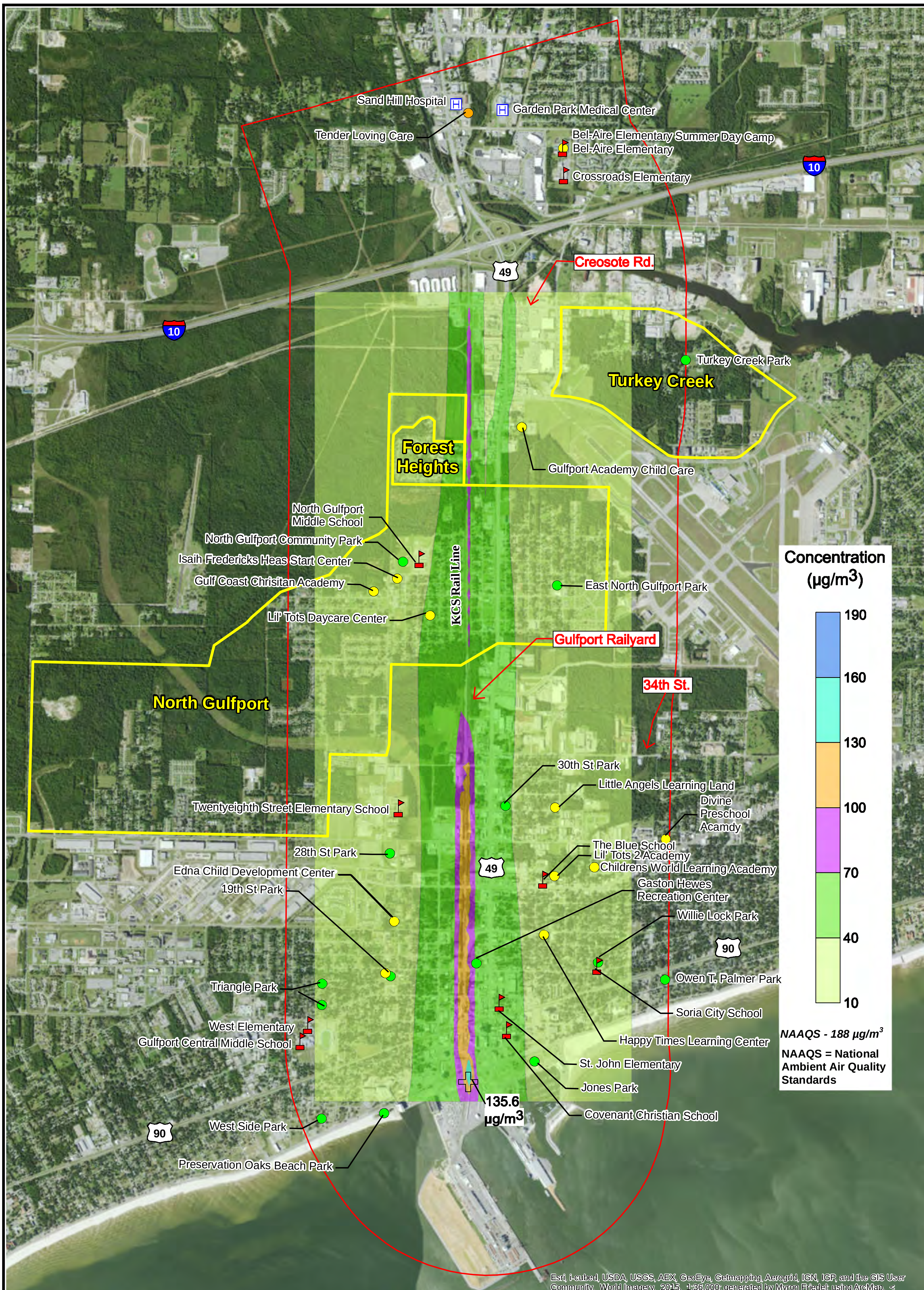
Figure 4.5-1

Port of Gulfport Expansion Project

Dispersion Modeling Results
NO_2 Annual
No-Action Alternative 2060

Prepared By: 18827	Scale: 1" = 3000'
Job No.: 100018536	Date: January 18, 2017

File: N:\Clients\M_N\Mississippi_State_Port_Authority\100018536\geospatial\Figs_EIS\Air_Quality_Figs\Fig_4_5_1_NO2_Annual_2060.mxd



- School
- Convalescence Facility
- Daycare
- Hospital
- Park
- Environmental Justice Community
- Sensitive Receptors Area Boundary

0 0.5 1 Miles

Figure 4.5-2

Port of Gulfport Expansion Project

Dispersion Modeling Results
NO_2 1-hour
No-Action Alternative 2060

Prepared By: 18827	Scale: 1" = 3000'
Job No.: 100018536	Date: January 18, 2017

File: N:\Clients\M_N\Mississippi_State_Port_Authority\100018536\geospatial\Figs_EIS\Air_Quality_Figs\Fig_4_5_2_NO2_1hr_2060.mxd

4.5.2 Proposed Project Alternative

4.5.2.1 Construction Emissions Inventory

Temporary increases in air pollution would result from the equipment associated with construction of the Proposed Project Alternative. These air contaminant emissions would result from the use of marine vessel and land-based mobile sources that would be used during the expansion activities, including:

- Dredge & Support Equipment – dredging vessels such as tugboats;
- Non-Road Construction Equipment – land-based equipment such as bulldozers and graders;
- On-Road and Employee Vehicles – land-based equipment such as cars and trucks; and
- Maintenance Dredging – dredging vessels for maintenance such as tugboats.

Air contaminant emissions associated with the expansion activities would be primarily combustion products from fuel burned in equipment used for Project dredging, support vessels, and dredged material placement equipment. Equipment such as excavators, backhoes, and front-end loaders would also be required. The marine vessel emission sources would be primarily diesel-powered engines. The off-road and on-road equipment may be assumed to be a mix of gasoline and diesel powered vehicles.

These construction activities would be considered one-time activities, i.e., the construction activities would not continue past the date of completion. The construction is anticipated to occur from 2018 through 2024. A summary of the total estimated emissions in tons, with the exception of CO_2e which is presented in MT, resulting from the use of dredging equipment, non-road equipment, and on-road equipment for the construction of the Proposed Project Alternative is presented in Table 4.5-8. Detailed construction emissions calculations are shown in Appendix P.

The highest annual air contaminant emissions due to construction activities associated with the Proposed Project Alternative, which would occur in 2018, were compared to the 2011 emissions inventory for Harrison County, as described in Section 3.5. The comparison is presented in Table 4.5-9.

Table 4.5-8
Proposed Project Alternative – Estimated Construction Emissions by Source

	VOCs (tons)	PM_{10} (tons)	$PM_{2.5}$ (tons)	CO (tons)	NO_X (tons)	SO_2 (tons)	CO_2e (metric tons)	Total HAPs (tons)
Year 2018								
Dredge & Support Equipment	10.83	10.35	10.04	200.63	272.86	0.261	25,416	2.99
Nonroad Construction Equipment	0.28	0.15	0.15	1.69	2.17	0.003	536	0.01
On-Road and Employee Vehicles	0.03	0.02	0.01	0.43	0.26	0.001	61	0.00
Maintenance Dredging	0.00	0.00	0.00	0.00	0.00	0.000	0	0.00
Subtotal	**11.14**	**10.52**	**10.20**	**202.70**	**275.26**	**0.265**	**26,013**	**3.00**
Year 2019								
Dredge & Support Equipment	15.04	14.37	13.94	278.55	378.83	0.362	35,287	4.35
Nonroad Construction Equipment	1.85	1.00	0.97	10.73	14.57	0.022	3,586	0.05
On-Road and Employee Vehicles	0.15	0.13	0.08	2.31	1.33	0.003	353	0.02
Maintenance Dredging	0.35	0.33	0.32	6.39	8.69	0.008	810	0.05
Subtotal	**17.39**	**15.83**	**15.31**	**297.98**	**403.41**	**0.395**	**40,036**	**4.46**
Year 2020								
Dredge & Support Equipment	6.98	6.67	6.47	129.27	175.81	0.168	16,376	1.99
Nonroad Construction Equipment	1.46	0.78	0.75	8.58	11.39	0.017	2,825	0.04
On-Road and Employee Vehicles	0.09	0.09	0.06	0.90	0.93	0.002	198	0.01
Maintenance Dredging	0.35	0.33	0.32	6.39	8.69	0.008	810	0.05
Subtotal	**8.88**	**7.86**	**7.60**	**145.15**	**196.82**	**0.195**	**20,209**	**2.09**

Table 4.5-8, cont'd

	VOCs (tons)	PM_{10} (tons)	$PM_{2.5}$ (tons)	CO (tons)	NO_X (tons)	SO_2 (tons)	CO_2e (metric tons)	Total HAPs (tons)
Year 2021								
Dredge & Support Equipment	9.43	9.02	8.75	174.72	237.62	0.227	22,134	2.89
Nonroad Construction Equipment	1.36	0.81	0.79	11.76	12.07	0.018	2,849	0.04
On-Road and Employee Vehicles	0.12	0.08	0.04	2.17	0.79	0.002	260	0.01
Maintenance Dredging	0.61	0.58	0.56	11.25	15.30	0.015	1,426	0.14
Subtotal	**11.52**	**10.49**	**10.14**	**199.90**	**265.78**	**0.261**	**26,669**	**3.08**
Year 2022								
Dredge & Support Equipment	0.07	0.07	0.06	1.27	1.72	0.002	161	0.00
Nonroad Construction Equipment	0.78	0.34	0.33	13.39	4.95	0.009	1,438	0.02
On-Road and Employee Vehicles	0.14	0.10	0.06	1.61	0.93	0.002	245	0.01
Maintenance Dredging	0.35	0.33	0.32	6.39	8.69	0.008	810	0.05
Subtotal	**1.33**	**0.83**	**0.77**	**22.66**	**16.30**	**0.021**	**2,653**	**0.09**
	VOCs	**PM_{10}**	**$PM_{2.5}$**	**CO**	**NO_X**	**SO_2**	**CO_2e**	**Total HAPs**
Year 2023								
Dredge & Support Equipment	0.05	0.04	0.04	0.84	1.14	0.001	106	0.00
Nonroad Construction Equipment	0.37	0.11	0.11	9.30	1.95	0.004	579	0.008
On-Road and Employee Vehicles	0.08	0.06	0.04	0.84	0.55	0.001	137	0.01
Maintenance Dredging	0.35	0.33	0.32	6.39	8.69	0.008	810	0.05
Subtotal	**0.84**	**0.54**	**0.50**	**17.37**	**12.32**	**0.014**	**1,631**	**0.07**

Table 4.5-8, cont'd

	VOCs (tons)	PM_{10} (tons)	$PM_{2.5}$ (tons)	CO (tons)	NO_X (tons)	SO_2 (tons)	CO_2e (metric tons)	Total HAPs (tons)
Year 2024								
Dredge & Support Equipment	0.00	0.00	0.00	0.00	0.00	0.000	0	0.00
Nonroad Construction Equipment	0.11	0.04	0.04	1.43	0.67	0.001	186	0.002
On-Road and Employee Vehicles	0.39	0.58	0.39	2.66	6.81	0.013	1,336	0.05
Maintenance Dredging	0.83	0.79	0.77	15.30	20.81	0.020	1,939	0.13
Subtotal	**1.33**	**1.41**	**1.20**	**19.39**	**28.29**	**0.034**	**3,461**	**0.18**
TOTAL (ALL YEARS)								
Dredge & Support Equipment	42.40	40.52	39.30	785.28	1,068	1.02	99,480	12.22
Nonroad Construction Equipment	6.22	3.23	3.13	56.88	47.76	0.07	11,997	0.17
On-Road and Employee Vehicles	1.01	1.05	0.69	10.92	11.60	0.02	2,592	0.11
Maintenance Dredging	2.81	2.69	2.61	52.12	70.88	0.07	6,603	0.48
	52.44	**47.49**	**45.73**	**905.14**	**1,198**	**1.186**	**120,672**	**12.97**

CO = carbon monoxide

NO_x = nitrogen oxide

PM_{10} particulate matter of 10 micrometers or less

$PM_{2.5}$ = particulate matter of 2.5 micrometers or less

SO_2 = sulfur dioxide

VOC = volatile organic compound

CO_2e = Carbon Dioxide Equivalent

HAP = hazardous air pollutant

Table 4.5-9
Proposed Project Alternative – Peak Annual Estimated Construction Emissions Compared With Harrison County Emissions (2011)

Air Contaminant	Peak Estimated Project Emissions (tons per year)	2011 Harrison County Emissions Inventory	Project Emissions % of Harrison County Emissions
NO_X	403.41	16,468	2.45
CO	297.98	62,403	0.48
PM_{10}	15.83	25,598	0.06
$PM_{2.5}$	15.31	4,892	0.31
VOCs	17.39	32,666	0.05
SO_2	0.395	32,925	<0.01
CO_2e (MT)	40,036	5,356,551	0.75
HAPs	4.46	5,911	0.08

Notes: CO_2e is presented in metric tons (MT).
Source: EPA 2015a, EPA 2015b.
CO = carbon monoxide
NO_x = nitrogen oxide
PM_{10} particulate matter of 10 micrometers or less
$PM_{2.5}$ = particulate matter of 2.5 micrometers or less
SO_2 = sulfur dioxide
VOC = volatile organic compound
CO_2e = Carbon Dioxide Equivalent
HAP = hazardous air pollutant

As shown in Table 4.5-9, air contaminant emissions from the construction activities associated with the Proposed Project Alternative would result in a relatively small increase in emissions above those from existing sources in Harrison County. As a result, the estimated increase in emissions may also result in corresponding minor short-term impacts on air quality in the immediate vicinity of the Project area. Due to the limited duration of these activities, emissions from these construction activities are not expected to adversely impact the long-term air quality in the area. Impacts to global climate change are discussed in Section 4.5.3.

4.5.2.2 Operational Emissions Inventory

Under the Proposed Project Alternative, operation of the expanded Port facilities is anticipated to result in an estimated throughput of up to 487,732 TEUs by 2020. An annual throughput of 1,725,215 TEUs is expected by 2060. As such, it would be expected that air contaminant emissions would increase due to increased truck, rail, and ship traffic resulting from growth of existing business and from new business at the Port.

The estimate of air emissions from the increased freight, rail, and employee and supplier traffic associated with the Proposed Project Alternative was based on the assessment of potential growth in freight and container shipping as discussed in Appendix I. In this analysis, the estimate of emissions was based specifically on the anticipated freight truck, rail car, and employee and supplier traffic volumes projected for the Proposed Project Alternative for the years 2020 and 2060, as summarized in Table 4.5-10. As derived in Section 4.14, 600 TEUs per vessel trip was used to determined annual vessel trips from the projected throughput in TEUs. Detailed operational emissions calculations are shown in Appendix P.

Table 4.5-10
Proposed Project Alternative –Freight Truck, Rail Car, and
Employee and Supplier Traffic Volumes – 2020 and 2060

	Annual Vessel Trips (round trip)		Daily Freight Truck (one way)		Daily Rail Car (round trip)		Daily Employee and Supplier (one way)	
Year	2020	2060	2020	2060	2020	2060	2020	2060
Projected Volume	812	2,876	861	2,030	122	865	3,707	13,112

Note: Vessel Trips listed are annual vessel trips.

Increases in air pollution would result from the equipment associated with operation of the Proposed Project Alternative. These air contaminant emissions would result from the use of marine vessel and land-based mobile sources that would be used during the operation of the Port, including:

- Trucks – trucks transporting the shipped containers;
- Railroad – line haul locomotive activity transporting the containers to, and north of, the Gulfport Rail Yard;
- Employee Vehicles – employees and suppliers commuting to and from the Port via cars and trucks; and
- Container/Tugboat – marine vessels for transporting containers such as container vessels and tugboats.

Other potential air pollution could come from the operation of switch locomotive engines and cargo handling equipment; however, since the Port would operate electric switch locomotives and cargo handling equipment, there would be no direct emissions from these activities. Maintenance dredging of between 486,000 cy and 1.3 mcy of material would need to be removed annually under the Proposed Project Alternative. A maximum of 1.3 mcy of material was assumed in this analysis. A summary of the total estimated emissions in tons, with the exception of CO_2e which is presented in MT, resulting from the operation of the Proposed Project Alternative for years 2020 and 2060 is presented in Table 4.5-11. A summary of the estimated emissions in tons resulting from one year of maintenance for the Proposed Project Alternative is shown in tons in Table 4.5-12.

Table 4.5-11
Estimated Operational Emissions by Source – Proposed Project Alternative

	VOCs (tons)	PM_{10} (tons)	$PM_{2.5}$ (tons)	CO (tons)	NO_X (tons)	SO_2 (tons)	CO_2e (MT)	Total HAPs (tons)
Year 2020								
Container Truck Emissions (on and off Port to Harrison County Boundary)	1.97	3.18	2.05	10.58	35.82	0.08	8,120	0.24
Railroad Emissions (US 90 to Gulfport Rail Yard)	0.32	0.19	0.19	1.77	8.39	0.01	622	--
Railroad Emissions (North of Gulfport Rail Yard to Harrison County Boundary)	0.53	0.32	0.31	2.92	13.80	0.01	1,023	--
Employee Vehicle Emissions	6.79	3.28	0.69	280.64	21.84	0.16	22,200	0.40
Container/Tugboat Emissions	18.61	8.55	8.01	59.54	526.15	14.82	26,934	3.97
Subtotal	**28.21**	**15.52**	**11.25**	**355.45**	**606.01**	**15.08**	**58,900**	**4.61**
Year 2060								
Container Truck Emissions (on and off Port to Harrison County Boundary)	0.56	3.03	0.72	4.29	15.24	0.17	18,276	0.14
Railroad Emissions (US 90 to Gulfport Rail Yard)	0.41	0.15	0.14	12.55	9.80	0.05	4,439	--
Railroad Emissions (North of Gulfport Rail Yard to Harrison County Boundary)	0.67	0.24	0.23	20.48	16.00	0.08	7,247	--
Employee Vehicle Emissions	4.47	10.95	1.88	235.42	13.25	0.45	61,113	0.29
Container/Tugboat Emissions	69.71	34.33	32.31	362.35	1355.14	51.76	105,221	15.48
Subtotal	**75.83**	**48.69**	**35.29**	**635.09**	**1,409.43**	**52.51**	**196,295**	**15.92**

CO = carbon monoxide
NO_x = nitrogen oxide
PM_{10} particulate matter of 10 micrometers or less
$PM_{2.5}$ = particulate matter of 2.5 micrometers or less
SO_2 = sulfur dioxide
VOC = volatile organic compound
CO_2e = Carbon Dioxide Equivalent
HAP = hazardous air pollutant

Table 4.5-12
Estimated Maintenance Dredging Emissions – Proposed Project Alternative

Every Ten Years	VOCs (tons)	PM_{10} (tons)	$PM_{2.5}$ (tons)	CO (tons)	NO_X (tons)	SO_2 (tons)	CO_2e (metric tons)	Total HAPs (tons)
Maintenance Dredging Emissions	7.6	9.0	8.7	89.8	122.2	0.12	11,378	1.5

CO = carbon monoxide
NO_x = nitrogen oxide
PM_{10} particulate matter of 10 micrometers or less
$PM_{2.5}$ = particulate matter of 2.5 micrometers or less
SO_2 = sulfur dioxide
VOC = volatile organic compound
CO_2e = Carbon Dioxide Equivalent
HAP = hazardous air pollutant

The total air contaminant emissions estimated for the Proposed Project Alternative were compared to the 2011 emissions inventory for Harrison County as described in Section 3.5. The comparisons for 2020 and 2060 are presented in Tables 4.5-13 and 4.5-14, respectively.

Table 4.5-13
Proposed Project Alternative – Annual Estimated Traffic Emissions – 2020
Compared With Harrison County Emissions (2011)

Air Contaminant	Projected Emissions Totals (tons per year)	2011 Harrison County Emissions Inventory	Project Emissions % of Harrison County Emissions
NO_X	606.01	16,468	3.68
CO	355.45	62,403	0.57
PM_{10}	15.52	25,598	0.23
$PM_{2.5}$	11.25	4,892	0.23
VOCs	28.21	32,666	0.09
SO_2	15.08	32,925	0.05
CO_2e (MT)	58,900	5,356,551	1.09
HAPs	4.61	5,911	0.08

Notes: CO_2e is presented in metric tons (MT).
EPA 2015a, EPA 2015b.
CO = carbon monoxide
NO_x = nitrogen oxide
PM_{10} particulate matter of 10 micrometers or less
$PM_{2.5}$ = particulate matter of 2.5 micrometers or less
SO_2 = sulfur dioxide
VOC = volatile organic compound
CO_2e = Carbon Dioxide Equivalent
HAP = hazardous air pollutant

Table 4.5-14
Proposed Project Alternative – Annual Estimated Traffic Emissions – 2060
Compared With Harrison County Emissions (2011)

Air Contaminant	Projected Emissions Totals (tons per year)	2011 Harrison County Emissions Inventory	Project Emissions % of Harrison County Emissions
NO_X	1,409.43	16,468	8.56
CO	635.09	62,403	1.02
PM_{10}	48.69	25,598	0.19
$PM_{2.5}$	35.29	4,892	0.72
VOCs	75.83	32,666	0.23
SO_2	52.51	32,925	0.16
CO_2e (MT)	196,295	5,356,551	3.66
HAPs	15.92	5,911	0.27

Notes: CO_2e is presented in metric tons (MT).
EPA 2015a, EPA 2015b.
CO = carbon monoxide
NO_x = nitrogen oxide
PM_{10} particulate matter of 10 micrometers or less
$PM_{2.5}$ = particulate matter of 2.5 micrometers or less
SO_2 = sulfur dioxide
VOC = volatile organic compound
CO_2e = Carbon Dioxide Equivalent
HAP = hazardous air pollutant

As shown in Tables 4.5-13 and 4.5-14, the Proposed Project Alternative would result in a relatively small increase in air contaminant emissions above those from existing sources in Harrison County by 2020 and 2060; the largest being for emissions of NO_X and CO_2e primarily due to the increase in truck, railroad, and container ship traffic. In the long term, the Proposed Project Alternative would be anticipated to have an increase in impacts compared with the No-Action Alternative due to increased cargo transport to and from the Port and increased material volumes for maintenance dredging. However, criteria pollutant and HAPs emissions from the Proposed Project Alternative would equal small percentages of the total criteria pollutants and HAPs emitted in the study area. Long-term impacts of criteria pollutants and HAPs from the operational inventory of the Proposed Project Alternative would be minor.

Annual maintenance dredging activities for the Proposed Project Alternative would result in higher air contaminant emissions compared to the maintenance dredging activity required under the No-Action Alternative. However, the air contaminant emissions resulting from maintenance dredging related to the Proposed Project Alternative would be a relatively small fraction of the estimated annual operational emissions. Long-term impacts of criteria pollutants and HAPs from the maintenance dredging of the Proposed Project Alternative would be minor.

It is expected that air contaminant emissions resulting from the increase in container volume traffic may result in a corresponding increase in impacts to air quality in the immediate vicinity of the Project area, diminishing as emissions are dispersed over the county. These localized impacts from air contaminants in the Proposed Project Alternative are analyzed and discussed in Section 4.5.2.3. Impacts to global climate change from GHG emissions are discussed in Section 4.5.3.

4.5.2.3 Air Dispersion Modeling

The purpose of the air quality modeling is to provide an estimate of the projected near-road and near-rail impacts on ambient air quality from line haul locomotives and container trucks operating off-property from the Port of Gulfport traveling north to Creosote Road just south of I-10. Emissions factors from MOVES 2014a for container trucks and emissions factors for line haul locomotives from *Current Methodologies for Preparing Mobile Source Port-Related Emission Inventories* were used for the analysis (EPA, 2009). AERMOD was run to predict the impact of emissions of CO, NO_x, PM_{10} and $PM_{2.5}$ from the Proposed Project Alternative in 2020 and 2060.

The AERMOD results of CO, NO_2, PM_{10}, and $PM_{2.5}$ concentrations and comparison to the NAAQS in 2020 and 2060 for the Proposed Project Alternative are shown in Tables 4.5-15 and 4.5-16, respectively. Detailed calculations, figures and files are shown in Appendix P.

As shown in Figures 4.5-3 and 4.5-4, the predicted NO_2 concentrations are higher along the railroad tracks and close to the Port than the locations along US 49. The concentrations drop quickly at receptor locations away from the railroad tracks. As shown in Tables 4.5-15 and 4.5-16, criteria pollutant concentrations modeled based on emissions from the Proposed Project Alternative would not exceed the applicable NAAQS. Long-term impacts to localized air quality from the operation of the Proposed Project Alternative would be below the NAAQS.

Table 4.5-15
AERMOD Modeling Results – 2020 Proposed Project Alternative

Pollutant	Averaging Period	NAAQS ($\mu g/m^3$)	Modeled Concentration ($\mu g/m^3$)
CO	8-hour	10,000	77.8
	1-hour	40,000	167.4
NO_2	Annual	100	25.6
	1-hour	188	162.2
PM_{10}	24-hour	150	3.2
$PM_{2.5}$	Annual	12	0.8
	24-hour	35	2.3

Note:

a. The maximum 1-hour NO_2 concentration includes ARM2 ratios of 0.2 to 0.9 and annual NO_2 includes the ARM ratio of 0.75.
b. Total predicted concentration for the 1-hour NO_2 standard is the average of the H8H (98 percentile) modeled over 5 years.
c. Total predicted concentration for the Annual NO_2 standard is maximum of five years modeled concentrations.
d. Total predicted concentrations for the 1-hour and 8-hour CO standards are the maximum modeled over 5 years.
e. Total predicted concentration for the 24-hour PM_{10} standard is the max of the H2H modeled over 5 years.
f. Total predicted concentration for the 24-hour $PM_{2.5}$ standard is the average of the H8H (98 percentile) modeled over 5 years.
g. Total predicted concentration for the Annual $PM_{2.5}$ standard is the five-year average of the annual concentrations.

CO = carbon monoxide
NO_2 = nitrogen dioxide
PM_{10} = particulate matter of 10 micrometers or less
$PM_{2.5}$= particulate matter of 2.5 micrometers or less
NAAQS = National Ambient Air Quality Standards

Table 4.5-16
AERMOD Modeling Results – 2060 Proposed Project Alternative

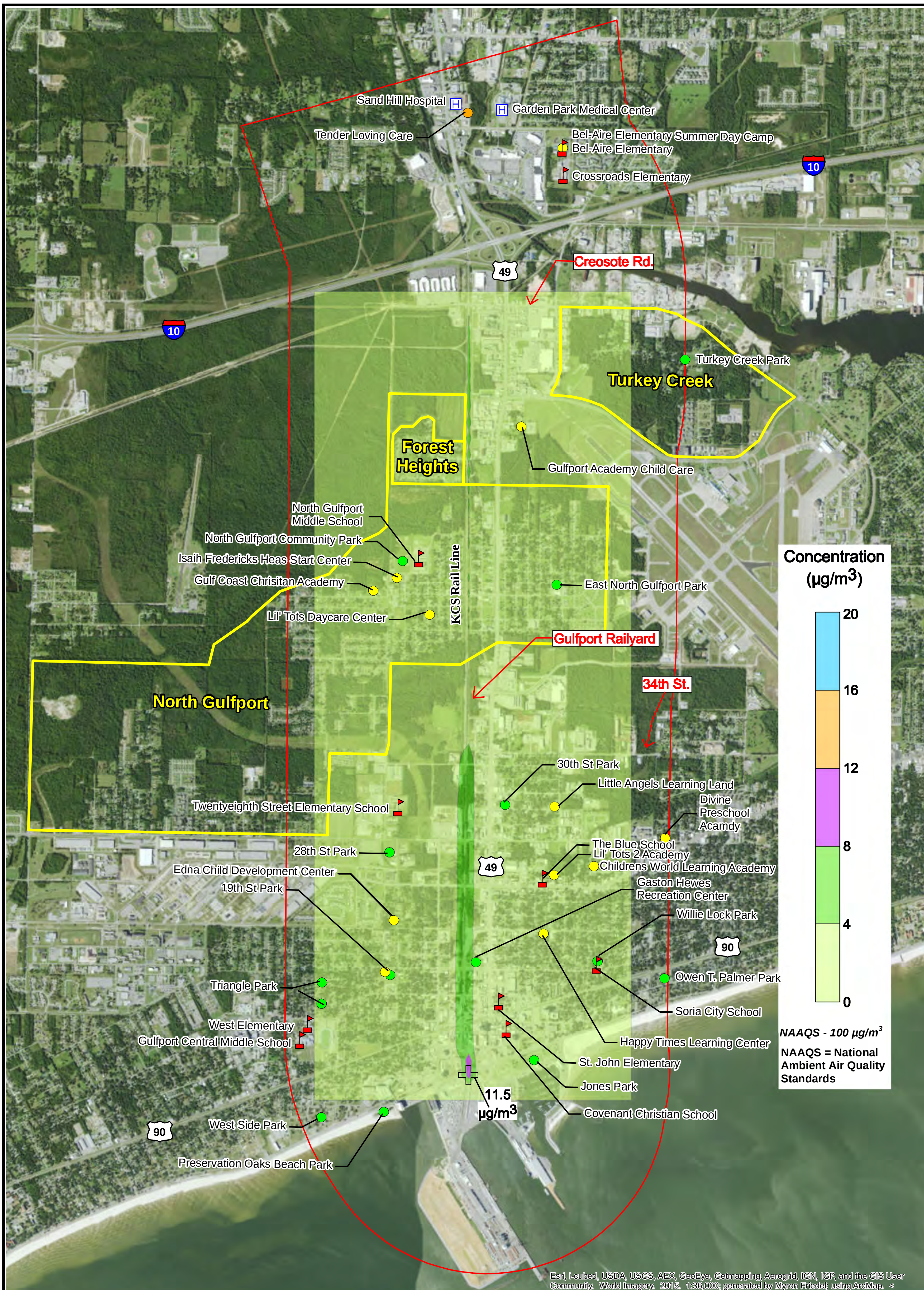
Pollutant	Averaging Period	NAAQS ($\mu g/m^3$)	Modeled Concentration ($\mu g/m^3$)
CO	8-hour	10,000	176.2
	1-hour	40,000	493.7
NO_2	Annual	100	11.5
	1-hour	188	142.5
PM_{10}	24-hour	150	1.6
$PM_{2.5}$	Annual	12	0.3
	24-hour	35	0.9

Note:

a. The maximum 1-hour NO_2 concentration includes ARM2 ratios of 0.2 to 0.9 and annual NO_2 includes the ARM ratio of 0.75.
b. Total predicted concentration for the 1-hour NO_2 standard is the average of the H8H (98 percentile) modeled over 5 years.
c. Total predicted concentration for the Annual NO_2 standard is maximum of five years modeled concentrations.
d. Total predicted concentrations for the 1-hour and 8-hour CO standards are the maximum modeled over 5 years.
e. Total predicted concentration for the 24-hour PM_{10} standard is the max of the H2H modeled over 5 years.
f. Total predicted concentration for the 24-hour $PM_{2.5}$ standard is the average of the H8H (98 percentile) modeled over 5 years.
g. Total predicted concentration for the Annual $PM_{2.5}$ standard is the five year average of the annual concentrations.

CO = carbon monoxide
NO_2 = nitrogen dioxide
PM_{10} = particulate matter of 10 micrometers or less
$PM_{2.5}$= particulate matter of 2.5 micrometers or less
NAAQS = National Ambient Air Quality Standards

This page intentionally left blank.



School
Convalescence Facility
Daycare
Hospital
Park
Environmental Justice Community
Sensitive Receptors Area Boundary

0 0.5 1 Miles

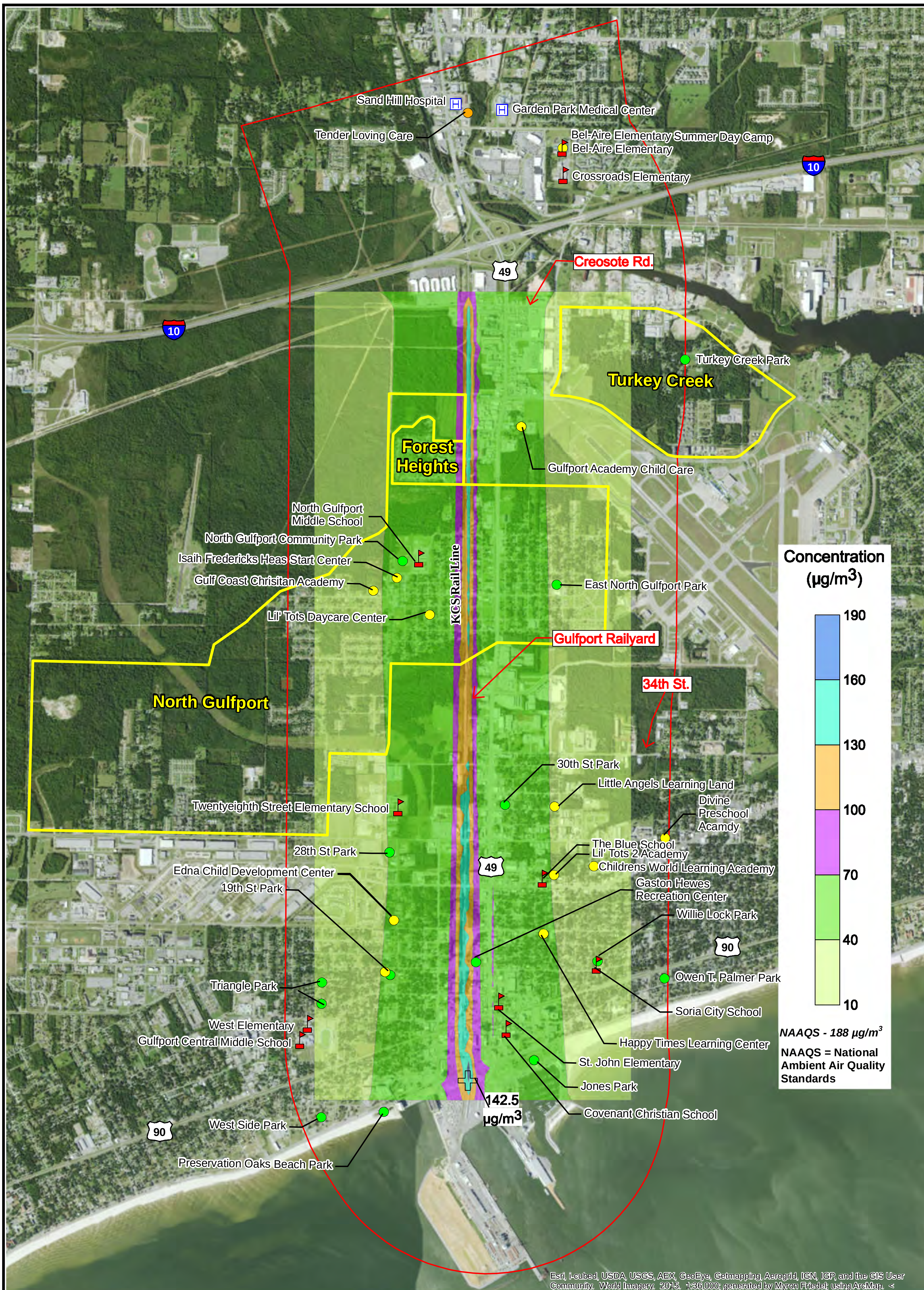
Figure 4.5-3

Port of Gulfport Expansion Project

Dispersion Modeling Results
NO_2 Annual
Proposed Project Alternative 2060

Prepared By: 18827	Scale: 1" = 3000'
Job No.: 100018536	Date: January 18, 2017

File: N:\Clients\M_N\Mississippi_State_Port_Authority\100018536\geospatial\Figs_EIS\Air_Quality_Figs\Fig_4_5_3_NO2_Annual_2060.mxd



School
Convalescence Facility
Daycare
Hospital
Park
Environmental Justice Community
Sensitive Receptors Area Boundary

0 0.5 1 Miles

Figure 4.5-4

Port of Gulfport Expansion Project

Dispersion Modeling Results
NO_2 1-hour
Proposed Project Alternative 2060

Prepared By: 18827	Scale: 1" = 3000'
Job No.: 100018536	Date: January 19, 2017

File: N:\Clients\M_N\Mississippi_State_Port_Authority\100018536\geospatial\Figs_EIS\Air_Quality_Figs\Fig_4_5_4_NO2_1hr_2060.mxd

4.5.3 Greenhouse Gas Emissions Reductions Program

The Port is committed to using methods to minimize GHG emissions including, for example, the use of light-emitting diode (LED) high mast lights and other "green" features to make the Port more energy efficient. The Port also joined the Green Marine Environmental Program in 2013. This program requires a voluntary commitment from participating maritime companies to tangibly and measurably strengthen their environmental performance with respect to priority environmental issues including GHG emissions. The program provides a framework and ranking system for maritime companies to follow to reduce their environmental footprint. Guidance on how maritime companies can improve their environmental performance on 11 topics such as GHG and air pollutant emissions, cargo residues, prevention of spills and leakages, and community impacts is also provided. Participants must demonstrate improvements each year to maintain their certification. Every two years, Green Marine will engage a third-party consultant to conduct an on-site visit to ensure the integrity of the program and certify the Port's self-evaluation.

There are six categories in which the Port is ranked: aquatic invasive species, GHG and air pollutant emissions, spill prevention, dry bulk handling and storage, community impacts, and environmental leadership. Scoring for the Green Marine Program includes Levels 1 through 4 with 1 being the first and lowest level of environmental performance and 4 being the highest level of achievement for environmental performance. The evaluations are submitted in April of each year. In 2013, the Port's first year in the Green Marine Environmental Program, the Port performed a self-evaluation to assess its initial level of environmental performance and scored Level 1 in the six categories.

In 2014, the Port scored Level 1 in environmental leadership, Not Applicable (NA) for invasive species, and Level 3 in spill prevention. At this time, the Port was certified at Level 2 for GHG and air pollutant emissions, dry bulk handling and storage, and community impacts. For Level 2, the Port is ranked on policies and enforcement of: limiting idling of vehicle engines; promoting sustainable transportation practices (e.g., carpooling); implementing measures to reduce congestion and idling during periods of heavy activity; and informing, and when necessary, issuing warnings to ships which emit excessive amounts of smoke. The Port has, by default, reduced emissions as a result of Hurricane Katrina which destroyed many of the Port's on-site vehicles such as fork lifts and trucks. Almost all of the Port's equipment is new, dating from 2006, including new propane-driven forklifts. In addition, the Port recently purchased electric carts, replacing on-site trucks, to be used by maintenance staff and crane operators. Another element that is improving emissions at the Port is the purchase and integration of three new electric rail-mounted gantry cranes. The cranes were delivered in March 2016 and as a result, the existing diesel-powered rubber tire gantry cranes are now used as back-up cranes for special cargo.

To achieve Level 3 for GHG and air pollutant emissions, the Port will be required to conduct an annual audit to determine the amount of CO_2 produced at the Port. The audit includes charting how much fuel is used by all Port vehicles and buildings. This information will be used to determine how much CO_2 is produced and therefore, how many MT of GHG were emitted. The audit applies only to Port-owned and operated equipment; equipment owned and operated by tenants is not included in the audit. To achieve a

Level 4 certification in the GHG and air pollutant emissions category, an energy performance plan is required. The energy performance plan must comprise the following elements:

Best Practices

- Description of the best practices the Port has put into place to reduce greenhouse gas emissions.
- Distribution and verification procedures for ensuring the implementation of these best practices.
- Identification of persons responsible for applying these procedures.

Reduction Plan

- A list and description of measures to be implemented to reduce GHG and air pollutant emissions related to the Port's activities.
- A quantifiable reduction target (based on intensity).
- Identification of possible improvements.
- Designation of a person responsible for annual follow-up of the reduction plan.

As previously shown, air contaminant emissions from the Proposed Project Alternative would result from the operation of dredges, tugboats, and land-side construction equipment, during construction activities, as well as the increase in freight (truck and rail), container ship, employee, and supplier vehicle traffic powered by internal combustion engines that produce exhaust emissions. Emissions from these sources would result in an increase in GHG emissions that could contribute to global climate change.

Measures that would be used to reduce GHG emissions for the Proposed Project Alternative would consider the equipment used for the Project over the expected life of the Project and the feasibility and practicality of such measures. Alternatives considered for their ability to reduce or mitigate GHG emissions are those that may provide for enhanced energy efficiency, lower GHG-emitting technology, and renewable energy sources, as appropriate, for the construction and operating equipment and vehicles to be used. Efforts to reduce GHG emissions from the construction and operation of the Proposed Project Alternative would include:

Dredging Mitigation Options

- Contract with dredging companies with energy efficient equipment.
- Design of the dredging operation and schedule so as to reduce overall fuel use.
- Repowering/refitting with cleaner diesel engines.
- Selection of newer dredges with more efficient engines, if possible.

Land-side Mitigation Options

- Use of Biodiesel Fuel – Biodiesel can be used directly in the unmodified diesel engines of some construction equipment, trucks, and other heavy vehicles resulting in emissions that are considerably cleaner than from the combustion of conventional diesel. Biodiesel is also considered a greenhouse-neutral fuel. Biodiesel could provide a 4 to 22 percent reduction in CO_2 emissions compared to diesel fuel.
- Conversion to compressed natural gas (CNG) or liquefied petroleum gas (LPG) – CNG could provide about a 27 percent reduction in CO_2 emissions compared to gasoline, and LPG could provide about a 14 percent reduction.
- Repowering/refitting with cleaner, more fuel efficient, diesel engines.
- Use of propane-generated fork-lifts for stevedores (already in place).
- Use of electric reefer plugs instead of gas-powered generators for containers with cargo that require climate control, such as bananas (already in place).
- Use of newer vehicles with more fuel efficient engines, including bio-diesel trucks, if possible (already in place).
- Provision of electric power to tugs and pilots, eliminating the need to run their vessels when in port.
- Installation of automated gates which are fully electronic within five years, thereby reducing idling time.
- Enforcement of idling requirements (no more than 10 minutes) for truckers while in port (already in place).

Freight Traffic Mitigation Options

- Repowering/refitting with cleaner, more fuel efficient, diesel engines.
- Use of hybrid rail engines and other vehicles, as available.
- Use of newer vehicles with more fuel efficient engines, if possible.

Container Ship Mitigation Options

- Use of container ships with more efficient engines and propulsion systems.
- Use of container ships with engine and propulsion systems and design features that follow the IMO guidance for improvements in energy efficiency.

Climate Change impacts are by nature, cumulative and long term. An individual project cannot generate enough GHG emissions to influence global climate change. Therefore, the Proposed Project Alternative would result in minor adverse impacts to global climate change. The No-Action and Proposed Project Alternatives participate in this potential impact by their incremental contribution combined with the cumulative increase of all other global sources of GHGs, which when taken together create changes in the climate. Consideration of a proposed action'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 GHGs. In addition, GHG emissions persist in the atmosphere for decades or longer, impacting the climate over the long term. Furthermore, the ultimate determination of significance remains subject to agency practice for the consideration of context and intensity. As such, impacts of the No-Action and Proposed Project Alternatives on global climate change will be evaluated comparatively against each other and at the regional scale with the consideration of context and intensity.

As shown in sections above, the No-Action Alternative would result in no construction GHG emissions. Comparatively, the Proposed-Project Alternative would result in a total of 120,672 MT CO_2e over the 7 years of construction. The No-Action Alternative operational activities would result in 36,579 MT CO_2e in 2020 while the Proposed Project Alternative would result in 458,900 MT CO_2e in 2020. By the year 2060, the No-Action Alternative would result in 122,964 MT CO_2e while the Proposed Project Alternative would result in 196,295 MT CO_2e. Further, the No-Action Alternative would result in 1,751 MT CO_2e due to maintenance dredging every 10 years, while the Proposed Project Alternative would result in up to 11,378 MT CO_2e annually for this activity.

When considering context and intensity, this analysis looks at both short-term and long-term effects and benefits associated with phases of the No-Action and Proposed Project Alternatives. Because there would be no construction associated with the No-Action Alternative, there would be no impacts to global climate change due to construction of the No-Action Alternative. Because the GHG emissions from the construction phase of the Proposed Project Alternative are short-term in nature, the associated adverse impacts on global climate change would be minor. The long-term effects of the No-Action and Proposed Project Alternatives would be as a consequence of their operational GHG emissions. The Proposed Project Alternative operational GHG emissions in 2020 are estimated to be about 12.5 times higher than those of the No-Action Alternative. GHG emissions for both alternatives are estimated to increase by 2060 and the Proposed Project Alternative is estimated to have about 60 percent more GHG emissions annually than the No-Action Alternative. On a CO_2e per TEU basis, it is estimated that the Proposed Project Alternative would result in CO_2e emissions of 0.115 MT CO_2e per TEU in 2060 compared to 0.112 MT CO_2e per TEU for the No-Action Alternative. Therefore, the long-term operation of the Proposed Project Alternative would be nearly as efficient in terms of CO_2e emissions per TEU. The Proposed Project Alternative is also estimated to emit many thousands more MT of CO_2e due to maintenance dredging compared to the No-Action Alternative.

It is important to note for context that the higher GHG levels for the Proposed Project Alternative are largely due to the higher levels of container throughput which requires increased vessel, truck, and rail activity. Although the Proposed Project Alternative is estimated to result in higher GHG emissions than the No-Action Alternative in the long-term, this is largely due to the facilitation of increased container throughput, rather than inefficiencies by the Port when compared to the No-Action Alternative.

4.6 NOISE AND GROUND-BORNE VIBRATION

4.6.1 Noise

The significance criterion for noise impacts on the human environment would be permanently elevated noise compared with existing conditions that would cause annoyance and result in complaints. Noise levels at noise-sensitive receptors were estimated based on expected noise levels from Project-related sources and the properties of noise attenuation over distance.

As noted in Section 3.6, the noise-sensitive receptors nearest to the Port include a recreational park located 2,100 feet from the site, a residential area 2,300 feet from the site, a school 2,300 feet from the site, and a church located approximately 3,000 feet from the site. These distances were measured from the nearest proposed area for Port expansion (i.e., the placement of fill in the North Harbor). Dredging operations for the expansion of the Turning Basin would occur approximately 3,600 feet farther from each of the noise-sensitive receptors. Noise-sensitive receptors are also located along portions of I-310 and the KCS rail line corridors. These sensitive receptors are already exposed to traffic and rail noise from the existing highway and rail line.

4.6.1.1 Methodology – Construction Impacts

Noise from multiple construction equipment sources is determined by adding the various noise emission reference levels together (10L1/10 + 10L2/10 . . .) and then converting the energy levels back to total decibels [10 log (10L1/10 + 10L2/10 . . .)], where L is the noise emission reference level in dBA for each piece of equipment. Noise attenuates over distance, which is referred to as divergence. A reference noise emission level at 50 feet, provided on Figure 4.6-1, is adjusted for distance to a particular point or receptor [adjustment factor equals 20 log (50 feet/distance from receptor to noise source in feet)]. The attenuation over distance does not consider any additional attenuation caused by characteristics of the noise propagation path, which may also modify attenuation at large distances.

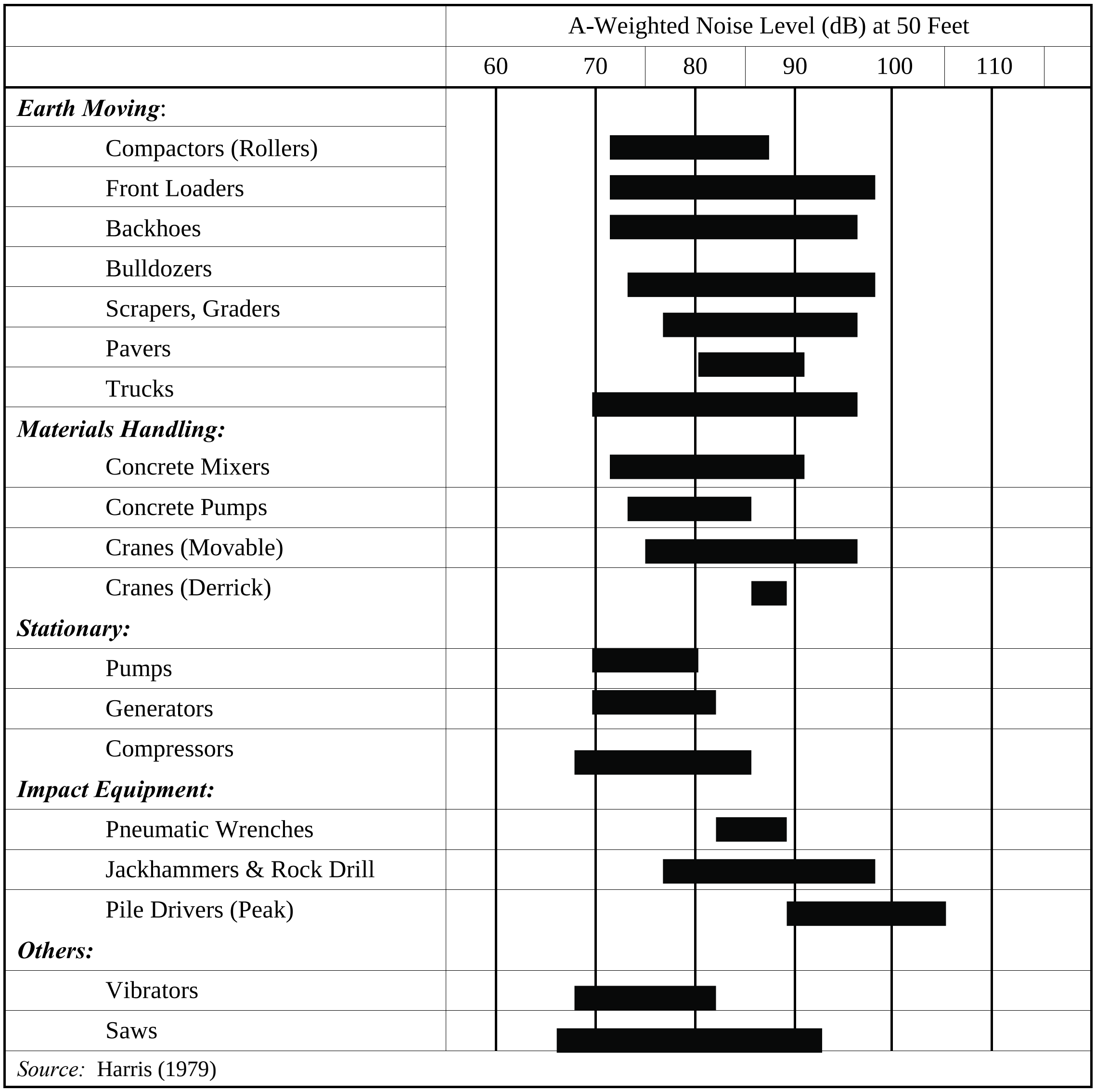


Figure 4.6-1
Construction Equipment Noise Levels
dB = decibels

4.6.1.2 Methodology – Operational Impacts

4.6.1.2.1 Port Operations

Noise data for the Port were not available for this EIS. The most recent available noise data are from the Port of Los Angeles, which has a throughput of approximately 8.0 million TEUs (Port of Los Angeles, 2008), compared with 1.0 million TEUs projected for No-Action Alternative at the Port by year 2060. Equating TEUs to the typical amount of operational equipment in use and contributing to operational noise at a given time, the data from the Port of Los Angeles were adjusted to levels anticipated from operational activities at the Port. Noise from Port operations also considered distance based on the assumption that noise attenuates 6 dB per doubling distance from its source.

4.6.1.2.2 Vehicle Traffic

A traffic study completed for this EIS provided traffic data used to establish baseline year (2012) traffic conditions (Section 3.4 and Appendix I) and forecasted future year (2060) traffic increases for the No-Action Alternative and the Proposed Project Alternative (Appendix I). The ROI for roadway traffic noise is identified in the study, and extends from Landon Road north of I-10 to US 90 on the south, and from US 49 on the east to Canal Road and 30th Avenue on the west. Roadway traffic includes passenger cars, service trucks, and freight trucks.

Baseline noise level data for the ROI were determined during a noise study conducted in August 2015 (Appendix J). Although conducted primarily to evaluate the impacts of increased rail traffic, sufficient data were gathered within the ROI to determine an average ambient noise level of 53 Ldn dBA. The level of roadway traffic noise depends on three traffic parameters: (l) the volume of the traffic, (2) the speed of the traffic, and (3) the number of trucks in the flow of the traffic. Generally, heavier traffic volumes, higher speeds, and greater numbers of trucks increase the loudness of traffic noise. Vehicle noise is a combination of the noises produced by the engine, exhaust, and tires. Defective mufflers or other faulty equipment on vehicles can also increase the loudness of traffic noise. Other factors also affect the loudness of traffic noise. For example, as a person moves away from a highway, distance, terrain, vegetation, and natural and manmade obstacles in the noise path reduce traffic noise levels. Traffic noise is not usually a serious problem for people who live more than 500 feet from heavily traveled freeways or more than 100 to 200 feet from lightly traveled roads (FHWA, 2011).

The traffic study completed for this EIS, and the current noise condition determined during the noise study, provide the necessary data to evaluate the change in noise levels that would be associated with the No-Action Alternative and the Proposed Project Alternative. The analysis is based on the correlation that a doubling of a noise source (i.e., traffic volume) would result in a doubling of noise, which equates to a 3-dBA increase in noise levels (FTA, 2006; FHWA, 2011).

Table 4.6-1 shows the baseline (2012) average daily traffic (ADT), average daily truck traffic (ADTT), and traffic totals for the roads potentially impacted by the considered alternatives. This table also provides real number and percentage forecasts of changes to traffic that would result from implementation of an alternative in the year 2060. Results are discussed in Sections 4.6.1.3.1 and 4.6.1.4.2.

Table 4.6-1
Average Daily Traffic Rates by Corridor

Alternative	ADT	ADTT	Total Traffic	Percent Change*	ADT	ADTT	Total Traffic	Percent Change*
	Interstate (I)-10				**US 49**			
Baseline (2012)	55,830	6,840	62,670		33,240	1,860	35,100	
No-Action (2060)	100,750	12,400	113,150	80.5	61,550	3,600	65,150	85.6
Proposed (2060)	101,450	12,700	114,150	0.9	63,940	4,280	68,220	4.7
	US 90				**Canal Road**			
Baseline (2012)	18,820	800	19,620		10,650	600	11,250	
No-Action (2060)	34,520	1,560	36,080	83.9	20,310	1,080	21,390	90.1
Proposed (2060)	35,460	1,840	37,300	3.4	21,590	1,080	22,670	6.0
	25th Street				**28th Street**			
Baseline (2012)	14,240	1,140	15,380		11,260	540	11,800	
No-Action (2060)	25,700	2,040	27,740	80.4	21,080	980	22,060	86.9
Proposed (2060)	25,840	2,040	27,880	0.5	22,020	980	23,000	4.3
	30th Avenue							
Baseline (2012)	10,920	500	11,420					
No-Action (2060)	21,600	940	22,540	97.4				
Proposed (2060)	23,800	1,100	24,900	10.5				

* Percent change for the No-Action Alternative was calculated from the 2012 baseline, while percent change for the Proposed Project Alternative was calculated from the No-Action Alternative.

ADT = Average daily traffic

ADTT = Average daily truck traffic

4.6.1.2.3 Rail Traffic

The noise analysis was performed in accordance with FTA guidelines published in the "Transit Noise and Vibration Impact Assessment" (May 2006). The FTA guidance manual provides three levels of evaluation: 1) a Noise Screening Procedure, 2) a General Noise Assessment Procedure and 3) a Detailed Noise Analysis Procedure. Consistent with FTA guidance, the General Noise Assessment was performed for comparison of the No-Action Alternative and the Proposed Project Alternative described in Section 2.8 of the EIS.

Because the Proposed Project Alternative would include an increase in rail traffic during nighttime hours, the noise analysis conservatively evaluated rail-related noise at land uses where overnight sleep occurs. This includes Category 2 (homes, hospitals, hotels) and certain Category 3 land uses (i.e., campgrounds).

However, a search was conducted for Category 1 land uses using the methods described below. None were identified. Overall impacts would be lessened as operational hours are expanded into daytime hours.

Using GIS, a 0.5-mile buffer was created on either side of the track for the length of the rail line to determine the locations of potentially affected noise-sensitive receptors, Residences and other sensitive land uses where people normally sleep were identified using current high-resolution aerial photography combined with Google Street View. Residences in densely populated areas in Harrison County (i.e., Gulfport) were crosschecked against county tax department parcel data and land-use records. This process effectively filtered former residential structures (Land Use Category 2) currently used for business purposes (not identified as noise sensitive).

As described in Section 3.6.1.2 and detailed in Appendix J, ambient noise levels were measured at 24 residential receptor locations along the KCS rail corridor.

In 2000, the Federal Railway Administration (FRA) published the *Horn Noise MS Excel Spreadsheet Model* to assess the impacts of locomotive horns on the local noise environment. The project team completed model runs including scenarios that incorporated existing noise levels, number of trains, train speed, presence or absence of horns, and noise shielding. The model results were incorporated into the GIS and compared with the locations of residential receptors to determine the number of impacted receptors. Existing noise impacts from train traffic were not evaluated, as those impacts were already incorporated into the noise data collected during the June 2014 sampling period. Rail traffic associated with the No-Action Alternative and the Proposed Project Alternative was evaluated in order to assess the Project-related effects of airborne noise.

Two general areas of existing noise conditions were identified along the Project corridor according to similarities in ambient conditions and average noise levels. These included the developed areas of Gulfport and Hattiesburg at the north and south ends of the KCS rail line, and the rural/small town areas between.

The Gulfport and Hattiesburg noise environment includes two segments on each end of the KCS line. The Gulfport segment extends from the southern terminus of the KCS line to Clark Drive, located just north of the KCS line/Interstate 10 intersection. The Hattiesburg segment extends from the KCS line/Highway 98 intersection to the northern terminus of the line. Common ambient noise sources in these predominantly urban and suburban areas included vehicular traffic, rail traffic, aircraft, and human voices/activity. The average Ldn within these segments was 53 dBA.

The rural/small town segment includes the portion of the line between the Gulfport and Hattiesburg segments. Ambient noise sources in these predominantly rural areas included vehicular traffic, rail traffic, barking dogs, and birds. The average Ldn within this segment was 50 dBA. Noise data and location information for existing conditions are provided in Appendix J.

4.6.1.3 No-Action Alternative

Under the No-Action Alternative, the Port would continue to operate without the proposed expanded facilities, so noise impacts related to construction would not occur. However, maximum throughput would be expected to increase due to the recent completion of the Restoration Project and KCS Rail Improvements Project. These projects facilitated changes in tenant configuration and cargo handling practices, which allow for increased throughput.

4.6.1.3.1 Operations Noise Impacts

Long-term noise impacts associated with the No-Action alternative would primarily be associated with increased throughput and increased rail and truck traffic expected to occur over time.

Port Operations

Under the No-Action Alternative, an annual throughput of between 250,000 and 400,000 TEUs would be anticipated due to efficiencies in tenant configuration and cargo handling practices. It would be expected that improved economic conditions over time, improvements in Port efficiencies, changes in tenant configuration and automation, and other unforeseeable changes in Port practices or economic conditions would allow the Port to achieve an annual throughput of up approximately 1,050,000 TEUs by 2060.

Most of the increase in Port operations would occur at the existing West Pier, which is located approximately 2,400 feet from the nearest noise-sensitive receptor. Using the operational range from the Port of Los Angeles, which has a throughput of approximately 8.0 million TEUs resulting in an operational noise level of 55 to 70 dBA at 1,100 feet (discussed in Section 3.6.1), noise levels at the noise-sensitive receptor nearest the West Pier caused by operations at the Port would be in the approximate range of 39 to 54 dBA for year 2060. Considering typical ambient noise levels in communities (about 60 L_{dn}), the low level of operational noise originating from the West Pier should not be noticeable and should not result in noise complaints.

Vehicle Traffic

Forecasted increases in 2060 traffic volumes resulting from the No-Action Alternative ranged from a low of 80.4 percent on 25th Street to a high of 97.4 percent on 30th Avenue (see Table 4.6-1). Because traffic volume increases would be less than double, we can conservatively estimate a less than 3-dBA increase in traffic noise throughout the ROI. Using the current noise conditions identified in Section 3.6.1.2, Port-related roadway traffic noise levels would conservatively increase from 53 dBA to less than 56 dBA within the ROI. Changes in noise levels of 3 dBA or less are not typically detectable by the average human ear (FHWA, 2011)

Therefore, based on FTA (2006) transit noise impact parameters, the No-Action Alternative would have a negligible effect on the noise environment. This means that the change in the cumulative noise level within the traffic corridor would result in an insignificant increase in the number of people highly annoyed by the noise increase.

Rail Traffic

Under the No-Action Alternative, the Port would generate approximately 28 train trips per day between (to or from) the Port and the Gulfport Rail Yard by 2060, and 18 train trips per day to or from the Gulfport Rail Yard and the KCS railway northern terminus.

Table 4.6-2 presents the calculated distance from the track to the moderate and severe impact contours for Land Use Category 2 receptors associated with the No-Action Alternative. Impact contours for various shielding scenarios and speed regimes were calculated and are shown in Appendix J. Table 4.6-3 shows the number of noise sensitive receptors that would fall within the moderate and severe noise impact contours under the No-Action scenario. The Land Use Category 2 receptors are primarily single-family residences. However, the impacted receptors include two hotels and 18 multi-unit residences within the moderate noise impact contour, and seven multi-unit residences in the severe noise impact contour. Two campgrounds located adjacent to the KCS rail line are included as Land Use Category 3 receptors. Both campgrounds fall within the severe noise impact contour.

Table 4.6-2
No-Action Alternative – Distance to Noise Impact Contours

Segment Location	Ambient Noise Level	Train Speed (miles per hour)	Train Length (feet) [Rail Cars]	Train Trips Per Day	Distance to Moderate Impact Contour (feet)		Distance to Severe Impact Contour (feet)	
					Road Crossing	Wayside	Road Crossing	Wayside
Port to Gulfport Rail Yard (33rd St.)	53	10	2,400 [37]	28	1,572	680	952	386
Gulfport Rail Yard (33rd St.) to Polk St.	53	10	3,900 [60]	18	1,346	579	806	324
Polk St. to Dedeaux Rd.	53	20	3,900 [60]	18	1,313	533	838	295
Dedeaux Rd. to Clark Rd.	53	49	3,900 [60]	18	1,199	857	760	505
Clark Rd. to Hwy 98	50	49	3,900 [60]	18	1,969	1,013	1,216	590
Hwy 98 North to MP 65	53	49	3,900 [60]	18	1,456	857	898	505
MP 65 to Northern Terminus	53	10	3,900 [60]	18	1,149	538	726	317

As shown in Table 4.6-3, 1,054 Land Use Category 2 receptors (approximately 15 per mile) would be included in the moderate impact contour, and 1,638 (approximately 24 per mile) would fall within the severe impact contour. The majority of these receptors are located in or near the cities of Gulfport and Hattiesburg, primarily due to the combination of population density and the high number of at-grade crossings in these more urbanized areas.

Table 4.6-3
No-Action Alternative – Impacted Receptors

Land Use Category	Moderate Impact	Severe Impact
Category 2	1,054	1,638
Category 3	0	2

4.6.1.4 Proposed Project Alternative

4.6.1.4.1 Construction Noise Impacts

Construction of the proposed Project would require the use of heavy equipment. Noise levels associated with heavy equipment typically used for construction activities associated with the proposed expansion are shown in Figure 4.6-1. The figure shows that noise levels range from approximately 67 to 105 dB at a distance of 50 feet. During any construction project, the overall noise levels vary based on the level of construction activity, the types of equipment that are being operated on-site, and the types of equipment operated simultaneously.

Using the equations described in Section 4.6.1, 10 pieces of simultaneously operating heavy equipment with an average noise level of 85 dBA at 50 feet would have a combined noise level of 95 dBA (at 50 feet). The noise level would be 63 dBA at 2,100 feet (i.e., the distance from the North Harbor to the nearest noise-sensitive receptor). Expansion activities at the East Pier, West Pier, and proposed breakwater would be a greater distance from noise-sensitive receptors; therefore project-related construction noise at sensitive receptor sites would be lower when work is underway in those areas.

Using the same equations, a dredge with a noise level of 70 dBA at 50 feet would result in a noise level of about 29 dBA at a distance of 5,700 feet (i.e., distance between dredging activities and the nearest noise-sensitive site). Two dredges operating in close proximity to each other would result in a noise level of 32 dBA at a distance of 5,700 feet.

Noise levels collected in 2014 for Gulfport indicated a calculated Ldn of 53.6 dBA. Therefore, peak noise levels generated by construction activities would likely be noticeable at the nearest receptor sites, but should not be loud enough to generate complaints. Noise from dredging activities would be lower than ambient levels, and therefore would be unlikely to generate complaints. Considering the distance between Port expansion or dredging operations and the noise-sensitive sites (between 2,100 and 5,700+ feet), the short-term noise increase associated with the Proposed Project Alternative would be anticipated to be insignificant.

4.6.1.4.2 Operational Noise Impacts

Port Operations

The Proposed Project Alternative would increase the throughput at the Port by approximately 70 percent over the No-Action Alternative. This would increase TEUs handled at the West Pier from 1.0 million TEUs to 1.7 million TEUs annually. With the expansion, the nearest noise-sensitive receptor remains approximately 2,400 feet from the West Pier. Using the operational range from the Port of Los Angeles, which has a throughput of approximately 8.0 million TEUs resulting in an operational noise level 55 to 70 dBA at 1,100 feet (discussed in Section 3.6.1), typical noise levels at the noise-sensitive receptor nearest the West Pier caused by operations at the Port with a throughput of 1.7 million TEUs would be in the approximate range of 41 to 56 dBA. This would be an increase of about 2 dBA compared with the No-Action Alternative. Considering the distance from the operational noise sources to the nearest sensitive receptor and typical ambient noise levels in communities, the low level of Project-related operational noise resulting from the proposed Project should not be noticeable and should not result in noise complaints.

Vehicle Traffic

Forecasted changes in traffic volume resulting from the implementation of the Proposed Project Alternative would result in very small increases in traffic volumes within the ROI. The increase would range from 0.5 percent on 25th Street to 10.5 percent on 30th Avenue (see Table 4.6-1). The change in noise resulting from this small increase in traffic when compared to the No-Action Alternative would not be perceptible to the human ear.

Rail Traffic

Under the Proposed Project Alternative, the Port would generate up to 47 train trips per day between (to or from) the Port and the Gulfport Rail Yard, and nearly 29 train trips per day to or from the Gulfport Rail Yard and the KCS railway northern terminus.

Table 4.6-4 presents the calculated distance from the track to the moderate and severe impact contours for Land Use Category 2 receptors associated with the Proposed Project Alternative. Impact contours for various shielding scenarios and speed regimes were calculated and are shown in Appendix J. Table 4.6-5 shows the number of noise sensitive receptors that would fall within the moderate and severe noise impact contours under the Proposed Project Alternative scenario. The Category 2 receptors are primarily single-family residences. However, the impacted receptors include three hotels (one more than the No-Action Alternative) and 18 multi-unit residences (the same as the No-Action Alternative) within the moderate noise impact contour. One hotel (one more than the No-Action Alternative) and eight multi-unit residences (one more than the No-Action Alternative) would occur within the severe noise impact contour. Two Land Use Category 3 receptors (same two campgrounds as the No-Action Alternative) would be within the severe noise impact contour under the Proposed Project Alternative scenario. The number of receptors within the moderate impact contour would increase by 268 (a 25 percent increase) compared to the No-Action Alternative, and receptors in the severe impact contour would increase by 144 (a 9 percent increase) (Table 4.6-5).

Table 4.6-4
Proposed Project Alternative – Distance to Noise Impact Contours

Segment Location	Ambient Noise Level	Train Speed (miles per hour)	Train Length (feet) [Rail Cars]	Train Trips Per Day	Distance to Moderate Impact Contour (feet)		Distance to Severe Impact Contour (feet)	
					Road Crossing	Wayside	Road Crossing	Wayside
Port to Gulfport Rail Yard (33rd St.)	53	10	2,400 [37]	47	1,867	825	1,144	476
Gulfport Rail Yard (33rd St.) to Polk St.	53	10	3,900 [60]	29	1,612	709	978	403
Polk St. to Dedeaux Rd.	53	20	3,900 [60]	29	1,342	601	858	358
Dedeaux Rd. to Clark Rd.	53	49	3,900 [60]	29	1,408	1,030	903	617
Clark Rd. to Hwy 98	50	49	3,900 [60]	29	2,013	1,213	1,246	719
Hwy 98 North to MP 65	53	49	3,900 [60]	29	1,726	1,030	1,078	617
MP 65 to Northern Terminus	53	20	3,900 [60]	29	1,651	756	1,028	440

Table 4.6-5
Proposed Project Alternative – Impacted Receptors

Land Use Category	Moderate Impact	Change from No-Action	Severe Impact	Change from No-Action
Category 2	1,322	+268	1,782	+144
Category 3	0	0	2	0

4.6.1.5 Summary of Potential Airborne Noise Impacts

As described in the preceding sections, the Proposed Project Alternative would result in increases in train-generated noise along the KCS rail line when compared to the No-Action Alternative. Table 4.6-6 provides a summary of the impacts to Land Use Category 2 receptors. No Land Use Category 1 receptors were identified within the impact contours. Two Land Use Category 3 receptors were included in the analysis (campgrounds situated near the KCS rail line in the rural area between Gulfport and Hattiesburg). These two receptors would be within the severe impact contours for both the No-Action Alternative and the Proposed Project Alternative. Table 4.6-6 summarizes the change in noise impacts between the No-Action and Proposed Project Alternatives. Under the Proposed Project Alternative, the number of moderately impacted receptors would increase by 25 percent, and the number of severely impacted receptors would increase by nine percent. The implementation of the Proposed Project Alternative would result in an additional four receptors per mile that would be moderately impacted, and two receptors per mile that would be severely impacted compared to the No-Action Alternative.

Table 4.6-6
Summary of Noise Impacts to Category 2 Receptors

	Impacted Category 2 Receptors	**Change from No-Action**	**Percentage Change in Impacted Receptors**	**Number of Impacted Receptors per Mile**
No-Action Alternative				
Moderate Impact	1,054	NA	NA	15
Severe Impact	1,638	NA	NA	24
Proposed Project Alternative				
Moderate Impact	1,322	+268	+25%	19
Severe Impact	1,782	+144	+9%	26

4.6.1.6 Potential Noise Mitigation

The FTA and FRA require that mitigation measures be considered when a noise assessment suggests either severe or moderate impacts. The Proposed Project Alternative would result in an increase in both severe and moderate impacts to noise-sensitive receptors. The majority of these impacts would occur in the Hattiesburg and Gulfport areas due to the combination of high population densities and numerous at-grade rail crossings (with their associated horn noise).

Reducing horn noise by the use of noise barriers is generally not feasible because they reduce driver visibility at intersections. Residential soundproofing is a mitigation option for smaller scale impacts, but is not feasible in this case due to the large number of impacted receptors. The most feasible noise mitigation measure would likely be the establishments of Quiet Zones in the Greater Gulfport and Hattiesburg areas.

By adopting approved Supplemental Safety Measures (SSMs) at each public grade crossing, a Quiet Zone of at least a half-mile long can be established that would preclude the need for use of a horn at rail crossings, and thus eliminate this noise source. These measures would be applicable in addition to the standard safety devices required at most public grade crossings (e.g., stop signs, reflective cross bucks, flashing lights with gates that do not completely block travel over the tracks). The six SSMs identified below have been predetermined by the FRA to fully or in tandem compensate for the lack of a locomotive horn:

1. *Reconstruct the street crossing into an under-over pass.* This measure, while expensive, would completely eliminate the need for a train to sound its horn.
2. *Temporary closure of a public highway-rail grade crossing.* This measure requires closure of the grade crossing one period for each 24 hours, and must be closed the same time each day.
3. *Four-quadrant gate system.* This measure involves the installation of at least one gate for each direction of traffic to fully block vehicles from entering the crossing.
4. *Gates with medians or channelization devices.* This measure keeps traffic in the proper travel lanes as it approaches the crossing. This denies the driver the option of circumventing the gates by traveling in the opposing lane.
5. *One-way street with gates.* This measure consists of one-way streets with gates installed so that all approaching travel lanes are completely blocked.
6. *Pole-mounted wayside warning horns.* This measure places warning horns on signal poles directly at the street crossing in question. The wayside horns are still relatively loud (92 dBA at 100 feet) but can be effectively aimed directly down the affected street to minimize disturbance to adjacent neighborhoods.

The lead agency in designating a Quiet Zone is the local public authority responsible for traffic control and law enforcement on the roads crossing the tracks. In order to satisfy the FRA regulatory requirements, the public transit agency must work closely with the highway/traffic agency while also coordinating with any freight or passenger railroad operator sharing the right-of-way.

4.6.2 Ground-Borne Vibration

A summary of vibration impact criteria established to evaluate potential vibration impacts was provided in Section 3.6.2.2. The FTA guidance manual, "Transit Noise and Vibration Impact Assessment" (May 2006) discusses development of the vibration impact criteria in greater detail. The assessment of GBV and GBN is limited to rail traffic.

4.6.2.1 Ground-Borne Vibration Assessment Methodology

The FTA guidance manual provides three levels of evaluation 1) Vibration Screening Procedure, 2) General Vibration Assessment and 3) Detailed Vibration Analysis. A General Vibration Assessment was performed to determine incremental GBV and GBN effects of the No-Action Alternative and the Proposed Project Alternative. The General Vibration Assessment as described by the FTA guidance manual (2006) is the potential vibration in terms of the overall vibration velocity level and the dBA. Estimated GBV and GBN levels are compared to the impact criteria and potential impact distances are provided for comparison purposes. GBV and GBN effects were calculated for existing conditions, the No-Action Alternative and the Proposed Project Alternative conditions, based on current and proposed rail traffic. The differences between the existing conditions, the No-Action Alternative and the Proposed Project Alternative conditions are the incremental impacts.

This vibration assessment principally assessed Project-related GBV at Land Use Category 2 and Land Use Category 3 (i.e., campgrounds). This vibration assessment also included a search for Land Use Category 1 sites where vibration levels below human perception may affect the use of the building. No Land Use Category 1 sites were identified.

The assessment began with data gathering and construction of GIS base maps for the project. The railroad alignments, train traffic data (number of locomotives and rail cars per train), aerial photography, and surface geology were among the critical information gathered. Train traffic data were compiled during the noise assessment. The traffic conditions developed for use in the noise assessment documented in the first part of this section were also applied in the vibration analysis. Likewise, receptors identified through the noise assessment aerial photography reconnaissance were also utilized in the vibration assessment.

Using GIS, a 0.5-mile buffer was created on either side of the track for the length of the rail line to determine the locations of potentially affected vibration and GBN-sensitive receptors. Residences and other sensitive land uses where people normally sleep were identified using current high-resolution aerial photography combined with Google Street View. Residences in densely populated areas in Harrison County (i.e., Gulfport) were crosschecked against county tax department parcel data and land-use records. This process effectively filtered former residential structures (Land Use Category 2) currently used for business and not identified as vibration sensitive.

Based on a review of geologic maps of Mississippi (http://www.epa.gov/gmpo/edresources/geology-image-02.html,http://mrdata.usgs.gov/geology/state/state.php?state=MS), the Gulfport area is underlain by coastal deposits, which consist primarily of loams, sands, gravel, and clay. North of Gulfport the geology consists of the Citronelle Formation and Pascagoula and Hattiesburg Formation. The Citronelle Formation is composed of gravel and sandstone with a few thin layers of silt or clay. The Pascagoula and Hattiesburg Formation is composed of clay, sandy clay, and sand. Based on the FTA guidance manual, these three formations would be relatively inefficient at propagating GBV when compared to stiff clay or bedrock dominated formations.

There was no evidence discovered during the online research indicating that stiff clay or shallow bedrock, which are typically associated with efficient propagation of GBV, occur along the Project alignment. It is therefore assumed that the geologic materials underlying the Project are inefficient at propagating GBV.

The generalized ground surface vibration curves (Figure 10-1 in the *FTA Transit Noise and Vibration Assessment*) provide the distance from track centerline versus VdB levels. These curves represent the upper range of measured vibration levels for generalized conditions and well-maintained systems. In order to determine potential impacts at receptors, the generalized (reference) ground surface vibration curve needs to be adjusted to reflect conditions particular to a project and often for different conditions particular to a location within a project.

The GBV reference curve most applicable to this project assumes a locomotive-powered passenger or freight train traveling at 50 mph; adjustments were applied to this reference curve to reflect the particular conditions for this project, including speed adjustments, source adjustments, path adjustments and receptor adjustments. The adjustments used to determine an appropriate estimate of vibration levels for existing conditions are described in Appendix J. The adjustments accounted for track type, vehicle type and the speed regimes identified in the noise assessment.

4.6.2.2 No-Action Alternative

Under the No-Action Alternative, the Port would generate approximately 28 train trips per day between (to or from) the Port and the Gulfport Rail Yard. Nearly 18 train trips per day would be anticipated between (to or from) the Gulfport Rail Yard and the KCS railway northern terminus. Lower GBV and GBN criteria levels were used for the No-Action Alternative to account for the increase in freight traffic and the fact that some trains will be operating on the line during nighttime hours.

Table 4.6-7 shows the calculated distance to the GBV impact contours and the number of receptors for Land Use Category 2 receptors associated with the No-Action Alternative. Table 4.6-8 presents the calculated distance to the GBN impact contours under the No-Action scenario. The impacted Land Use Category 2 receptors are limited to single-family residences. Two campgrounds located near the KCS rail line are included as Land Use Category 3 receptors and fall within the GBV impact contour. Both fall outside the GBN impact contour.

As shown on Tables 4.6-7, 122 Land Use Category 2 receptors (approximately two per mile) would be included in the GBV impact contours, the majority of which are located in rural areas. This is primarily due to the higher train speed, which increases the impact of GBV. As with the existing conditions, two Category 3 receptors (campgrounds) would be within the 49 mph GBV impact contour. As shown in Table 4.6-8, no receptors would be included in the GBN impact contours under the No-Action Alternative.

Table 4.6-7
No-Action Alternative Ground-Borne Vibration (GBV)
Impact Contour Distances and Number of Receptors

Train Speed (miles per hour)	10	20	49
Impact Distances (feet)	45	80	153
Number of Receptors	10	0	112

Note: 72 VdB was used as the GBV impact level to account for the increased frequency and the nighttime use of the track.

Table 4.6-8
No-Action Alternative Ground-Borne Noise (GBN)
Impact Contour Distances and Number of Receptors

Train Speed (mph)	10	20	49
Impact Distances (feet)	<20	<20	40
Number of Receptors	0	0	0

Note: 35 dBA was used as the GBN impact level to account for the increased frequency and the night use of the track.

4.6.2.3 Proposed Project Alternative

Under the Proposed Project Alternative, the Port would generate up to 47 train trips per day between (to or from) the Port and the Gulfport Rail Yard, 19 more than the No-Action Alternative. Nearly 29 train trips per day (11 more than the No-Action Alternative) would be anticipated between (to or from) the Gulfport Rail Yard and the KCS railway northern terminus. Because the proposed increase represents less than a doubling of train traffic compared to the No-Action Alternative, the GBN and GBV impacts that are described in Section 4.6.2.2 for the No-Action Alternative would be practically the same for the Proposed Project Alternative.

4.6.2.4 Summary of Ground-Borne Vibration and Ground-Born Noise Potential Impacts

A General Vibration Assessment was performed to determine potential GBV and GBN impacts that would be associated with implementation of the No-Action Alternative or the Proposed Project Alternative. Impacts would be similar for both analyzed alternatives. Table 4.6-9 provides a comparison between the existing conditions and the No-Action and Proposed Project Alternatives for Land Use Category 2 receptors. No Land Use Category 1 receptors were identified within 0.5 mile of the KCS rail line, and the number of Land Use Category 3 receptors (campgrounds) located within the GBV impact contours would remain at two regardless of the alternative selected. As the table shows, the number of impacted Land Use Category 2 receptors would approximately double, from 60 to 122 compared to existing conditions for the No-Action and Proposed Project Alternatives. Of the additional receptors that would be impacted, all but 10 would be located in the rural areas, where the train speeds can reach 49 mph.

Table 4.6-9
Summary of Ground-Borne Vibration Impacts

Scenario	Impacted Category 2 Receptors	Change From Existing Conditions	Percentage Change in Impacted Receptors	Number of Impacted Receptors per Mile
Existing Conditions	60	NA	NA	0.85
No-Action Alternative and Proposed Project Alternative	122	+62	+103%	1.74

No receptors currently fall within the GBN impact contours, and none would be impacted under either the No-Action or Proposed Project Alternatives.

4.6.2.5 Potential Ground-Borne Vibration Mitigation

The proposed increase in rail traffic would occur in an existing corridor, so relocating tracks or creating buffer zones are not viable mitigation options. Regular maintenance could be used as a mitigation measure against the effects of vibration. Maintenance may include regularly scheduled rail grinding, wheel truing programs, use of wheel-flat detectors, and general reconditioning programs.

4.7 PHYSIOGRAPHY, TOPOGRAPHY, AND BATHYMETRY

4.7.1 No-Action Alternative

The No-Action Alternative assumes the completion of the Restoration Project as noted in Section 2.8.1. This scenario would have no further impact on physiography, topography, and bathymetry aside from the impacts included in the Restoration Project. Once completed, the Restoration Project expands the Port facilities for a total footprint of 369 acres.

The No-Action Alternative would include the continuation of minor alterations to bathymetry from maintenance dredging of existing navigation channels, turning basin, small ship harbor, docking areas, and placement of dredged material at existing ODMDS and open-water disposal sites. Maintenance dredging would be required due to widespread shoaling in Mississippi Sound and Ship Island Pass. Dredged materials are deposited into open-water sites on either side of the navigation channel along the majority of its length (USACE, 1975, 2009b).

4.7.2 Proposed Project Alternative

The Proposed Project Alternative includes expansion of the Port facilities that would impact approximately 282 acres of Mississippi Sound estuarine mud and sand bottom. New work dredged material that is structurally suitable would be used for fill at the Project site, whereas material not structurally suitable would be evaluated for potential beneficial use and possible placement at a designated or candidate BU site. The MDMR submitted a permit application to the USACE and LDNR in February 2016 to permit the BMC in Louisiana for beneficial use of dredged material. At this time, it is intended that all new work dredged material would be placed in the BMC (if approved and authorized for use). If the BMC is not permitted prior to dredging, and no other BU sites are available, the Pascagoula ODMDS would be used for sediment disposal of new work dredged material if the material is determined to be in compliance with Section 103 of the MPRSA. Appendix G provides results from sediment sampling and testing conducted by MSPA for all sediment that would be dredged as part of the proposed Project according to requirements of Section 103 of the MPRSA. This comprehensive sampling process satisfies the requirements of EPA, MDMR, USACE New Orleans District, MDEQ, and LDNR for the placement of dredged material in either an ODMDS or BU site. New work, dredged material not suitable for beneficial use would also be placed in the Pascagoula ODMDS if it meets the criteria in Section 103 of the MPRSA (33 USC 1413). If the dredged material is not suitable for the ODMDS, the material would be placed in an approved and permitted upland disposal site(s). Initial results indicate that only a portion of the disposal material would not be feasible for ODMDS disposal (see Appendix G) and would therefore be placed in a permitted and approved upland disposal site. Currently, the Harrison County Development Commission dredged material disposal site on the Industrial Seaway has capacity for up to 750,000 cy. The material would be transported by barge and offloaded to the disposal site as described in the DMMP (Anchor QEA LLC, 2017, Appendix F). Because dewatering of the material occurs in the disposal site, dewatering of the dredged material before transporting or offloading is unnecessary. This site would be suitable for the East Pier Expansion dredged material. Additionally, an upland disposal site 30 miles north of the Port in Stone County has been identified as a potential placement site for the remaining 7.11 mcy of dredged material; the name of the site and specific location have been withheld at the owner's request. For this option, the material would be mechanically dredged, dewatered, placed into trucks, and hauled to the disposal site for offloading. Considering that it would require approximately 14 years to dredge, transport, and offload the material to the upland disposal site, and would cost over $200 million, use of an upland disposal site for the 7.11 mcy of dredged material is not a viable placement alternative (Anchor QEA LLC, 2017, Appendix F). However, this upland site may still be utilized for the portion of disposal material that could not feasibly be placed in an ODMDS or BU site. The Port would be responsible for maintenance dredging of those areas outside of Federal jurisdiction. Maintenance dredged material would be disposed of using thin-layer placement, as discussed in the DMMP (Anchor QEA LLC, 2017, Appendix F).

While local changes would occur to bathymetry and topography during construction under the Proposed Project Alternative, these alterations would be expected to have negligible impacts on the regional physiography, topography, and bathymetry of the submerged and subaerial portions of the study area. Local physiography and topography within the footprint of the proposed expansion features (described in Section 2.8.2) would undergo minor changes from an elevation increase of up to 25 feet to provide protection from future storm events and an increase in the total Port footprint from about 369 acres to 650.5 acres (see Table 2.8-2).

4.8 COASTAL GEOLOGIC PROCESSES

The study area lies within the East Gulf Coastal Plain and is composed of Miocene, Pliocene, Pleistocene, and Holocene geologic formations. Modern sediments in the area consist mostly of sandy, fined-grained silt sand clays with organic materials (see Section 3.8). Dominating wave approach direction during high energy events is south and east, and alongshore the overall direction is east to west (Baker, 2011). Long-shore wave-induced sediment transport processes contribute less to shoreline change than the cross-shore sediment transport processes that dominate shoreline changes in the area (Anchor QEA LLC, 2015). Based on an MDEQ (2002) report, the harbor is large enough to block longshore sediment transport and create updrift accretion, which can reverse or negate the dominant longshore direction for over 0.5 mile to the west of the harbor. Sediment can move toward the harbor from the west and/or lessen the movement of sediment to the west (MDEQ, 2002). Shoreline (retreat) erosion is also an important geologic process in this area. Currently, estimated shoreline erosion rates in the Gulfport area range from –2.3 to –3.3 feet per year, representing a major concern to the Port. Storm surges take an additional large amount of sediments from the system increasing the rates of erosion (see Section 3.8). Neither of the alternatives evaluated would affect climate changes or sea level rise.

4.8.1 No-Action Alternative

The No-Action Alternative does not include any of the proposed improvements to the Port or any construction requiring a USACE permit. Thus, any other proposed construction would impact ongoing coastal geologic processes within the study area.

Maintenance dredging to the FNC would continue as scheduled. Since 1960, the USACE has dredged the Sound Channel almost every year. Currently, maintenance dredging takes place along the north and south harbor and the Entrance Channel. Historical maintenance dredging quantities vary; however, 1.9 mcy of sediment were removed from the FNC and basin during the dredging event in March 2011. Maintenance-dredged material is disposed of using the thin-layer dispersal process in the designated open-water disposal areas as stated in USACE permit SAM-2009-00433-JBM (Anchor QEA LLC, 2017, Appendix F). Current maintenance dredging impacts on the geology of the area include sediment redistribution, short-term sediment suspension, and minimal change in the bathymetry of the area adjacent to where the dredging takes place.

Low-energy waves dominate within the Port area on a regular basis. Extreme wave events, such as hurricanes, create the highest wave impacts. Yearly high-wave events originate from the south and east. The main regional net alongshore transport direction is westward, with the exception of the area immediately west of the Port, where a local reversal on net transport direction (eastward) extends for approximately 0.6 mile west of the Port (Baker, 2011).

4.8.2 Proposed Project Alternative

The Proposed Project Alternative would result in the expansion of the East Pier (14.5 acres), West Pier (155 acres), North Harbor Fill (9 acres), and Turning Basin (85 acres) areas, the installation of 4,000 linear feet of breakwater on the eastern side of the FNC, placement of dredged material, and site configuration and automation. Contrary to the No-Action Alternative, where dredging would be required only for maintenance, the Proposed Project Alternative would require dredging for the expansion of the East and West piers, the North Harbor, and the Turning Basin.

The construction phase under the Proposed Project Alternative would generate a total of 7.68 mcy of dredged material, including 560,000 cy of dredged material (debris from East Pier) that would be designated for upland disposal (see Appendix F). New work dredged material structurally suitable would be placed for fill at the Project site. Any material not structurally suitable would be evaluated for beneficial use and possible placement at a designated or candidate BU site. At this time, it is intended that all new work dredged material would be placed in the BMC (if approved and authorized for use). The BMC BU site would function to provide needed particulate material for shoreline nourishment, as protection from shoreline erosion on the Mississippi and Louisiana coasts, and to offset impacts to EFH. Enhanced protection of shorelines along Hancock County and Louisiana would result in reduced erosion rates from storms in those areas.

Sediment rework and an increase in sediment suspension can be expected as a short-term impact due to the expansion and maintenance dredging (see Section 5.0). Minimal change in the bathymetry could also be expected as a result of sediment rework and removal related to the expansion of the East and West piers and Turning Basin (see Section 4.7.2).

The expansion of the West Pier could potentially have an impact on sediment net transport direction. Net sediment transport in the region is mainly east to west; however, the sheltering Port landform determines west to east transport on the west side of the Port. Expanding the West Pier could have an impact on the position of the net transport reversal point. The shifting is expected to be small-scale, meaning that it would not have a major impact on the general westward net transport direction, although it could increase locally the area where eastward transport is observed. The shifting point would likely be proportional to the length of the West Pier Expansion (Baker, 2011).

A modeling evaluation of impacts to Harrison County beaches showed that the proposed Project would not result in significant changes in wave heights or breaking wave angles along the adjacent beaches. As a result, it is unlikely the proposed Project would affect piping plover beach habitat (Anchor QEA LLC, 2015). The installation of the breakwater would for the most part create a positive impact in the area; shoreline protection measures associated with shoreline erosion and storm event protection would be enhanced. Models indicate that the wave approaching angle during high-energy events would impact the West Pier Expansion. Several breakwater placement sites were considered (Baker, 2011); the recommended breakwater provides the best protection from high-wave-energy events approaching from the south and east (see Section 2.8.2). However, the construction of a breakwater and expansion of the West Pier would likely have only a minor impact on the general system's hydrodynamics. If these zones are close to a turning basin or navigation channel and the deposition rates are significantly high, maintenance dredging activities may need to be increased (Baker, 2011). If dredging frequency is increased, the budget set for dredging activities may need to be increased or be reconsidered.

In terms of other coastal hazards associated with dredging, no impacts or modifications to geologic processes, such as faulting or subsidence, are expected. Because the expansion proposes raising the elevation of sections of the Port, localized land subsidence would be temporarily abated on these elevated sections of the Port facilities. Localized subsidence would also be temporarily abated by placement of new work dredged material (up to about 7.11 mcy) in the BMC.

4.9 ENERGY AND MINERAL RESOURCES

4.9.1 No-Action Alternative

Energy and mineral resources associated with the Mississippi coastline include sand and gravel mining and a small, but optimistic, oil and gas exploration market. The No-Action Alternative would result in no change to the restored Port and would therefore have no impact on energy and mineral resources. Sand and sediment are currently available from maintenance dredging of existing navigation channels, the turning basin, docking areas, small ship harbor, and from potential future channel deepening and/or widening projects. In the absence of project activity, however, the existing patterns of area shoreline erosion described in Section 3.8.4 are expected to continue, which over time would naturally reduce the availability of economically viable volumes of sand and gravel transported from the shoreline into the channels and extracted during maintenance dredging.

4.9.2 Proposed Project Alternative

Construction of the Proposed Project Alternative would have no impacts on the energy resources within the Project area. A number of oil wells are located in and next to Gulfport; however, the majority of the oil wells are inactive, plugged, and/or abandoned. A recent review of State-published oil and gas records shows one plugged well is located on the Port's property (Mississippi State Oil and Gas Board, 2013). As noted in Section 3.9, no producing wells occur in Harrison County. Well and pipeline locations reported by the Mississippi State Oil and Gas Board GIS Database are approximate, and the well located on the Port's property appears to be onshore. Dredging and/or dredged material placement and construction activities associated with the Proposed Project Alternative would not appear to impact known areas of energy production.

Sand and gravel resources extracted during dredging activities associated with the Proposed Project Alternative that are appropriate for use in construction would be consumed by this project. It is assumed that additional aggregate fill material would be required to meet the construction demands of this project. Therefore, no substantial impacts to mineral resources are associated with the implementation of the Proposed Project Alternative beyond normal construction operations. Consumptive use of construction products such as sand, gravel, and cement would constitute an irretrievable commitment of these mineral resources. Shoreline protection components of this project would have a long-term positive effect on the availability of sand and gravel, due to decreased shoreline erosion anticipated by the installation of the eastern breakwater.

4.10 SOILS (PRIME AND OTHER IMPORTANT FARMLAND)

4.10.1 No-Action Alternative

In the study area, the Harrison County Soil Survey (NRCS, 2013) lists 11 mapping units as prime farmland, 2 as prime farmland, if drained, and 7 as farmland of statewide importance or other important farmland.

Impacts to prime farmland under the No-Action Alternative may occur from commercial and/or residential development, which would continue according to historic trends (see Section 3.10).

4.10.2 Proposed Project Alternative

Under this alternative the proposed BU site has no apparent mapping units designated by NRCS as prime farmland, so the FPPA regulations do not apply, and no impacts to these resources would result from the activities with the implementation of the Proposed Project Alternative.

4.11 GROUNDWATER AND SURFACE WATER HYDROLOGY

4.11.1 No-Action Alternative

The No-Action Alternative would not impact groundwater or surface water hydrology within the Project area, thus the hydrology of the study area would continue according to historic trends (see Section 3.11).

4.11.2 Proposed Project Alternative

Construction and operation activities associated with the proposed Project are not expected to result in impacts to groundwater and surface water hydrology. No groundwater withdrawals are anticipated for the Project. In addition, no apparent private, public, or industrial water wells registered with the State of Mississippi would be destroyed and/or affected by construction of the proposed Project based on their proximal distances and completed depths below surface grade.

The coastal lowlands aquifer system is the surficial aquifer for the Project area and groundwater recharge occurs inland by precipitation over outcrop areas. In general, groundwater quality becomes poorer near the coast where saltwater encroachment limits the amount of available fresh water. Under the Proposed Project Alternative, construction would not penetrate the coastal lowlands aquifer system and thus no impacts are anticipated.

Possible impacts to shallow groundwater exist from the potential release of petroleum products during construction and hazardous material spills from shipping interests. However, the use of BMPs in the Project area would greatly minimize the potential for this type of impact. BMPs that meet local, state, and Federal requirements would be developed and implemented as part of the Spill Response Plan for the Project to address potential spills. In addition, in the event that the Port ships hazardous materials as cargo, packages for hazardous material must conform to standards set by Research and Special Programs Administration of the DOT and IMO. A carrier accepting hazardous cargo from a shipper or intermediary is obliged to exercise reasonable care to be sure that the shipment has been properly prepared. This obligation exists each time the cargo is handed off during the transportation process. Specific requirements apply to highway, rail, air, and ocean transport. Compliance within these procedures would greatly reduce the risk of impact to the underlying groundwater in the Project area.

4.12 HAZARDOUS MATERIAL

4.12.1 No-Action Alternative

The No-Action Alternative would have no impact on hazardous materials associated with regulated facilities in the region. Maintenance dredging of existing ship channels and the placement of dredged material would continue under the No-Action scenario. A limited potential exists to encounter hazardous material during maintenance dredging. However, based on review of available data (Section 3.12), that potential is considered to be extremely low. Dredged materials may not be suitable for beneficial use, but there is no indication that they would need to be disposed as hazardous waste.

Under the No-Action Alternative, throughput at the Port would be expected to increase over time to up to 1.0 million TEUs annually and a corresponding increase in ship traffic within the FNC would be anticipated (see Section 4.14.1.3). Increased vessel trips into the Port may raise the risk of spills, while expansion of the Turning Basin may lower the probability of spills; however, those probabilities are not quantified. However, risk would not be expected to be high based on the low frequency of incidents in the past (Anchor QEA LLC, 2017, Appendix F) and increased State and Federal focus on spill prevention and response over the past 20 years.

4.12.2 Proposed Project Alternative

The potential for encountering hazardous materials or waste during construction associated with the implementation of the Proposed Project Alternative would be very limited. Due to the prolonged use of the Project area, a limited potential exists to encounter hazardous material during the construction and dredging processes; however, the potential would be considered low to very low. Dredged materials may not be suitable for beneficial use, but there is no indication that they would need to be disposed as hazardous waste. According to a review of the database records and research of the environmental history of the area (Section 3.12), no regulated sites exist at the Port where construction activities associated with the Proposed Project Alternative would occur. The vast majority of the sites revealed in the search are located north of the Port and US 90 or along US 90 (east and west of the Port) and thus would not be affected by proposed Project activities.

Operational impacts associated with the Proposed Project Alternative would include an increased risk of hazardous materials spills, as described for the No-Action Alternative. However, under the Proposed Project Alternative this risk would be higher, as the number of ships transiting the FNC would be expected to be about 1,166 vessels more per year than for the No-Action Alternative (Section 4.14.2).

4.13 WATER AND SEDIMENT QUALITY

4.13.1 Water Exchange and Inflows

4.13.1.1 No-Action Alternative

No significant change in water exchange and inflow patterns would occur under the No-Action Alternative. The 369-acre footprint of the Port, which includes the Restoration Project, covers approximately 0.03 percent of Mississippi Sound's nearly 1.2 million surface acres. Consequently the No-Action Alternative, including the recently completed Restoration Project, is not expected to measurably change water exchange and inflows into Mississippi Sound. Circulation patterns and water exchange between the Port and Mississippi Sound and between Mississippi Sound and the Gulf would remain essentially unchanged from present.

4.13.1.2 Proposed Project Alternative

No significant change in water exchange and inflow patterns would occur under the Proposed Project Alternative. The estimated footprint of the Port would be 650.5 acres, which is approximately 0.05 percent of Mississippi Sound's area. The Turning Basin would be expanded whereby 85 acres would be deepened from an average depth of 12 feet below MLLW (Anchor QEA LLC, 2017, Appendix F) to a depth of 40 feet below MLLW (36 feet plus 2 feet advanced maintenance, 3 feet of sediment disturbance layer, and 2 feet overdepth). A minor localized change in sediment transport may occur. Typical sediment transport to the east is blocked by the Port for a distance of about 0.6 mile west of the Port. Consequently net sediment transport along this reach is from the west to the east with sediment accreting along the shore west of the Port. Expansion of the West Pier and construction of the proposed breakwater may slightly increase the distance west of the Port where sediment transport is from the west to the east (Baker, 2011).

The DMMP (Appendix F) recommends evaluating any new work material that is not structurally suitable for fill at the Project site for potential beneficial use and possible placement at a designated or candidate BU site. At this time, it is intended that all new work dredged material would be placed in the BMC (if approved and authorized for use). This site would function to provide needed particulate material for shoreline nourishment, as protection from shoreline erosion on the Mississippi and Louisiana coasts, and to offset impacts to EFH. If the BMC is not permitted prior to dredging, and no other suitable BU sites are available, the Pascagoula ODMDS would be used for sediment disposal of new work dredged material if the material is determined to be in compliance with Section 103 of the MPRSA. Appendix G provides results from sediment sampling and testing conducted by MSPA for all sediment that would be dredged as part of the proposed Project according to requirements of Section 103 of the MPRSA. This comprehensive sampling process satisfies the requirements of EPA, MDMR, USACE New Orleans District, MDEQ, and LDNR for the placement of dredged material in either an ODMDS or BU site. New work, dredged material not suitable for beneficial use would also be placed in the Pascagoula ODMDS if it meets the criteria in Section 103 of the MPRSA. If the dredged material is not suitable for the ODMDS, the material would be placed in an approved and permitted upland disposal site(s). Disposal of dredge material at the Pascagoula

ODMDS is not expected to affect water exchange or inflow. Maintenance dredging frequency may not increase; however, the maintenance dredged material volume may increase (Anchor QEA LLC, 2017, Appendix F). Disposal of the maintenance material would be disposed of using thin-layer placement, as discussed in the DMMP (Anchor QEA LLC, 2017, Appendix F), and would not be expected to measurably affect water exchange and inflow patterns.

4.13.2 Water and Sediment Quality

Water quality and sediments would be affected by activities resulting from the No-Action and Proposed Project Alternatives. However, effects on water quality and sediment would be localized and would not measurably impact water and sediment quality of the study area, Mississippi Sound, or the Gulf. The water and sediment quality under the No-Action Alternative should not differ from the baseline water and sediment quality presented in Section 3.13.3.

Turbidity would increase whenever sediment is being removed and placed during maintenance dredging activities. Measurable increases in turbidity would be temporary, lasting only days after dredging activity is completed, and would not extend far beyond the area where sediment is being disturbed. Turbidity increases would be managed according to Mississippi's requirement that turbidity not exceed 50 nephelometric turbidity units above background outside a 750-foot mixing zone around dredged material placement areas in coastal areas of Mississippi (Anchor QEA LLC, 2017, Appendix F).

Recent water column monitoring showed bottom water DO can be low, approaching 0 mg/L, particularly in the Turning Basin (Appendix L; EPA, 1999, 2013b; Orlando et al., 1993; USACE, 2006a). DO in the middle and bottom of the water column in deepened parts of the Turning Basin would be measurably lower and most of the time would remain lower than adjacent shallower waters in the study area, and Mississippi and Chandeleur Sounds. Low DO conditions may exclude some types of nekton and benthic macroinvertebrates, which require oxygen levels above 4 mg/L. Since the increased area with low DO would be very small, it should not measurably affect ecological health in the study area or Mississippi Sound.

Measurable impacts from chemical contaminants such as heavy metals, synthetic organic compounds, cyanide, and nutrients are not expected to occur. This conclusion is based on monitoring and laboratory bioassays conducted since 2000 (see Section 3.13.2 and Appendix L). In summary, chemicals of potential concern are present in water and sediment, and different analytical tests evaluated the likelihood contaminants would impact water or sediment quality.

Results of these analyses indicate that no extensive or severe chemical contamination occurs in the harbor. The harbor is the portion of the Project surrounded by industry and may have been most susceptible to chemical contamination from adjacent industries, berthed vessels, loading and unloading operations, and stormwater runoff from industrial areas. Sediments in the harbor, ODMDS, and placement sites throughout the study area have similar composition, and there are generally no contaminants of concern in these areas. Thus, sediment quality impacts resulting from placement of dredged material at any of the sites considered are not likely (Anchor QEA LLC, 2017, Appendix F). Sediment sampling data from the immediate vicinity south of the East Pier in May 2015 determined that those sediments would not be suitable for beneficial use at a marine site.

Nitrogen and phosphorus, major nutrients for algal growth, may be dissolved in sediment pore water and adsorbed to clay and silt particles. These nutrients may be released into the water column during new work or maintenance dredging activities, possibly stimulating planktonic or benthic algal growth. Bricker et al. (2007) and EPA (2013b) indicate chlorophyll is relatively low in the study area. Short-term suspension of nutrients into the water column during dredging and dredged material placement may create localized temporary increases in algal chlorophyll; however, any increases are not expected to be geographically extensive or persistent enough to impact the study area.

4.13.2.1 No-Action Alternative

No significant impacts on water and sediment quality would occur under the No-Action Alternative. Maintenance dredging would continue in the Turning Basin and berthing areas at an average rate of once every 29 months, and in the Sound Channel at an average rate of once every 18 months (Anchor QEA LLC, 2017, Appendix F). Maintenance material would continue to be disposed of at thin-layer disposal sites west of the harbor and FNC.

Localized, temporary increases in turbidity would occur near dredging and disposal of dredged material placement. DO has been measured near 0 mg/L below water depths of 30 feet in the harbor (USACE, 2006a). Dredging may cause some mixing of bottom water with low oxygen and oxygenated water higher in the water column, resulting in lowered oxygen concentrations higher in the water column. Additionally, disturbed sediment with oxygen-demanding materials may increase oxygen demand in bottom waters and at the dredged disposal areas. Possible episodes of lowered oxygen concentrations would be localized and temporary, and expected to return to pre-dredging conditions within a day after dredging and dredged disposal activities ceased.

Although some chemicals of potential concern are present in the sediment, elutriate analysis and bioassay and bioaccumulation tests indicate that a very low possibility of chemical contamination of water and sediments would result from continued maintenance dredging.

4.13.2.2 Proposed Project Alternative

No significant impacts on water or sediment quality would result from implementation of the Proposed Project Alternative. Impacts on water and sediment quality would be similar to those described for the No-Action Alternative. Dredged materials may not be suitable for beneficial use, but there is no indication that they would need to be disposed as hazardous waste. Since more material would be dredged for expansion of the West Pier, East Pier, Turning Basin, and North Harbor and West Pier berthing areas, periods with increased turbidity associated with maintenance dredging would be longer and cover a broader geographic area (an additional 282 acres of estuarine mud and sand bottom) than in the No-Action Alternative.

Temporary increases in turbidity would result from placement of fill needed to build the West and East Piers' expansions. Construction of a breakwater to protect the West Pier would also cause temporary, local, turbidity increases. The MSPA commits to requiring contractors to comply with the standard BMPs necessitated by the MDEQ and the State Water Quality Certification (WQC) in accordance with Section 401(a)(1) of the CWA to avoid and minimize impacts to water quality. Low DO below the middle of the water column occurs in this area, thus the Proposed Project Alternative would increase the area of estuarine mud and sand bottom experiencing low DO but would be short-term in duration.

The expanded Port would be expected to experience higher traffic volume, both from ships with cargo and vehicles with Port workers. The larger area of the expanded Port (650.5 acres) under the Proposed Project Alternative compared with the existing Port of the No-Action Alternative (369 acres) may generate a greater volume of stormwater runoff from Port facilities. Increased volume of stormwater runoff (from increased land area adjacent to the harbor) may increase turbidity and levels of oxygen-demanding materials, and chemical contaminants discharged into the harbor. Increased vessel trips into the Port may raise the risk of spills, while expansion of the Turning Basin may lower the probability of spills; however, those probabilities are not quantified. However, risk would not be expected to be high based on the low frequency of incidents in the past (Anchor QEA LLC, 2017, Appendix F) and increased State and Federal focus on spill prevention and response over the past 20 years.

4.14 COMMERCIAL AND RECREATIONAL NAVIGATION

4.14.1 No-Action Alternative

4.14.1.1 Federal Channel Aids to Navigation

Under this alternative, the existing ATON in the FNC would not be impacted.

4.14.1.2 Commercial Small Craft Channel and Harbor Aids to Navigation

The existing Commercial Small Craft Channel and Harbor are not affected by this alternative. No ATON would require relocation.

4.14.1.3 Vessel Traffic

The results of the ship simulation study (STAR, 2011; Appendix D) indicate that the largest container vessels that can consistently and safely access the Port via the existing channel are smaller, shallower-drafting vessels such as the *Dania Exporter*. These vessels draft in the low 30-foot range, with an LOA of 650 feet and a beam of 100 feet. These vessels are typically classified as Feeders, Handsize, Intermediate, or Feedermax, with capacities ranging from 1,000 to 3,000 TEUs. With the shallower channel depths typically found in the Gulf Coast ports, a greater number of these shallower-drafting container ships would likely be utilized. Furthermore, it is probable that ships would not be arriving fully laden, given multi-ports of call transits. Therefore, for purposes of this analysis, a design vessel capacity with a midpoint in the 1,000 to 3,000 range (i.e., 2,000 TEUs) was selected for transit estimates. Additionally, only a portion of the ship's cargo would be loaded/unloaded at the Port with the remainder slated for other destinations. Containerships would typically seek to load as many containers onto the ship as were offloaded; however, vessel trips cited herein represent imported TEUs only.

To provide a conservative estimate of changes in ship traffic, the 224,000-TEU throughput from the Gulfport Container Volume Projections (see Appendix B) is used as a baseline condition, rather than the 250,000- to 400,000-TEU throughput anticipated upon completion of the Restoration Project. Furthermore, the number of baseline vessel trips is determined from 2011 data shown in Table 3.14-3. For those vessels in this table drafting 18 to 35 feet, the number of vessel trips would be 363. Based upon a baseline throughput of 224,000 TEUs and 363 vessel trips, an average of 600 TEUs per vessel trip was derived as shown in Table 4.14-1.

Table 4.14-1
Average (Baseline) Twenty-foot Equivalent Unit (TEU)
Estimate per Containership Trip

Baseline TEUs	Annual Containership Vessel Trips	Daily Container Vessel Trips (600 TEUs/Trip)	Average TEUs per Vessel Trip
224,000	363	1	600

Under the No-Action Alternative scenario, including the Restoration Project (see Section 1.3.1), up to 400,000 TEUs may throughput the Port annually. Compared with the baseline of 224,000 TEUs, this would be an annual increase of 176,000 TEUs (Table 4.14-2). Using the average vessel trips of 600 TEUs and a potential annual throughput of 400,000 TEUs, 667 vessel trips per year, or 1.8 trips per day, would be required. Compared with the baseline of 363 vessel trips, this would be an increase of an additional 304 vessel trips per year, or 84 percent (Table 4.14-2).

Table 4.14-2
Projected Throughput/Container Vessel Trips
(Post-Restoration Project)

Throughput (TEUs) (with permitted improvements)	Annual Container Vessel Trips (600 TEUs/Trip)	Daily Container Vessel Trips (600 TEUs/Trip)	Percent Increase Over Baseline
400,000	667	1.8	84

TEU = twenty-foot equivalent unit

Under the same No-Action Alternative, projecting through 2060 yields an increased throughput up to 1.0 million TEUs per year, an increase of 776,000 TEUs as compared to the baseline condition. At 600 TEUs per vessel trip, a total of 1,667 annual vessel trips would occur, an increase to 359 percent over the baseline condition (Table 4.14-3).

Table 4.14-3
Projected Throughput/Container Vessel Trips
(Post-Restoration Project at Year 2060)
No-Action Alternative

Throughput (TEUs) (with permitted improvements)	Annual Container Vessel Trips (600 TEUs/Trip)	Daily Container Vessel Trips (600 TEUs/Trip)	Percent Increase Over Baseline
1,000,000	1,667	4.6	359

TEU = twenty-foot equivalent unit

In addition to the above-referenced trips, the vast majority of the non-containership fleet servicing the Port would continue to be the smaller bulk and breakbulk cargo feeder vessels with drafts ranging from less than 5 feet to 17 feet. Per the baseline conditions, these totaled over 3,808 of the 4,244 vessel trips to the Port annually. Other non-containership vessels include, but are not limited to, McDermott's pipelay vessels and work barges with drafts ranging from 23 to 32 feet; these vessels total between 20 and 40 vessel trips to the Port annually. It would be expected that containerized cargo would dominate the market, although it is anticipated that non-containership fleet trips would increase over time.

Due to the increased vessel traffic associated with the Restoration Project, MSPA submitted a joint permit application in July 2016 to the USACE/MDMR for construction of a barge mooring structure at the northern end of the Gulfport Anchorage Basin. The purpose of the project is to provide additional berthing space for barges at the Port in support of the Restoration Project. The mooring structure will include an eight-pile cluster dolphin fender on the southern end, and 15 single mooring piles installed in a "T" configuration, north of the dolphin fender and will accommodate 24 barges, 35 feet wide by 195 feet long. Construction of the structure is expected to be completed in September 2017.

Other vessel traffic includes the commercial (charter) fishing vessels and the private recreational boaters. Charter vessel activities are strongest in the Sound. Likewise, recreational boaters, with a focus on the barrier islands, would be dispersed throughout the Sound.

The boat harbors and ramps, being located more to the protected waters of Biloxi Bay and St. Louis Bay divert charter and recreational vessel traffic far from the Port and away from the shipping channels. Consequently, changes in vessel traffic within the FNC are not expected to negatively affect charter fishing vessels and recreational boaters. Some delays could be encountered by recreational boaters using the Gulfport Yacht Club and Gulfport Small Craft Harbor or the Commercial Small Craft Harbor immediately adjacent to the Port while yielding to larger ships transiting the FNC. However, these delays are not expected to be excessive, given the number of ships expected to call at the Port in a given day.

4.14.2 Proposed Project Alternative

4.14.2.1 Federal Channel Aids to Navigation

Under this alternative, the existing ATON would not be impacted (see MSPA letter dated February 1, 2016, Appendix E-1).

4.14.2.2 Commercial Small Craft Channel and Harbor Aids to Navigation

The existing Commercial Small Craft Harbor would not be affected by this alternative. The Commercial Small Craft Channel would be realigned and six buoys and three beacons would be relocated.

4.14.2.3 Vessel Traffic

The Proposed Project Alternative scenario combines the criteria in the No-Action Alternative and expansion of Port facilities (see Section 2.8). Up to 1.7 million TEUs may throughput the Port annually by 2060.

Compared with the baseline of 224,000 TEUs per year, this would be an annual increase of 1,476,000 TEUs (Table 4.14-4). Using the average vessel trips of 600 TEUs and the throughput of 1.7 million TEUs, 2,833 vessel trips per year, or 7.8 trips per day, would be required. Compared with the baseline of 363 vessel trips, this would be an increase of 2,470 vessel trips per year, or 680 percent (see Table 4.14-4).

Table 4.14-4
Projected Throughput/Container Vessel Trips
Proposed Project Alternative

Throughput (TEUs) (with permitted improvements)	Annual Container Vessel Trips (600 TEUs/Trip)	Daily Container Vessel Trips (600 TEUs/Trip)	Percent Increase Over Baseline
1,700,000	2,833	7.8	680

TEU = twenty-foot equivalent unit

As with the No-Action Alternative, in addition to the above-referenced trips, the vast majority of the non-containership fleet servicing the Port would continue to be the smaller bulk and breakbulk cargo feeder vessels with drafts ranging from less than 5 feet to 17 feet. Per the baseline conditions, these totaled over 3,808 of the 4,244 vessel trips to the Port. Other non-containership vessels include, but are not limited to, McDermott’s pipelay vessels and work barges with drafts ranging from 23 to 32 feet; these vessels total between 20 and 40 vessel trips to the Port annually. It would be expected that containerized cargo would dominate the market, although it is anticipated that non-containership fleet trips would increase over time.

Potential impacts to recreational and commercial fishing vessels would be the same as described for the No-Action Alternative.

4.14.3 Summary

From the baseline condition described in the market forecast (see Appendix B) to completion of the Restoration Project, annual throughput would be projected to increase from 224,000 to 400,000 TEUs to 1.0 million TEUs by 2060. Container volume delivered/dropped at the Port would remain constant at an average of 600 TEUs per containership vessel trip. Under the No-Action Alternative, container vessel trips would increase from the baseline count of 363 to 667, with completion of the Restoration Project, and then to 1,667 trips by 2060. Under the Proposed Project Alternative, vessel trips would increase up to 2,833.

Table 4.14-5 and Figures 4.14-1 and 4.14-2 present these results.

Table 4.14-5
Projected Vessel Traffic[1]

Alternative	TEUs[2]	Annual Vessel Trips 600 TEUs per Vessel	Daily Container Vessel Trips (600 TEUs/Trip)	% Increase (from present)[3]
Present	224,000	363	1	0
No-Action	400,000	667	1.8	84
No-Action (2060)	1,000,000	1,667	4.6	359
Proposed Project Alternative (2060)	1,700,000	2,833	7.8	680

TEU = twenty-foot equivalent unit

[1] 3,808 vessel trips (from Table 3.14-3), 0 to 17 feet draft, assumed to be non-container ships and are not included.

[2] Gulfport Container Volume Projections (Parsons Brinkerhoff, 2012)

[3] 363 trips (from Table 3.14-3, Mississippi Sound Trips by Draft/Vessel type, 18 to 35 feet draft)

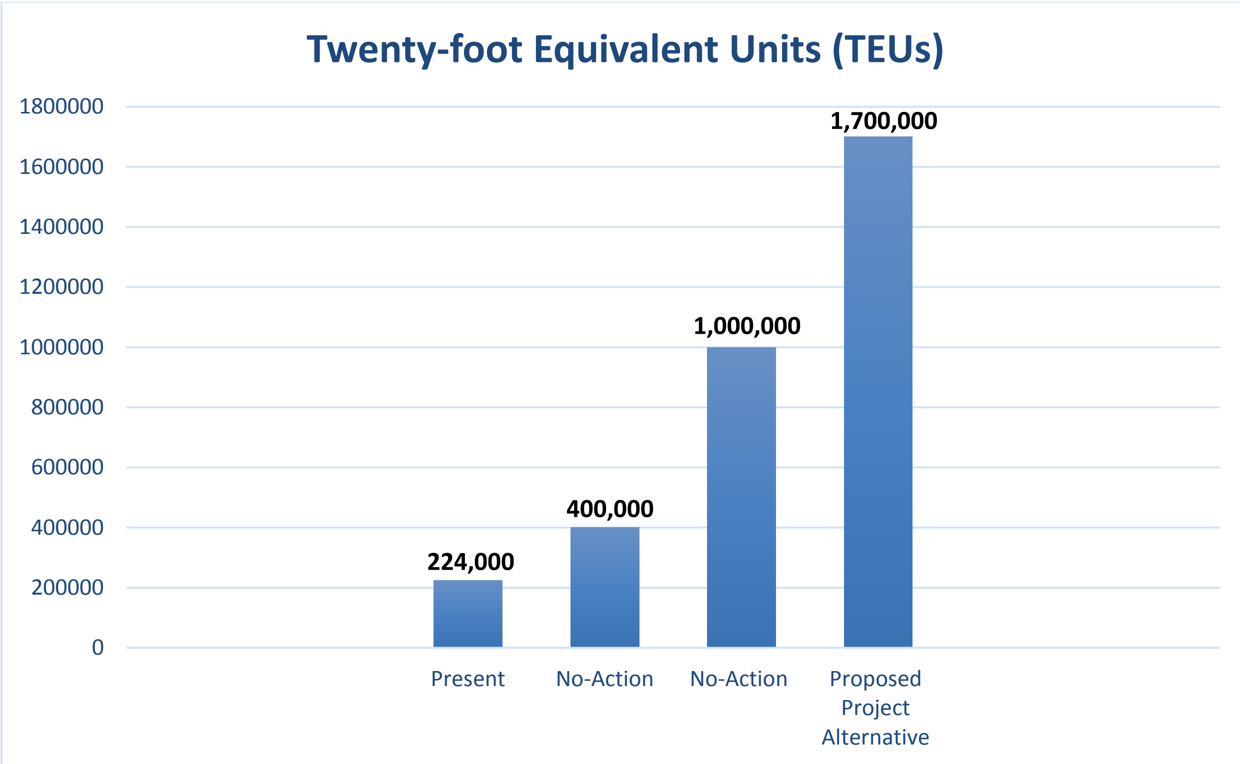


Figure 4.14-1
Projected TEUs

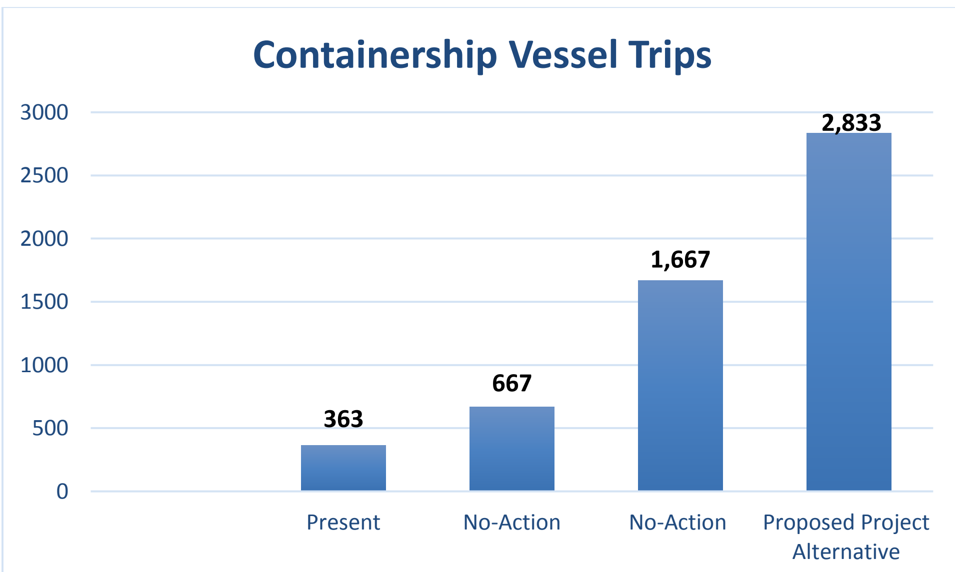


Figure 4.14-2
Projected Containerships Vessel Trips

4.15 ECOLOGICAL SETTING

4.15.1 No-Action Alternative

Under the No-Action Alternative, no new activities or associated impacts would occur in the seven habitat subtypes or other terrestrial vegetation communities identified within the study area, as described in Section 3.15. Projecting the No-Action Alternative out to 50 years, impacts to terrestrial vegetation communities may occur as general commercial development occurs due to normal economic growth. As discussed in Section 4.1 (Land Use), under the No-Action Alternative, the Port and surrounding coastline area would continue on the present course of moderate growth. Residential, commercial, and public land uses in the region would likely increase proportionately to population trends discussed in Section 3.3. Although the No-Action Alternative would not result in any direct impacts, ongoing residential and commercial growth and development would occur and may impact terrestrial vegetation communities.

4.15.2 Proposed Project Alternative

No impacts to the habitat subtypes described in Section 3.15 or other terrestrial vegetation communities are anticipated under the Proposed Project Alternative. Expansion of the Port footprint would occur within the Mississippi Sound, and no terrestrial impacts would occur. The expansion of the Port would increase the industrial land uses of the greater Gulfport metropolitan area and would contribute to ongoing residential and commercial growth and development. Ongoing growth and development could result in impacts to terrestrial vegetation communities, just as anticipated under the No-Action Alternative.

4.16 WETLANDS AND SUBMERGED AQUATIC VEGETATION

4.16.1 No-Action Alternative

Under the No-Action Alternative, the Port would continue to operate without the proposed expanded facilities. No direct impacts to wetlands or SAV would result under the No-Action Alternative. The continued regional growth and development would be anticipated to result in only minor impacts to wetlands and SAV due to regulatory mechanisms created by Section 404 of the CWA, Section 10 of the Rivers and Harbors Act, and Coastal Zone Management Act (CZMA). Assuming another 50 years of current Port operations and maintenance, additional impacts are not anticipated to either wetlands or SAV beyond baseline trends and conditions.

4.16.2 Proposed Project Alternative

Since the Proposed Project Alternative would not be expected to result in changes to water exchange and inflow patterns (see Section 4.13.1.2), direct impacts to wetlands and SAV are not expected. Furthermore, no SAV occurs within 5 miles of the proposed Project area, thus any increases to ship vessel traffic would not impact SAV. Impacts or trends of wetlands and SAV resources are the same under the No-Action

Alternative and the Proposed Project Alternative. A DMMP was prepared to evaluate potential placement options for new work and maintenance dredged material associated with the Proposed Project Alternative (Anchor QEA LLC, 2017, Appendix F). New work dredged material structurally suitable would be used for fill at the Project site. Any material not structurally suitable would be evaluated for potential beneficial use and possible placement at a designated or candidate BU site. At this time, it is intended that all new work dredged material would be placed in the BMC (if approved and authorized for use). This site would function to provide needed particulate material for shoreline nourishment, as protection from shoreline erosion on the Mississippi and Louisiana coasts, and to offset impacts to EFH. If the BMC is not permitted prior to dredging, and no other suitable BU sites are available, the Pascagoula ODMDS (see Figure 1.2-1) would be used for disposal of new work dredged material if the material is determined to be in compliance with Section 103 of the MPRSA (33 USC 1413). Appendix G provides results from sediment sampling and testing conducted by MSPA for all sediment that would be dredged as part of the proposed Project according to requirements of Section 103 of the MPRSA. This comprehensive sampling process satisfies the requirements of EPA, MDMR, USACE New Orleans District, MDEQ, and LDNR for the placement of dredged material in either an ODMDS or BU site. New work dredged material not suitable for beneficial use would also be placed in the Pascagoula ODMDS, if it meets the criteria in Section 103 of the MPRSA. Depending on which sites are used, temporary impacts from turbidity are likely. If the dredged material is not suitable for the ODMDS, the material would be placed in an approved and permitted upland disposal site(s), as discussed in the DMMP (Appendix F). Initial results indicate that only a portion of the disposal material would not be feasible for ODMDS disposal (see Appendix G) and would therefore be placed in a permitted and approved upland disposal site.

4.17 TERRESTRIAL WILDLIFE

4.17.1 No-Action Alternative

The No-Action Alternative would result in no immediate direct or indirect impacts from construction activities at the Port to wildlife species or wildlife habitats within the proposed Project area. Additionally, ongoing maintenance of the existing channel and turning basin, and subsequent placement of dredged material, would not result in direct or indirect impacts beyond what is already occurring on a regular basis. Terrestrial wildlife is acclimated to the existing operations at the Port.

4.17.2 Proposed Project Alternative

Given the heterogeneity of habitat provided in the proposed Project area, it is likely that a variety of species occur within the Project area with the exception of those species that are designated threatened or endangered (see Section 3.19). However, because of the urbanization and industrialization of the proposed Project area, many of the species requiring “natural” habitats are not likely to be present. Only the most common, generalist species are expected to occur within the proposed Project area. It would be unlikely that components of the Proposed Project Alternative, including the West and East Pier expansions, the North Harbor fill area, expansion of the Turning Basin, and an eastern breakwater, would result in direct or indirect impacts to these generalist species (including avian species), especially given that they are acclimated to the existing operations at the Port. Although the potential placement of dredged material as described in the DMMP (Anchor QEA LLC, 2017, Appendix F) may have temporary direct and indirect negative impacts on terrestrial wildlife and avian species due to noise and construction activity, it would result in long-term beneficial effects for both by providing increased habitat for foraging, burrowing, resting, roosting, breeding, and nesting (Brandon and Price, 2007).

4.18 AQUATIC ECOLOGY

No State or Federal measurable criteria exist for defining significant impacts to the quality and/or quantity of aquatic communities, fisheries, and EFH. The assessment of potential impacts to aquatic communities, fisheries, and EFH is based on scientific literature. For this evaluation, temporary and long-term impacts to aquatic communities, fisheries, and EFH are presented. Temporary impacts would be impacts occurring during Project construction, potentially lasting for weeks to months following completion of the proposed Project, while long-term impacts would last months to years following construction of the proposed Project.

The following is a brief description of the dredged material placement options as described in Section 2.8.2 and the DMMP (Appendix F). For the Proposed Project Alternative, new work dredged material that is structurally suitable would be used for fill on the Project site, while the remaining new work material would be evaluated for potential beneficial use and possible placement at a designated or candidate BU site. At this time, it is intended that all new work dredged material would be placed in the BMC (if approved and authorized for use). If the BMC is not permitted prior to dredging, and no other suitable BU sites are available, the Pascagoula ODMDS would be used for sediment disposal of new work dredged material if the material is determined to be in compliance with Section 103 of the MPRSA. Appendix G provides results from sediment sampling and testing conducted by MSPA for all sediment that would be dredged as part of the proposed Project according to requirements of Section 103 of the MPRSA. This comprehensive sampling process satisfies the requirements of EPA, MDMR, USACE New Orleans District, MDEQ, and LDNR for the placement of dredged material in either an ODMDS or BU site. New work material not suitable for beneficial use would also be placed in the Pascagoula ODMDS if it meets the criteria in Section 103 of the MPRSA. If the dredged material is not suitable for the ODMDS, the material would be placed in an approved and permitted upland disposal site(s), as discussed in the DMMP (Appendix F). Initial results indicate that only a portion of the disposal material would not be feasible for ODMDS disposal (see Appendix G) and would therefore be placed in a permitted and approved upland disposal site. The Port would be responsible for maintenance dredging of those areas outside of Federal jurisdiction. Maintenance dredged material would be disposed of using thin-layer placement, as discussed in the DMMP (Anchor QEA LLC, 2017, Appendix F).

4.18.1 Aquatic Communities

4.18.1.1 No-Action Alternative

Under the No-Action Alternative, aquatic communities would remain as described in Section 3.18.1. Impacts from current maintenance dredging of the FNC include increased water column turbidity during and for a short time after dredging activities, and burial of benthic organisms from placement activities. No long-term effects are expected. A more comprehensive discussion of impacts associated with dredging and placement activities are described in Section 4.18.1.2, below.

4.18.1.2 Proposed Project Alternative

The Proposed Project Alternative would directly affect the aquatic communities in Mississippi Sound by the loss of 196.5 acres of open-water habitat, which would be removed with the expansion of the West and East Piers, creation of breakwaters, and North Harbor fill, and permanent conversion of 85 acres to deeper habitat, thus reducing the amount of food and habitat available to some aquatic communities. However, the area involved would be a small fraction (0.04 percent) of the total available habitat within the entire system.

Turbidity in estuarine and coastal waters is generally cited as having a complex set of impacts on a wide array of organisms (Hirsch et al., 1978; Stern and Stickle, 1978; Wright, 1978; Wilber et al., 2005). The release of sediment during dredging and placement of material increases turbidity in the water column, which creates a sediment plume, the extent of which is determined by the direction and strength of the currents and winds, and the particle size. Suspended material can play both beneficial and detrimental roles in aquatic environments. Turbidity from TSS tends to interfere with light penetration and thus reduce photosynthetic activity by phytoplankton and algae (Wilber and Clarke, 2001). Such reductions in primary productivity would be localized around the immediate area of the dredging and placement operations and would be limited to the duration of the plume at a given site. Conversely, the decrease in primary production, presumably from decreased available light, can be offset by an increase in nutrients that are released into the water column during dredging activities (Morton, 1977; Newell et al., 1998). These nutrients may act to enhance the area surrounding the dredging and placement activities, increasing productivity. In past studies of impacts of dredged material placement from turbidity and nutrient release, the effects are both localized and temporary (May, 1973). Thus, due to the capacity and natural variation in phytoplankton and algal populations, the impacts to phytoplankton and algae from Project construction, dredging within the Project area, and dredged material placement of new work and maintenance material would be temporary.

Reduced light penetration due to turbidity may have a short-term impact on zooplankton populations since they feed on the phytoplankton (Armstrong et al., 1987; Valiela, 1995). Such reductions would be localized around the immediate area of dredging and placement operations. Impacts to zooplankton from Project construction and dredging within the Project area, and dredged material placement of new work and maintenance material would be temporary.

Teeter et al. (2003) found that the area of high turbidity extended roughly to the edge of the fluid mud flow, or about 1,300 to 1,650 feet from the dredge discharge pipe. Modeling of dredged material discharge in the Laguna Madre, Texas, determined that turbidity caused by dredging was short lived and therefore impacts to the estuarine and offshore water column would be minimal (Teeter et al., 2003). Elevated turbidity during Project construction and dredging within the Project area and dredged material placement of new work and maintenance material may affect some aquatic organisms near the dredging activity. However, turbidities can be expected to return to near ambient conditions within a few hours after dredging ceases in a given area. Increased sedimentation can impact juvenile and adult finfish by disrupting foraging patterns, reducing feeding and feeding rates, and loss of habitat for feeding and reproduction; however, these would be temporary and occurs only during Project construction (Newcombe and Jensen, 1996; Clarke and Wilber, 2000). Fine particles can coat the gills of juvenile and adult finfish, hindering gas exchange, ultimately resulting in asphyxiation (Clarke and Wilber, 2000; Wilber and Clarke, 2001). However, finfish and shellfish are motile enough to avoid highly turbid areas and under most conditions, finfish and other motile organisms are only exposed to localized suspended-sediment plumes for short durations (minutes to hours) (Clarke and Wilber, 2000; Wilber and Clarke, 2001; Newcombe and Jensen, 1996).

Effects of elevated turbidities on the adult stages of various filter-feeding organisms such as oysters, copepods, and other species include reduced filtering rates, and clogging of filtering mechanisms interfering with ingestion, respiration, and abrasion (Newcombe and Jensen, 1996; Wilber and Clarke, 2001; Stern and Stickle, 1978). These effects tend to be more pronounced when TSS concentrations are greater than 100 mg/L, but are apparently reversible once turbidities return to ambient levels (Newcombe and Jensen, 1996). Research has shown that the more-sensitive species and life stages (i.e., eggs, larvae, and fry) are more negatively impacted by longer exposure to suspended sediments than less sensitive species and older life stages (Germano and Cary, 2005; Wilber and Clark, 2001; Wilber et al., 2005; Newcombe and Jensen, 1996). Many crustaceans (such as shrimp and crabs) are less impacted by elevated suspended sediments since these organisms reside on or near the bottom where sedimentation naturally occurs (Wilber and Clark, 2001; Wilber et al., 2005). Furthermore, turbid waters may actually provide a refuge for these species from predation (Wilber and Clarke, 2001). Mississippi Sound is often naturally turbid due to wind and currents. Notwithstanding the potential harm to some individual organisms, no long-term impacts to finfish or shellfish populations are anticipated from Project construction, dredging, and placement activities associated with the Proposed Project Alternative compared with the No-Action Alternative.

Vessel traffic would be expected to increase with the Proposed Project Alternative (see Section 4.14.2), slightly increasing the probability of a petroleum spill (see Section 4.12.2 for further discussion). However, in the unlikely event a petroleum spill should occur, adult shrimp, crabs, and finfish are probably motile enough to avoid most areas of high oil concentration. Depending on the product, most petroleum, particularly crude oil, would remain at or near the surface and typically does not impact motile organisms in deeper water. Lighter petroleum, such as some refined products, can entrain in the water column or may have additives that can dissolve in water, potentially impacting less motile organisms. Larval and juvenile finfish and shellfish tend to be more susceptible to petroleum than adults and could be affected extensively by a spill during active immigration periods. Due to their lack of mobility, they are less likely to be able to avoid these areas and could be negatively impacted if a spill were to occur. An oil spill in the Project area could result in impacts to phytoplankton, algal, and zooplankton. However, since these organisms have the ability to recover rapidly from a spill, due primarily to their rapid rate of reproduction and to the widespread distribution of dominant species, long-term impacts would not be expected (Kennish, 1992).

Dredged material is to be used beneficially within the BMC, if permitted prior to dredging. This habitat would have the potential to be more productive than the open-water habitat that would be lost as a result of the Proposed Project Alternative. The aquatic community in Mississippi Sound may benefit from the higher productivity of the marsh, which would create an overall positive benefit to the bay system throughout the life of the 50-year Project when compared with the No-Action Alternative (Rozas et al., 2005).

4.18.2 Recreational and Commercial Fisheries

4.18.2.1 No-Action Alternative

Under the No-Action Alternative, recreational and commercial fisheries would remain as described in Section 3.18.1.1. Impacts from current maintenance dredging include temporary disruptions in fish distributions and associated disruptions in recreational and commercial fisheries during and immediately following dredging. Impacts to fisheries also include disruptions in fisheries distributions for a short time after placement of dredged material during channel maintenance. Temporary increases in turbidity would also occur. No long-term effects are expected. Additional discussion of impacts associated with dredging and placement activities are described in Section 4.18.2.2.

4.18.2.2 Proposed Project Alternative

The Proposed Project Alternative would temporarily disrupt fish distributions and localized commercial and recreational fishing in the immediate vicinity of Project construction, dredging, and placement activities. The Proposed Project Alternative would result in permanent loss of 196.5 acres of shallow, primarily silt and clay soft-bottom habitats to construct the proposed Project and permanent conversion of 85 acres to deeper habitat, thus reducing the amount of food and habitat available to some commercial or sport fish species. Temporary impacts to economically important species and their prey may occur due to increased turbidity. During Project construction and dredging, east-west migration across the Project area may be disrupted; however, once dredging operations are completed the fish community would return to the area remaining and commercial and recreational fishing activities would continue. These impacts are expected to be temporary and conditions in the Project area should return to pre-construction conditions once the Project is completed. Dredging can result in a reduction of species diversity by 30 to 70 percent, the number of individuals by 40 to 95 percent, and a similar reduction in the biomass of benthic fauna existing within the boundaries of dredged areas (Newell et al., 1998).

During placement of dredged material, individual fishes may be harmed from smothering or increased turbidity that can clog gills. The majority of fish are expected to move from the vicinity during placement activities. Fish and shellfish targeted by anglers are highly mobile and would leave the area. Since the

Project does not include valuable nursery areas, impacts to economically important juveniles are not expected. Fishing grounds in other portions of Mississippi Sound would be available to recreational and commercial fishing during the dredging and placement operations; therefore, fishing activities could be conducted at other locations in the Mississippi Sound. Use of most aquatic habitats in dredged and placement areas by recreational and commercial fish species are expected to resume after work is complete. Therefore, no long-term effects are expected. Refer to Sections 4.18.1 and 4.18.3 for a more-detailed discussion of impacts to aquatic and estuarine mud and sand bottom communities.

Dredged material is to be used beneficially within the BMC, if permitted prior to dredging. This habitat would have the potential to be more productive. Therefore, recreational and commercial fisheries may benefit from the higher productivity of the marsh, creating an overall positive benefit to the bay system throughout the life of the 50-year Project when compared with the No-Action Alternative (Rozas et al., 2005).

4.18.3 Estuarine Mud and Sand Bottoms

4.18.3.1 No-Action Alternative

Under the No-Action Alternative, estuarine mud and sand bottoms would remain as described in Section 3.18.1.2. Impacts from current maintenance dredging include increased water column turbidity during and for a short time after dredging and placement activities, and burial of benthic organisms. No long-term effects are to be expected. Additional discussion of impacts associated with dredging and placement activities are described in Section 4.18.3.2.

4.18.3.2 Proposed Project Alternative

With the Proposed Project Alternative, for the expansion of the West and East Piers, North Harbor, and breakwater, a permanent loss of 196.5 acres of estuarine mud and sand bottoms would result. For the expansion of the Turning Basin, a permanent conversion of 85 acres to deeper-water habitat would result. The proposed Project would alter the benthic habitat through permanent loss of habitat and dredging and placement activities. Mississippi Sound contains approximately 452,000 acres of estuarine mud and sand bottoms habitat. The 196.5-acre loss is a small fraction (0.04 percent) of the total available habitat within the entire system.

Excavation removes and buries benthic organisms, whereas placement smothers or buries benthic communities. Dredging and placement of dredged material may cause ecological damage to benthic organisms in three ways: (1) physical disturbance to benthic ecosystems; (2) mobilization of sediment contaminants, making them more bio-available; and (3) increasing the amount of suspended sediment in the water column (Montagna et al., 1998). Dredging can result in a reduction of species diversity by 30 to 70 percent, the number of individuals by 40 to 95 percent, and a similar reduction in the biomass of benthic fauna existing within the boundaries of dredged areas (Newell et al., 1998).

Recolonization of areas impacted by dredging and dredged material disposal occurs through vertical migration of buried organisms through the dredged material, immigration of postlarval organisms from the surrounding area, larval recruitment from the water column, and/or sediments slumping from the side of the dredged area (Bolam and Rees, 2003; Newell et al., 1998). The response and recovery of the benthic community from dredged material placement is affected by many factors, including environmental (e.g., water quality, water stratification), sediment type and frequency, and timing of disposal. Communities in these dynamic ecosystems are dominated by opportunistic species tolerant of a wide range of conditions (Bolam et al., 2010; Bolam and Rees; 2003, Newell et al., 2004; Newell et al., 1998). Although changes in community structure, composition, and function may occur, these impacts would be temporary in some dredging and disposal areas (Bolam and Rees, 2003). Shallower, higher-energy estuarine habitats can recover as fast as 1 to 10 months from perturbation, while deeper, more-stable habitats can take up to 8 years to recover (Bolam et al., 2010; Bolam and Rees, 2003; Newell et al., 1998; Sheridan, 1999, 2004; Wilber et al., 2006; VanDerWal et al., 2011). Water column turbidity would increase during the disposal of dredged material. Such effects are usually temporary and local and can be expected to return to near-ambient conditions within a few hours after dredging ceases or in a given area (Newcombe and Jensen, 1996; Clarke and Wilber, 2000), as described in Section 4.18.1.2. DO levels in deepened parts of the Turning Basin would be measurably lower and most of the time would remain lower than adjacent waters in the study area (see Section 4.13.2). These hypoxic conditions may exclude some benthic organisms; however, the area would be very small and should not measurably affect ecological health in the study area.

Maurer et al. (1986) demonstrated that many benthic organisms were able to migrate vertically through 35 inches of dredged material; however, the species present in early successional stages of recovery are not the same as those buried by the dredged material. Although vertical migration is possible, most organisms at the center of the disturbance do not survive and survival was shown to increase as distance from the disturbance increased (Bolam and Rees, 2003; Maurer et al., 1986). The release of nutrients during dredging may also enhance species diversity and population densities of benthic organisms outside the immediate dredge placement area as long as the dredged material is not contaminated (Newell et al., 1998).

The impact to benthic organisms would be likely to be confined to the immediate vicinity of the area dredged (Newell et al., 1998) and recovery of benthic macroinvertebrates following burial is typically rapid (recovering within months rather than years) (VanDerWal et al., 2011; Wilber et al., 2006; Wilber and Clarke, 2001); thus, no long-term impacts are expected in disposal areas. However, 196.5 acres of estuarine mud and sand bottoms habitat would be permanently removed except in the Turning Basin area. Because of the constant re-creation of “new” habitat via disturbance, new recruits continually settle and grow, although communities are dominated by small, surface-dwelling organisms with high growth rates. Consequently, dredged material placement from the Proposed Project Alternative may result in a shift in community structure rather than a decrease in production (Bolam and Rees, 2003; Montagna et al., 1998). In addition, the study area exhibited higher diversity and number of species than the Project footprint and Project area, which may indicate that the existing operation of the Port facilities may have an effect on the ambient conditions surrounding the facility (see Appendix L).

The proposed PGEP would result in the permanent loss of 196.5 acres of estuarine mud and sand bottoms habitat. There are no HAPCs designated in the Project area (NOAA, 2013). In addition, no EPA Special Aquatic Sites are located in the Project area. Coordination with NMFS is ongoing.

4.18.4 Oyster Reefs

4.18.4.1 No-Action Alternative

Under the No-Action Alternative, oyster reefs would remain as described in Section 3.18.1.3. No additional impacts are anticipated.

4.18.4.2 Proposed Project Alternative

No oyster reefs occur within the study area or Project area; therefore, no impacts are anticipated.

4.18.5 Artificial Reefs

4.18.5.1 No-Action Alternative

Under the No-Action Alternative, artificial reefs would remain as described in Section 3.18.1.4. No additional impacts are anticipated. Periodic maintenance dredging of the FNC would continue.

4.18.5.2 Proposed Project Alternative

Five nearshore artificial reefs are located within the Project area. Water column turbidity would be expected to increase during Project construction and associated maintenance dredging, although it would be temporary and motile organisms are mobile enough to avoid highly turbid areas (Clarke and Wilber, 2000; Wilber and Clarke, 2001; Newcombe and Jensen, 1996). See Section 4.18.1.2 for a more-detailed discussion of impacts to aquatic communities.

4.18.6 Essential Fish Habitat

EFH for brown shrimp, pink shrimp, white shrimp, spinner shark, finetooth shark, bull shark, blacktip shark, Atlantic sharpnose shark, scalloped hammerhead shark, cobia, greater amberjack, red snapper, gray snapper, lane snapper, red drum, king mackerel, and Spanish mackerel occurs in the Project area. The categories of EFH that occur within the Project area include the estuarine water column and estuarine mud and sand bottoms (unvegetated estuarine benthic habitats). Additionally, EFH located adjacent to the Project area includes estuarine emergent marsh, seagrasses, oyster reefs, and artificial reefs. EFH and all impacts associated with the Project are described in detail in Appendix M. The following sections provide a brief summary of the impacts described in EFH Assessment (Appendix M).

4.18.6.1 No-Action Alternative

Under the No-Action Alternative, EFH would remain as described in Section 3.18.2. Impacts from current maintenance dredging include increased water column turbidity during and for a short time after dredging and placement activities, and burial of benthic organisms. No long-term effects are expected.

4.18.6.2 Proposed Project Alternative

The Proposed Project Alternative could temporarily reduce the quality of EFH in the vicinity of the Project area and some individual species may be displaced. This alternative would result in permanent loss of 196.5 acres of shallow, estuarine mud and sand bottom habitat to construct the proposed Project and permanent conversion of 85 acres to deeper habitat, thus reducing the amount of food available to federally managed species.

Since fish are motile enough to avoid highly turbid areas (Clarke and Wilber, 2000), it would be anticipated they would temporarily shift their feeding habitat to undisturbed areas until recovery is complete from dredging-related turbidity. Feeding habits of shrimp would not be impacted since shrimp typically reside on or near the bottom where sedimentation naturally occurs (Wilber and Clark, 2001; Wilber et al., 2005). Sections 4.18.1.2 and 4.18.3.2 provide a more-detailed discussion on impacts to the aquatic and benthic communities, respectively.

Dredging and placement activities are not expected to cause direct mortality to juvenile and adult pelagic finfish since these life history stages are motile and are capable of avoiding highly turbid areas associated with Project construction (Clarke and Wilber, 2000). Penaeid shrimp use deeper water of the bay as a staging area from which they migrate to the Gulf during certain times of the year (GMFMC, 2004). The displacement of juvenile and adult finfish and shrimp during Project construction would likely be temporary and individuals should return to these specific areas once the Project is completed. Juvenile and adult finfish and shrimp would experience minimal direct impacts from dredging and placement activities. Juvenile penaeid shrimp may experience negative impacts due to their preference for burrowing in soft muddy areas, although these are usually in association with plant/water interfaces.

Demersal eggs and larval finfish may be lost to physical abrasion, burial, or suffocation during dredging and placement activities due to their limited motility and sensitivity to elevated suspended sediments (Newcombe and Jensen, 1996; Wilber and Clark, 2001; Stern and Stickle, 1978; Germano and Cary, 2005; Wilber et al., 2005). Larvae in the latter stages of development are capable of some motility, which may allow for movement away from dredging and placement activities, thereby minimizing impacts. Predatory fish species that feed on larval stages of federally managed species may be temporarily displaced from the area as a result of dredging and placement activities. Section 4.18.1.2 provides a more-detailed discussion on impacts to the aquatic communities.

Anticipated increases in turbidity may negatively impact the ability of some finfish to navigate, forage, and find shelter (Newcombe and Jensen, 1996; Clarke and Wilber, 2000); however, these impacts would be short lived (Clarke and Wilber, 2000; Wilber and Clarke, 2001; Newcombe and Jensen, 1996; Teeter et al., 2003). Shrimp spend at least some of their life cycle in areas where they are exposed to turbid conditions and are likely able to move from an area when it becomes inhospitable. Many crustaceans (such as shrimp and crabs) are not impacted by elevated turbidities since they typically reside on or near the bottom where sedimentation occurs (Wilber and Clark, 2001; Wilber et al., 2005). Mississippi Sound is often naturally turbid due to wind and currents. Finfish, shrimp, and other marine organisms in this area are accustomed to fluctuations in turbidity and would not be substantially affected by the temporary increase in turbidity during construction activities associated with the Proposed Project Alternative. Section 4.18.1.2 provides a more-detailed discussion on impacts to the aquatic communities.

Material to be dredged that is suitable for beneficial use placement would not be expected to pose contamination issues that could affect federally managed species (refer to Section 3.13.3 for sediment constituent contents and to the DMMP in Appendix F for details). Oil or other chemical spills may adversely impact federally managed species, and larval and juvenile finfish could be affected in the event a spill occurs. Larval and juvenile finfish tend to be more susceptible to spills than adults and could be affected extensively by a spill during their active migration periods. Due to their lack of mobility, larval and juvenile finfish are less likely to avoid these areas and could be negatively impacted if a spill occurs. However, the risk of spills associated with changes in traffic under the Proposed Project Alternative would not be much greater than that expected under the No-Action Alternative (see Sections 4.12 and 4.14).

The Proposed Project Alternative would result in permanent loss of estuarine mud and sand bottom habitat and some habitat with the dredging of deeper areas. As a result, the proposed Project would have more than minimal, but less than substantial adverse effects on EFH. The potential harm of some individual organisms from turbidity-related impacts would be minimal as compared with the existing conditions and would not substantially reduce populations of federally managed species. These disruptions to federally managed species would be temporary since they are motile and avoid areas of dredging and placement activities and would be able to return after these activities are completed (Clarke and Wilber, 2000).

New work dredged material that is not structurally suitable for fill on the Project site would be evaluated for potential beneficial use and possible placement at a designated or candidate BU site. At this time, it is intended that all new work dredged material would be placed in the BMC (if approved and authorized for use). This site would function to provide needed particulate material for shoreline nourishment, as protection from shoreline erosion on the Mississippi and Louisiana coasts, and to offset impacts to EFH.

The EIS has served to initiate EFH consultation under the MSFCMA. NMFS and GMFMC have been provided the EFH Assessment. Comments on EFH impacts and how they were incorporated into subsequent drafts and the FEIS are outlined in Appendix E.

4.18.7 Invasive Species in Ballast Water

4.18.7.1 No-Action Alternative

Under the No-Action Alternative, invasive species in ballast water would remain as described in Section 3.18.3. Vessel traffic would be expected to increase with the No-Action Alternative (see Section 4.14.1.3), increasing the potential for invasive species. However, the USCG mandatory ballast water management protocols (33 CFR 151 subparts C and D) are in place and all vessels, foreign and domestic, equipped with ballast water tanks that operate within U.S. waters are required to comply with the protocols.

4.18.7.2 Proposed Project Alternative

An increase in vessel traffic would be expected under the Proposed Project Alternative, which could increase the potential for invasive species in the Project area (see Section 4.14.2.3). However, the USCG mandatory ballast water management protocols (33 CFR 151 subparts C and D) would remain in place for all vessels, foreign and domestic, equipped with ballast water tanks that operate within U.S. waters.

4.19 THREATENED AND ENDANGERED SPECIES

The following sections provide an assessment of potential impacts to federally or State-listed threatened and endangered species. A formal BA has been prepared for the Project to fulfill USACE requirements as outlined in Section 7(c) of the ESA as amended and is included as Appendix N.

The criteria for assessing significant impacts to threatened and endangered species are:

- Loss of or long-term reduction in a population.
- Habitat modification that causes a permanent disruption to breeding, foraging, or other life history requirements.
- Permanent interference with the movement of native resident or migratory protected species.
- Loss of any areas designated as critical habitat.

Potential temporary and permanent impacts are described in general below and then discussed with respect to potentially impacted species.

Temporary impacts include:

- Underwater noise caused by pile driving, dredging, maintenance dredging, and placement activities during construction and maintenance dredging;
- Impingement from dredging activities;
- Changes to water quality such as elevated turbidity levels and potential release of contaminants in sediments;
- Changes to predator prey dynamics for benthic feeders (disruption of foraging habitat);

- Risk of collision with vessels; and
- Potential release of hazardous or toxic materials during operation.

Permanent impacts include:

- Changes in water quality and bottom conditions (potential water column stratification resulting in hypoxic conditions); and
- Permanent loss of Mississippi Sound bottom and associated benthic community.

Twenty-two threatened and endangered species are discussed in the baseline section as potentially occurring in the study area (see Section 3.19). Of those 22 species, only 4 birds, 6 marine mammals, 5 reptiles, and 1 species of fish are discussed below in the impacts section as these are the only species likely to occur within the Project area. Therefore, no impact discussion is included below for flora, although it is discussed in Section 3.19.

4.19.1 No-Action Alternative

Under the No-Action Alternative, no direct impacts to terrestrial threatened and endangered species in the study area are anticipated, as no new activities would occur in the terrestrial environment within the proposed area. The Port and surrounding coastline area would continue on the present course of moderate growth. Ongoing residential and commercial growth and development would occur and may have indirect impacts on terrestrial threatened and endangered species. Current trends would continue, such as shoaling rates in and around the Port; therefore, maintenance dredging would continue within the existing turning basin, existing channels, and the FNC. The majority of impacts to threatened and endangered species anticipated as a result of the No-Action Alternative would be temporary in nature and due to maintenance dredging activities. These impacts are discussed below.

4.19.1.1 Birds

The piping plover is known to occur in the Project area and critical habitat for this species occurs in the vicinity of the Project area on the barrier islands and along the shoreline east and west of the Project area. The PCEs for the piping plover’s wintering habitat are those components that are essential for the primary biological needs of foraging, sheltering, and roosting, and only those areas containing these PCEs within the designated boundaries are considered critical habitat. No maintenance dredging or placement of dredged material would occur within areas of designated critical habitat or in areas that include PCEs for the piping plover.

The recently federally listed rufa red knot is also known to occur in the vicinity of the Project area on barrier islands; however, there is no recent documentation of species occurrence close to the Project area.

The State-listed southeastern snowy plover and the brown pelican are known to occur in the Project area. Both species would have the potential to use coastal habitat in the Project area similar to the piping plover described above. No maintenance dredging or placement of dredged material would occur within the Project area that would potentially be used by the southeastern snowy plover or the brown pelican.

No impacts to the piping plover, rufa red knot, southeastern snowy plover, or the brown pelican are expected under the No-Action Alternative.

4.19.1.2 Mammals

The West Indian manatee is known to migrate through the Project area between Florida and Louisiana. Active maintenance dredging may disturb these animals and cause them to alter their routes due to underwater noise and elevated turbidity levels. While these temporary impacts would likely cause the manatee to avoid the Project area, they would not prevent the manatee's passage across the study area, nor would they impact any habitat or foraging activities. Also, an increased chance of vessel strikes with manatees exists because of increased shipping traffic expected to occur over time.

The blue whale, finback whale, humpback whale, sei whale, and sperm whale are not expected to occur in the study area because of the lack of water depth. As a result, although whales are susceptible to ship strikes and disturbance by anthropogenic noise from shipping activity (NMFS, 2013d), no impacts to whales are expected under the No-Action Alternative despite an expected increase in shipping traffic over time.

4.19.1.3 Reptiles

Maintenance dredging activities have the potential to negatively impact sea turtles, should they be present in the Project area during dredging operations. A greater chance of impacts to sea turtles exists when using a hopper dredge when compared to a hydraulic cutterhead dredge, although a cutterhead dredge has the potential to injure or cause mortality from impingement, which would be less likely with a hopper dredge. In fact, NMFS, in their Gulf Regional Biological Opinion (GRBO), have determined that the risk of mortality from cutterhead dredging is discountable (NMFS, 2003, 2005, 2007). Periodic maintenance dredging, using hydraulic cutterhead dredges, would continue with its inherent potential to directly impact sea turtles and their habitat.

Dredging would cause temporary increases in suspended solids and reduce DO conditions. These conditions would most likely result in less-productive bottom conditions within the dredged area. Following the completion of dredging, any displaced animals would be expected to resume normal use of the area after some period of recovery if sediment and water characteristics are suitable.

Vessel traffic would be expected to increase over time with the No-Action Alternative slightly increasing the probability of a petroleum spill. However, in the unlikely event a petroleum spill should occur, these species are motile enough to avoid most areas of high oil concentration. With the increase in vessel traffic, the potential for ship strikes also increases to threatened and endangered species.

4.19.1.4 Fish

Maintenance dredging and placement of material would cause temporary increases in suspended solids and reduce DO conditions. These conditions would most likely result in less-productive bottom conditions within the dredged area. Following the completion of dredging and placement activities, any displaced animals would be expected to resume normal use of the placement area after some period of recovery if sediment and water characteristics are suitable.

Vessel traffic would be expected to increase over time under the No-Action Alternative, slightly increasing the probability of a petroleum spill. However, in the unlikely event a petroleum spill should occur, Gulf Sturgeon are motile enough to avoid most areas of high oil concentration. Depending on the product, most petroleum, particularly crude oil, would remain at or near the surface and typically does not impact motile organisms in deeper water. Lighter petroleum, such as some refined products, can entrain in the water column or may have additives that can dissolve in water, potentially impacting less motile organisms. Larval and juvenile finfish tend to be more susceptible to petroleum than adults and could be affected extensively by a spill during active immigration periods. Due to their lack of mobility, they are less likely to be able to avoid these areas and could be negatively impacted if a spill were to occur.

Incidental mortality of the Gulf Sturgeon could result from entrainment by maintenance dredging equipment, and could result in large population reductions because of the already reduced population size following Hurricane Katrina.

4.19.2 Proposed Project Alternative

The majority of impacts to threatened and endangered species anticipated as a result of the Proposed Project Alternative would be temporary in nature due to construction of the West Pier Expansion (155-acre footprint, 2.4 mcy of dredged material), East Pier Expansion (14.5-acre impact footprint, 560,000 cy of dredged material), Turning Basin expansion (85 acres, 3.8 mcy of dredged material), and maintenance dredging of the North Harbor and West Pier berthing areas, East Pier, and turning basin, construction of the breakwater (18 acres), and the North Harbor fill (9 acres).

The Proposed Project Alternative may result in underwater noise from pile installation, dredging, and boat traffic associated with the proposed construction activities. The Mississippi Sound currently experiences moderately high volumes of boat traffic, particularly from large vessels accessing the Port. Noise may be generated by vessels associated with construction of the Proposed Project Alternative; however, noise levels are not expected to add to the current background noise levels from existing boat traffic. Therefore, noise from vessels and barges will not be discussed further in this analysis.

The West Indian manatee is the only endangered mammal likely to visit the study area or Project area, albeit infrequently. The MMPA of 1972 (16 U.S.C. § 1361 et seq.) established, the “taking” of marine mammals in waters or on lands under U.S. jurisdiction. The term “take,” as defined in Section 3 of the MMPA, means “to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal.” “Harassment” is further defined in the 1994 amendments to the MMPA, which establishes two levels of harassment: Level A (potential injury) and Level B (potential behavioral disturbance). The potential effects of pile driving activities on marine mammals, such as the West Indian manatee, and sea turtles would be expected to be similar to those effects on fish and depend on several factors which may include, but are not limited to: the species, animal size, and proximity to the underwater noise source; the intensity and duration of the pile driving noise; the depth of the water column; and the type of substrate. Shallow water environments can be more structurally complex and lead to rapid sound attenuation. However, soft estuarine mud and sand bottoms can absorb or attenuate the noise and require less intensity and time to drive the pile.

The Proposed Project Alternative includes the installation of approximately 4,000 pre-stressed concrete piles for construction of the new wharf associated with the West Pier Expansion. These piles would consist of approximately 2,680 24-inch by 24-inch square, pre-stressed concrete piles that range in length from 80 feet to 100 feet. The remaining 1,320 piles would be 36-inch cylindrical, hollow, pre-stressed concrete piles installed along the outside edge of the wharf to support the crane rail. The proposed installation plan estimates driving six piles per day (during daylight hours) in approximately 20 feet of water depth, within a 10-hour work day. It is anticipated that the selected contractor would install the piles one at a time and that there would be no simultaneous pile-driving operations of either or both pile types. Using one installation rig, the installation would occur 6 days per week and take approximately 2.5 years to complete. However, if a second installation rig is utilized, up to 12 piles could be driven in a single work day. The installation would include pre-augering or jetting the piles for the first 65 to 70 feet; the remaining 10 to 15 feet would be driven with a standard pile-driving hammer to set the bearing capacity of the pile. A "ramp-up" method would be utilized at the beginning of the in-water impact driving of piles that would involve driving at a low force and gradually increasing to full force over a period of 10 to 15 minutes. If driving stops for more than 1 hour during the course of a day, the "ramp-up" would be repeated. The estimated total number of strikes per day would range from 3,768 to 15,132.

The NMFS Pile Driving Calculator Model was used to assess the potential underwater noise impacts from pile driving for the Proposed Project Alternative (NMFS, 2015). This model is based on data from similar piles in similar substrate and requires an estimate of the total number of strikes per day to install the piles. Assumptions for input into the NMFS model were based on the number of strikes proposed for the 24-inch by 24-inch square pre-stressed concrete piles and the 36-inch cylindrical, hollow, pre-stressed concrete piles. Reference noise levels were selected from the Compendium of Pile Driving Sound Data, updated in October 2012, provided as Appendix I to Caltran's Final Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish (February 2009) to represent the proposed Project (Caltrans, 2012).

Based on the size of the piles and estimated water depth, noise generated by installation of the square and cylindrical piles is estimated to be 185 dB peak, with a cumulative strike sound exposure level of 197 dB cSEL (square piles) and 196 dB cSEL (cylindrical piles), and RMS sound levels of 173 dB (square piles) and 176 dB (cylindrical piles). Based on a scenario of 3,768 total strikes per day (2,514 strikes for the square piles and 1,254 strikes for the cylindrical piles), the model analysis shows that the threshold for physical injury to listed fish species that are larger than 2 grams would have the potential to be exceeded up to 151 and 131 feet from the installation site of square piles and cylindrical piles, respectively. The threshold for physical injury to listed fish species that are smaller than 2 grams would have the potential to be exceeded up to 243 feet for the square piles and 240 feet for the cylindrical piles.

Calculations for the pile driving scenario of 15,132 total strikes per day (10,092 strikes for the square piles and 5,040 strikes for the cylindrical piles), show that the noise generated by installation of the square and cylindrical piles is estimated to be 185 dB peak, with a cumulative strike sound exposure level of 203 dB cSEL (square piles) and 202 dB cSEL (cylindrical piles), and RMS sound levels of 173 dB (square piles) and 176 dB (cylindrical piles). The threshold for physical injury would have the potential to be exceeded within up to 243 and 328 feet from the installation site of square piles and cylindrical piles, respectively, for listed fish species both larger and smaller than 2 grams. Table 4.19-1 provides a summary of the NMFS Pile Driving Calculator Model outputs for this analysis.

Based on the underwater noise analysis, the proposed pile driving of the aforementioned piles would likely exceed the adopted underwater noise thresholds for physical and behavioral (Level B) impacts to fish species, marine mammals and sea turtles. Sound pressure levels in excess of the disturbance threshold (but below the threshold for injury) can potentially cause temporary behavioral changes that may increase the risk for predation and reduce an individual fish's likelihood of foraging or spawning success. For example, a behavioral response of Gulf sturgeon may be to move to areas outside of the noise threshold and avoid the Project area, which may affect normal migratory movements. However, based on the information presented in the BA (Appendix N), it is unlikely that adult Gulf sturgeon would use the proposed Project footprint for feeding during construction and placement activities. Therefore, adult Gulf sturgeon are likely to pass through the Project area, but are not likely to feed there. Notably, comparable pile driving activities to those proposed for the PGEP were occurring at Port facilities as part of the Restoration Project construction, while the Gulf sturgeon monitoring was being conducted by Peterson et al. (2015).

Any marine species that are exposed to high sound pressure levels during pile installation may change their normal behavior patterns (e.g., foraging) and such may have only a minor effect on individuals and not likely to affect their populations. While some underwater noise exposure will be unavoidable, minimization measures (e.g., use of bubble curtains, resonators, or other sound-cancelling options) are expected to reduce or avoid most potential adverse underwater impacts to marine species from pile driving activities. Therefore, no significant impacts to fish, marine mammals, and sea turtles are anticipated as a result of the Proposed Project Alternative.

Table 4.19-1
Proposed Project Alternative National Marine Fisheries Service
Pile Driving Calculator Model Underwater Noise Analysis

Analysis Based on 3,768 Total Strikes Per Day									
						Distance (feet) to threshold			
						Onset of Physical Injury			**Behavior**
	Source sound at 33 feet						**Cumulative SEL dB***		
Pile Type	**peak sound dB**	**SEL, single strike dB**	**RMS dB**	**Estimated Number of Strikes (total)**	**SEL, accumulated**	**Peak dB (206)**	**Fish ≥2 grams (187)**	**Fish <2 grams (183)**	**RMS dB (150)**
24-x-24-inch Square Pre-Stressed Concrete	185	163	173	2,514	197	0	151	243	1,120
36-inch Cylindrical Pre-Stressed Concrete	185	165	176	1,254	196	0	131	240	1,775
Analysis Based on 15,132 Total Strikes Per Day									
						Distance (feet) to threshold			
						Onset of Physical Injury			**Behavior**
	Source sound at 33 feet						**Cumulative SEL dB***		
Pile Type	**peak sound dB**	**SEL, single strike dB**	**RMS dB**	**Estimated Number of Strikes (total)**	**SEL, accumulated**	**Peak dB (206)**	**Fish ≥2 grams (187)**	**Fish <2 grams (183)**	**RMS dB (150)**
24-x-24-inch Square Pre-Stressed Concrete	185	163	173	10,092	203	0	243	243	1,120
36-inch Cylindrical Pre-Stressed Concrete	185	165	176	5,040	202	0	328	328	1,775

dB = decibels
SEL = sound exposure level
RMS = root mean square
* This calculation assumes that single strike SELs < 150 dB do not accumulate to cause injury (Effective Quiet).

Noise impacts from dredging associated with the Proposed Project Alternative may occur. It is estimated that a dredge would have a noise level of 70 dBA (A-weighted decibels) at 50 feet water depth (see Section 4.6.1.4.1). Based on this information, the noise level produced from dredging activities would be below the interim fish injury thresholds currently accepted by the NMFS, 206 dB peak level sound measurement (LPEAK) and 187 dB cSEL (Federal Highway Administration, 2012). The noise level produced from dredging activities would also be below the interim guidance for Level A (180 dB RMS) and Level B (160 RMS) for marine mammals within 66 feet of an active dredge (NOAA, 2012a). Injury thresholds are not likely to be exceeded. The probability of noise impacts to marine species from dredging noise impacts would be expected to be minimal.

4.19.2.1 Birds

No dredging or placement of dredged material would occur within areas of habitat potentially used by the southeastern snowy plover, designated critical habitat for the piping plover, or in areas that include PCEs for this species. A modeling evaluation of impacts to Harrison County beaches describes the longshore sediment transport in the area to be from east to west (Anchor QEA LLC, 2015); however, the Port is currently large enough to block longshore sediment transport (MDEQ, 2002). Based on the Anchor QEA model, the proposed Project would not result in significant changes in wave heights or breaking wave angles along the adjacent beaches. As a result, it is unlikely the proposed Project would affect piping plover beach habitat (Anchor QEA LLC, 2015), or southeastern snowy plover beach habitat.

Although, the recently federally listed rufa red knot is also known to occur in the vicinity of the Project area on the barrier islands, there is no recent documentation of the species occurrence close to the Project area. Therefore direct impacts to the rufa red knot are not likely.

Any indirect impacts that may occur (e.g., disturbances related to noise) to the piping plover, rufa red knot, southeastern snowy plover, or brown pelican are expected to be minimal and temporary. Informal consultation between the USACE and USFWS through the Section 7 consultation process regarding impacts from the proposed Project and dredging and placement of dredged material to federally listed shore birds was concluded as of November 2015 (Appendix E-2).

4.19.2.2 Mammals

Underwater noise and elevated turbidity levels from construction activities, including active dredging and placement activities, may disturb West Indian manatee and cause them to alter their routes during potential migration through the Project area. While these temporary impacts would likely cause the manatee to avoid the Project area, they would not prevent the manatee's passage across the study area, nor would they impact any habitat or foraging activities. However, manatees are sometimes relatively docile animals and may not leave the Project area, thus making them more susceptible to injury or impact. Therefore, the Guidelines for Activities in Proximity to Manatees and Their Habitat, provided by USFWS (see USFWS letter dated November 13, 2015, Appendix E-2) would be adhered to in order to minimize potential impact to this species. Underwater noise impacts from the installation of pilings would be mitigated through the use of bubble curtains, resonators, or other sound-cancelling options. Dredging, disposal, and filling activities would cause the complete removal or burial of benthic species within the dredging, disposal, and fill footprints. Following the completion of dredging and dredged material disposal, any displaced mammals would be expected to resume normal use of the area after some period of recovery if sediment and water characteristics are suitable. Also, an increased chance of vessel strikes with manatees exists because of increased shipping traffic expected to occur over time.

The blue whale, finback whale, humpback whale, sei whale, and sperm whale are not expected to occur in the study area because of the lack of water depth. As a result, although the Proposed Project Alternative would be expected to result in an increase in shipping traffic (see Section 4.14.2), no impacts to whales are expected. The USACE is consulting with the NMFS regarding impacts from the proposed Project and dredging and placement of dredged material to listed marine species.

4.19.2.3 Reptiles

Although all five species of sea turtles are known to occur in the Gulf, the Kemp's ridley sea turtle would be the most common species observed in the study and Project area. Very few observations of the hawksbill sea turtle have occurred in the study or Project area, and no known occurrences of the green sea turtle exist for the study and Project area. A group of at least six leatherback sea turtles have been observed feeding near Petit Bois Island (MMNS, 2001). Nesting or mating sea turtles would not be negatively impacted by the Proposed Project Alternative. Nesting in the study and Project area is uncommon, as one loggerhead turtle was reported on May 22, 2012, nesting on a beach in Jackson County (Hoke, 2012) and another in Pass Christian (Johnson, 2013). Mating typically occurs offshore and would also not be likely to be impacted by the Proposed Project Alternative.

As noted above under the No-Action Alternative, hydraulic cutterhead dredging activities have the potential, although unlikely, to affect any of the five species of sea turtles should they be present in the Project area during dredging operations. Sea turtles can become impinged or entrained in dredges, causing injury or death. Kemp's ridley would be the most common sea turtle species in the area and has been observed on numerous occasions throughout the Mississippi Sound and just south of the barrier islands, including the Chandeleur Islands (IMMS, 2013). Therefore, this species is the most likely of the sea turtle species to be impacted by dredging activities during Project construction. Dredging may result in mortality of individual Kemp's ridley sea turtles, but would not be likely to cause a long-term reduction in their population.

Dredging and placement activities would cause temporary increases in suspended solids and reduce DO conditions. These conditions would most likely result in less-productive bottom conditions within the dredged and placement areas. Dredging, disposal, and filling would cause the complete removal or burial of benthic species within the dredging, disposal, and fill footprints. Following the completion of dredging, any displaced animals would be expected to resume normal use of the area after some period of recovery if sediment and water characteristics are suitable. Although filling activities would result in the permanent loss of the areas filled, sea turtles are not likely to forage in the fill areas associated in the Proposed Project Alternative. Other potential impacts to sea turtles under the Proposed Project Alternative include limited temporary physical and behavioral impacts from noise, increased turbidity and resuspended sediment, and loss of benthic food resources during dredging activities.

Vessel traffic would be expected to increase with the Proposed Project Alternative, slightly increasing the probability of a petroleum spill. However, in the unlikely event a petroleum spill should occur, these sea turtles are motile enough to avoid most areas of high oil concentration.

Some measures that can be employed to reduce sea turtle injury are:

- Use of intake and overflow screening;
- Use of sea turtle deflector dragheads;
- Use of relocation trawlers working ahead of the dredges; and
- Observer reporting requirements (see Appendix N for a more-detailed discussion).

In summary, of the five species of sea turtles occurring in Mississippi waters, Kemp's ridley is the most likely species to be affected because it is the most common. A moderate chance exists for both the leatherback and loggerhead sea turtles being negatively impacted by the Proposed Project Alternative. The hawksbill and green sea turtle are the species least likely to be affected by the proposed Project because of their rare occurrence. However, any of the five sea turtle species could be negatively impacted by dredging activities. The USACE is consulting with the NMFS regarding impacts from the proposed Project and dredging and placement of dredged material to sea turtles.

4.19.2.4 Fish

Based on the most recent data collected, potential impacts to the Gulf sturgeon from the Proposed Project Alternative include:

- Reduction of critical habitat due to the Turning Basin, North Harbor Expansion, and East and West Pier expansions;
- Temporary degradation of critical habitat PCEs due to suspended solids, noise, reduced DO and burial of benthic organisms (prey items);
- Reduction in the availability of prey for foraging during dredging and placement activities;
- Entrainment during dredging and placement activities;
- Behavioral impacts due to construction noise from pile driving and dredging; and
- Reduction in habitat quality around the construction area, including elevated turbidity levels and low DO levels during dredging and placement activities.

The proposed Project is located in Critical Habitat Unit 8 for the Gulf sturgeon; habitat within the West Pier Expansion has sediment characteristics and water quality characteristics favorable to the Gulf sturgeon and contains prey known to occur in an adult Gulf sturgeon's diet (Appendix L). The expansion of the West Pier would result in permanent removal of this sediment and deeper, hypoxic habitat, which would reduce prey availability and critical habitat for Gulf sturgeon. However, Gulf sturgeon critical habitat within the Project area is relatively small, 0.8 percent, compared to the total critical habitat occurring within the Mississippi Sound. Therefore, the reduction in habitat surrounding the Port from the proposed Project would not cause a significant shortage in suitable habitat for Gulf sturgeon. Furthermore, after conducting a benthic habitat assessment for the proposed Project, it was concluded that adult Gulf sturgeon are likely to pass through the Project area but are not likely to feed there (Appendix L). Although critical habitat surrounds the existing Port, noise and vessel traffic from ongoing operations likely deter Gulf sturgeon from utilizing this habitat.

Recent data suggest that Gulf sturgeon utilize the nearshore habitat directly east of the Port and approximately 8 miles east of the Port more than they use the habitat surrounding the Port and west of the Port (Appendix O). This may suggest that the existing Port structure may already serve as a signal/indicator for sturgeon to go around and away from the Port toward the barrier islands, but as part of this analysis, Gulf sturgeon are expected to continue to utilize this area as under existing conditions.

The expansion of the Port (the Proposed Project Alternative) and the BMC are located within the Gulf sturgeon critical habitat boundary. Of the potential impacts to Gulf Sturgeon critical habitat PCEs, identified long-term impacts due to permanent conversion to deeper-water habitats are not expected to be significant to overall critical habitat. Impacts to the water quality, sediment quality, and migration habitat PCEs from dredging activity and material placement would be localized and temporary. Dredging and placement of material would cause temporary increases in suspended solids and reduce DO conditions. Dredging operations can attract some species, because prey items get resuspended in the water column and become easier to catch. Depending on when the dredging operation occurs, dredging could attract Gulf sturgeon for feeding. After dredging, these conditions would most likely result in less-productive bottom conditions within the dredged area because of the reduced water quality conditions. Following the completion of dredging and placement activities, any displaced animals would be expected to reutilize the placement area after some period of recovery time, if sediment and water characteristics are suitable. Incidental mortality of Gulf sturgeon could result from entrainment by dredging equipment and could result in population reductions.

Underwater noise levels from construction activities, including active dredging, placement activities, and pile driving may disturb Gulf sturgeon and cause them to alter their routes during potential migration through the Project area. Underwater noise impacts from the installation of pilings would be mitigated through the use of bubble curtains, resonators, or other sound-cancelling options.

Vessel traffic would be expected to increase with the Proposed Project Alternative, slightly increasing the probability of a petroleum spill. However, in the unlikely event a petroleum spill should occur, Gulf Sturgeon are motile enough to avoid most areas of high oil concentration. Depending on the product, most petroleum, particularly crude oil, would remain at or near the surface and typically does not impact motile organisms in deeper water. Lighter petroleum, such as some refined products, can entrain in the water column or may have additives that can dissolve in water, potentially impacting less motile organisms. Larval and juvenile finfish tend to be more susceptible to petroleum than adults and could be affected extensively by a spill during active immigration periods. Due to their lack of mobility, they are less likely to be able to avoid these areas and could be negatively impacted if a spill were to occur.

This Project does not fall under the GRBO (NMFS, 2003, 2005, 2007), which is specifically for hopper dredging. At this time, it is expected that new work dredging would occur using a mechanical/hopper dredge and maintenance dredging would occur using a hydraulic/cutterhead or mechanical/hopper dredge, as necessary. The USACE is consulting with the NMFS regarding impacts from the proposed Project and dredging and placement of dredged material to the Gulf sturgeon and Gulf sturgeon critical habitat.

4.20 CULTURAL RESOURCES

4.20.1 No-Action Alternative

The Project area has a low probability for containing unrecorded cultural resources sites. Based on the information provided by the MDAH, no cultural resources are listed in the NRHP within the Project area.

No adverse impacts to known, or as yet unknown, cultural resource sites within the Project area are anticipated from the No-Action Alternative. This assessment remains the same for a No-Action Alternative to a projection of 50 years.

4.20.2 Proposed Project Alternative

Since no previously recorded cultural resources sites listed in the NRHP are located within the Port facility portion of the Project area and the probability for unrecorded cultural resources within this portion of the Project area would be considered low, construction activities associated with the Proposed Project Alternative would not likely impact any terrestrial or submerged cultural resources within the Project area that are potentially eligible for inclusion in the NRHP. The procedures outlined in Appendix Q have been developed for the treatment of any unexpected discoveries that may occur during Project construction and operation, as well as maintenance activities.

5.0 CUMULATIVE IMPACTS

5.1 INTRODUCTION

Cumulative impact is defined as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or persons undertake such action” (40 CFR § 1508.7). The regulations further state that cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time. Additionally, ecological effects refer to effects on natural resources and on the components, structures, and functioning of affected ecosystems, whether direct, indirect, or cumulative.

This analysis considers the impacts of the proposed Project in combination with past, present, and other reasonably foreseeable future actions within the study area, which includes the cities of Gulfport, Pass Christian, Biloxi, and surrounding areas, including the Mississippi Sound, as shown on Figure 3.0-1. Potential cumulative impacts to the environmental resources described in Section 3 were evaluated for past, present, and reasonably foreseeable projects.

5.1.1 Cumulative Impact Assessment Methodology

This section describes the application of the cumulative impact assessment methods to the proposed Project. The geographic area for this assessment encompasses the PGEP study area, as described in Section 3.0 and depicted on Figure 3.0-1. Industrial, transportation, commercial, restoration, and beneficial use projects are included in this analysis because of the similarity of their operations and/or associated impacts to the proposed Project, and the resulting potential for cumulative impacts on the impacted resources.

Initial research and scoping identified numerous preliminary past, present, and reasonably foreseeable projects within the study area for potential evaluation in the cumulative impacts assessment. Subsequent screening led to the removal of several of these projects. Removal resulted from the project impacts not being reasonably foreseeable, insufficient information being available to forecast impacts, and/or occurrence outside of the study area. Actions eliminated from further evaluation are presented below with justification for exclusion:

- Turkey Creek Watershed Land Acquisition (not reasonably foreseeable)
- Nearshore Artificial Reefs (not reasonably foreseeable)
- 32 Environmental Restoration Areas (not reasonably foreseeable, insufficient information)
- DuPont Coastal Preserve (not reasonably foreseeable, insufficient information)
- Sand Beach Improvements and Maintenance (not reasonably foreseeable)
- Bayou Cadet Restoration (outside study area)

- SeaOne Gulfport Compressed Gas Liquids Production Plant (insufficient information)
- McDermott Terminal Pond Fill Project (insufficient information)

Actions evaluated in the cumulative impacts analysis are included in Table 5.1-1. Numeric reference in Table 5.1-1 corresponds to the general project location presented on Figure 5.1-1.

Impacts of these actions on the resources evaluated for the proposed Project are summarized in the resource-specific tables at the end of each results section (Section 5.4) to facilitate review. Several actions were not included in these tables but are described in Sections 5.2 and 5.3. These actions are outlined below.

- The proposed BMC BU site and existing Pascagoula ODMDS were not included individually in the resource tables because their impacts are generally limited to only a few resource areas; however, they are described in Section 5.3.2 and their impacts are included for applicable projects utilizing these locations and in the total column of resource tables.
- Maintenance dredging in the study area and vicinity has been addressed generally to include past, as well as current and future activities. Enumeration of individual resource impacts is provided in resource tables generally for the USACE and MSPA maintenance dredging as well as within the Pascagoula Proposed Widening of the Pascagoula Lower Sound/Bayou Casotte Channel EIS.

Most of the reasonably foreseeable projects are planned, but do not have definitive implementation schedules due to a variety of factors including funding constraints and permitting. The cumulative impact assessment was conducted based on the general assumption these projects would move forward over the proposed PGEP duration. Best professional judgment was relied upon for the cumulative impact assessment to a greater extent than the impact analyses for the proposed Project (Section 4), because information on other projects was based entirely on the limited information available in the public domain.

This cumulative analysis covers activities since the landfall of Hurricane Katrina on August 29, 2005. This is consistent with the cumulative impact analysis for the Pascagoula Harbor Navigation Channel EIS, which found that the hurricane's substantial impact on coastal Mississippi and the Port of Pascagoula makes it a reasonable starting point for assessing project impacts (USACE, 2010a). It is anticipated that construction of the proposed Port expansion would not occur until the market demand at Gulfport supports additional growth (expected in approximately 2017). Although the precise timing of construction of the Proposed Project Alternative is unknown at this time, for evaluation purposes, a conceptual schedule was developed by MSPA, and based on that schedule, it is assumed that construction would begin in 2018. This analysis predicts the impacts of reasonably foreseeable future actions to be completed within 50 years (2018 to 2068). The 50-year timeframe was chosen because this is the project duration over which impacts have been forecasted and analyzed. Reasonably foreseeable future projects in this study area with sufficient analysis of potential impacts are available over this timeframe; however, many unforeseen future projects are likely to occur in the study area over this timeframe as well.

Table 5.1-1
Proposed Port of Gulfport Expansion Project
Cumulative Impacts Actions

Reasonably Foreseeable Future Actions	3.	Ward Investments Project
	14.	Mississippi Coastal Improvement Program Barrier Island Restoration (Ship Island and Cat Island)
	7.	Maritime Commerce Center
	27.	MDOT's I-310 Project
	30.	Gulfport Federal Navigation Channel Modification with Bend Easing
Past or Present Actions	8.	Maintenance Dredging and Disposal Biloxi Harbor – 2006
	9.	Maintenance Dredging and Disposal MS and LA GIWW – 2008
	17.	Pascagoula Ocean Dredged Material Disposal Site
	28.	Biloxi Marsh Complex Beneficial Use Site
	11.	Gulfport Harbor Navigation Channel Widening Project – 2011
	26.	Port of Gulfport Restoration Project
	25.	KCS Rail Improvements Project
	29.	City of Gulfport Small Craft Harbor Redevelopment
	5.	Shearwater Bridge Erosion Control and Hurricane Storm Damage Reduction
	6.	Long Beach Canals
	19.	Harrison County Beaches Ecosystem Restoration and Hurricane Storm Damage Reduction
	4.	Courthouse Road Flood Damage Reduction and Ecosystem Restoration
	16.	Coast-wide Beach and Dune Restoration*
	12.	Proposed Widening of the Pascagoula Lower Sound/Bayou Casotte Channel
	24.	West Ship Island North Beach Area Restoration
	18.	Deer Island Ecosystem Restoration
	10.	Forrest Heights Levee Improvements
	23.	Turkey Creek Ecosystem Restoration
	21.	Henderson Point Greenway
	15.	Blakeslee Preserve Habitat Restoration
	2.	Tchoutacabouffa River Greenway
	1.	Biloxi River Greenway
	20.	Harrison County Watershed Assessment and Restoration Projects
	22.	Oyster Bayou Restoration
	13.	Acquisition and Restoration of Flood-prone Properties for Green Space

*Not depicted on Figure 5.1-1 due to multi-county extent.

Figure 5.1-1

Port of Gulfport Expansion Project

Cumulative Impacts Projects

Prepared By: 19910	Scale: 1" = 6 miles
Job No.: 100018536	Date: September 21, 2015

File: N:\Clients\M_N\Mississippi_State_Port_Authority\100018536\geospatial\Figs_EIS\2015_Revisions\PGEP_EIS_Figure_5_1_1_Cumulative_Impact_Projects_092115.mxd

With respect to regulatory actions undertaken within the study area since Hurricane Katrina, the USACE has issued 182 individual permits (74 letters of permission and 108 standard permits) and 316 general permits (233 nationwide general permits, 45 programmatic general permits, and 38 regional general permits) totaling 498 actions for 489 projects. One hundred and ninety of the 489 projects (39 percent) include 1 or fewer acre of authorized fill. The projects with the largest authorized fill were for the MSPA at Gulfport (84 acres), River Hills, LLC Old Highway 49 project (68.14 acres), and KBN Commercial Properties, LLC (38.6 acres), and the median authorized fill for projects having such impact was 0.39 acre. Table 5.1-2 summarizes the 489 projects including the permittee, the USACE SAM number, type of permit, and number of acres permitted for authorized fill. Permitted actions include authorizing 548.78 acres of wetland habitat to be filled, 4,534,500.51 cu ft of dredged material to be removed, 2.09 acres of dredge fill, 1,135.39 acres of dredged material removal, and construction of 11,210.50 feet of linear structures and 1,234.45 acres of nonlinear structures within waters of the U.S. Approximately six Nationwide Permits are verified annually by the USACE; this trend is not anticipated to increase. The USACE is not aware of any additional major public or private sector projects, other than those listed above and discussed in Sections 5.2 and 5.3, which would result or contribute in a substantive manner to cumulative impacts associated with the proposed Project.

5.1.2 Evaluation Criteria

Cumulative impacts were determined by reviewing the impacts described in the available documents as well as the resource discussion found in Section 4 of this EIS.

5.1.2.1 Individual Project Evaluation

Individual project documents, such as public notices, draft and final EAs and EISs, Records of Decision (RODs), newspaper articles, and project fact sheets, were reviewed for impacts to the resource areas. No attempts were made to verify or update those documents, and no field data were collected to verify the impacts described in the above documents. For projects with final EIS documents that have since been constructed, proposed impacts and mitigation plans described in their respective EISs were not verified. This analysis recognizes that some of the projects are undergoing revisions that may alter their eventual environmental impact, and has thus relied upon the best available information in existing published documents. Quantitative impact estimates were included, where possible, and summed across projects, but in many cases, only qualitative information was available.

5.1.2.2 Resource Impact Evaluation

This analysis includes an evaluation of the biological/ecological, physical/chemical, and cultural/ socioeconomic impacts of the proposed Project and other projects. Each of the evaluated projects is described below. The results section first summarizes the project impacts of the Proposed Project Alternative and then discusses the cumulative impacts on each of the resource areas from the Proposed Project Alternative in combination with past, present, and reasonably foreseeable future projects in the

Table 5.1-2
U.S. Department of Army Permits for Projects Within a 12-Mile Radius of the Port and Issued Within the Past 8 Years (August 2016)

DA Number	Project Name	Distance from Port (miles)	Permit Type	Authorized Fill (acres)
SAM-1996-02828-JBM	Mississippi State Port Authority at Gulfport	0	SP	84
SAM-2008-00416-CRO	River Hills, LLC (Old Highway 49)	11.45	SP	68.14
SAM-2014-00508-DMY	KBM Commercial Properties, LLC	10.60	SP	38.6
SAM-2007-01330-CRO	Lorraine Road Development (Noel Sims)	7.92	SP	21.8
SAM-2013-00569-SMZ	Love's Travel Stop	7.04	SP	15.92
SAM-2007-01809-MFM	Holliman Place (Prudie Circle & East St)	7.08	SP	15.58
SAM-2008-00556-SMZ	Flat Branch North Sewer Inteceptor System	9.56	NWP	13.69
SAM-2010-00116-MJF	Stribling Equipment, LLC	9.44	SP	11.73
SAM-2007-01232-SMZ	Turtle Creek Subdivision (O'Neal Rd)	8.57	SP	11.21
SAM-2007-00125-JBM	Florence Gardens (O'Neal Rd)	6.87	SP	11.1
SAM-2015-00675-KMN	Castine Point, Riecke Development, Long Beach, MS	3.87	SP	10.9
SAM-2015-01098-RCV	Biloxi Junior High School - Biloxi Public School District	10.05	SP	10.75
SAM-2011-00754-AFM	Anchor Development (Landon Road)	4.93	SP	10.5
SAM-2007-01264-JAM	Navy Base Housing Project in Gulfport	1.50	SP	10.4
SAM-2006-01553	Wrigleyville Subdivision (53rd & 55th Av	3.09	SP	10.25
SAM-2006-00567	Gulfport Biloxi Regional Airport	3.54	SP	9.8
SAM-2008-00083	The Biloxi Gates, Harrison County, MS	10.97	SP	9.8
SAM-2014-01184-MJF	John Fayard Moving	5.43	SP	9.5
SAM-2005-01732	Bailey Homes, Inc.	7.06	SP	9.49
SAM-2006-01552	Castine Pointe Development	3.92	SP	9.37
SAM-2011-00733-TMZ	Gulfport-Biloxi Airport Authority (Taxiway Extension)	3.57	SP	9.2
SAM-2007-00717	Belvedere Subdivision (Hwy 53 & 49)	9.95	SP	9.19
SAM-2006-02727	Povenir Holdings (Sheffield Road)	7.57	SP	8.3
SAM-2015-00081-TMZ	Alleged Violation,Southern RV Supercenter	10.02	SP	8.1
SAM-2007-00621-JBM	Lowes Avenue Industrial Park (34th St)	2.37	SP	8
SAM-2007-00193-JBM	Charlestowne Development (Commission Rd)	3.82	SP	7.99
SAM-2007-00301	Swan Lake Estates (Swan Lake Blvd)	10.87	SP	7.9
SAM-2007-00988-JBM	28th Street Elementary School (46th Avenue & 31st Street)	2.40	SP	7.83
SAM-2007-00102-JBM	MS Wellness Foundation (Richard Drive)	10.65	SP	7.57
SAM-2006-01987-KMN	RW Development (Veterans Av)	9.11	SP	7.34
SAM-2007-00113-JBM	Safeport Subdivision (37th St & 38th Av)	2.46	SP	6.89
SAM-2015-00411-KMN	Magnolia Springs Subdivision, Canal Road, Randy Wrigley	5.39	SP	6.61
SAM-2006-02095	First Baptist Church of Long Beach	3.41	SP	6.5
SAM-2005-03579	Harrison Co Bd Supv (Lorraine Rd Bridge)	10.45	SP	5.8

Table 5.1-2, cont'd

DA Number	Project Name	Distance from Port (miles)	Permit Type	Authorized Fill (acres)
SAM-2007-01998-JBM	Long Beach Estates, LLC	3.59	SP	5.44
SAM-2006-00753	U.S. Coast Guard (Henderson Point)	11.87	RGP	5.13
SAM-2014-01067-PAH	Small Craft Harbor	0.33	SP	4.94
SAM-2004-00458	Rgt/Charleston Partners, Ltd.	9.97	SP	4.89
SAM-2005-02753	Newman, Tommy	8.85	SP	4.801
SAM-2010-01182-dmy	Mississippi Methodist Senior Services, Inc.	7.86	SP	4.68
SAM-2007-00435	Three Rivers Landing (Williams Rd)	7.97	SP	4.5
SAM-2008-01674-JBM	MDOT (US 49 From o'Neal Rd. to School Rd.)	8.45	RGP	4.5
SAM-2010-00561-DMY	Souther Tire Mart, Inc. (New Store - Old Hwy. 67)	9.97	SP	4.37
SAM-2006-00039	Pass Christian Public School District	10.66	SP	4.3
SAM-2006-02396	Lankford, John (28th Street, Long Beach)	3.80	SP	4.13
SAM-2006-01985	Three Rivers Office Park West	6.09	SP	3.96
SAM-2006-02729	Cowan Station Apartments (MLP Cowan Road LLC & Bacaro Club, LLC)	4.42	SP	3.94
SAM-2011-01932-SBC	Kansas City Southern Railway Company	3.66	NWP	3.844
SAM-2007-00348	Penny Lane Subdivision (Pineville Rd)	4.61	SP	3.71
SAM-2007-01989-CRO	EPA RCRA Creosote Road Site, Gulfport (Cavenham Forest Ind. Inc.)	4.73	NWP	3.67
SAM-2014-01331-MJF	Biloxi Commerce Park, Jimmy Lane	10.50	SP	3.6
SAM-2010-01061-ALM	United Truck Group	4.68	SP	3.26
SAM-2012-00402-TMZ	Bryan Leatherman Lorraine/East Taylor Rd.	5.41	SP	3.25
SAM-2011-01535-TMZ	Breland Homes	10.43	SP	3.16
SAM-2007-00630	Gant & Shivers (South Swan Rd)	9.30	SP	3
SAM-2008-01388-KMN	Lindsey Estates Subdivision (Duckworth Road)	8.33	SP	3
SAM-2006-02244	Le'Petit Cove Subdivision	4.02	SP	2.95
SAM-2008-00084	Bellemont Gardens, Harrison Co., MS	11.33	SP	2.94
SAM-2013-00788-TMZ	Commercial Development, U.S, 49 and Orange Grove Road, Gulfport, MS	6.33	SP	2.94
SAM-2007-01169-JBM	Hwy 49 Motel (Gulfport)	4.19	SP	2.6
SAM-2007-01447-SMZ	Duckworth Pond Residential Housing Development	8.85	SP	2.55
SAM-2014-01357-RCV	Institute for Marine Mammal Studies	6.02	SP	2.54
SAM-2006-01605	Cedar Lake Medical Plaza	11.17	SP	2.51
SAM-2008-01671-GAC	Hatten Farms Subdivision (N. Swan Rd.)	9.75	SP	2.45
SAM-2009-01156-MJF	John Hill Blvd. Extension	2.70	SP	2.41
SAM-2015-00262-MGS	Glen Jordan	11.56	SP	2.4
SAM-2007-02111	Allen Toyota Gulfport Mississippi	7.09	SP	2.3
SAM-2008-00900-KMN	Canal Road Apartments	5.58	SP	2.18
SAM-2008-00229-SMZ	Lyman Shopping Center (Dennis OBrian)	9.78	SP	2.12
SAM-2008-01272-JWS	New Coast Developments, LLC (O'Neal & Three Rivers Road)	7.99	SP	2

Table 5.1-2, cont'd

DA Number	Project Name	Distance from Port (miles)	Permit Type	Authorized Fill (acres)
SAM-2007-01430-MFM	Goel Apartments	9.05	SP	1.96
SAM-2010-01450-TMZ	Touriel Development Company	8.53	SP	1.83
0.01SAM-2013-00786	Walmart, Pass Road, Gulfport, Mississippi	5.14	SP	1.82
SAM-2014-01283-DMY	HCUA Forcemain	4.88	NWP	1.77
SAM-2006-02679	Firetower Landfill (8280 Firetower Rd)	9.41	SP	1.7
SAM-2008-00995-JWS	Sandstone Apartments (11391 East Dedeaux Rd)	7.24	SP	1.65
SAM-2012-00117-AFM	Maritime Dev. Center - Slip/Basin/Bulkhead	5.13	SP	1.6
SAM-2015-00121-PAH	City of Gulfport - Coffee Creek Improvements	2.61	SP	1.56
SAM-2013-00417-RCV	HCBos - Sewer Main Racetrack/Canal Rd.	3.30	NWP	1.461
SAM-2009-00060-JBM	Harrison County Utility Authority (13A-East Interseptor, Pass Christian Wastwater Improvments, MS Gulf Region Water Plan)	6.71	NWP	1.43
SAM-2007-01385	The Columns at Gulfport	4.09	SP	1.4
SAM-2007-00992-ALF	Riverchase Park (Highland Circle)	6.77	SP	1.36
SAM-2006-02096	MS Power Company (Hwy 49 N)	10.62	SP	1.3
SAM-2013-00894-DMY	HCBOS - Tuxachanie Creek Sewer CIAP Project	11.96	NWP	1.18
SAM-2007-00056	Reserve at Pitcher Point (Hwy 90)	11.47	SP	1.1
SAM-2007-01281-ALF	USCG Debris Removal St. Louis Bay Marsh	11.78	NWP	1.1
SAM-2009-01793-MJF	Harrison County Utility Authority Old Woolmarket Road	11.68	SP	1.09
SAM-2010-00763-TMZ	Harbor Expansion; City of Pass Christian	10.45	SP	1
SAM-2010-00372-SPG	Cottages @ 2nd Street, LLC	9.47	SP	0.96
SAM-2005-03654-MBM	Gulf Coast Veterinary Services, LLC	9.95	SP	0.93
SAM-2006-01623	Canal Crossing Subdivision	7.65	NWP	0.907
SAM-2006-02611	West Fritz Creek Interceptor	8.99	NWP	0.9
SAM-2011-00952-MBM	Turkey Creek Wetland Mitigation Bank	5.66	NWP	0.9
SAM-2014-00797-TMZ	Naval Construction Battalion Center	2.83	NWP	0.75
SAM-2012-00696-TMZ	Harrison County School District	9.14	SP	0.74
SAM-2006-01529-DMY	Dipsouth, LLC U.S. Highway 49	7.37	SP	0.73
SAM-2009-01491-DMY	TSA Group Plantation Pines Cottages	4.59	NWP	0.6
SAM-2013-00063-TMZ	BBID Watermain - Gulfport	5.50	NWP	0.52
SAM-2006-00617	Enviro South; Tarabrook S/D NWP	9.86	NWP	0.5
SAM-2006-00755	Reunion of Biloxi Development, LLC	11.22	NWP	0.5
SAM-2006-02069	Advanced Technology Park	7.98	NWP	0.5
SAM-2007-01433-JAM	Landon Place (JFM Parkway)	5.50	NWP	0.50
SAM-2009-01581-TMZ	Catholic Charities Housing Assoc.	10.45	NWP	0.497
SAM-2008-01883-JBM	Traymore Place (Turnberry Av.)	6.96	NWP	0.493
SAM-2008-01062-MFM	Turnberry Gardens Subdivision	6.59	NWP	0.492
SAM-2001-02965	Pennell, Bill	7.21	NWP	0.49
SAM-2006-02220	Gulf Haven Plantation II (County Farm Rd	9.98	NWP	0.49

Table 5.1-2, cont'd

DA Number	Project Name	Distance from Port (miles)	Permit Type	Authorized Fill (acres)
SAM-2006-02503-SMZ	Trace Subdivision (Daugherty Rd)	4.95	NWP	0.49
SAM-2007-01504-JAM	GSW Holding, LLC (Switzer Rd)	5.44	NWP	0.49
SAM-2008-00600-MFM	Grace Temple Baptist Church	8.41	NWP	0.49
SAM-2009-01555-MJF	Gulfport Land Holdings	6.49	NWP	0.49
SAM-2012-00268-AFM	Andrew Densing - Short Cut Rd.	10.43	NWP	0.49
SAM-2012-00592-TMZ	Arbor Landing - Popps Ferry, LLC	10.60	NWP	0.49
SAM-2012-01097-TMZ	Oak Landing, LLC	8.20	NWP	0.49
SAM-2014-01167-AFM	Randall Corp of MS	9.84	NWP	0.49
SAM-2015-00848-AFM	Andrew Densing	10.43	NWP	0.49
SAM-2008-01196-MFM	Forest Gardens Subdivision	6.18	NWP	0.489
SAM-2015-01406-KMN	Hix Snedecker Company	2.31	NWP	0.486
SAM-2007-00811-JAM	Habitat for Humanity (34th Street)	2.57	NWP	0.482
SAM-2007-00286-JBM	Green Bridge Company Subd Transferred to Go Green	9.15	NWP	0.48
SAM-2007-00616	Allard, David (Thompson Rd)	5.58	NWP	0.48
SAM-2007-01020-SMZ	Ladner, John (Beatline Road)	5.90	NWP	0.48
SAM-2007-01926-MFM	Lobouy Subdivision (Lobouy Rd)	11.28	NWP	0.47
SAM-2009-00774-MMG	Plantation Pines Cottage Park	4.59	NWP	0.46
SAM-2014-00369-KMN	John Fayard Jr.	6.00	SP	0.46
SAM-2007-00810-JAM	Hatten Farms Subdivision (North Swan Road)	9.58	NWP	0.45
SAM-2009-00842-JBM	Gulfport-Biloxi International Airport Control Tower	3.04	NWP	0.45
SAM-2015-00486-MJF	WC, CG &JL Holdings, LLC (Grand Oaks Estates) REF: SAM-2014-01305-TMZ for PJD	7.45	NWP	0.45
SAM-2012-00199-KMN	VFW on Veterans Avenue, Biloxi MS	9.21	NWP	0.44
SAM-2011-00265-MJF	City of Gulfport Emergency Watershed Protection Program	7.03	NWP	0.436
SAM-2009-01213-CRO	George W. Healy, IV	5.28	NWP	0.43
SAM-2007-01383-CRO	Bay Cove (Biloxi, MS - Greg Stewart)	10.40	LOP/NWP/SP	0.428
SAM-2007-00857-MFM	Harris, Rick (1313 Old Pass Rd)	2.26	NWP	0.42
SAM-2006-01527	NFC, Inc. (Teagarden Rd)	4.15	NWP	0.406
SAM-2006-02178	St Vincent DePaul School (Derrick Rd)	7.07	NWP	0.4
SAM-2007-01127-SMZ	Gulfport Biloxi International Airport (Cuandet Rd)	4.08	NWP	0.40
SAM-2013-00382-TMZ	Seaway Road Widening Project, Gulfport, MS	5.32	NWP	0.4
SAM-2015-00222-MJF	DG Development VI Oneal Road	8.61	NWP	0.4
SAM-2008-01063-MFM	Waring Oil Storage Yard	6.45	NWP	0.38
SAM-2014-00644-PAH	Gulf Properties for Dynsmore Subdivision	5.83	NWP	0.37
SAM-2015-00392-AFM	Hope Academy	6.90	NWP	0.37
SAM-2007-00438-MFM	MS Department of Public Safety (Hwy 67)	7.35	NWP	0.35
SAM-2007-01692-JAM	Thomas, David (Lot 12 Victoria Ln)	9.22	NWP	0.35
SAM-2009-01320-JBM	Gulfport II Equity Holdings,LLC	9.96	NWP	0.35

Table 5.1-2, cont’d

DA Number	Project Name	Distance from Port (miles)	Permit Type	Authorized Fill (acres)
SAM-2014-01396-MJF	Bellewood, LLC REF: SAM-2007-00297 DMR-070397	10.60	NWP	0.34
SAM-2007-00101	Biloxi High School (Popps Ferry Rd)	10.90	SP	0.33
SAM-2007-02238-MFM	Convenience store/gas station (Three Rivers Rd at Swan Rd)	8.84	NWP	0.33
SAM-2008-00408-CRO	Saucier, Christina (Woolmarket Rd)	11.54	NWP	0.33
SAM-2013-00085-TMZ	Windance Holdings Subdivision	8.63	NWP	0.33
SAM-2015-00727-KMN	City of Gulfport - Sewerline Maintenance Orange Grove	7.02	NWP	0.32
SAM-2006-01470	Oak Haven Sub.; Jeff Savarese	5.66	NWP	0.3
SAM-2007-01507	Tellus Development	7.33	NWP	0.3
SAM-2008-00777-JBM	City of Biloxi Popps Ferry Road	11.65	NWP	0.294
SAM-2010-00962-PAH	Oasis Real Estate Investments Inc.	4.83	NWP	0.29
SAM-2011-00474-SPG	Marvin C. Stolf	8.01	NWP	0.28
SAM-2015-00416-AFM	Elliott Homes	8.47	NWP	0.27
SAM-2009-00051-DEM	Harrison County Utility Authority (S-19B Transmission Mains)	10.59	NWP	0.265
SAM-2010-00087-KMN	Extension of Pearl St.	2.94	NWP	0.26
SAM-2006-02502	Windridge Subdivision (John Clark Rd)	9.92	NWP	0.25
SAM-2009-01692-JBM	City of Gulfport	7.62	NWP	0.245
SAM-2006-01397	Landmark Investment Group, Cowan Lorrain	4.93	NWP	0.23
SAM-2009-01493-JBM	Skipper Smith	4.85	NWP	0.23
SAM-2014-00825-RCV	Butner, Bruce	5.99	NWP	0.23
SAM-2008-00710-JBM	Harper=McCaughan School	4.27	NWP	0.22
SAM-2008-01141-CRO	Veterans Avenue Roadway Improvements	9.20	NWP	0.21
SAM-2008-01234-CRO	Alleged Violation - Canal Road (south of I-10, next to Waffle House)	4.91	NWP	0.205
SAM-2006-01548	Lively, James (Ivy Hill Dr)	8.86	NWP	0.2
SAM-2007-01586-SMZ	Harrison Co. Utility Authority (Three Rivers/South Swan Interceptor)	8.42	NWP	0.20
SAM-2007-01628-SMZ	City of Biloxi (Hwy 67-Jim Byrd Rd Sewer/Water Main)	10.58	NWP	0.20
SAM-2008-00729	28th Street Widening and Improvements, Gulfport, MS	1.71	NWP	0.2
SAM-2008-00808-JBM	Gulfport-Biloxi International Airport	2.74	NWP	0.2
SAM-2012-00254-TMZ	City of Biloxi Drainage Improvements	11.85	NWP	0.2
SAM-2012-01421-MJF	Nursing Home Force Mail	6.55	NWP	0.2
SAM-2006-02393	Woolmarket Plaza (13063 Hwy 67)	10.71	NWP	0.19
SAM-2008-01858-GAC	Stokes Development (Henderson/Queen St.)	10.30	NWP	0.19
SAM-2013-00084-DMY	Biloxi Lighthouse & Visitor Ctr.	11.68	NWP	0.189
SAM-2009-01693-TMZ	Karsten Mueller	10.60	NWP	0.18
SAM-2010-00706-SPG	RGR Properties	3.23	NWP	0.17
SAM-2011-00036-MJF	City of Gulfport, Old Taylor Place Dam Repair	5.06	NWP	0.15

Table 5.1-2, cont’d

DA Number	Project Name	Distance from Port (miles)	Permit Type	Authorized Fill (acres)
SAM-2012-01176-PAH	O'Neal Equity Holdings, LLC	7.61	NWP	0.15
SAM-2011-00239-MJF	Sunset Landing, LLC	10.24	SP	0.137
SAM-2010-00461-KMN	Victor Stegall	6.63	NWP	0.13
SAM-2006-00712	Chuong Nguyen	2.57	NWP	0.12
SAM-2007-02134-MFM	Fox-Sanlenay Court Violation	7.86	NWP	0.12
SAM-2008-00739-MFM	First Baptist Church of Gulfport	8.17	NWP	0.12
SAM-2008-01986-CRO	Harrison County Utility Authority (S. Gulfport Sewer Line - Brickyard Bayou)	4.42	NWP	0.12
SAM-2011-00676	MDOT BR-008-01(076);102111/302000 CON Replace Bridges along US 49 over Little Biloxi River Harrison County	11.23	NWP	0.11
SAM-2012-01100-MJF	Shawn Pederson	7.16	NWP	0.11
SAM-2014-00643-DMY	Duckworth Road Estates	8.50	NWP	0.11
SAM-2013-00624-RCV	Pineville Area Sewer Improvement	7.44	NWP	0.106
SAM-2007-01164-MFM	Felsher, Kevin (426 Sanlenay Court)	7.87	NWP	0.1
SAM-2007-01238-SMZ	Piper Woods Subdivision Utility Line	7.02	NWP	0.1
SAM-2009-00397	Popps Ferry Bridge Repair Biloxi Back Bay	8.01	NWP	0.1
SAM-2009-01486-MJF	Derrick Moffett	3.10	NWP	0.1
SAM-2010-01694-MBM	Land Trust for the Mississippi Coastal Plain - South Forest Heights ILF Site	3.26	NWP	0.1
SAM-2010-01695-MBM	Land Trust for the Mississippi Coastal Plain-Middle School West ILF site	3.27	NWP	0.1
SAM-2012-00439-AFM	David Batol - South Swan Road	9.14	NWP	0.1
SAM-2014-01094-TMZ	City of Gulfport	7.43	NWP	0.1
SAM-2014-01375-AFM	City of Long Beach	3.13	NWP	0.10
SAM-2010-00883-MJF	Ronald W. Blacklidge REF: SAM-2003-01508	5.86	NWP	0.098
SAM-2013-00205-PAH	Richard Johnson - Bradfors Place Subd.	9.63	NWP	0.09
SAM-2010-00319-KMN	Duplex Construction (Lots 8-10, Louisiana Avenue, Gulfport, MS)	3.22	NWP	0.089
SAM-2015-01068-APS	J. W. Kahler	4.61	NWP	0.088
SAM-2010-01421-MJF	Chevron Pipe Line Company	10.07	NWP	0.08
SAM-2014-00457-KMN	Live Oak on the Bay; Lots 24 & 25; Randy Wrigley	10.88	SP	0.08
SAM-2009-00043-DEM	Harrison County Utility Authority (Shore Crest Dr./Lorraine Rd.)	8.13	NWP	0.07
SAM-2009-01492-MJF	Jan Dubuisson	7.46	NWP	0.07
SAM-2011-01117-PAH	Woolmarket Sewer	9.57	NWP	0.07
SAM-2011-01761	MDOT State Aid Project LSBP-24(8) Tillman Road culvert replacement Harrison County MS	6.90	NWP	0.07
SAM-2012-00267-AFM	Dick Palenik - Driveway	9.23	NWP	0.07
SAM-2014-00299-MJF	City of Biloxi, Cedar Lake area Sewer Extension	11.43	NWP	0.07
SAM-2014-00126-KMN	Keesler Air Force Base	11.30	NWP	0.069
SAM-2010-00716-TMZ	Mr. & Mrs. Sean V. McGinley	5.59	NWP	0.06

Table 5.1-2, cont'd

DA Number	Project Name	Distance from Port (miles)	Permit Type	Authorized Fill (acres)
SAM-2008-01885-JBM	Long Beach Small Craft Harbor (S. Cleveland Ave.)	3.08	SP	0.051
SAM-2008-01690-GAC	Harrison County Board of Supervisors (Spinaker Drive)	9.57	NWP	0.05
SAM-2009-00843-JBM	Cedar Lake Area Wastewater Facility	11.50	NWP	0.05
SAM-2009-01753-JBM	Oasis Development Group	4.07	NWP	0.05
SAM-2014-00694-KMN	Emergency Repair - Harrison County Sand Beach authority	4.25	NWP	0.048
SAM-2013-01221-RCV	City of Biloxi - Division St/Benachi Ave/Seal Ave	11.94	NWP	0.047
SAM-2007-00942-JBM	Peoples Bank	10.45	NWP	0.046
SAM-2009-00517-KMN	Mississippi Department of Marine Resources (Kiln-Delisle Rd.)	11.06	NWP	0.041
SAM-2010-00031-MJF	James Fisackerly Jr.	11.52	NWP	0.04
SAM-2011-01883-KMN	Gulfport Real Estate holdings - Pass Road	4.77	NWP	0.04
SAM-2012-00650-DEM	Warren Paving	5.99	SP	0.04
SAM-2013-00559-TMZ	Charles Carlson	10.31	NWP	0.036
SAM-2012-00878-MJF	City of Gulfport - Culvert Fritz Creek	8.83	NWP	0.034
SAM-2006-01530	Gulfport Equity Holdings (Creosote Rd)	4.70	NWP	0.03
SAM-2013-00630-PAH	HCUA - Acadian Farm Road	7.42	NWP	0.02
SAM-2015-00198-KMN	Joseph Blanchard - Texas Ave, Gulfport MS	10.21	NWP	0.02
SAM-2015-00516-PAH	Coca-Cola Bottling United, Inc.	2.18	NWP	0.018
SAM-2013-01280-PAH	City of Gulfport - Harrison Drive	3.15	NWP	0.011
SAM-2007-00631-JBM	Warren Paving (11211 Reichold Rd)	5.99	SP	0.01
SAM-2007-00817-JBM	City of Gulfport (Broad and Camp Avenues)	1.20	NWP	0.01
SAM-2008-00351-MFM	Sam's East., Inc.	5.46	NWP	0.01
SAM-2008-00892-MFM	Realtex Development Corp.	7.64	NWP	0.01
SAM-2009-00120-DEM	City of Long Beach (Klondyke Rd.)	3.61	NWP	0.01
SAM-2011-00065-MJF	City of Gulfport Anniston Ave Culvert	4.86	NWP	0.01
SAM-2012-00849-AFM	City of Biloxi Infrastructure Repair, Northaven Subdivision	9.53	NWP	0.01
SAM-2013-01105-TMZ	City of Biloxi	7.65	NWP	0.01
SAM-2013-01110-MJF	City Of Long Beach, DMR-140106	2.89	NWP	0.01
SAM-2013-01119-TMZ	City of Gulfport/NRCS EWP Project	9.22	NWP	0.01
SAM-2016-00305-MJF	Christoper Ladner	8.03	NWP	0.01
SAM-2010-00844-MJF	City of Pass Christian	9.35	NWP	0.009
SAM-2014-01166-RCV	Gary Rosetti	7.24	LOP/NWP	0.009
SAM-2006-01270-MBM	Bayou Plantation Homes, Inc.	3.67	NWP	0.007
SAM-2014-00043-MJF	City of Biloxi - Infrastructure Repair	7.00	NWP	0.006
SAM-2013-01265-TMZ	Michael Pettus	10.03	NWP	0.005
SAM-2016-00025-KMN	City of Biloxi, Hiller Park	8.90	NWP	0.004
SAM-2009-00119-DEM	City of Long Beach (Pineville Rd.)	4.11	NWP	0.001

Table 5.1-2, cont'd

DA Number	Project Name	Distance from Port (miles)	Permit Type	Authorized Fill (acres)
SAM-2009-01486-MJF	Derrick Moffett	3.10	NWP	0.001
SAM-2015-01131-KMN	Parker Creek Boat Launch Drainage, City of Biloxi	10.23	NWP	0.001
SAM-2006-00699	Green Oak Lakes Subdivision	4.88	SP	0
SAM-2006-00711	Grenadine Development LLC	10.30	NWP	0
SAM-2006-01281	Lykes, William	11.88	LOP	0
SAM-2006-01517	FEMA Temp Housing Site, Dry Hydrant	10.02	NWP	0
SAM-2006-02211	Rockwood Development; ditch maintenance	5.15	NWP	0
SAM-2006-02272-JBM	Seaway Marine Center (13247 Seaway Rd)	5.04	SP	0
SAM-2006-02614	USCG (MS Sound)	5.24	RGP	0
SAM-2007-00302	USCG (Sunkist Country Club Canal)	8.19	RGP	0
SAM-2007-00303	USCG (Parker Creek)	10.26	RGP	0
SAM-2007-00304	USCG (LaPort Bayou)	9.05	RGP	0
SAM-2007-00306	USCG (Holly Hills Canal)	9.27	RGP	0
SAM-2007-00307	USCG (Eagle Point)	7.98	RGP	0
SAM-2007-00309	USCG (Gulfport Industrial Seaway)	5.47	RGP	0
SAM-2007-00310	USCG (Biglin Bayou)	11.52	RGP	0
SAM-2007-00311	USCG (Bernard Bayou)	5.57	RGP	0
SAM-2007-00316	MDMR (Oyster Reefs Rehab Project)	11.23	NWP	0
SAM-2007-01082-MFM	MDOT (Hwy 90 to I-10)*	4.13	SP	0
SAM-2007-01218-JBM	Seemann Composites (12481 Glascock Dr)	5.29	LOP	0
SAM-2008-01065-JBM	Jimmy Lowry & Michael Long	4.64	SP	0
SAM-2008-01073-CRO	Chevron Pipeline Company	10.23	NWP	0
SAM-2008-01142-KMN	Gulfport Sewer Line Crossing – HWY 605 & US 90	4.43	NWP	0
SAM-2009-00479	U.S. Naval Battalion Center (NCBC) Gulfport, MS Wetland Delineation Verification	2.84	NWP	0
SAM-2011-00293-PAH	EP22/23 Segment Replacement	9.68	NWP	0
SAM-2012-00929-AFM	City of Gulfport - Bridge Repair North Railroad Street	2.64	NWP	0
SAM-2012-00930-AFM	City of Gulfport Bridge Repair - Gulf Ave.	2.61	NWP	0
SAM-2015-00395-PAH	Michael Schneider	11.53	SP	0
SAM-2005-02491	City Of Pass Christian	10.45	LOP	
SAM-2005-04649	U.S. Coast Guard Gulfport Station	10.45	LOP	
SAM-2006-01677	Long Beach Water Management District	10.45	SP	
SAM-2006-01932	Camden Court Townhouses	6.41	NWP	
SAM-2006-02004	MS-GP-01 (Shoreline Stabilization)	4.06	RGP	
SAM-2006-02023	MS-GP-04 (Mooring Pilings)	7.08	RGP	
SAM-2006-02027	MS-GP-06 (Boat Ramps)	8.54	RGP	
SAM-2006-02031	MS-GP-09 (Fill Previous Dredged Area)	1.76	RGP	
SAM-2006-02032	MS-GP-10 (Debris Removal)	4.39	RGP	
SAM-2006-02034	MS-GP-11 (Intake/Discharge Structures)	4.17	RGP	

Table 5.1-2, cont'd

DA Number	Project Name	Distance from Port (miles)	Permit Type	Authorized Fill (acres)
SAM-2006-02035	MS-GP-12 (Subsurface Utility Lines)	3.11	RGP	
SAM-2006-02089	USCG (Fritz Creek)	7.27	RGP	
SAM-2006-02090	USCG (Cedar Lake Canal)	11.47	RGP	
SAM-2006-02092	USCG (Mississippi Sound)	4.71	NWP	
SAM-2006-02210	Park Development; Oakwood Subdivision	2.56	SP	
SAM-2006-02241-TMZ	Bert Jones Yacht Basin (off 20th Av)	0.44	SP	
SAM-2006-02620	City of Pass Christian (South Heirn Av)	9.86	NWP	
SAM-2006-02640	Keesler AFB (Landfill 3)	10.82	NWP	
SAM-2007-00007	Tradition Properties (E Wortham Rd)	8.50	RGP	
SAM-2007-00024	Carter, Keith (15121 Lorraine Rd)	10.54	NWP	
SAM-2007-00041	Goss, Richard (River Plantation Ct)	7.04	NWP	
SAM-2007-00090	USCG (Back Bay)	8.88	RGP	
SAM-2007-00114	Gulfport Promenade (Dedeaux Rd)	7.29	SP	
SAM-2007-00716	Tarpon Lake Bayou (Tarpon Drive)	6.66	NWP	
SAM-2007-00795-MFM	USCG (Wolf River)	9.05	RGP	
SAM-2007-00802-MFM	USCG (Timber Ridge)	10.62	RGP	
SAM-2007-00803-MFM	USCG (Johnson Bayou)	9.02	RGP	
SAM-2007-00804-MFM	USCG (Delisle Bayou)	11.64	RGP	
SAM-2007-00807-MFM	USCG (Discovery Bay Harbor)	9.72	RGP	
SAM-2007-00808-MFM	USCG (Bayou Portage)	9.08	RGP	
SAM-2007-00809-MFM	USCG (Arcadia Bayou)	9.72	RGP	
SAM-2007-01124-DMR	Kenneth Smith	8.53	PGP	
SAM-2007-01146-DMR	Michael Hagmann	11.81	PGP	
SAM-2007-01148-SMZ	Pass Christian Smallcraft Harbor (South Market St & Heirn Avenue)	9.78	NWP	
SAM-2007-01150-DMR	Ken Budde	10.38	PGP	
SAM-2007-01161-DMR	Linda J. Cain	11.45	PGP	
SAM-2007-01170-DMR	Roger Caplinger	11.65	PGP	
SAM-2007-01172-DMR	Farrington, Thomas and Mary	11.07	PGP	
SAM-2007-01188-DMR	Barbra Thompson	8.15	PGP	
SAM-2007-01189-DMR	Carl Zaniboni	11.07	PGP	
SAM-2007-01252-MFM	Northrop Grumman Ship Systems Gulfport Shipyard Bulkhead	4.96	LOP	
SAM-2007-01263-DMR	Brad Gottsegen	9.21	PGP	
SAM-2007-01269-DMR	John Mladnich	2.52	PGP	
SAM-2007-01305-DMR	Paul A. Lea, Jr.	10.15	PGP	
SAM-2007-01315-DMR	George Petty	2.31	PGP	
SAM-2007-01325-DMR	Leroy Duvall, Jr.	8.35	PGP	
SAM-2007-01327-DMR	John Duffy	11.00	PGP	
SAM-2007-01350-DMR	Diane O'Hara	10.41	PGP	
SAM-2007-01377-DMR	William Sharpton	10.75	PGP	

Table 5.1-2, cont'd

DA Number	Project Name	Distance from Port (miles)	Permit Type	Authorized Fill (acres)
SAM-2007-01384-DMR	Paul Montjoy	8.40	PGP	
SAM-2007-01388-DMR	Richard Rose and Stuart Patterson	8.69	PGP	
SAM-2007-01390-DMR	Randall Skupien	8.35	PGP	
SAM-2007-01432-DMR	Martin de Laureal	11.31	PGP	
SAM-2007-01448-DMR	Wayne Herberger	10.41	PGP	
SAM-2007-01491-DMR	Bruce Strain	4.75	PGP	
SAM-2007-01533-DMR	Linda Buchanan	8.50	PGP	
SAM-2007-01534-DMR	George Bordeaux	5.00	PGP	
SAM-2007-01535-DMR	Edward J. Bertoneau	10.41	PGP	
SAM-2007-01543-DMR	Patrick Egan	11.36	PGP	
SAM-2007-01547-DMR	Tom Harvey, III	5.03	PGP	
SAM-2007-01550-DMR	Reginald Bossier	9.82	PGP	
SAM-2007-01561-DMR	Milton Williams	9.30	PGP	
SAM-2007-01565-DMR	Lynn Hammons	9.06	PGP	
SAM-2007-01579-DMR	Jack Miller	10.45	PGP	
SAM-2007-01583-DMR	Dr. Hal Jones	8.99	PGP	
SAM-2007-01612-DMR	Southern Scrap Material Co., LLC	6.13	PGP	
SAM-2007-01636-DMR	Gerald & Lynn Dodge	8.84	PGP	
SAM-2007-01639-DMR	Nona Flagg	8.99	PGP	
SAM-2007-01647-DMR	Della Stephenson	7.21	PGP	
SAM-2007-01651-DMR	Bill Jones	11.38	PGP	
SAM-2007-01654-DMR	Michael Felter	9.95	PGP	
SAM-2007-01674-DMR	Thomas M. Graham	9.41	PGP	
SAM-2007-01709-DMR	Bruce Hicks	10.35	PGP	
SAM-2007-01728-JBM	Pass Christian Harbor Repair	9.76	NWP	
SAM-2007-01746-DMR	A. Garner Russell	7.21	PGP	
SAM-2007-01759-DMR	John B. Mayer	8.51	PGP	
SAM-2007-01766-DMR	W. Taylor Guild, lll	5.18	PGP	
SAM-2007-01770-DMR	Harold R. York	11.98	PGP	
SAM-2007-01775-DMR	Richard Klibert	8.99	PGP	
SAM-2007-01810-JBM	Broadwater Marina (Hwy 90)	7.98	SP	
SAM-2007-01957-GAC	City of Gulf Port (Bert Jones Yacht Basin) (20th Avenue)	0.59	SP	
SAM-2007-01959-SMZ	GMH Military Housing (County Farm Rd)	10.33	NWP	
SAM-2008-00180-MFM	USCG (Bay Drive)	10.46	RGP	
SAM-2008-00191-MFM	Gulf Coast Pre-Stress (Pass Christian)	9.69	LOP	
SAM-2008-00221-MFM	Gulfport Lake Pier/Boat Ramp Project	4.86	LOP	
SAM-2008-00354-SMZ	City of Biloxi Coliseum Pier	7.37	NWP	
SAM-2008-00356-MFM	Thomas M. Kennedy (Vessel Removal)	10.46	RGP	
SAM-2008-00467-JBM	North Grumman Ship Systems (Gulfport)	4.94	NWP	
SAM-2008-00467-JBM	North Grumman Ship Systems (Gulfport)	4.94	LOP	

Table 5.1-2, cont'd

DA Number	Project Name	Distance from Port (miles)	Permit Type	Authorized Fill (acres)
SAM-2008-00814	Jackson, Gary Fritz Creek Violation	7.64	RGP	
SAM-2008-01422-JBM	Trinity Yachts Marine Lift	5.27	LOP	
SAM-2008-01459-GAC	Deboorah W. Weeks (River Bend Road)	7.21	NWP	
SAM-2008-01690-GAC	Harrison County Board of Supervisors (Spinaker Drive)	9.57	NWP	
SAM-2008-01772-KMN	Bayou Bluff Tennis Club	4.93	LOP	
SAM-2008-01827-JBM	Keith & Shelley Williams (11098 Channelside Dr.)	5.52	LOP	
SAM-2008-01860-GAC	City of Gulfport (Russell Blvd.)	3.84	NWP	
SAM-2008-01987-CRO	Harrison County Utility Authority (N. Gulfport, West Flat Branch, Sewer Interceptor)	10.39	NWP	
SAM-2008-02001-SMZ	Louis Freeman (Havana Ave.)	11.78	LOP	
SAM-2008-02028-KMN	Teresa Williams (10277 Riverroad Dr.)	8.68	LOP	
SAM-2009-00046-DEM	U.S. Coast Guard (Merrill Shell Bank Light)	10.45	NWP	
SAM-2009-00085-JBM	PAN Isles, Inc.	5.20	LOP	
SAM-2009-00189-GAC	Robert Hassinger (305 Sandy Hook Dr.)	10.45	LOP	
SAM-2009-00269-JBM	City of Long Beach Smallcraft Harbor (Cleveland Ave.)	3.14	NWP	
SAM-2009-00270-KMN	Biloxi Lighthouse Pier (Porter Ave.)	11.74	LOP	
SAM-2009-00419-JBM	Urie and Moses Pier/Jetty Repairs	0.66	NWP	
SAM-2009-00433-JBM	Port of Gulfport (Maintenance Dredging)	0.30	SP	
SAM-2009-00614-HEH	U.S. Coast Guard, CEU Miami	0.36	LOP	
SAM-2009-00776-KMN	Courthouse Rd. Jetty Repair	3.19	NWP	
SAM-2009-00785	Department of the Navy, NCBC, 11th St by WH225 bank stabilization project #002-20090416	2.90	NWP	
SAM-2009-00834-JBM	Courthouse Rd. Boat Launch	2.89	SP	
SAM-2009-01086-KMN	Popps Ferry Pier - Rebuild - Back Bay of Biloxi	8.12	NWP	
SAM-2009-01202-KMN	Navy Base Golf Course Culvert (Gulfport, MS)	3.18	NWP	
SAM-2009-01205-KMN	Culvert Replacement (Naval Base, Brown Avenue, Gulfport, MS)	2.33	NWP	
SAM-2009-01220-LTB	Anderson Boathouse	4.65	LOP	
SAM-2009-01277-MMG	Plant Jack Watson Lorraine Rd.	6.90	NWP	
SAM-2009-01490-JBM	Tim Murphy (Pier/Bulkhead Repairs)	8.99	LOP	
SAM-2009-01579-SPG	Robert Easterling	4.64	LOP	
SAM-2009-01673-MJF	Keesler AFB	10.81	LOP	
SAM-2009-01730	Linda Kay Randolph	11.64	NWP	
SAM-2009-01760-KMN	Daniel Collins-Pier & Boat House - Back Bay Biloxi(1270 Kensington Drive, Biloxi, MS)	11.70	LOP	
SAM-2009-01783-JBM	MDOT-State Aid Engineer (Lobouy Rd. Bridge Replacement) LSBP-24(11)	11.46	NWP	
SAM-2009-01785-JBM	MDOT-State Aid Engineer (John Lee Rd. Bridge Replacement) LSBP-24(9)	9.73	NWP	

Table 5.1-2, cont'd

DA Number	Project Name	Distance from Port (miles)	Permit Type	Authorized Fill (acres)
SAM-2010-00284-MJF	Harrison Cty Development Commission, Gulf Ship, LLC - REF SAM-2008-00070-SMZ	5.34	LOP	
SAM-2010-00502-MJF	Dept. Marine Resources	9.10	NWP	
SAM-2010-00816-DMY	Popps Ferry Causeway Park	8.04	LOP/NWP	
SAM-2010-01026-SPG	DMR Breakwater	8.73	SP	
SAM-2010-01067-SPG	Porter Avenue Wetland Verification	11.68	NWP	
SAM-2010-01090-ALM	Long Beach Small Craft Harbor	3.10	RGP	
SAM-2010-01696-MBM	Land Trust for the Mississippi Coastal Plain - Long Beach ILF Project	4.43	NWP	
SAM-2011-00062-PAH	John Koerner Boathouse, Pier & Slip	10.51	LOP	
SAM-2011-00103-PAH	Harrison Co. Eng. Dept. Debris Removal	6.51	NWP	
SAM-2011-00132-SPG	Gulfport ANG Fuel Pier Maint.	4.90	LOP	
SAM-2011-00177-PAH	Keesler AFB - Blue Angels Air Show Support	10.76	NWP	
SAM-2011-00255-DMR	Salloum, George	8.18	LOP/RGP	
SAM-2011-00276-TMZ	Pete Benjamin	8.35	RGP	
SAM-2011-00522-PAH	MDMR - Vessel Removal - Grasshopper Island	8.03	NWP	
SAM-2011-00914-MJF	City of Gulfport, Loren D. Heights Subdivision Drainage Improvements	6.07	NWP	
SAM-2011-01179-AFM	MDMR - Derelict Sailboat	3.02	NWP	
SAM-2011-01304-TMZ	Louis LaBourgeois	10.89	NWP	
SAM-2011-01457-KMN	Graham, Scott	11.72	LOP	
SAM-2011-01458-MJF	Ware, Derek	4.68	LOP	
SAM-2011-01593-AFM	Henderson Point Vessel removal	11.96	NWP	
SAM-2011-01595-TMZ	Ricky Bishop - Pier & Boathouse	10.13	LOP	
SAM-2011-01750-MJF	Poplar Point, LLC	10.75	LOP	
SAM-2012-00325	DMR-100358	11.58	RGP	
SAM-2012-00660-PAH	MS. Dept. of Marine Resources	9.87	NWP	
SAM-2012-00695-DEM	Eric H. Wolfson	8.33	LOP	
SAM-2012-00734-PAH	MS State Port	0.40	SP	
SAM-2012-00738-DMR	W. Larry Wilson	7.16	RGP	
SAM-2012-00739-DMR	W. Larry Wilson	3.28	RGP	
SAM-2012-00757-TMZ	Horst Grasz	7.43	LOP	
SAM-2012-00979-PAH	Beauvoir - Home of Jefferson Davis	7.75	NWP	
SAM-2012-00993-MJF	City of Gulfport - Quibbie Creek	7.09	NWP	
SAM-2012-01262-PAH	Trinity Yachts, LLC	5.25	SP	
SAM-2012-01387-TMZ	City of Biloxi - White Ave.	11.13	NWP	
SAM-2013-00261-SMZ	Paul Mace - Boat Dock	5.80	LOP	
SAM-2013-00416-KMN	Curt & Leslie Patton - Pier and Boat House	5.57	LOP	
SAM-2013-00625-KMN	Flora S. Point - Pier/Deck	7.62	LOP	
SAM-2013-00802	Harrison County Sand Beach Department Jim Simpson Pier	3.38	NWP	
SAM-2013-00901-RCV	Holly and Kim Ray - Pier	5.82	LOP	

Table 5.1-2, cont'd

DA Number	Project Name	Distance from Port (miles)	Permit Type	Authorized Fill (acres)
SAM-2013-00908-KMN	Mr. Paul A. Lea, Jr., - Boathouse and Assocated Piers (After-the-Fact)	10.10	LOP	
SAM-2013-00979-PAH	Ms. Mary Scott McKinnon	11.65	LOP	
SAM-2013-01052	Mississippi Gulf Fishing Banks, Inc FH-8-MD96-01005-V	10.17	NWP	
SAM-2013-01194-DMY	Courthouse Road Pier & Jetty Repairs	3.19	NWP	
SAM-2013-01195-DMY	Mosses Pier & Jetty Repairs	0.65	NWP	
SAM-2013-01196-DMY	Urie Pier & Jetty Repairs	0.45	NWP	
SAM-2013-01304-MJF	Nick Gristina	10.44	LOP	
SAM-2013-01385-DMY	City of Gulfport	0.89	NWP	
SAM-2013-01420-PAH	Island View Casino Resort	0.47	LOP	
SAM-2013-01426-TMZ	City of Pass Christian Small Craft Harbor	9.87	NWP	
SAM-2013-01427-SMZ	Long Beach Harbor	3.08	NWP	
SAM-2014-00111-TMZ	City of Pass Christian	10.45	NWP	
SAM-2014-00124-TMZ	Naval Construction Battalion Center	3.04	NWP	
SAM-2014-00183-PAH	DMR - Vessel Removal	9.77	NWP	
SAM-2014-00184-PAH	DMR - Vessel Removal	9.94	NWP	
SAM-2014-00186-PAH	DMR - Vessel Removal	9.94	NWP	
SAM-2014-00188-MJF	Dale Gollott	8.56	LOP	
SAM-2014-00230-DMY	Missippi State Port Authority - Pier 7	8.56	LOP	
SAM-2014-00275-TMZ	MDEQ - Popp's Ferry Causeway Park (Restore Project)	4.13	SP	
SAM-2014-00363-PAH	Cat Island Reef	11.53	NWP	
SAM-2014-00484-AFM	Kevin Courville	11.05	LOP	
SAM-2014-00486-KMN	Jerry L. Saporito	11.70	LOP	
SAM-2014-00592-DMY	Telepak Networks, Inc. - C Spire Fiber	5.40	NWP	
SAM-2014-00793-AFM	Jerrod Hunt	10.58	LOP	
SAM-2014-00888-PAH	Martin De Laureal	11.45	LOP	
SAM-2014-00934-KMN	Peter Johnson	5.25	LOP	
SAM-2014-01144-PAH	McDermott	0.38	SP	
SAM-2014-01367-AFM	City of Long Beach	3.05	LOP	
SAM-2014-01371-KMN	Drainage Clean out - Beau Chene, Biloxi	8.39	NWP	
SAM-2015-00034-MGS	David Belcher	9.43	LOP	
SAM-2015-00152-RCV	C. T. Payment	8.59	LOP/NWP	
SAM-2015-00217-RCV	Stummgirls LLC	11.67	LOP	
SAM-2015-00230-MJF	Jorda Elliot and Arthur Wynne	11.32	LOP	
SAM-2015-00280-KMN	James A. Seese, III	11.94	LOP	
SAM-2015-00352-RCV	City of Long Beach Port Commission	3.17	LOP	
SAM-2015-00414-SBC	Martin Miller - New Pier and Boat Shelter and Bulkhead Replacement	11.37	LOP/NWP	
SAM-2015-00415-SBC	Ben & Helen Morrison - Residential Boathouse and Pier	11.44	LOP	

Table 5.1-2, cont’d

DA Number	Project Name	Distance from Port (miles)	Permit Type	Authorized Fill (acres)
SAM-2015-00474-MGS	Dr. Daniel Butler	11.57	LOP/NWP	
SAM-2015-00606-MJF	Christopher & Kelly Van Cleave	9.27	LOP	
SAM-2015-00804-MJF	Joel R. Carter, Sr. DMR-150-378	4.80	LOP	
SAM-2015-00931-MJF	Tim Donner	11.74	LOP	
SAM-2015-01021-MGS	Georgia Shippey	10.34	LOP	
SAM-2015-01067-AFM	Mike Bobo	11.52	LOP	
SAM-2015-01104-MGS	Dale Kaliszeski	11.38	LOP	
SAM-2015-01147-AFM	Gulf Coast Shipyard Group	5.15	LOP	
SAM-2015-01211-PAH	Harrison County Development Commission, Pilings	4.96	LOP	
SAM-2015-01288-PAH	Jose Suquet	11.76	LOP	
SAM-2015-01405-KMN	Richard Jeansonne	11.93	LOP	
SAM-2016-00139-MJF	Jimmy Strickland Pass Christian Yacht Works	9.26	LOP	
SAM-2016-00177-MGS	Paul Sterbcow	11.64	LOP/NWP	
SAM-2016-00183-MGS	Michael Hagmann	11.66	LOP	
SAM-2016-00472-MGS	Kirby Stumpt	11.65	LOP	

Source: USACE (2016).

LOP = Letter of Permission; SP = Standard Permit; PGP = Programmatic General Permit;
RGP = Regional General Permit; NWP = Nationwide Permit

* Due to litigation, this project has been vacated, and it is unknown when the project will move forward.

study area. For each resource in the results section, discussion is followed by a resource-specific table that summarizes the impacts of the individual projects, as well as the total or cumulative impact anticipated to occur, corresponding to and expanding upon impacts addressed in the preceding discussion.

5.2 REASONABLY FORESEEABLE FUTURE ACTIONS

5.2.1 Ward Investments Project

Ward Investments is proposing a new mixed use development (commercial, industrial, and residential), and a new city recreational facility, to be located south and adjacent to I-10, between US 49 and Canal Road, in the City of Gulfport, Harrison County, Mississippi. The Ward project is not related to or connected with the PGEP. Access to the project area will be provided by extending Creosote Road westward from its current terminus, west of the Outlet Mall, with an additional western connection of the road to either the MDOT Corridor Road, Canal Road, or both. The Ward project would include retail/commercial outlets, industrial centers, a recreational facility, a town center, and business parks. The approximately 1,300 acre project area includes approximately 1,067 acres of wetlands, with proposed project impacts including the fill of approximately 432 acres of those wetlands within the vicinity of the Turkey Creek watershed. Proposed mitigation would be through on-site restoration, enhancement, and preservation for unavoidable impacts to wetlands. Ward Investments also proposes to provide in-kind compensatory mitigation through offsite restoration, enhancement, and preservation. As of June 2, 2015, Ward Investment submitted to the USACE an application for a DA permit pursuant to Section 10 of the Rivers and Harbors Act and Section 404 of the CWA. Ward Investments has applied for State WQC in accordance with Section 401(a)(1) of the CWA, and for Coastal Zone Consistency (CZC) in accordance with the State Coastal Zone Management Program. Upon completion of the required USACE advertising and public comment review, a determination relative to WQC and CZC will be made by the Mississippi Office of Pollution Control and the MDMR. Section 7 consultation with USFWS was requested to determine the level of potential effect to federally listed species. Additional coordination and review of this information is being and will be completed by the USACE and cooperating State and Federal agencies. The USACE issued a joint public notice (SAM-2015-00573-PAH) with MDEQ Office of Pollution Control and MDMR on June 2, 2015.

5.2.2 Maritime Commerce Center

MSPA is considering development of a Maritime Commerce Center (MCC) on their property located on an existing parking lot between an existing parking garage and hotel north of the Commercial Small Craft Harbor and south of US 90. The MCC would be multi-use mixed-use retail and commercial office space building complex that would provide enclosed access to both the parking garage and hotel adjacent to the site. The facility would be approximately 130,000 to 150,000 square feet with space for the port tenant and potential Federal agency offices, and restaurants and retail services. The building structure would be elevated, with the first floor constructed above the existing base flood elevation. Construction would include pile driving in the commercial small craft harbor along the north bulkhead area with no other fill required. Upon completion, the MCC would offer dock and pier access for ferry service and transient pleasure-craft dockage. At this time, no other project details or potential impacts to the surrounding environment are available. Consequently, this project has been excluded from resource-specific results tables and is included herein for informational purposes.

5.2.3 MSPA 33rd Street Property

The Port owns a property within the Gulfport city limits that is commonly referred to as the "33rd Street Property." The Port has proposed various projects for the site, such as evacuation parking or off-terminal tenant facilities (e.g., a freezer). Based on feedback from the community and concerns expressed by the adjacent residents, the Port has decided not to follow through with any of the proposed projects. There are no plans in the reasonably foreseeable future for any development of this site. Consequently, this project has been excluded from resource-specific results tables and is included herein for informational purposes only.

5.2.4 FNC Channel Modification with Bend Easing

The MSPA intends to modify the FNC in the future to include deepening and potential widening of the channel. The intent of these changes is to allow for increased ease of navigation of the FNC by current users and to allow larger, deeper-draft vessels to enter the Port. The MSPA will pursue Federal assumption of maintenance of the modified channel through the WRDA 204(f) process, including all necessary USACE planning and permitting approvals. Modification to the FNC would include deepening and widening of the federally authorized dimensions for the Sound Channel and the Bar Channel, as well as bend easing at two turns and extension of the Bar Channel dimensions to Buoy #37. The proposed dimensions that would result from the channel modifications include:

- Bar Channel (depth / width): 47 feet / 500 feet (from existing 38 feet / 400 feet)
- Sound Channel (depth / width): 45 feet / 400 feet (from existing 36 feet / 300 feet)

The anticipated quantity of new work dredged material for the channel modification would be approximately 52 mcy; and new work material dredged from the FNC modification would be placed primarily within the BMC (if approved and authorized for use), unless additional permitted sites are available for beneficial use of the material. Maintenance dredge material is estimated to be 7.7 mcy/year (however the actual maintenance volumes of the improved FNC would depend on the channel alignment approved and permitted by the USACE), with maintenance frequency variable and dependent on shoaling and funding, with likely recurrence every 2 to 4 years.

5.2.5 MDOT's I-310 Project

I-310 is a planned, four-lane access-controlled freeway between US 90 at the Port and I-10 near Canal Road. Also referred to as Mississippi Highway 601 South and the Canal Road-Port Connector Highway in older documents, it is proposed to begin at a new interchange with I-10 that will also serve as the southern terminus of the proposed US 49 Gulfport to Hattiesburg Freeway (also known as Mississippi Highway 601

North). South of I-10, I-310 would connect to a split-diamond interchange at 25th/28th streets to access the Gulfport CBD and the Naval Construction Battalion Center military installation. A half diamond would connect with US 90 farther south to provide access to the beach front and commuter access to the southern reaches of the Gulfport CBD. I-310 would then enter the Port to provide direct access for trucks and Port employees. Once constructed, the I-310 highway is expected to relieve congestion on US 49 by providing an alternative route for tourists destined for beach front attractions, workers of the Gulfport CBD, including the Naval Construction Battalion Center, and for trucks traveling between the Port and I-10 and points farther north (Harrison County Development Commission, 2011). In fact, Port-related trucks will be required to use I-310 upon its completion, according to commitments made by MSPA.

During environmental studies of I-310, the Gulfport Metropolitan Planning Organization (2003) 2020 traffic forecast predicted I-310 would draw 20,000 vehicles per day south of I-10. US 49 currently carries up to 58,000 vehicles per day among the sections south of I-10. The route also will serve as an additional hurricane evacuation route.

In 2003, the FHWA issued a FONSI for the project based on MDOT’s EA (Parsons Brinckerhoff Quade and Douglas, Inc., 2003). Survey and design work was initiated in 2005 and right-of-way acquisition began on the northern portion of the project. Although construction of the project has not started at this time, it is included in the Gulf Coast Regional Plan, and MDOT considers it as part of their No-Build scenario for future planning efforts. However, due to litigation, this project has been vacated, and it is unknown when the project will move forward. For purposes of this study, the inclusion of this roadway is discussed under cumulative impacts in the Roadway and Rail Traffic Analysis (Appendix I) and below in the impacts discussion.

5.2.6 MsCIP Barrier Island Restoration (Ship Island and Cat Island)

The NPS proposes to authorize the USACE, Mobile District, to restore a portion of East and West Ship Islands and Cat Island, within the boundaries of the Gulf Islands National Seashore. The current Supplemental EIS (SEIS) prepared by the USACE dated March 2014 evaluates alternatives designed to accomplish the purpose of and need for the barrier island restoration elements as recommended in the MsCIP Comprehensive Plan and authorized by Congress, as well as the potential environmental impacts and benefits associated with the USACE final design for the plan to implement the authorized construction action in compliance with NEPA and applicable regulations.

Due to frequent, intense storms, relative sea level rise, and anthropogenic activities that may have resulted in a reduction of sand supply to these islands, the Mississippi barrier islands are diminishing and are unable to rebuild themselves. A consequent decline has resulted in the ecosystem services and functions and economic benefits, provided by the barrier islands. These benefits include regulation of salinity within Mississippi Sound, storm protection to the coastline, and habitat for diverse flora and fauna, some of which are threatened or endangered and others that are commercially important. To address these issues, the proposed project includes restoration of Ship Island within the Gulf Islands National Seashore, Mississippi unit and consists of the placement of approximately 22 mcy of sand in Camille Cut and the replenishment of the southern shoreline of East Ship Island and beach-front placement of sand along the eastern shoreline of Cat Island. Of this material, approximately 13 mcy of sand would be used to construct a low-level dune system to close the 4-mile gap between East Ship Island and West Ship Island, which was originally opened by Hurricane Camille. Placement would occur once and would not be maintained. The remaining 9 mcy of sand would be placed in the littoral zones at the eastern ends of Ship and Petit Bois islands. Project benefits include the restoration of 1,150 acres of critical coastal zone habitats. The restoration of Ship Island would provide over 400 average annual functional habitat units and help to ensure the sustainability of the Mississippi Sound ecosystem by moderating salinity from the Gulf. Incidental benefits associated with this project include average annual hurricane and storm damage risk reduction benefits of $20,000,000 to mainland Mississippi, $470,000 in average annual recreation benefits, and $43,000,000 in average annual fishery benefits to Mississippi Sound. The placement of sand would also provide incidental protection to two cultural sites listed in the NRHP. Adverse impacts would be minor, temporary, and localized (USACE, 2009a–c).

5.3 PAST OR PRESENT ACTIONS

5.3.1 Maintenance Dredging

Past maintenance dredging at the Port and proposed maintenance under the PGEP are discussed in detail in the DMMP (Appendix F) and summarized herein with addition of other past and present maintenance dredging activities within the Mississippi Sound. Since 1960, the USACE has dredged the Sound Channel almost every year. From 1992 to 1993, the USACE deepened the channel to 36 feet MLLW (Sound Channel) and 40 feet MLLW (Bar and Gulf channels), removing approximately 19 mcy of material from the channel. The last maintenance dredging event for the Anchorage Basin, Sound Channel, and Bar Channel was completed in July 2015. The USACE contractor removed a total of 561,897 cy from the Anchorage Basin, 5,313,413 cy from the Sound Channel, and 3,060,000 cy from the Bar Channel. However, due to funding, the USACE was unable to dredge the Anchorage Basin and the upper Sound Channel to maintenance depths (Anchor QEA LLC, 2017, Appendix F).

The maintenance dredging of the Port facilities is currently addressed in the September 11, 2009, USACE permit SAM-2009-00433-JBM. Under this permit, material has been and will be dredged by hydraulic and mechanical methods, with hydraulically dredged material placed in the Federal Project Mississippi Sound open-water disposal sites utilizing thin layer disposal techniques and mechanically excavated material placed in the Harrison County Development Commission upland disposal areas C-1 and C-2. The permit expires on August 7, 2019, and includes maintenance dredging for the berths along the North and South harbors, the Commercial Small Craft Harbor, and the Entrance Channel. The estimated Port facility cumulative maintenance dredging quantity for the 10-year period is 200,000 cy, as requested in the permit application. Current maintenance dredging impacts on the geology of the area include sediment redistribution, short-term sediment suspension, and minimal change in the bathymetry of the area adjacent to where dredging takes place (Anchor QEA LLC, 2017, Appendix F).

The Gulfport Harbor Channel Widening Project (see Section 5.3.3), completed in September 2011, extended from the south entrance of the Anchorage Basin (Station 43+23) to the Gulf Channel (Station 1106+00). The Sound Channel was widened from 220 feet to its authorized width of 300 feet. The bar and Gulf channels were widened from 300 feet to an authorized width of 400 feet. According to the project bid schedule, approximately 6.7 mcy of material was removed from the channels (USACE, 2009a).

Although not all within the study area, at present there are three major Federal navigation channels in the Mississippi Sound in addition to the Gulfport Harbor. Each serves as an international port and is maintained to their federally authorized dimensions by the USACE with approved dredging plan for operations and maintenance. These Federal channels include Biloxi Bay in Harrison County, Pascagoula Harbor in Jackson County, and the GIWW (CH2M HILL, 2011). In addition to the federally designated channels, numerous smaller, private navigation projects and boat harbors are located along the coastal Mississippi shoreline. Maintenance dredging of both Federal and private channels generates additional dredged material that must be disposed. Low volume maintenance dredging (up to 2,500 cy) is allowed for previously dredged areas for purposes of navigation and maintenance of existing manmade ditches under the SAM-2010-01347-SPG, MS-GP-07—Maintenance Dredging general permit.

The Port of Pascagoula has been active since the early nineteenth century. By the 1830s, dredging of the eastern segment of the Pascagoula River accommodated larger oceangoing vessels. The Port of Pascagoula channel was widened to accommodate growing ship traffic in the late 1870s. Bayou Casotte was dredged and the harbor opened to shipping traffic in the late 1950s. In the 1850s, the depth across the outer bar in Horn Island Pass was unmodified from its natural depth (14.8 to 16.7 feet). In the 1880s, dredging of Horn Island Pass began and work started on the ship channel to Pascagoula (USACE, 1935). By 1935, the dredged channel across the outer bar in Horn Island Pass had been deepened to 18.7 feet (USACE, 1935). In 2005, the maintained dimensions of the Outer Bar Channel were 43.3 feet deep and 443 feet wide and maintained dimensions of the Horn Island Pass Channel were 41.3 feet deep and 590.6 feet wide (Morton, 2007). To maintain the intended dimensions of the Bayou Casotte Channel, dredging every 48 to 72 months is necessary. The USACE estimates that 3.98 mcy of dredged material from the Federal shipping channels will need to be removed and disposed of every 3 years for the next 40 years (Johnson et al., 2010). The Proposed Widening of the Pascagoula Lower Sound/Bayou Casotte Channel will also increase maintenance dredge volume, dredge frequency, and/or duration (Atkins, 2012).

The federally authorized Biloxi Harbor navigation project is located in Harrison and Jackson counties, Mississippi, in the vicinity of the City of Biloxi. The navigation project consists of the Lower and Upper harbors, with numerous associated channels (e.g., East Access Channel, West Access Channel, Bernard Bayou Channel, Back Bay Channel, Ott Bayou Channel, and East Harrison County Industrial Canal). Maintenance dredging of these channels is completed by the USACE Mobile District on a scheduled basis. Maintenance dredging of the Ott Bayou Channel was recently proposed to remove sediments deposited from Hurricane Katrina which had not been dredged since the early 1990s. Approximately between 40,000 and 55,000 cy of dredged material were to be removed to restore to –8 to –9 feet depths (pre-hurricane conditions), with return to authorized dimensions if future funding is obtained. If completed, approximately

250,000 cy of dredged material would be removed to restore the depths to –13 feet MLLW. Dredged material disposal would be through open-water disposal sites 6 and 7 (USACE, 2006b).

Maintenance dredging and placement activities for the GIWW in Jackson, Harrison, and Hancock counties, Mississippi, are conducted by the USACE to authorized dimensions. The Mississippi portion of the GIWW is 65 miles in length, 150 feet in width, and has a depth of –12 feet MLLW, plus an additional –2 feet of advanced maintenance plus –2 feet of overdepth dredging. For this portion of the GIWW, maintenance dredging and disposal activities for approximately 3 mcy of sandy silt by hydraulic pipeline dredge on an infrequent basis (every 3 to 5 years) over a 10-year period is proposed in Public Notice No. FP13-IW01-14, dated February 15, 2013. Dredged material would be placed in previously used and authorized open-water disposal areas (65A, 65B, 65C) using a thin-layer technique when practicable. Emergency use of a barge-mounted dragline or snagboat and placement on the side of the channel until a hydraulic pipeline dredge can be dispatched to restore dimensions is allowed to immediately remove rapidly formed or unexpected shoals or other hazards to navigation and allow immediate vessel passage (USACE, 2008, 2010a).

5.3.2 Beneficial Use Sites and ODMDS

State of Mississippi law under Section 49-27-61, passed in July 2010, requires dredging activities generating over 2,500 cy to participate in appropriate BU programs, provided such material is suitable and a BU site is appropriate. In accordance with this law, the DMMP was completed by Anchor QEA LLC (2017) for the PGEP (Appendix F). The recommended placement alternative for the dredged material from the West and East Pier expansions, North Harbor and West Pier berthing areas, and the Turning Basin Expansion as part of the Proposed Project Alternative is a permitted and approved BU site, such as the BMC (currently in permitting process). Possible designated BU sites identified in the Mississippi Gulf Coast region, in addition to the BMC, include in Hancock County: Tennessee Gas Pipeline (510 mcy), St. Joseph Point (3,400 mcy), Bayou Caddy Marsh (30 mcy), Bayou Caddy Safe Haven (200 mcy); in Harrison County: Wolf River Marsh (420 mcy), Deer Island (1,100 mcy), and Black Bay Marsh Island (300 mcy); and in Jackson County: Lake Mars Pier and Boat Launch (39 mcy), Lower Escatawpa (1,150 mcy), and Round Island (3,300 mcy) (CH2M HILL, 2011).

The MDMR submitted a permit application to the USACE and LDNR in February 2016 to permit the BMC in Louisiana for beneficial use of dredged material. The goal of this designation is to provide a new BU site on the western side of the state to accommodate material generated from private and public dredging projects to meet the requirements of Mississippi's beneficial use law.

During the DMMP evaluation, the Port began discussions with the MDMR/USACE BUG on using the BMC as a placement area for the dredged material from the Port. The BUG, formed in 2008 following Hurricane Katrina, is co-chaired by the USACE and includes representatives of the USFWS, EPA, NOAA/NMFS, DEQ, the Mississippi Secretary of State Office, as well as staff from Senate and Congressional representatives. One of the key actions of the BUG in 2010 was to write and have enacted new legislation that requires the beneficial use of dredge material when BU sites are available and the material is suitable. As a result, to facilitate keeping the sediments in the system, Mississippi passed § 49-27-61, *Charges for Materials Removed under Permit; Alternative for Dredge Material Disposal*. For the proposed PGEP, the BUG was in favor of a BU site instead of an ODMDS. As such, the BMC is the recommended placement alternative for the new work dredged material. The BU site would meet the preferred Mississippi placement method and provide additional shoreline protection. Although the Pascagoula ODMDS is not the preferred placement area for the West and East Pier expansions, North Harbor and West Pier berthing areas, and the Turning Basin Expansion, it is a viable placement alternative. If BU sites are not available or viable for dredged material placement, the dredged material would be placed in the Pascagoula ODMDS if it meets the criteria in Section 103 of the MPRSA. If the dredged material is not suitable for the ODMDS, the material would be placed in an approved and permitted upland disposal site(s). Appendix G provides results from sediment sampling and testing conducted by MSPA for all sediment that would be dredged as part of the proposed Project according to requirements of Section 103 of the MPRSA. Initial results indicate that only a portion of the disposal material would not be feasible for ODMDS disposal (see Appendix G) and would therefore be placed in a permitted and approved upland disposal site. General information pertaining to the BMC and Pascagoula ODMDS is provided below.

The BMC consists of approximately 30,290 acres of islands, bays, and open-water lakes within the Breton National Wildlife Refuge and 210,000-acre BMC estuary, as part of the St. Bernard delta region. The area functions to control salinities for portions of the Mississippi Sound. Improvements through beneficial use would serve to enhance the fisheries of the surrounding areas, providing benefits to commercial and recreational anglers, and provide additional storm protection of the coastal region of Louisiana and Hancock County (CH2M HILL, 2011). Conceptual site plans include revegetation for stability and habitat establishment (T. Baker Smith, 2006).

When other open-water, beneficial use, or upland placement options for dredged material are not feasible, the USACE and other public and private entities use an approved ODMDS. Currently, there are three designated ODMDS in the vicinity of the proposed Project: Gulfport Eastern, Gulfport Western, and Pascagoula. The Gulfport Eastern ODMDS is no longer used by the USACE, and the Site Management and Monitoring Plan has expired and is not likely to be renewed. As per the 2009 Site Management and Monitoring Plan, the northern portion of the Gulfport Western ODMDS is no longer available for use (USACE, 2009d). The Pascagoula ODMDS was evaluated as a potential placement location for dredged material and is the only location of potential use by the project (see Appendix F). Designated as an ODMDS in 1991, the Pascagoula ODMDS is located south of Horn Island on the western side of the Pascagoula Bar Channel. From 1976 to 1990, a portion of the area was used as an undesignated placement location. During this period, approximately 5.8 mcy were placed at the undesignated placement location. The existing Pascagoula ODMDS is approximately 32 square miles, with depths ranging from 38 feet in the north near Horn Island to greater than 52 feet along the southern boundary. This ODMDS is active and received an average of 1.7 mcy every 16 months during the period from 1992 to 2009, with total placement at the site approximately 28.6 mcy. The Site Management and Monitoring Plan for the Pascagoula ODMDS does not specify an annual maximum placement quantity; therefore, it is assumed the amount of material disposed of at one time is not an issue for this site, and capacity is unlimited. Further information regarding this site is presented in Appendix F.

The recommended placement option for the Turning Basin maintenance dredge material is thin-layer placement over a designated open-water bottom. The Port currently has permits for and uses the thin-layer placement areas for maintenance dredged material. The 60-year FNC project history indicates that the open-water disposal areas on the western side of the Sound Channel (1, 3, 5, 7, and 9) have sufficient capacity, which is restored via the predominant east-to-west Mississippi Sound currents (Anchor QEA LLC, 2017, Appendix F). As documented in the MsCIP studies (Rosati et al., 2009), the northern 70 percent of disposal area 1 is not used for USACE FNC maintenance, and thus would provide a placement area that would feed the areas west of the Port. However, future surveys are necessary to determine the capacity of the open-water disposal area(s) selected to receive the maintenance material prior to each maintenance dredging event for the PGEP. Placement at the Pascagoula ODMDS is also a viable option for future dredged maintenance material; however, this option is more costly, as the material must be transported off-site for placement. Additionally, this placement method removes materials from the sediment processes within the estuary.

5.3.3 Gulfport Harbor Navigation Channel Widening Project

First authorized by the Fiscal Year 1983 Supplemental Appropriations Act (PL 99-88), improvements to the Federal Gulfport Harbor Navigation Project were modified under WRDAs 1986 (PL 99-662) and 1988 (PL 100-676) to cover both widening and deepening the channel and thin-layer disposal. Authorized deepening was completed in 1993, and the authorized widening was completed under this project in 2011, funded under PL 84-99 Flood and Coastal Storm Emergencies (33 USC 701n) (69 Stat. 186). The width of the Mississippi Sound Channel was increased from 220 to 300 feet for a distance of approximately 11 miles and the Gulf Entrance Channel and Bar Channel from 300 to 400 feet for a distance of approximately 10 miles, with maintenance and future maintenance dredging also performed. These improvements were needed to provide for safe and unrestricted navigation into and out of the Gulfport Harbor, a problem that had been manifested prior to Hurricane Katrina by frequent “waiting at anchor” statuses for many vessels attempting to enter the Port and delay of vessel departure from the Port due to inbound traffic. Disposal of dredged material was directed to one of four disposal sites dependent on material characteristics. Material associated with widening the channel to its authorized dimensions (an estimated 925,300 cy of suitable material) and future maintenance material was placed in the littoral zone southeast of Cat Island between the 14- and 18-foot contour and in the littoral zone east of the Chandeleur Islands (estimated 3,926,400 cy of material) in water depths greater than 25 feet. Maintenance material was disposed of in open-water sites within Mississippi Sound implementing thin-layer disposal methods, in the Littoral Zone Area (LZA), and within the existing ODMDS located on the western side of the navigation project (USACE, 2009a). Construction of the project is complete and changes are reflected in the No-Action Alternative. This project was taken into consideration in baseline descriptions and evaluation of alternatives.

5.3.4 Port of Gulfport Restoration Project

Over the past two decades, MSPA has prepared several master plans to develop the Port and attract new tenants to increase the throughput of the Port as discussed above. This development at the Port was initiated in 1996 with submittal of a CWA Section 404 and Rivers and Harbors Act Section 10 permit application to the USACE. The application was approved by the USACE in 1998 with their issuance of a FONSI for the project based on the results of the EA (USACE, 1998a). Construction of 60 acres of the 84-acre project was underway when Hurricane Katrina impacted the area in 2005, causing significant damage to the partially constructed facility.

In November 2005, the former governor of the State of Mississippi (Haley Barbour) presented to Congress and members of the Mississippi Legislature a request for long-term funding to address recovery needs. In keeping with that original plan, MSPA is utilizing a portion of the disaster recovery funding provided by HUD to restore public infrastructure and publicly owned facilities, which were destroyed by Hurricane Katrina, to provide mitigation against future damage and to provide for the long-term recovery of the operating capacity of the Port.

The Restoration Project consists of restoring 60 acres destroyed by Hurricane Katrina and executing Phases I and II of the originally proposed project, referred to as the 84-acre project (USACE, 1998a); referred to as the “Port of Gulfport Restoration: 60-acre fill” in the resource-specific results tables in Section 5.4. Phase III included filling 24 acres on the west side of the West Pier thereby completing the 84-acre project, as permitted in 1998; referred to as the “Port of Gulfport Restoration 24-acre fill” in the resource-specific results tables in Section 5.4. In conjunction with the modified Port footprint, construction activities included fill placement to increase elevations of the West Pier and modifications of wharf, terminal, utility, and railroad facilities. These improvements are designed to better serve existing Port tenants, accommodate higher volume container and noncontainer terminal operations and future nonterminal concessions, provide for long-term recovery of the operating capacity of the Port, provide protection against future tropical storm surge events, and establish a solid infrastructure foundation for current and future operations of MSPA.

In 2009, MDA issued an EA, which concluded with a FONSI, and HUD approved the release of funds to complete 60 acres of fill (Phases I and II of the previously permitted 84-acre project), which was under construction prior to Hurricane Katrina. This work was completed in 2011. Phase III, which included construction on the remaining 24 acres and construction of infrastructure, was completed in July 2013 following MDA’s release of the 2010 EA and FONSI and HUD’s approval of the release of funds. It should be noted that in 2012, the change in elevation of the West Pier was reduced from +25 feet above msl to up to +14 feet msl.

With the completion of the Restoration Project, the Port is expecting the improved facilities will provide a more modern and efficient port for users. Depending on the configuration of tenant spaces, the amount of automation, and the condition of land-based rail and roadway infrastructure, the restored Port facility will be able to accommodate between 250,000 and 1.0 million TEUs annually. With regard to the PGEP, the

No-Action Alternative assumes that the Restoration Project has been completed. Thus, this project was taken into consideration in baseline descriptions and evaluation of alternatives.

In July 2016, MSPA submitted a joint permit application to the USACE/MDMR for construction of a barge mooring structure at the northern end of the Gulfport Anchorage Basin. The purpose of the project is to provide additional berthing space for barges at the Port in support of the Restoration Project. The mooring structure will include an eight-pile cluster dolphin fender on the southern end, and 15 single mooring piles installed in a “T” configuration, north of the dolphin fender. Construction of the structure is expected to be completed in September 2017. As with the Restoration Project, with regard to the PGEP, the No-Action Alternative assumes that the barge mooring structure has been constructed.

5.3.5 KCS Rail Improvements Project

The KCS Rail Improvements Project was a public-private partnership between the MSPA and KCS, which included repairs and upgrades, including new rail and ties, improved and additional siding, new switches and other modernization devices, and repairs, replacements, rebuilds, and improvements to existing road crossings and bridges. The rail line was restricted to single-stacked containers and speeds of 10 mph. The improvements upgraded the 67.5 miles of rail to accommodate double-stacked containers at 49 mph between Gulfport and north to Hattiesburg, Mississippi. Improving rail capacity was intended to provide the following: a viable alternative mode of transportation for cargo, support local and state economic development plan, promote energy efficiency and environmental quality, and improve safety for nearby residents (Burk-Kleinpeter, Inc. et al., 2011). The KCS Rail Improvements Project was identified in the Comprehensive Economic Development Strategy 2007–2012 (Southern Mississippi Planning and Development Districts, 2011b) to improve access to and from the Port. Construction of the project is complete, and changes are reflected in the No-Action Alternative. Thus, this project was taken into consideration in baseline descriptions and evaluation of alternatives. Based on the criteria identified in the KCS Railway EA, the additional trains associated with the PGEP would result in similar impacts between Gulfport and Hattiesburg as those defined in the EA.

5.3.6 City of Gulfport Small Craft Harbor Redevelopment

The Gulfport Small Craft Harbor served as a town centerpiece for recreational and commercial boating prior to severe damage and lost capacity incurred from Hurricane Katrina’s storm surge. It included boat slips and facilities for boaters, a ferry terminal, fishing piers, beach access, restaurants, and several small businesses. After Katrina, the Gulfport Small Craft Harbor could no longer provide berthing and storage for commercial and recreational boats, restaurants, and other harbor facilities, with the only remaining users recreational anglers who used the boat launch and fishing piers that had since been repaired. The purpose of this project was to restore and revitalize the City of Gulfport downtown area’s economy through addressing the need to replace the Gulfport Small Craft Harbor facilities to provide services to boaters and support local recreation and tourism. Funding sources for the 40-acre harbor area included the Federal Emergency Management Agency (FEMA) funds, in conjunction with CDBG and other public funding sources. Evaluation of impacts in the EA included both the FEMA-funded and non-FEMA funded redevelopment activities. The FEMA-funded activities included the following: construction of 3,065 linear feet of new bulkheads; replacement of the existing piers to provide 318 boat slips and 88,642 square feet of piers (comparable capacity but modified layout from the pre-Katrina design); upgrades to the electrical system supporting the piers and slips that meet Digital Flood Insurance Rate Map requirements and local ordinances; dredging of approximately 34,000 cy of sand and silt located within 50 feet of the existing harbor bulkheads; relocation and reconstruction of the Harbor Services Facility building, at elevation above the Coastal High Hazard Area and with a new bulkhead; and relocation of the fueling dock and bait shop to the south side of the harbor. The non-FEMA funded actions evaluated in the EA included widening of 20th Avenue; developing 0.96 acre of shallow water habitat adjacent to the shoreline east of Fisherman's Village; construction of a Fisherman's Village that would include an office, a restaurant, and a retail business space; construction of a Coast Transit Authority Rest Station that would provide park and ride services for the public; and improvements to Bert Jones Park that would include walking trails and an amphitheater. Benefits to many resources, such as land use, recreation, aesthetics, and community infrastructure, resulted from the project, with adverse impacts to resources such as roadway traffic, air quality, noise, and water quality impacts generally localized, temporary, and short term. Permanent loss of 5.17 acres of upland beach habitat did occur, which potentially had an adverse effect on terrestrial wildlife (FEMA, 2009). Further comprehensive description of project impacts is provided in resource-specific results tables.

5.3.7 Proposed Widening of the Pascagoula Lower Sound/Bayou Casotte Channel

The USACE prepared an EIS for a Permit Application for widening the Lower Sound and Bayou Casotte segments of the Pascagoula Navigation Project, as well as limited widening and bend easing of the northern portion of the Horn Island Pass channel between the Horn Island Pass and Lower Sound channel segments, in the Port of Pascagoula, Jackson County, Mississippi. Although this project is outside of the study area defined for the PGEP, it is included herein due to the similar nature of the project and its resource impacts, its general proximity and occurrence in the Mississippi Sound, the general east-to-west circulation and sediment transport of the Sound, and potential use of the Pascagoula ODMDS by both projects. A ROD was signed and permit was issued November 28, 2012, for Jackson County Port Authority (JCPA) permit application number SAM-2011-00389-PAH, which concurred with the finding of the LEDPA in the EIS.

The purpose for the project was to alleviate past vessel transit restrictions and increase travel efficiencies at Bayou Casotte Harbor. The proposed project included the dredging of approximately 38,200 linear feet (7.2 miles) of the Pascagoula Lower Sound/Bayou Casotte Federal Navigation Channel segment to widen the existing channel from the federally authorized width of 350 feet and depth of –42 feet MLLW to a width of 450 feet, parallel to the existing channel centerline and to the existing Federally authorized depth of -42 feet MLLW.

Benefits of the proposed project included a temporary increase in jobs, migration of workers, and associated temporary housing demand. The project purported increased efficiencies that would reduce operating costs for vessel operators and offer more availability of terminals, which would be an economic benefit for the vessel operators and/or marine terminal. Reduced transit restrictions that would increase Port efficiency and channel activities and maintain vessel safety was also a goal of the project. No increase in ground traffic, utilities, parks, recreational areas, or other community facilities were anticipated. Positive impacts to islands and barrier drifts were anticipated from placement of dredged material in BU sites. The Proposed Project Alternative provided 125,000 cy of material for beneficial use at the LZA site. Because aquatic, wetland, and terrestrial plant communities were absent from the project area, no direct impacts to these resources were anticipated.

The project may have resulted in negative impacts to area resources. Impacts to coastal processes such as tides and currents were not expected; however, there may have been long-term impact by altering longshore sediment delivery across the channel. Temporary impacts to water quality (temperature, salinity, DO, TSS) were anticipated during dredging and placement. Dredging temporarily increased TSS and possibly DO demand, resulting in localized hypoxia. Deepening of the channel may have resulted in hypoxic, cooler bottom water temperatures. In addition, the deeper channel may have resulted in increased salinity, particularly near the bottom. Lead and dioxin in some sediment samples exceeded criteria levels. The EPA issued a Section 103 concurrence letter stating the sediments from certain project segments met the exclusionary criteria and would be suitable for placement in the Pascagoula ODMDS, but that sediments from other project segments did not meet the exclusionary criteria and would need to be tested further.

Potential for impacts to federally listed species were anticipated for the proposed project. These species included the West Indian manatee, Gulf sturgeon, Alabama shad (SOC), bald eagle, brown pelican, Mississippi sandhill crane, and piping plover. The project was coordinated fully with USFWS and NMFS, and avoidance and minimization measures were implemented to avoid and reduce impacts on these species. Permanent conversion of 87.6 acres of shallow-water habitat to deeper habitat was a primary direct impact of the project. Short-term turbidity increases during construction and placement may have temporarily impacted fisheries (including recreational and commercial species), associated prey, and success of foraging bird species that dive or plunge for food. Temporary impacts on nesting and roosting behavior during placement may have occurred; however, it was anticipated that species should return once the project was complete. Temporary disruption of fish and wildlife during construction, including potential temporary reduction in EFH quality, was anticipated, but no long-term impacts were expected. Furthermore, no long-term effects on benthic organisms by dredging were expected due to species' motility and the rapid recovery of benthic communities following temporary, short-term impacts in the immediate vicinity.

There was a potential for project impacts to cultural resources. The JCPA proposed a draft work plan for data recovery of archaeological site 22JA516 (if project avoidance was not possible). The draft work plan included a research design, specific methodologies for specific data recovery phases, public interpretation/education, a plan for the treatment of human remains, and a project schedule. The USACE coordinated with the MDAH and interested federally recognized Native American tribes.

Minor short-term air impacts were anticipated as a result of additional emissions from harbor vessels and land-based mobile sources (primarily combustion emissions) during channel widening activities. Minor and temporary noise impacts may have occurred, but there were no violations of local noise control requirements. Noise levels of additional activities did not exceed existing conditions.

5.3.8 Mississippi Coastal Improvements Program Interim Near-Term Projects

The following projects within the study area were evaluated under the MsCIP Interim EA and FONSI signed June 30, 2006 (USACE, 2006c), and the Chief's Report signed December 30, 2006 (USACE, 2006d), with study authorization under PL 109-48. Screening therein identified 15 near-term projects that were subsequently authorized under PL 110-28, signed May 25, 2007. Project status based on publicly available information is uncertain, though the MsCIP Comprehensive Plan and Integrated Programmatic EIS (USACE, 2009a) references that these projects had been completed or were nearing completion at that time. Based on the proposed PGEP construction schedule, it is assumed that these projects will be complete by initiation of PGEP construction.

5.3.8.1 Shearwater Bridge Erosion Control and Hurricane Storm Damage Reduction

Shearwater Bridge is located along Shearwater Drive in the City of Ocean Springs, Jackson County, Mississippi. Shearwater Drive is a paved road along the east end of the Ocean Springs Harbor on Mississippi Sound, where the bridge serves as a local traffic artery and evacuation route. The purpose of the project was hurricane and storm damage reduction through provision of additional protection of the approaches and abutments for the Shearwater Bridge. These structures sustained damage from storm surge associated with Hurricane Katrina, and the timber retaining walls were deteriorating and had lost fill material such that subsequent storm surge could result in failure. The project consisted of the installation of continuous interlocked vinyl sheet piling along both sides of the north and south approaches of the bridge, with sheet pile bulkheads anchored to each other using steel tie rods under the roadway, backfilled with gravel, and sealed at the top with a reinforced concrete cap (USACE, 2006c–e). Anticipated beneficial effects from the project include improved overall aesthetic quality, prevention of the erosion of fill material resulting in improved water quality of Ocean Springs Harbor and negating the need for future dredging, improvement of the overall health of the tidal waterbody, and continued use of the roadway by the public during normal circumstances as well as during evacuations when necessary. Adverse environmental effects were insignificant or very minor and short term, such as localized impacts to water quality from erosion during construction that were not avoided through BMPs (USACE, 2006c–e). Evaluation of the project was included in the MsCIP Interim EA and FONSI signed June 30, 2006 (USACE, 2006c), and the Chief's Report signed December 30, 2006 (USACE, 2006d), with authorization included under PL 110-28 signed May 25, 2007, which authorized and appropriated $107.7 million for construction of 15 projects. The project was budgeted at $2.0 million and was completed.

5.3.8.2 Long Beach Canals

Drainage for approximately 70 percent of the total surface area of the City of Long Beach and additionally a large unincorporated area to the north in central Harrison County in the Turkey Creek watershed is conveyed through one of two major canals, which traverse the northern part of the city from east to west. Canal Number 1 flows into the head of Johnson Bayou within the City of Pass Christian to the west, and Canal Numbers 2 and 3 drain into the head of Bayou Portage near the unincorporated community of Cuevas. Hurricane Katrina negatively affected the capacity of this drainage system through sediment deposition from storm surge and windblown debris, which had further adverse effects on arterial drainages upgradient. The project included replacing the 28th Street Bridge, modifying the geometry of Canals 2 and 3, and constructing an earthen berm and diversion channel at the upper limit of Canal 2 at Turkey Creek to divert overbank flows into the modified Canal 2 and toward Bayou Portage. Project benefits included significant reduction in the water-surface elevation and flooding along Canal 2 upstream of Menge Avenue to 28th Street in the cities of Gulfport and Long Beach; significant improvements in floodwater conveyance; aesthetic improvements in the vicinity of the canals; and increased circulation and tidal exchange that resulted in better water quality and aquatic habitat conditions that would benefit fisheries and wildlife. The project functions to prevent damage from more frequent, small to moderate storm events and protects the city’s main street, utilities, and utility lines, which parallel the proposed seawall, and the city and county emergency and public services during such events. No changes to water surface elevations along Turkey Creek were anticipated, but modeling output suggested potential rise in water level downstream at Bayou Portage. Temporary displacement or impact to fauna was anticipated during construction. The project included 263,000 cy of sediment removal (USACE, 2006c–d). Evaluation of the project was included in the MsCIP Interim EA and FONSI signed June 30, 2006 (USACE, 2006c), and the Chief’s Report signed December 30, 2006 (USACE, 2006d), with authorization included under PL 110-28 signed May 25, 2007. This authorized and appropriated $107.7 million for construction of 15 projects. The project was budgeted at $2.0 million and was completed.

5.3.8.3 Harrison County Beaches Ecosystem Restoration and Hurricane Storm Damage Reduction

Within the PGEP study area, post-Katrina beach and dune restoration was evaluated under the Harrison County Beaches Ecosystem Restoration and Hurricane Storm Damage project in the MsCIP Interim EA and FONSI signed June 30, 2006 (USACE, 2006c), and the Chief’s Report signed December 30, 2006 (USACE, 2006d), with authorization included under PL 110-28 signed May 25, 2007. This project includes restoration of approximately 26 miles of dune systems, which were destroyed by Hurricane Katrina. Beach, but not dune, restoration was authorized through renourishment under the Flood Control and Coastal Emergency program (PL 84-99), allowing placement of additional materials to an authorized width of 270 feet. This project proposes construction of a 5-foot-high dune with a crest width of 10 feet and 1:3 side slopes. Construction design includes placement of approximately 681,000 cy of dune sand sourced from established borrow areas a minimum of 1,500 feet offshore, fencing along a 134,000-foot-long perimeter for protection, and planting of approximately 125 acres of native vegetation indigenous to Mississippi for stabilization. Replacement of the dune is anticipated within 10 years of construction and dune plantings and fencing within 15 years. Project benefits include: habitat creation, such as foraging and roosting habitats, for various shore and migratory birds and other coastal wildlife, including several rare or listed species (e.g., piping plover and least tern); recreation benefits annually totaling $4,706,546 on average; and secondary storm damage reduction through absorption of surge and wave energy. Adverse impacts were anticipated to be minor and temporary, including displacement of shorebirds, impacts to water quality, disruption of recreation, and noise impacts during construction (USACE, 2006c). Project status based on publicly available information is uncertain at this time, but is referenced in the MsCIP EIS (USACE, 2009a) as funded with planning and specifications underway by the USACE. A modeling evaluation of impacts to Harrison County beaches describes the longshore sediment transport in the area to be from east to west except in areas with high amounts of vegetation or manmade structures that alter the direction and intensity of the longshore transport (Anchor QEA LLC, 2015); however, the Port is currently large enough to block longshore sediment transport (MDEQ, 2002). Based on the Anchor QEA model, the Proposed Project Alternative would not result in significant changes in wave heights or breaking wave angles along the adjacent beaches. As a result, it is unlikely the proposed PGEP would affect this restoration project (Anchor QEA LLC, 2015).

5.3.8.4 Courthouse Road Flood Damage Reduction and Ecosystem Restoration

The Courthouse Road Flood Damage Reduction and Ecosystem restoration project was evaluated in the MsCIP Interim EA and FONSI signed June 30, 2006 (USACE, 2006c), and the Chief's Report signed December 30, 2006 (USACE, 2006d), with authorization included under PL 110-28 signed May 25, 2007. The project includes the replacement of 14 stormwater wall braces along 235 feet of the Courthouse Road drainage channel, and the restoration of 0.3 acre of adjacent marshland at the Courthouse Road Pier on the Mississippi Sound in the City of Gulfport, Harrison County, Mississippi. These features sustained extensive damage from Hurricane Katrina. The project seeks to prevent the collapse of the channel walls through bracing repair and the installation and anchoring of new pre-cast concrete lateral braces. In the event of such collapse, the flood damage reduction performance of the near-shore community's stormwater drainage network would be compromised. Proposed restoration includes the placement of fill, grading, and planting of native low- and high-marsh vegetation to yield 6,300 square feet of high marsh and 7,900 square feet of low, tidal marsh. Plants would either be purchased from a commercial nursery or borrowed from a source site of similar habitat. Fill material used in restoration was proposed to include poorly graded silty sands removed from between the road and channel outfall, and soils with higher silt and organic content brought in by truck from off-site sources within 5 miles of the project, with a calculated requirement of approximately 1,500 cy of soil. Benefits anticipated in the Interim MsCIP EA and FONSI (USACE, 2006c) include restoration and maintenance of storm drainage for the upland areas on the landward side of the road; flood reduction and reduction of associated damages (e.g., erosion); infrastructure maintenance and reduced risk of water quality impacts associated with failure; and functional benefits through localized stabilization of sediments and provision of nursery areas for fishes, shellfish, and crustaceans and shorebird habitat.

5.3.9 MsCIP Comprehensive Plan Projects

The MsCIP was authorized by the Department of Defense Appropriations Act, 2006 (PL 109–148) December 30, 2005. The USACE, as the Federal sponsor, along with the State of Mississippi, as the non-Federal sponsor, developed the MsCIP Comprehensive Plan, which implements a multiple lines-of-defense approach to identify 12 elements, both structural and nonstructural, that address cost-effective solutions for hurricane and storm damage risk reduction, salt water intrusion, shoreline erosion, and preservation of fish and wildlife. Evaluation and selection of these elements is described in the Final MsCIP Comprehensive Plan Report, which includes an Integrated Programmatic EIS, dated June 2009, approved in a ROD dated January 14, 2010. These elements were recommended for construction authorization in the Chief's Report dated September 15, 2009. The MsCIP Comprehensive Plan describes a number of additional components that are not recommended for construction authorization, but for further feasibility level analysis under additional study authority. Additional components would evaluate the potential for restoration of over 30,000 acres of coastal forest, wetlands, beaches, and dunes; restoration of barrier islands, structural measures; and floodproofing of structures on, or acquisition of, over 58,000 tracts within the 100-year floodplain. Because these components are not reasonably foreseeable at this time, they were not included within this analysis. Nonetheless, their impacts would be likely similar in nature to those of elements carried forward in the analysis.

5.3.9.1 Coast-wide Beach and Dune Ecosystem Restoration

Coast-wide Beach and Dune Ecosystem Restoration was evaluated as a structural element in the MsCIP Comprehensive Plan and Integrated Programmatic EIS (USACE, 2009a) under PL 109-148, and proposed for construction among 12 structural and nonstructural elements in the ROD (USACE, 2009c). Due to degradation and destruction in areas of the manmade dune system from Hurricane Katrina, the project seeks to restore more than 30 miles of beach and dune, including 105 acres of dune restoration, along the length of the three coastal counties: Hancock, Harrison, and Jackson, Mississippi (USACE, 2009a). A dune field would be created approximately 50 feet seaward of the existing seawall and about 2 feet above the existing berm with a width of approximately 60 feet. Fencing and planting of native vegetation would also be completed, as previously described for Harrison County. Benefits and adverse impacts from the project would generally be similar to those stated in Section 5.3.8.3 for Harrison County Beaches Ecosystem Restoration and Hurricane Storm Damage Reduction, with aesthetic benefits from placing the dune system against a raised seawall or roadway to mask the appearance of a structural barrier. Adverse impacts would be minor and short-term, such as temporary impacts to air quality and noise during construction.

5.3.9.2 West Ship Island North Shore Restoration

An EA was completed and a FONSI issued for the West Ship Island North Shore Restoration project, which is an important element of the larger MsCIP Barrier Island Restoration Project (USACE, 2010b). The purpose of the project is to supplement the eroded northern shoreline of West Ship Island with sand. The project was scheduled to begin sometime in 2010 and was completed in 2012. The proposed action included the placement of sand along the northern shore of West Ship Island in order to provide stabilization and perpetuation of biological diversity in Mississippi Sound. The placement of sand extends along approximately 62 percent (10,350 feet) of the northern shore with placement widths of 150 to 550 feet in a narrow band of sand along the existing shoreline. Rubble/rip rap in the placement area (1,100 cy) was also removed from the area and used at an existing artificial reef site. Sourcing of fill material was from the Bar Channel portion of the federally authorized Gulfport Harbor widening project and the old Gulfport Harbor Channel abandoned in the 1990s. An incidental benefit of the project is the continued structural protection to Fort Massachusetts, a historic Civil War fort, which is currently eroding with risk of structural foundation damage. A modeling evaluation of impacts to Harrison County beaches describes the longshore sediment transport in this area to be from east to west except in areas with high amounts of vegetation or manmade structures that alter the direction and intensity of the longshore transport (Anchor QEA LLC, 2015). Based on the Anchor QEA model, the Proposed Project Alternative would not result in significant changes in wave heights or breaking wave angles along the adjacent beaches. As a result, it is unlikely the proposed PGEP would affect this restoration project (Anchor QEA LLC, 2015). Additionally the Proposed Project Alternative is located over eleven miles northwest of this restoration project and is not likely to contribute to sand supply issues at Ship and Petit Boi Islands.

5.3.9.3 Deer Island Ecosystem Restoration

Deer Island, located south of Biloxi near the mouth of Biloxi Bay in Harrison County, is owned by the State of Mississippi and is part of the MDMR Coastal Preserves Program. The diverse natural communities of the island, including coastal maritime forests, beach/dune complex, freshwater lakes, and emergent tidal marsh habitat, suffered drastic damages from the 2005 storms that exacerbated their already deteriorating condition. An estimated 300 acres (34 percent) of the island was lost since 1850 due to erosion. Restoration efforts were funded under Section 528 of WRDA (PL 106–541) for breaches at the west end of the island near Grand Bayou and parts of the southern shoreline, and restoration activities were completed in spring 2011. This project complemented existing Federal restoration projects by minimizing the fracturing of biodiversity. Measures included restoration of a portion of the northern and southern shorelines of the island and new stone training dikes to prevent future erosion. These measures provided an additional 400 acres of highly productive estuarine wetlands, restored beach and dune habitat, created hard bottom habitat, reduced coastal erosion, and restored the coastal maritime forest. Project restoration activities were intended to produce an increase of 2,125 average annual functional habitat units and provide incidental hurricane and storm damage risk reduction benefits to the developed mainland Biloxi area (USACE, 2009a–c).

5.3.9.4 Forrest (Forest) Heights Levee Improvement

Located within the City of Gulfport in the lower end of the Turkey Creek floodplain, the Forrest (Forest) Heights community was heavily damaged by the hurricanes of 2005. Storm surge and high winds from Hurricane Katrina, in particular, caused structural damage to the existing levee that protected the community from inland floods. The existing levee was constructed in 1969, prior to Hurricane Camille, with top width of 6 feet and height to elevation 16.5 feet North American Vertical Datum (NAVD) 29. This project element consists of raising approximately 6,500 linear feet of an existing non-Federal levee to a levee crest elevation of 21 feet NAVD 88, inclusion of an existing public park as a water detention area for temporary containment of rainfall during storms, and clearing and snagging of debris in Turkey Creek for approximately 4.5 miles from the mouth of Turkey Creek at Bernard Bayou upstream. Two residential properties were acquired for the project, and adverse impacts to wetlands (loss of 3.62 acres nontidal wetland) would be mitigated through acquisition and restoration of approximately 3 acres. Project benefits include hurricane and storm damage risk reduction at $101,000 to a historically significant minority residential population, maintained cohesiveness of historically significant community, and the preservation of culture and heritage of a predominantly minority residential population (USACE, 2009a–c).

5.3.9.5 Turkey Creek Ecosystem Restoration

This project element consists of the restoration of 689 acres of an undeveloped site of degraded wet-pine savannah habitat located in north Gulfport adjacent to US 49 within the Turkey Creek watershed. Wet pine savannah is a habitat type of high ecological value for native species and is becoming scarcer. Restoration of this area would provide an increase of 1,565 average annual functional habitat units. Proposed measures required to restore hydrology and natural vegetation on the site include filling previously constructed drainage ditches, excavating and removing existing roadbeds and additional fill, and maintaining vegetation by controlled burning and mowing. The project would provide benefits to wetland and aquatic habitats, terrestrial wildlife, aquatic ecology, and threatened and endangered species. Rare, threatened, and endangered birds that are expected to utilize the areas following burning and regrowth include Henslow's sparrow (*Ammodramus henslowii*), Bachman's sparrow (*Peucaea aestivalis*), red-cockaded woodpecker, and Mississippi sandhill crane. This restored ecosystem may also benefit the dusky gopher frog and, in drier areas along ridges, the black pine snake and the gopher tortoise (USACE, 2009a–c).

5.3.10 Coastal Impact Assistant Program Projects

Authorized by Congress in October 2000, the Coastal Impact Assistance Program (CIAP) allocates funds from the Outer Continental Shelf (OCS) Lands Act, as amended (31 USC 6301–6305) to mitigate environmental impacts related to OCS oil and gas production. Seven coastal states, including Mississippi, receive CIAP funds, the distribution of which is based on allocation formulas prescribed by the Act as calculated by NOAA, who also guides the use of authorized funds. Authorized uses are generally related to conservation, restoration, enhancement, or protection of coastal or marine habitats. Original CIAP goals of the State of Mississippi include barrier island restoration/shoreline stabilization; storm drain consolidation and sewer system upgrades to improve water quality; acquisition of ecologically significant and important natural areas; wetland and aquatic habitat improvement in the coastal zone; and education on the importance of coastal natural resources (MDMR, 2012). Mississippi's CIAP Plan 2007–2010 was approved in 2009, and implementation of approved projects is underway through 2016. Tier 1 projects are those proposed for funding from allocations received in fiscal years 2007 through 2010; whereas, Tier 2 projects have been identified if any Tier 1 projects are deemed infeasible but are not proposed for funding. Only Tier 1 projects were deemed reasonably foreseeable and included in the cumulative impacts assessment. In addition to the Tier I projects discussed below, in Section 5.4, and in resource-specific results tables for Harrison County, an additional 63 Tier I State projects were approved, some of which occur within the study area. These state projects have been excluded from the cumulative impacts assessment due to lack of available information. However, project impacts and contribution to cumulative effects are anticipated to be similar to evaluated CIAP projects due to program goals and objectives.

5.3.10.1 Henderson Point Greenway

The Henderson Point Greenway Project acquired 15 acres of land along the eastern shore of St. Louis Bay in Pass Christian, Harrison County, Mississippi, and established a "greenway" path to provide conservation, educational, and recreational opportunities for coastal resource use and management. Slated to start in January 2009 and end in December 2011, the "greenway" project connects the Bay St. Louis shoreline and adjacent maritime habitats within the MDOT right-of-way, and allows for native species restoration where anthropogenic development and coastal erosion result in the loss of shoreline, marsh, and upland habitat. The project served to conserve and protect the coastal landscape and improve the quality of the coastal environment in the St. Louis Bay area.

5.3.10.2 Blakeslee Preserve Habitat Restoration

The Blakeslee Preserve Habitat Restoration Project implemented a habitat restoration and river bank stabilization program for the 1,000-acre Blakeslee Preserve tract on the western bank of the scenic Wolf River in Harrison County, Mississippi. The tract includes 3 miles of river frontage and the adjacent upland area just north of I-10. The Harrison County Board of Supervisors collaborated with the Wolf River Conservation Society and other stakeholders to produce the restoration plan and implement the priorities for riverine and riparian habitat protection.

5.3.10.3 Tchoutacabouffa River Greenway

Initiated in 2009, the 4-year Tchoutacabouffa River Greenway Project proposed to acquire 60 to 100 acres of land within the floodplain of the Tchoutacabouffa River, north and south of the Highway 67/15 Bridge in D'Iberville, Mississippi. Through collaboration with the City of D'Iberville and the Land Trust of Mississippi Coastal Plains, the Harrison County Board of Supervisors planned to acquire riverine habitat at risk of being negatively impacted by development and restore and enhance water quality. Additional objectives included long-term protection of the property from future development and creation of a baseline assessment to identify opportunities for ecological restoration and public use.

5.3.10.4 Biloxi River Greenway

The Biloxi River Greenway Project Phases 1 and 2, was proposed as Harrison County CIAP Project MS.24.704, and is located along the margins of the Biloxi River, north of I-10 in Gulfport, Mississippi. Organized by the Harrison County Board of Supervisors, the objective of the project was to purchase approximately 20 to 35 acres of land within the floodplain of the Biloxi River in order to manage and protect critical habitat and provide educational and public access opportunities compatible with the conservation and protection of the area. The project provides additional green space, prevents impacts from encroachment, provides opportunities for restoration and enhancement, and allows for the establishment of "natural corridors" which help mitigate the impacts of habitat fragmentation and isolation along the river.

5.3.10.5 Harrison County Watershed Assessment and Restoration Projects

The Harrison County Watershed Assessment and Restoration Projects were proposed to counter the negative effects from construction and development that increased sedimentation and runoff in coastal watersheds. Project schedule was proposed to last 4 years, from January 2009 to December 2012. The projects allowed the Harrison County Board of Supervisors to assess impacted areas and develop solutions to reduce stormwater runoff and restore flow characteristics. Areas of concern included the lower end of Bernard Bayou north of I-10, the upper and lower ends of Flat Branch, Brashier Bayou, and Tuxachainie Creek. The objectives included first selecting negatively impacted sites, identifying control measures, and developing plans for the restoration activities to improve overall water quality.

5.3.10.6 Oyster Bayou Restoration

Located in the lower portion of Oyster Bayou between Beauvoir Road and US 90 in Biloxi, Harrison County, Mississippi, the Oyster Bayou Restoration Project was proposed to provide guidance, support, and funds to assist in the restoration and enhancement of Oyster Bayou. Proposed project scheduling included a 4-year project duration and start date in January 2010. Additionally, upstream drainage features west of Beauvoir Road that discharge into Oyster Bay were identified and evaluated in an effort to improve aquatic and terrestrial habitat and provide additional water quality benefits and improvements. The project was organized by the Harrison County Board of Supervisors with collaboration from the City of Biloxi Engineering and Public Works Departments, Beauvoir representatives, and other stakeholders. It further provides additional green space within the watershed, which empties into the Mississippi Sound, to help mitigate the impacts of habitat fragmentation and isolation along its shoreline.

5.3.10.7 Acquisition and Restoration of Flood-Prone Properties for Green Space, Phases 1 and 2

This project was organized by the City of Ocean Springs to acquire and restore flood-prone properties for green space and involved several locations including property on Dewey Avenue, Ruskin Avenue, and Washington Avenue. Proposed project schedule included a start date in January 2009 and end date in December 2011. The project allowed the purchase from willing sellers of approximately 4.4 acres of near-waterfront property that have a history of flooding. Once the properties were acquired, any remaining debris and invasive flora were removed. Additionally, the placement of a perpetual deed restriction on the 4.4-acre property was implemented to prevent future development and ensure natural drainage functions and public green space.

5.4 RESULTS

The sections below describe potential cumulative impacts anticipated as a result of the proposed PGEP combined with past, present, and reasonably foreseeable future actions affecting the study area on the

20 resources/resource groups described in Section 4 of this EIS. A summary of the impacts of the individual projects on each of the resources and the total or cumulative impacts anticipated to occur is presented at the end of each resource. In general, for each resource or resource group, impacts of the Proposed Project Alternative are summarized, after which those of past, present, and foreseeable future projects in the study area and cumulative impacts to the resource or resource group are discussed. Wherever possible, quantitative impact estimates are included and summed across projects, but in many cases, only qualitative information was available. Furthermore, where resource impact information was not available for a project, but impacts could be reasonably anticipated and qualitatively described, it was done so.

5.4.1 Land Use, Recreation, and Aesthetics

The Proposed Project Alternative would have an increase of throughput at the Port of up to 1.7 million TEUs annually by 2060, which would lead to a minimal impact to land uses within the site or adjacent to associated infrastructure. The increase in Port capacity would be expected to have a positive impact on the local economy. It is possible that an increase of throughput may lead to the potential demand for land uses to support ancillary businesses, such as Port and shipping-related support industries, transportation centers, or distribution warehouses. Many of these land uses already exist adjacent to the Port, but some additional increase in these adjacent land uses is likely and is consistent with existing trends.

Although some disruptions of access to the main channel may occur during construction of the proposed 4,000-foot, 18-acre breakwater, these impacts should be temporary and short term. However, once in place, the breakwater would provide increased protection for recreational watercraft within the channel and boat basin. The breakwater could therefore be considered beneficial in the long term. Also, the additional 3,600 feet of West Pier Expansion, approximately 155 acres, would require recreational and commercial (e.g., fishing charter) boat drivers to move farther out into the Gulf to circumvent Port structures, and it would therefore take more time than currently to navigate around the Port.

The Proposed Project Alternative would have a moderate impact on aesthetics due to expansion of Port facilities both in area and height, creation of the proposed breakwater, and larger throughput allowing increased cargo traffic. The expansion to the Port as proposed would significantly lengthen the Port’s reach into the Mississippi Sound (by approximately 3,600 feet), which would add to the existing aesthetic impact. However, as an active and heavily industrial Port facility operating near a centralized urban area, much of the surrounding land uses directly to the north in the City of Gulfport are commercial. Thus, the proposed Project facilities would add incrementally to this impact but the overall contribution would be relatively minor given that the majority of the Project facilities would be adjacent to existing facilities of similar appearance. From a broader perspective, the Proposed Project Alternative may have a slightly larger aesthetic impact due to the increased throughput at the Port. However, any increased activity would remain consistent with the current aesthetic landscape of the Project area, and any additional aesthetic impact should be negligible compared with the existing visual impact of the Port facilities.

Most evaluated projects in the study area have or would result in benefits to land use, recreation, and aesthetics (i.e., acquisition of lands, conversion to publicly accessible conservation easements, conversion of developed areas into flood mitigation easements), especially MsCIP Comprehensive Plan elements and CIAP projects, which target conservation, reduction in storm and hurricane damage risk, and ecosystem restoration. For example, MsCIP Barrier Island Restoration (Ship Island and Cat Island) would produce $466,000 in recreation benefits, and the Harrison County Beaches Ecosystem Restoration and Hurricane Storm Reduction project was projected to provide annual recreation benefits totaling $4,706,546 on average. Industrial projects, such as the Restoration Project, Gulfport Small Craft Harbor Redevelopment, the Proposed Widening of the Pascagoula Lower Sound/Bayou Casotte Channel, FNC Channel Modification with Bend Easing, maintenance dredging and beneficial use, and transportation projects (including MDOT I-310 and the KCS Rail Improvements Project) have and/or will have short-term adverse impacts on land use, recreation, and/or aesthetics during construction or operation, but overall provide more substantial benefits to these resources, as described in Table 5.4-1. Because of their short-term duration, these relatively small adverse impacts would not incrementally accumulate to result in a more substantial effect. These projects are consistent with their surrounding land uses and existing trends, result in negligible adverse impacts, and provide common beneficial impacts to recreation. When considering positive effects from other projects, the present industrial setting of the Port, and the low potential for indirect development as a result of the Proposed Project Alternative, past, present, and reasonably foreseeable future projects will contribute to the continuation and growth of the current industrial land uses at the Port and the associated visual character (in accordance with current trends) that support the continuation of recreational boating and its safety. Only a minor contribution to cumulative impacts to land use and recreation and a moderate contribution to cumulative impacts to aesthetics are anticipated from the proposed Project.

5.4.2 Community Infrastructure and Municipal Services

The Proposed Project Alternative would have a minimal impact on utilities (see Section 4.2). Water supply, wastewater collection and treatment, telephone, fiber optic service, electricity, and possibly natural gas would all need to be expanded at the site to include the additional 155-acre West Pier Expansion, the 14.5-acre East Pier Expansion, and the 9-acre North Harbor fill. Without the PGEP, the study area would likely continue on its present course of economic development, population growth trends, and residential and industrial development patterns, elevating demand for community facilities and services. Taking into consideration available capacity and adjustments in service likely to occur over time, the PGEP is not expected to result in capacity overloads for any utility services. Minor or no temporary impacts would result to local community facilities and services, such as police, fire, security, and health services. No impacts to schools or libraries are anticipated.

Some evaluated projects in the study area target improvements to community infrastructure and municipal services as detailed in Table 5.4-2. Projects include stormwater, drainage, and flood improvements, such as installation of new culverts, improving floodplains, or removal and repair of damaged utilities. Additionally, numerous MsCIP and CIAP projects provide hurricane and storm damage risk reduction. The

Table 5.4-1
Cumulative Impacts to Land Use, Recreation, and Aesthetics

Action	Land Use, Recreation, Aesthetics
Applicant's Proposed Project Alternative	Increased throughput may increase demand for land adjacent to the Port for ancillary business; increases in housing, services, industrial land uses, truck and rail traffic, development of industries; minimal temporary impact to recreational boaters (long-term safety benefits), moderate impact to aesthetics due to expansion of Port facilities both in area and height, and construction of breakwater
Ward Investments Project	Conversion of green space to commercial development
Proposed Widening of the Pascagoula Lower Sound/Bayou Casotte Channel	Land use impacts compatible with surrounding industrial complex; reduced transit restrictions expected to increase the efficiency of Port and channel activities and provide more economic opportunities at the Port; no impacts to the existing marine terminals at the Port from the widening of the west side of the existing channel
Turkey Creek Ecosystem Restoration	Significant opportunity for ecotourism; significant aesthetic improvement; adjacent property values could increase due to greenspace and reduction in flooding
Deer Island Restoration	Restores emergent tidal habitat; increased recreation and ecotourism value; aesthetic improvement; minor reduction in flood, hurricane, and/or storm damage
Forrest Heights Levee Improvement	Land protection benefits; $100,540 damages prevented; no change in recreation benefits or aesthetic values
MsCIP Barrier Island Restoration (Ship Island and Cat Island)	Land protection benefits; $18,866,000 damages prevented; $466,000 recreation benefits; aesthetic improvement
Coast-wide Beach and Dune Restoration	Protects mainland lands and land uses; aesthetic benefits by masking seawall and roadway; Functional Habitat Index increase of 736
CIAP Projects	Benefits from land acquisition/conservation easements/preservation, public access, and restoration; consequent benefits to aesthetics
FNC Channel Modification with Bend Easing	Increase in housing, services, industrial land uses, truck and rail traffic, development of industries; minimal impacts to recreation; moderate impact on aesthetics
MDOT's I-310 Project	Short-term adverse aesthetic impact due to construction. Long-term aesthetic and recreational benefits to include modern design, sidewalks and landscaping; seeks to enhance level of transportation service and accessibility to entire project area while improving mobility of goods, services, and people; does not preclude expansion of existing land uses, nor hinder any projected future uses
KCS Rail Improvements Project	No impacts anticipated
Courthouse Road Flood Damage Reduction	N/A
Shearwater Bridge Storm Damage Reduction	Improved aesthetic quality
Long Beach Canals	Aesthetic improvements in vicinity of canals; protects mainland lands and land uses

Table 5.4-1, cont'd

Action	Land Use, Recreation, Aesthetics
Harrison County Beaches Ecosystem Restoration and Hurricane Storm Damage Reduction	Temporary, localized displacement of beach visitors; long-term aesthetic benefits; recreation benefits annually totaling $4,706,546 on average
Port of Gulfport Restoration: 24-acre fill	Consistent with existing land uses; compatible with local zoning plans/ordinances and no adverse effects on urban setting; landscaping provides a vegetative screen of the Port facilities which enhances the public's view from US 90 and Island View Casino; added new green space and expanded greenway along US 90; elevation of project site to +14 feet msl changed viewshed, but the overall impact to visual quality minimal since it is an industrial setting; no negative impacts to recreational fishing and boating
Port of Gulfport Restoration: 60-acre fill	Consistent with existing land use at Port; no change to visual quality along Mississippi Sound shoreline; loss of open water habitat did not negatively affect recreational fishing and boating opportunities
Gulfport Small Craft Harbor Redevelopment	Benefits to land use, recreation, and aesthetics
Maintenance Dredging	Temporary impacts to aesthetics but not significant
Gulfport Harbor Navigation Channel Widening Project	Temporary localized disruption of commercial and recreational fishing in immediate vicinity of dredging activities
Qualitative Summary of Cumulative Impacts	Economic development, including increased throughput at Port, may increase demand for land adjacent to facilities for ancillary business; protection of these land uses provided by MsCIP projects; anticipated increases in housing, services, industrial land uses, truck, ship, and rail traffic, development of industries; minimal temporary impact to recreational boaters due to increased traffic and dredging but with long-term safety benefits; impacts to aesthetics both beneficial and adverse but consistent with industrial setting

Table 5.4-2
Cumulative Impacts to Community Infrastructure and Municipal Services

Action	Community Infrastructure and Municipal Services
Applicant's Proposed Project Alternative	Minimal impact to community infrastructure as some utilities may need relocation, and increased throughput may increase utility usage or demand for public services; minor temporary impacts, or no impacts to public safety and health services; no impact on schools and libraries; no impact on aviation
Ward Investments Project	N/A; however, may increase demand on public utilities; MDEQ coordination underway for stormwater requirements
Proposed Widening of the Pascagoula Lower Sound/Bayou Casotte Channel	No short- or long-term impacts to utilities or parks, recreational areas, or other community facilities
Turkey Creek Ecosystem Restoration	N/A
Deer Island Restoration	Provides incidental hurricane and storm damage risk reduction benefits to public facilities and services in the developed mainland Biloxi area
Forrest Heights Levee Improvement	Protects infrastructure; significant improvement to public facilities by reduction in flooding
MsCIP Barrier Island Restoration (Ship Island and Cat Island)	Reduced likelihood of interruption of public services
Coast-wide Beach and Dune Restoration	Minor protection of public facilities
CIAP Projects	Benefits from stormwater drainage and flood reduction improvement activities
FNC Channel Modification with Bend Easing	No major short- or long-term impacts on utility service levels; minor temporary impacts, or no impacts to public safety and health services; no impact on schools and libraries; minimal impact on aviation
MDOT's I-310 Project	Displacement of 60 residences and 27 commercial/industrial businesses; increased access to the community; reduced traffic congestion and enhanced economic development; improvements to local roads, sidewalks, and bicycle routes; improved emergency response time; safer and better access for public
KCS Rail Improvements Project	No impacts anticipated
Courthouse Road Flood Damage Reduction	Benefits from repair of damaged culverts and channel braces that maintain the integrity of the road and channel structure
Shearwater Bridge Storm Damage Reduction	Repair to damaged infrastructure yield benefits through public use of the roadway during normal circumstances and during evacuations
Long Beach Canals	Benefits through prevention of damage from more frequent, small to moderate storm events and protection of the city's main street, utilities, and utility lines that parallel the proposed seawall, as well as city and county emergency and public services during such events
Harrison County Beaches Ecosystem Restoration and Hurricane Storm Damage Reduction	Benefit from secondary storm damage reduction through absorption of surge and wave energy; potential protection of major thoroughfare and hurricane evacuation route (US 90)

Table 5.4-2, cont'd

Action	Community Infrastructure and Municipal Services
Port of Gulfport Restoration: 24-acre fill	No impacts anticipated on educational and health care facilities; no impacts anticipated on existing social services; minimal impacts on solid waste; slight increase in wastewater; MDEQ stormwater treatment requirements met; no significant increase in water usage and no impact to the overall water supply; no increase in demand on police and fire services in the community and no decrease to overall public safety at the Port
Port of Gulfport Restoration: 60-acre fill	No significant increase in solid waste generation; no adverse impacts to health care facilities or system; no increase in wastewater generation; no significant increase in water use or impact to supply; increase in police patrol area but no decrease to public safety; no increase in emergency medical response actions
Gulfport Small Craft Harbor Redevelopment	N/A; however, benefits to community infrastructure and municipal services, including improvements to Bert Jones Park and Coast Transit Authority Rest Station
Maintenance Dredging	N/A
Gulfport Harbor Navigation Channel Widening Project	No impact on public safety
Qualitative Summary of Cumulative Impacts	Negligible contribution of adverse impacts by PGEP to cumulative effects; benefits to resource provided by MsCIP and CIAP projects, as well as Gulfport Small Craft Harbor Redevelopment; added cumulative demand on resource by development projects and economic growth; adverse displacement of 60 residences and 27 commercial/industrial businesses by MDOT I-310 offset to some indeterminate degree by reduced traffic congestion, enhanced economic development, infrastructure improvement, and enhanced emergency response time and transit safety

MDOT I-310 project would result in the relocation of 60 residences and 27 commercial institutions; however, emergency response would improve, traffic congestion would be alleviated, and travel safety would improve. Although water supply, wastewater collection and treatment, telephone, fiber optic service, electricity, and possibly natural gas would all need to be expanded with the Proposed Project Alternative, these efforts are considered an inconsequential alteration to existing services. Nonetheless, the PGEP and future projects would contribute to the demand on local facilities and services. Infrastructure and community services of the City of Gulfport are presently adequate and the gradual increased demand over time would allow the city to sufficiently address projected future growth. Therefore, the Proposed Project Alternative is not expected to contribute to negative cumulative impacts to community infrastructure and municipal services. Furthermore, cumulative impacts from evaluated past, present, and reasonably foreseeable projects are anticipated to have a net positive effect on community infrastructure and municipal services, as detailed in Table 5.4-2.

5.4.3 Socioeconomic Resources

The evaluated past, present, and reasonably foreseeable projects are compatible with the economic goals of the Port and would result in increased employment and stimulation of the local economy. Temporary employment opportunities would be created during construction and/or operation of these projects and the PGEP. Jobs would also be created during the operational phase of the Port expansion. It is likely that most of the construction jobs would be filled locally with minimal anticipated in migration of skilled workers, and the Proposed Project Alternative would not affect study area population or social characteristics. Wage earnings are also anticipated to increase, benefiting personal income levels in the study area. Tourism surrounding the Port, largely centered on the adjacent Island View Casino, is not anticipated to be significantly affected by the Proposed Project Alternative. Additional public finances would be generated by the taxes associated with the Port expansion and from the economic benefits of the Project. The Proposed Project Alternative could also induce indirect growth in the form of support business from Port expansion and increased throughput.

No EJ impacts are known to be associated with any of the past or current channel improvement or maintenance dredging projects. Initial analysis indicated that a disproportionate impact to minority populations is not anticipated as a result of the proposed Project. Potential impacts that would be associated with the PGEP include noise, traffic, and air quality. However, impacts from noise and traffic would not disproportionately impact EJ communities and there are no significant impacts anticipated to air quality. The noise study indicated impacts to areas throughout Gulfport and Harrison County and provides measures to mitigate and reduce the potential impact to sensitive receptors (see Sections 4.6, 5.6 and 6.4). The traffic study included information from the GRPC 2035 traffic forecasts and indicated impacts to the LOS at numerous roadways (see Sections 4.4 and 5.4 and Appendix I). The potential impacts would occur for both the No-Action Alternative and the Proposed Project Alternative; however, the impacts would not be disproportionate to EJ communities.

In response to public and agency comment during the scoping process, a CIA (Appendix H) was used to evaluate how the PGEP would affect the community and its quality of life, and specifically addresses the EJ communities within the area. The CIA found no disproportionate impacts on minority, low-income, or Limited English Proficiency (LEP) populations from the PGEP, and found that the Proposed Project Alternative is the most beneficial from an EJ perspective through provision of increased jobs, revenue, and other associated economic benefits. Additional studies on roadway traffic and noise were prepared for this EIS. As part of the roadway traffic analysis prepared for this EIS (Appendix I), both the No-Action Alternative and the Proposed Project Alternative would generate impacts to traffic in census tract block groups with a higher minority percentage than the city population. However, the majority of potential impacts to traffic for the Proposed Project Alternative will not be felt immediately due to the expected gradual increase in TEU throughput. As a result, there would be sufficient time to address the potential issues associated with the No-Action and Proposed Project Alternatives; these issues would therefore be mitigated before being considered impacts. Additionally, the noise and vibrational technical report prepared for the EIS (Appendix J) concluded that noise from construction and dredging activities would not disproportionately or exclusively impact any EJ communities.

Past, present, and reasonably foreseeable future projects in the study area have not and would not generally result in adverse impacts to socioeconomic resources based on review of publicly available information, as shown in Table 5.4-3. Many projects have contributed to or will contribute to the job base in the study area benefiting employment and to some degree increasing housing demand. The study area currently exhibits high construction-sector unemployment. Job creation for the PGEP and most current and reasonably foreseeable projects evaluated is predominantly in the construction sector, which could have an increased cumulative effect on the local economy dependent on project construction timing. Based on projected growth in employment from current and reasonably foreseeable future jobs, relative to the existing housing vacancy rate for the Gulfport-Biloxi region, it is anticipated that these projects would have a minor beneficial cumulative effect on housing occupancy rates and market conditions.

Evaluated projects generally have not had or will not have a disproportionate impact on minority or low income populations in the study area based on publicly available information. For MDOT's I-310 project, the original EA and subsequent reevaluations and public involvement activities would be required to address EJ issues. Concern has been raised by the historic Turkey Creek community over direct and indirect project effects on the community via reduced flood storage, changes in drainage patterns, water quality degradation, destruction or degradation of natural forest communities, increased potential flooding for downstream neighborhoods, adverse effects from removal of tree buffers (e.g., storm winds, noise, air quality, etc.), stormwater runoff effects, loss of wetlands and floodplains, and facilitation of the spread of invasive or noxious plant species (MDOT and FHWA, 2008). The Forrest Heights Levee Improvement project benefits a predominantly minority residential population (Forrest Heights) by supporting community integrity through positive impacts to numerous resources, such as flood protection with the levee improvements and the reduction in hurricane and storm damage risk with inclusion of a water detention area (USACE, 2009a–c). At this time, potential for EJ impacts has not been evaluated for several

Table 5.4-3
Cumulative Impacts to Socioeconomic Resources

Action	Socioeconomic Resources/Environmental Justice
Applicant's Proposed Project Alternative	Increase in economic growth and employment short-term during construction and long-term at the Port; increase in total wages and personal income; impacts to minority populations not anticipated; expect 8,089 FTEs by 2060 and total wages of $655,138,101 by 2060
Ward Investments Project	N/A; however, may increase local job base with commercial and retail businesses
Proposed Widening of the Pascagoula Lower Sound/Bayou Casotte Channel	Short-term economic benefits during construction from job creation; long-term economic benefits during operation for the vessel operators and/or marine terminal; no EJ issues
Turkey Creek Ecosystem Restoration	Increase of $15,237,000 in additional sales volume; increase of $3,225,297 in additional local income; increase of 97 new jobs; no change in taxes; benefits to quality of life in Forrest Heights, a culturally significant minority community; no EJ issues; restricted development in this area of Gulfport; moderate reduction of risk of loss of life within Turkey Creek watershed
Deer Island Restoration	Increase of $35,614,320 in additional sales volume; increase of $7,379,544 in additional local income; increase of 220 new jobs; some local tax revenue gain due to recreation and construction; some positive impact on community cohesion; minor impacts on tax values and community growth due to added recreational and ecotourism resource; no EJ issues
Forrest Heights Levee Improvement	Maintains integrity of historical minority community; increase in additional sales volume; increase of $6,440,117 in additional local income; increase of 193 new jobs; significant decrease in risks to life, health, and safety; no change in tax or property values; no EJ issues
MsCIP Barrier Island Restoration (Ship Island and Cat Island)	Increase of $798,984,000 in additional sales volume; 4,920 new jobs; significant decrease in risks to life, health, and safety; increased community cohesion; moderate increase tax values; moderate stabilization of community structure; moderate increase property values; reduced risk of displacement of businesses; no EJ issues
Coast-wide Beach and Dune Restoration	Increase of $33,413,200 in additional sales volume; increase of $7,306,957 in additional local income; increase of 208 new jobs; small reduction in risk during storm events; no negative impacts on community cohesion; no impacts anticipated on community growth; minor impact in preservation of property values; small reduction of risk of displacement of businesses immediately adjacent to the shoreline; no EJ issues
CIAP Projects	N/A
FNC Channel Modification with Bend Easing	Would provide economic growth and employment benefits
MDOT's I-310 Project	Short- and long-term economic benefits; no foreseeable long-term negative impacts on employment, income, or business activity in local or regional economy; minimal to no adverse impacts; increased highway safety; no anticipated disproportionate impacts on minority or low income populations in Gulfport area, though concern raised by Turkey Creek community

Table 5.4-3, cont'd

Action	Socioeconomic Resources/Environmental Justice
KCS Rail Improvements Project	No impacts anticipated
Courthouse Road Flood Damage Reduction	N/A
Shearwater Bridge Storm Damage Reduction	N/A
Long Beach Canals	N/A
Harrison County Beaches Ecosystem Restoration and Hurricane Storm Damage Reduction	N/A
Port of Gulfport Restoration: 24-acre fill	No EJ issues; no relocations; no changes to the demographic character of the area in the vicinity of the Port; increased revenue for tenants and reduced storm damage risk
Port of Gulfport Restoration: 60-acre fill	No EJ issues; no change to demographic character of region; no displacement of residents or residential property; no increased demand on social services; reduced storm damage risk
Gulfport Small Craft Harbor Redevelopment	No impacts on public health; no adverse impacts on socioeconomic resources or EJ issues
Maintenance Dredging	No EJ issues; no change in demographics, housing, or public services
Gulfport Harbor Navigation Channel Widening Project	Long-term economic benefit from increased shipping and jobs creation; no impacts on EJ
Qualitative Summary of Cumulative Impacts	Positive contribution by PGEP to socioeconomics; Port expansion projects, channel improvements, transportation, restoration, and other evaluated projects are expected to increase the amount of cargo managed through the Port facilities, provide economic benefits, and promote the economic growth of the study area. Potential impacts to traffic would need to be addressed through mitigation; however, a significant amount of traffic would be caused by future forecasted background traffic; no disproportionate adverse impacts to minority or low-income populations are anticipated

reasonably foreseeable future projects, such as the DPC. It is anticipated that Federal regulations, under Executive Order 12898 will limit EJ impacts from these projects where a Federal nexus occurs. Overall, the Proposed Project Alternative is anticipated to result in beneficial effects that would contribute positively to cumulative impacts from other past, present, and reasonably foreseeable projects on the socioeconomics of the study area.

5.4.4 Roadway and Rail Traffic

For the purposes of the cumulative assessment, a separate analysis was conducted to consider changes in traffic associated with the proposed PGEP and potential impacts to the roadways if MDOT's I-310 Project were in place. Impacts of evaluated actions are displayed at the end of this section (see Table 5.4-8). To present a worst-case scenario, the traffic analysis did not take into account projects in the GRPC long-range plan, such as State Route (SR) 601 North or urban street projects, which could potentially relieve future congestion in certain areas. However, two projects in the GRPC long-range transportation plan for which funding has been confirmed are included in the traffic analysis for LOS. The two projects included affect 28th Street and are expected to be completed by 2020. The first adds a two-way left-turn lane and minor intersection improvements from Canal Road to 30th Avenue. The second project widens 28th Street to four lanes with a two-way left-turn lane from 30th Avenue to US 49. The complete analysis was conducted for a baseline year of 2012 and forecasted to 2020, 2040, and 2060 for the Proposed Project Alternative considered in the EIS and is presented in Appendix I. The discussion focuses on impacts for, the Applicant's Proposed Project Alternative, which represents the highest throughput scenario and thus the potentially worst-case scenario.

The assessment for roadway traffic began with a comparison of ADT demand (all vehicles) with and without I-310 for potentially affected roadways (Table 5.4-4). Levels of freight flow, trip generation, and external distribution patterns for the traffic scenarios that include I-310 are identical to those without I-310, except that traffic routes change to take advantage of the new highway. Traffic patterns accessing the Port change to take advantage of direct access to I-310. With I-310 built, future patterns of use for Port access roads by trucks indicate an increase of 10 percent to 30th Avenue, 83 percent to I-310, zero percent to Copa Boulevard, and 7 percent to Captain James McManus Drive. Future patterns of use for Port access roads by passenger cars and single unit trucks are 23 percent to 30th Avenue, 50 percent to I-310, 11 percent to Copa Boulevard, and 12 percent to Captain James McManus Drive (Appendix I). In 2020, I-310 produces modest reductions in traffic on US 49 of 3,000 to 4,000 vehicles per day. However, in 2060, the reductions on US 49 range from 6,000 to 8,000 vehicles per day. I-310 also reduces traffic on the 30th Avenue corridor by 4,000 to 5,000 vehicles per day under the 2020 scenario and by 8,000 to 10,000 vehicles per day under the 2060 scenario.

Table 5.4-4
Average Daily Traffic by Corridor With and Without Interstate (I)-310

Year	Alternative		I-10	I-310	US 49	US 90	Canal Road	25th Street	28th Street	30th Avenue
2012	No-Action	No I-310	55,830	-	33,240	18,820	10,650	14,240	11,260	10,920
2020	No-Action	No I-310	63,220	-	37,640	21,320	12,100	16,140	12,780	12,440
2020	Proposed Project	No I-310	63,470		38,450	21,640	12,480	16,180	13,060	13,120
2060	No-Action	No I-310	100,750		61,550	34,520	20,310	25,700	21,080	21,600
2060	Proposed Project		101,450		63,940	35,460	21,590	25,840	22,020	23,800
2020	No-Action	With I-310	60,060	10,870	34,150	21,200	9,970	13,860	11,800	8,380
2020	Proposed Project	With I-310	60,270	11,560	34,530	21,390	9,990	13,920	11,800	8,480
2060	No-Action	With I-310	96,410	19,050	55,550	34,420	15,990	22,300	18,840	13,660
2060	Proposed Project	With I-310	97,050	21,160	56,750	35,070	16,050	22,500	18,840	13,980

The key conclusion from the forecasts is as follows:

- Majority of changes in traffic are due to non-Project related local traffic growth from 2012 to 2020 and to 2060.
- Without I-310, variations in traffic due to the Proposed Project Alternative in 2060 range between 140 and 2,390 vehicles per day among most roads when comparing the No-Action Alternative to the Proposed Project Alternative. With I-310, traffic increases on other corridors in 2060 are reduced to the range of zero to 1,200 vehicles per day. Only I-310 draws a larger amount of new Port generated traffic at nearly 2,000 additional vehicles per day for the Proposed Project Alternative versus the No-Action Alternative in 2060.
- Table 5.4-5 presents the ADTT demand levels on each of the seven corridors in the study area affected by Port traffic demand with and without I-310. With I-310, the maximum reduction on US 49 is 1,140 trucks per day in 2060 under the Proposed Project Alternative.

Potential traffic impacts were assessed using LOS, as described in Section 4.4. As discussed in Section 3.4.4, there are six LOS ratings that are depicted by the letters A through F. A description of what these qualitative ratings mean is described below:

- LOS A is the best LOS, and represents uncongested traffic with light traffic volumes;
- LOS B represents reasonably free flow, where maneuverability is slightly restricted;
- LOS C is normally the worst LOS tolerated in rural areas before improvements are warranted;
- LOS D is normally the worst tolerated in urban areas;
- LOS E represents traffic volumes near capacity; and
- LOS F is the worst and represents congested traffic conditions due to traffic volumes that exceed the road’s capacity.

Table 5.4-5
Average Daily Truck Traffic by Corridor and
Port Growth Scenario With and Without Interstate (I)-310

Year	Alternative		I-10	I-310	US 49	US 90	Canal Road	25th Street	28th Street	30th Avenue
2012	No-Action	No I-310	6,840		1,860	800	600	1,140	540	500
2020	No-Action	No I-310	7,720		2,030	880	680	1,300	620	540
2020	Proposed Project	No I-310	7,850		2,340	1,000	680	1,300	620	620
2060	No-Action	No I-310	12,400		3,600	1,560	1,080	2,040	980	940
2060	Proposed Project	No I-310	12,700		4,280	1,840	1,080	2,040	980	1,100
2020	No-Action	With I-310	7,430	810	1,810	750	460	960	660	340
2020	Proposed Project	With I-310	7,510	1,010	1,880	770	460	980	660	360
2060	No-Action	With I-310	11,970	1,520	2,980	1,210	730	1,550	1,050	560
2060	Proposed Project	With I-310	12,150	1,970	3,140	1,230	730	1,570	1,050	620

The City of Gulfport, GRPC, and MDOT do not have thresholds requiring mitigation in order to address the impacts of new traffic generated by development. Therefore, in order to evaluate whether traffic generated by the Proposed Project Alternative is significant compared to the No-Action Alternative, LOS D or better was identified as the desirable level of service, as LOS D is widely considered the worst acceptable LOS tolerated in urban areas and road segments operating at LOS E or F would be considered unacceptable and an impact. In this analysis, the No-Action Alternative is the baseline for comparison, as it represents the level of growth or changes in traffic expected to occur if the proposed PGEP is not implemented. Thus, only additional auto and truck traffic associated with the Proposed Project Alternative is assessed as a potential impact.

The Project study area includes a total of 40.2 directional miles of major streets and highways when I-310 is added. The number of directional miles of each major corridor in the study area operating at LOS E or F for the No-Action Alternative and the Proposed Project Alternative in 2012, 2020, and 2060, both AM and PM peak hours and with and without I-310, is presented in Table 5.4-6. For example, on 28th Street in 2020, 0.3 directional mile out of 6.8 directional miles operate at LOS E or F during the AM and PM peak hours for both the No-Action Alternative and the Proposed Project Alternative. This indicates that the loss of LOS for these directional miles is a result of background traffic growth expected to occur with or without the Proposed Project Alternative.

Table 5.4-6
Directional Road Miles at Level of Service (LOS) E or F
During AM and PM Peak Hours With and Without Interstate (I)-310

Year	Alternative		I-10	I-310	US 49	US 90	Canal Road	25th Street	28th Street	30th Avenue	Impact in Study Area
AM Peak Hours											
2012	No-Action	Existing	–	–	–	–	–	–	–	–	–
2020	No-Action	No I-310	–	–	–	–	–	–	0.3	–	0.3
2020	Proposed Project	No I-310	–	–	–	–	–	–	0.3	–	0.3
2060	No-Action	No I-310	–	–	–	–	1.3	–	2.5	–	3.8
2060	Proposed Project	No I-310	–	–	0.5	–	1.3	–	2.5	–	4.3
2020	No-Action	With I-310	–	–	–	–	–	–	–	–	–
2020	Proposed Project	With I-310	–	–	–	–	–	–	–	–	–
2060	No-Action	With I-310	–	–	0.5	–	–	–	1.1	–	1.6
2060	Proposed Project	With I-310	–	–	0.5	–	–	–	1.1	–	1.6
PM Peak Hours											
2012	No-Action	Existing	–	–	–	–	–	–	0.3	–	0.3
2020	No-Action	No I-310	–	–	–	–	–	–	0.3	–	0.3
2020	Proposed Project	No I-310	–	–	–	–	–	–	0.3	–	0.3
2060	No-Action	No I-310	–	–	0.5	–	1.3	–	2.7	–	4.6
2060	Proposed Project	No I-310	–	–	0.7	–	1.3	–	2.7	0.2	5.0
2020	No-Action	With I-310	–	–	–	–	–	–	0.3	–	0.3
2020	Proposed Project	With I-310	–	–	–	–	–	–	0.3	–	0.3
2060	No-Action	With I-310	–	–	0.5	–	–	0.4	1.4	–	2.3
2060	Proposed Project	With I-310	–	–	0.5	–	–	0.4	1.4	–	2.3

Note that for the Proposed Project Alternative, during the AM peak hours in 2060, construction of I-310 reduces the number of directional miles operating at LOS E or F from 4.3 to 1.6. During the PM peak hours in 2060, I-310 reduces the number of directional miles operating at LOS E or F from 5.0 to 2.3 under the Proposed Project Alternative (see Table 5.4-6). The length of roadways affected by Port traffic does not change from existing 2012 conditions to the year 2020 for the Proposed Project Alternative with I-310, but without I-310 there is an impact on 28th Street in AM peak hours under both the No-Action Alternative and the Proposed Project Alternative. This indicates that it is background traffic causing the impact rather than traffic changes associated with the Proposed Project Alternative. In 2060, both AM and PM peak hours show a difference in total impact between the No-Action Alternative and the Proposed Project Alternative without I-310 (see Section 4.4.5 for details). Also note that for AM peak hour traffic in 2060, there are two changes when I-310 is added. The first is on US 49 where no delay is seen for the No-Action Alternative without I-310, but 0.5 mile of US 49 is impacted when I-310 is added. This is likely because changes in traffic patterns caused by the addition of I-310. Because this change is seen in the No-Action Alternative, the change is not a result of the Proposed Project Alternative. The second change to note is that in 2060 without I-310, 1.3 miles of Canal Road are impacted, but when I-310 is added this impact is alleviated. Because this is seen for both the No-Action Alternative and the Proposed Project Alternative, the change is due to I-310 and is not associated with the Proposed Project Alternative. For PM peak hour traffic in 2060, the same elimination of impact is seen for Canal Road when I-310 is added. However, for US 49, the 0.7-mile impact seen for the Proposed Project Alternative is reduced to 0.5 mile of impact when I-310 is added. These results indicate that Port-related traffic associated with the Proposed Project Alternative would be somewhat alleviated by including I-310. However, changes are slight, as impacts are primarily caused by background traffic changes.

Specific segments of each corridor affected in 2020 and 2060 and potential causes for LOS of E or F (with I-310) are provided in Table 5.4-7. Results indicate that for 2020, only 28th Street is impacted, and the impact does not change due to inclusion of PGEP traffic. Additionally, these results indicate that background traffic growth in 2020 would not cause an LOS worse than D.

In 2060, 2.3 miles of the 40.2 miles of directional roadway considered within the study area are considered deficient with I-310 in place. Although this is less than the 4.6 miles for the No-Action Alternative and 5.0 miles for the Proposed Project Alternative without I-310, there would still be an impact. Results indicate that even with I-310 in place, background traffic growth and growth associated with the No-Action Alternative increase demands a section of US 49, a section of 25th Street, and a longer section of 28th Street experience LOS worse than D. Therefore, although there are still impacted areas with I-310, the impacts are reduced by adding the road into the system.

As part of the traffic analysis prepared for this EIS (Appendix I), freight rail forecasts were also generated for the Port. Forecasts were based on anticipated throughput, average weekday vehicle trips, and took into account recent changes on the track following the KCS Rail Improvements Project. Under the No-Action Alternative, the number of train trips between (to or from) the Port and the Gulfport Rail Yard would be expected to expand to 28 per day by 2060; nearly 18 train trips per day are anticipated north of the Gulfport Rail Yard by 2060. Under the Proposed Project Alternative, up to 47 train trips per day are expected between (to or from) the Port and the Gulfport Rail Yard by 2060; nearly 29 train trips per day are anticipated north of the Gulfport Rail Yard by 2060.

Table 5.4-7
Roadway Corridor Level of Service (LOS) Deficiencies After Building
Interstate (I)-310 – 2020 and 2060 No-Action Alternative and Proposed Project Alternative

	2020		2060	
Corridor Name	LOS Impacts	Potential Cause of LOS E–F	LOS Impacts	Potential Cause of LOS E–F
I-10 Freeway	All LOS D or better	No Issues	All LOS D or better	No issues
US 49 (25th Avenue)	All LOS D or better	No Issues	PM LOS F, northbound approaching 28th Street and southbound approaching 25th Street	Reduction in US 49 traffic lanes from 6 to 4 lanes at 28th Street
US 90 (Beach Blvd.)	All LOS D or better	No Issues	All LOS D or better	No issues
Canal Road	All LOS D or better	No Issues	All LOS D or better	No issues
25th Street	All LOS D or better	No Issues	PM LOS F, eastbound approaching US 49	Intersection Capacity
25th Street	All LOS D or better	No Issues	PM LOS F, westbound approaching I-310 NB ramp	Intersection Capacity
28th Street	PM LOS E, eastbound approaching Canal Road	Intersection Capacity	AM LOS F, eastbound approaching Canal Road	Intersection Capacity
28th Street	All LOS D or better	No Issues	AM LOS F, eastbound approaching 30th Avenue	Intersection Capacity
30th Avenue	All LOS D or better	No Issues	All LOS D or better	No issues

Table 5.4-8
Cumulative Impacts to Roadway and Rail Traffic

Action	Roadway and Rail Traffic
Applicant’s Proposed Project Alternative	LOS impacts on two roadways and at four intersections by 2060 primarily caused by background traffic growth, traffic signal timing, and intersection capacity; rail crossing delays approximately 2.5 minutes with up to 47 train trips per day
Ward Investments Project	N/A; facility would include connector roads
Proposed Widening of the Pascagoula Lower Sound/Bayou Casotte Channel	No impacts
Turkey Creek Ecosystem Restoration	N/A
Deer Island Restoration	N/A
Forrest Heights Levee Improvement	N/A
MsCIP Barrier Island Restoration (Ship Island and Cat Island)	No impacts
Coast-wide Beach and Dune Restoration	No impacts
CIAP Projects	N/A
FNC Channel Modification with Bend Easing	Impacts to intersections could occur due to traffic signal timing as well as intersection capacity. Railroad crossing delays could be up to 47 train trips per day.
MDOT’s I-310 Project	Road would alleviate Port traffic and provide increased traffic efficiency; improved Port access and increased truck efficiency; reduced Port-generated traffic on the local roads and streets; minimal negative impact on roadway traffic during construction
KCS Rail Improvements Project	Benefits expected from rail improvements; shorter delays at most grade crossings and trains intermittent in frequency
Courthouse Road Flood Damage Reduction	N/A
Shearwater Bridge Storm Damage Reduction	Benefits expected from road improvements
Long Beach Canals	N/A
Harrison County Beaches Ecosystem Restoration and Hurricane Storm Damage Reduction	N/A
Port of Gulfport Restoration: 24-acre fill	All fill material transported by barge. Traffic hazards and nuisances associated with the trucks occurred in the Tombigbee River area during mobilization of equipment: only minor impacts due to rural industrial nature of the area.

Table 5.4-8, cont'd

Action	Roadway and Rail Traffic
Port of Gulfport Restoration: 60-acre fill	Increase in local motor vehicle traffic during construction: 800 truck trips per work day (400 each way). A 1% increase over the 2010 Annual Average Daily Traffic (AADT) on US 49 near I-10 and a 2% increase over current AADT on US 49 near downtown; temporary increase in truck traffic on 30th Avenue and 28th Street during construction; expected substantial increase in truck traffic post-construction; approximately 50% of the containers projected to move by rail when operational, which results in four train trips per day in 2020, increasing to 29 train trips per day when project reaches full capacity in 2060
Gulfport Small Craft Harbor Redevelopment	Localized minor temporary increase in construction traffic volume; benefits to public transportation services from construction of the Coast Transit Authority Rest Station
Maintenance Dredging	N/A
Gulfport Harbor Navigation Channel Widening Project	Long-term increase in ship, vehicular, and rail traffic in the vicinity of the Port; channel widening would facilitate vessel traffic and reduce delays by allowing two-way traffic patterns in the channel
Qualitative Summary of Cumulative Impacts	PGEP would contribute adverse impacts to the cumulative effects on roadway and rail traffic; adverse impacts would be offset to some degree from the KCS Rail Improvements Project and should MDOT's I-310 be completed; cumulative growth in traffic anticipated

5.4.5 Air Quality

Air emissions of major contaminants (i.e., VOCs, NO_X, CO, SO_X, PM_{10}, and $PM_{2.5}$) from Port expansion construction activities and placement of dredged material, as well as emissions from vehicular traffic and maintenance dredging were estimated for the No-Action Alternative and the Proposed Project Alternative based on the construction and equipment schedule and estimated increased truck, rail, and ship traffic rates. The impact of emissions is analyzed relative to the existing (2011) inventory for Harrison County, except O_3. Minor, short-term, and localized impacts on air quality caused by temporary increases in air pollution are anticipated from construction activities due to the combustion of fuel for dredging and support vessel activities and landside construction equipment and employee vehicles. Due to the limited duration of the expansion activities, emissions from construction activities are not expected to adversely impact the long-term air quality in the area. Additionally, maintenance dredging and disposal activities would be infrequent and therefore, would only have temporary, short-term impacts on air quality from the combustion of fossil fuels in the dredging and supporting vessels and equipment.

Operation of the expanded Port facilities is anticipated to result in an increase in throughput up to approximately 1.7 million TEUs annually by 2060. An increase in throughput and ancillary operations would result in an increase in air contaminant emissions due to increased truck, rail, employee vehicle, and ship traffic resulting from both the growth of existing business and new business at the Port. Nonetheless, the No-Action Alternative and Proposed Project Alternative would result in a relatively small increase in air contaminant emissions above those from existing sources in Harrison County, and as such, is expected to result in a corresponding increase in impacts to air quality in the immediate vicinity of the Project area, diminishing as emissions are dispersed over the county.

Air quality impacts from construction of past, present, and reasonably foreseeable future actions, where information is available, are similarly expected to be localized and short term with no long-term effects and have not or will not cause exceedance of NAAQS, as shown in Table 5.4-9. Air emissions from combustion of fuels in vehicle engines (e.g., truck, rail, and ship) are regulated to standards discussed in Section 3.5. Maintenance dredging and disposal and other construction activities associated with the Proposed Project Alternative would result in infrequent, temporary, short-term increases in emissions of air contaminants that would locally affect air quality.

Air dispersion modeling was completed for CO, NO_2, PM_{10} and $PM_{2.5}$ to provide an estimate of projected near-road and near-rail impacts on ambient air quality from line haul locomotives and container trucks operating off-property between the Port of Gulfport and Creosote Road, just south of I-10. The air dispersion modeling estimated that concentrations of CO, NO_2, PM_{10}, and $PM_{2.5}$ from the No-Action Alternative and the Proposed Project Alternative would not exceed the NAAQS. The threshold significance criteria for air quality cumulative impacts would be an exceedance of the NAAQS caused directly or indirectly by the Proposed Project Alternative in conjunction with other listed projects.

The dispersion modeling completed for this analysis includes projected near-road and near-rail impacts of the Proposed Project Alternative and does not include concentrations from past, existing, or reasonably foreseeable future actions. Long-term increases in air contaminant emissions that could contribute to localized air pollutant concentrations would be expected from the several other projects listed in Table 5.4-9. The larger projects evaluated in the study area do not individually exceed NAAQS, and the use of BMPs would minimize air quality and dust impacts, where practicable. General growth of the region, including commercial, residential, and industrial sectors and associated populations increases, would presumably result in greater vehicle traffic and consequently, a potentially significant increase in vehicular emissions in the future. Although the Proposed Project Alternative is not anticipated to cause an exceedance in the NAAQS, the proposed action would contribute to adverse long-term impacts to air quality that, although not independently significant, would in combination with other past, present, and reasonably foreseeable future projects and the anticipated growth of the region contribute to negative cumulative impacts on Harrison County's air quality and air quality throughout the airshed. The other projects listed in Table 5.4-9 do not have air dispersion modeling data available, and therefore, the cumulative impacts of these projects cannot be quantified.

Past and existing concentrations of criteria pollutants are monitored by MDEQ; however, only O_3 and $PM_{2.5}$ data are monitored and available for Harrison County. O_3 is not emitted, but rather formed in the air through a photochemical reaction of NO_x and VOCs, and concentrations cannot be estimated using a dispersion model on a project level. The maximum modeled concentration of $PM_{2.5}$ was for the Proposed Project Alternative in 2020 and was 0.8 μg/m^3 for the Annual Average and 2.3 μg/m^3 for the 24-Hour Average. When added to the 2015 monitoring data for Harrison County, the cumulative concentrations total 9.6 μg/m^3 for the Annual Average and 21.3 μg/m^3 for the 24-Hour Average; neither exceed the NAAQS of 12 μg/m^3 for the Annual Average and 35μg/m^3 for the 24-Hour Average.

Cumulative effects on air quality are not anticipated to result in an exceedance of NAAQS for Harrison County over the 50-year project duration. Should past, present, and reasonably foreseeable future projects result in the exceedance of NAAQS during this time, requirements under the CAA (e.g., SIP, Transportation Conformity Rule, General Conformity Rule) would prevent Federal agencies from funding, permitting, constructing, or licensing any project that does not conform to an applicable SIP. State air quality permitting requirements would restrict activities that contribute additional adverse impacts on air quality and promulgate a plan formulation to improve air quality. Harrison County is currently designated as attainment or unclassifiable with the NAAQS for all regulated pollutants. Should the attainment status of Harrison County change prior to PGEP construction or during operations, MSPA would need to coordinate with MDEQ regarding a General Conformity Determination.

Table 5.4-9
Cumulative Impacts to Air Quality

Action	Air Quality
Applicant's Proposed Project Alternative	Temporary one-time increases in air pollution, including VOCs, NO_X, CO, SO_X, PM_{10}, $PM_{2.5}$, and HAPs would occur during construction; permanent increase in air contaminant emissions due to increased truck, rail, employee vehicle and ship traffic and related Port operations from growth of existing business and new business at the Port
Ward Investments Project	N/A; may result in local and temporary decrease in air quality during construction
Proposed Widening of the Pascagoula Lower Sound/Bayou Casotte Channel	Minor, short-term increase in air emissions during construction; however, no long-term air quality impacts
Turkey Creek Ecosystem Restoration	Temporary and localized intermittent adverse impacts during restoration activities from combustion of fuel and prescribed fire; NAAQS not violated; air emission de minimis (negligible)
Deer Island Restoration	Temporary and localized minor effects from fuel combustion during construction; no long-term impacts anticipated; NAAQS not violated; impacts de minimis (negligible)
Forrest Heights Levee Improvement	Temporary and localized minor effects from fuel combustion during construction; no long-term impacts anticipated; NAAQS not violated; impacts de minimis (negligible)
MsCIP Barrier Island Restoration (Ship Island and Cat Island)	Temporary and localized adverse impacts during restoration activities from combustion of fuel; NAAQS not violated; impacts de minimis (negligible)
Coast-wide Beach and Dune Restoration	Temporary and localized adverse impacts during restoration activities from combustion of fuel; NAAQS not violated; impacts de minimis (negligible)
CIAP Projects	N/A; however, anticipated temporary, localized adverse impacts during construction for some activities
FNC Channel Modification with Bend Easing	Impacts associated with increased operations at the Port and periodic maintenance dredging of the FNC; increased emissions with increased vessel throughput over time. No significant long-term effect; air quality in immediate vicinity of dredging equipment slightly affected for a short period of time by fuel combustion and engine exhausts; NAAQS not violated; no impacts anticipated on attainment status
MDOT's I-310 Project	Temporary and localized negative air quality impacts during construction activities; no long-term adverse effect on air quality and NAAQS not exceeded
KCS Rail Improvements Project	Increases in freight transport by rail activity, increases in emissions of NO_x, PM_{10}, SO_2 expected, roughly no change in VOCs, net decrease in CO_2 emissions; no impacts anticipated
Courthouse Road Flood Damage Reduction	N/A
Shearwater Bridge Storm Damage Reduction	N/A

Table 5.4-9, cont'd

Action	Air Quality
Long Beach Canals	N/A
Harrison County Beaches Ecosystem Restoration and Hurricane Storm Damage Reduction	N/A
Port of Gulfport Restoration: 24-acre fill	NAAQS not exceeded; impacts minimized by BMPs; slight decrease in air quality impacts due to fill materials transported by barge rather than by truck; potential minor impacts to local air quality during construction; potential fugitive dust during grading; no negative impact on ambient air quality
Port of Gulfport Restoration: 60-acre fill	Minor adverse impact on air quality primarily from loading, unloading, and moving containers and increased truck traffic during construction and during operation; NAAQS not exceeded; impacts minimized by BMPs; potential minor impacts to local air quality during construction; potential fugitive dust during grading; no negative impact on ambient air quality
Gulfport Small Craft Harbor Redevelopment	Temporary adverse impacts during construction
Maintenance Dredging	No significant long-term effect; air quality in immediate vicinity of equipment slightly affected for a short period of time by fuel combustion and engine exhausts; NAAQS not violated; no impacts anticipated on attainment status
Gulfport Harbor Navigation Channel Widening Project	Temporary negligible increase in air pollutants during dredging and disposal activities
Qualitative Summary of Cumulative Impacts	PGEP would contribute long-term adverse impacts that increase the cumulative effect of evaluated projects on air quality; most impacts to air quality from evaluated projects will be temporary and localized and are not anticipated to contribute to significant adverse cumulative effects on air quality; nonetheless, increased cumulative emissions of air pollutants is anticipated

N/A = Not Applicable

Climate change impacts are by nature, cumulative and long term. An individual project cannot generate enough GHG emissions to influence global climate change. The No-Action and Proposed Project Alternatives participate in this potential impact by their incremental contribution combined with the cumulative increase of all other global sources of GHGs, which when taken together create changes in the climate. Consideration of a proposed action'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 GHGs. As such, cumulative effects of GHG emissions is analyzed in Section 4.5.

5.4.6 Noise

Increases in noise levels due to construction and operation are expected under the Proposed Project Alternative. Construction-generated noise from machinery and dredging activities would be temporary, could be restricted to daylight hours, would not be noticeable in communities, and should not generate complaints at noise-sensitive sites in closest proximity to the proposed Project. Operation noise levels are expected to increase by approximately 3 dBA over baseline levels; however, this increase in noise levels is considered relatively insignificant. Based on the distance from the operational noise sources to the nearest sensitive receptor and considering typical ambient noise levels in communities, the Project-related increase in operational noise should not be noticeable and should not result in noise complaints. Dredging and associated noise generated by dredging vessels and dredged material placement activities for the Proposed Project Alternative and for the other projects described in Sections 5.2 and 5.3 has been and will be temporary in nature. Thus, adverse noise-related impacts on marine wildlife, such as displacement, will be short-term. A summary of impacts due to construction noise from pile driving and dredging on aquatic species are discussed in Section 5.4.18 and are discussed in detail in Appendices M and N. Traffic noise analysis, as detailed in Section 4.6, evaluated and forecasted passenger cars, service trucks, and freight truck roadway traffic in 2012 and 2060 from Landon Road north of I-10 to US 90 on the south, and from US 49 on the east to Canal Road and 30th Avenue on the west. The Proposed Project Alternative would result in minor increases in traffic volume that would induce a negligible increase in traffic noise imperceptible to the human ear. A rail traffic noise study was conducted to address potential noise concerns from increased rail traffic along the 67.5-mile KCS Railway for all alternatives (see Appendix J). As described in Section 4.6.1, the Proposed Project Alternative would result in increases in train-generated noise along the KCS rail line when compared to the No-Action Alternative. The implementation of the Proposed Project Alternative would result in an additional four receptors per mile that would be moderately impacted, and two receptors per mile that would be severely impacted compared to the No-Action Alternative. The Proposed Project Alternative would result in an increase in both severe and moderate impacts to noise-sensitive receptors. The majority of these impacts would occur in the Hattiesburg and Gulfport areas due to the combination of high population densities and numerous at-grade rail crossings (with their associated horn noise). Adoption of the SSMs outlined in Section 4.6.1 will help to mitigate the anticipated severe and moderate impacts to the noise-sensitive receptors in the study area from implementation of the Proposed Project Alternative.

Most of the past, present, and reasonably foreseeable future projects evaluated herein are located within a predominantly industrial area, and the additional noise that would be produced by these projects and the Proposed Project Alternative would be consistent with the surrounding environment. Those projects resulting in new industrial facilities and/or operations would include noise attenuation features and would operate within local noise control standards. Long-term increase in noise due to traffic increases has resulted from the Restoration Project and the KCS Rail Improvements Project, and is anticipated for the MDOT I-310 Project and the Proposed Project Alternative, as described in the Table 5.4-10. Underwater noise generated during dredging operations may cause marine species to temporarily avoid the general area, but normal use of the habitats would return once dredging operations are terminated. The Proposed Project Alternative in combination with the Restoration Project, the KCS Rail Improvements Project, the FNC Channel Modification with Bend Easing, and the MDOT I-310 Project will have cumulative adverse impacts on noise within the study area, albeit to an unknown extent, but with potential for incremental effects.

Table 5.4-10
Cumulative Impacts to Noise

Action	Noise
Applicant's Proposed Project Alternative	Short-term increases during construction; long-term increases with Port operations (about 3 dBA) and increased truck and rail traffic
Ward Investments Project	N/A; may result in local and temporary increase in noise during construction
Proposed Widening of the Pascagoula Lower Sound/Bayou Casotte Channel	Minor and temporary impacts during construction
Turkey Creek Ecosystem Restoration	Temporary increase during construction phase with no significant effects; no long-term effects
Deer Island Restoration	Temporary increase during construction phase with no significant effects; no long-term effects
Forrest Heights Levee Improvement	Temporary increase during construction phase with no significant effects; no long-term effects
MsCIP Barrier Island Restoration (Ship Island and Cat Island)	Temporary increase during construction phase with no significant effects; no long-term effects
Coast-wide Beach and Dune Restoration	Temporary increase during construction phase with no significant effects; no long-term effects
CIAP Projects	N/A; however, anticipated temporary, localized adverse impacts during construction for some activities
FNC Channel Modification with Bend Easing	Short-term increases during construction; long-term increases with Port operations (about 3 dBA) and increased truck and rail traffic
MDOT's I-310 Project	Temporary and localized noise impacts during construction; long-term increase in noise levels at occupied facilities due to traffic; expected traffic noise impact from connector road at 4 occupied facilities and from interchange at 15 occupied facilities; mitigation not feasible under MDOT policy (minimum 5-db reduction); noise-reduction measures incorporated into contract plans and specifications to reduce construction noise impacts
KCS Rail Improvements Project	Noise and vibration effects of the project are localized to areas immediately adjacent to these locations where locomotive horns are used; effects of airborne noise are not considered significant
Courthouse Road Flood Damage Reduction	Short-term and minor adverse construction impacts
Shearwater Bridge Storm Damage Reduction	Temporary and minor adverse noise impacts from construction equipment
Long Beach Canals	Temporary and minor adverse noise impacts from construction equipment
Harrison County Beaches Ecosystem Restoration and Hurricane Storm Damage Reduction	Temporary and minor adverse noise impacts from construction equipment

Table 5.4-10, cont'd

Action	Noise
Port of Gulfport Restoration: 24-acre fill	Reduced noise impacts due to barge hauled fill material; No adverse impacts; increased intermittent noise during construction consistent with surroundings
Port of Gulfport Restoration: 60-acre fill	Temporary increase in noise levels during the 2 to 3 year construction schedule from additional truck traffic; primary noise source post-construction from additional truck traffic: 508 truck trips per day in 2020 and 1,235 trucks trips per day when the project reaches full capacity in 2060; trucks will use the controlled access MDOT I-310, which will eliminate noise on local streets; truck traffic from the proposed project is not expected to have a major noise impact along the MDOT I-310; increased rail, ship, and private vehicle traffic cause minor increase in noise levels
Gulfport Small Craft Harbor Redevelopment	Temporary increase in noise levels during construction
Maintenance Dredging	Temporary increase during operations from dredge or other job-related equipment; no significant impact
Gulfport Harbor Navigation Channel Widening Project	Potential short-term minor disruption of roosting behavior in birds on the western end of Ship Island and foraging behavior of marine organisms in the vicinity of dredging operations; any impacts limited to duration of dredging operations
Qualitative Summary of Cumulative Impacts	PGEP would add long-term increases in noise, primarily from rail traffic along the KCS rail line, that would contribute to cumulative effects; The Restoration Project and KCS Rail Improvements Project have contributed to localized noise in vicinity of Port due to traffic increases, as is anticipated for the MDOT I-310 Project; noise impacts of other projects would be localized and short-term, and are not anticipated to contribute to cumulative noise effects

5.4.7 Physiography, Topography, Bathymetry, and Coastal Geological Processes

The Proposed Project Alternative would alter 282 acres of estuarine mud and sand bottom due to dredging, material placement, and Port expansion. Construction of the Port expansion will require dredging of approximately 7.68 mcy of material, with subsequent maintenance dredging of 486,000 cy to 1.3 mcy every year. Local physiography and topography within the Project footprint (described in Section 2.8.2) would undergo a change from an elevation increase of up to +25 feet msl and from an increase of total footprint from about 369 to 650.5 acres.

Negligible impacts to coastal geological processes would result from material placement and Port expansion. Coastal geological processes in the Mississippi Sound have been analyzed and are discussed further in Section 4.8, including regional sediment transport studies by Rosati et al. (2009), Byrnes et al. (2012, 2013), Morang et al. (2012), and others.

A DMMP has been prepared for the PGEP (Appendix F) to evaluate the placement options for the dredged material from the expansion of the piers, construction of the Turning Basin, and maintenance dredging events. As part of the DMMP, a shoaling analysis was performed of the proposed Turning Basin to estimate the dredging frequency of the proposed Turning Basin as part of the proposed Project. The DMMP also includes a discussion on the effects of the proposed breakwater on anticipated shoaling in the Project area. The purpose of the analysis and modeling was to determine the potential shoaling rates for the Turning Basin based on the quantity and frequency of past dredging events from the Anchorage Basin and Sound Channel. As a result of the analysis, the estimated total shoaling of the proposed Turning Basin ranges from 6.3 to 9.5 mcy. The MsCIP sediment transport analysis includes a comprehensive evaluation of the current coastal conditions and processes (Rosati et al., 2009). For the site-specific areas of the PGEP, short- and long-term shoaling rates were developed from the USACE FNC condition surveys and dredging history cards to supplement the information presented in the MsCIP sediment transport analysis.

The Turning Basin Expansion could potentially impact sediment net transport direction; however, any impact is expected to be small scale and not have a major effect on the general westward net transport direction. The Project design includes the addition of a breakwater along the eastern border of the FNC with an opening to allow shallow draft navigation access to the Bert Jones Yacht Basin. Because the proposed breakwater may influence shoaling rates, the DMMP includes an analysis of the breakwater design. According to computer modeling, the installation of the breakwater would provide protection from shoreline erosion and improve storm surge protection (Baker, 2011). Localized sedimentation impacts would occur from construction, but those impacts would be short term. The Anchor QEA LLC modeling evaluation of impacts to Harrison County beaches describes the longshore sediment transport in the area to be from east to west (Anchor QEA LLC, 2015); however, the Port is currently large enough to block longshore sediment transport (MDEQ, 2002). Based on the Anchor QEA model, the proposed Project would not result in significant changes in wave heights or breaking wave angles along the adjacent beaches. The Proposed Project Alternative would cause minimal changes in the bathymetry of the region, as discussed above. Elevated vessel traffic could potentially yield increased channel sedimentation and could impact the frequency of maintenance dredging if unexpectedly high shoaling rates occur under the Proposed Project Alternative. Placement of new work dredged material in a BU site, such as the proposed BMC, would result in potentially reduced erosion rates along parts of the Mississippi Sound shoreline and would abate subsidence in the BMC (see Appendix F).

While localized impacts to these resources would occur within the Project area, these alterations would be expected to have negligible impacts on the regional physiography, topography, and bathymetry of the submerged and subaerial portions of the study area and coastal geological processes (Anchor QEA LLC, 2017, Appendix F). Beneficial use of dredged material at the BMC (if approved and authorized for use) would result in positive effects. As such, the Proposed Project Alternative is not expected to contribute to negative cumulative impacts on these resources.

Moreover, evaluated projects have not and are not anticipated to individually or cumulatively have significant adverse impacts on physiography, topography, bathymetry, and coastal geologic processes in the study area, as shown in Table 5.4-11. Historic dredging of navigation channels in and to the east of the study area resulted in a deficiency in the sediment load and sediment transport. Storm surge damage from hurricanes Camille and Katrina, and similar storm events, in combination with anthropogenic activities, have perpetuated current trends of shoreline and barrier island loss (Morton, 2007). Evaluated projects would maintain the altered sediment transport process. Mississippi Sound barrier islands provide critical storm surge and hurricane damage protection and important wildlife habitat. Cumulative benefits to these resources would result and have resulted from restoration, stabilization, and storm damage protection projects, including designated Tier I CIAP and MsCIP projects, and continued beneficial use of dredged material, as discussed in Section 5.3 and detailed in Table 5.4-11 below.

Allocating dredged material for beneficial use not only reduces the level of traditional placement disruptions, but when properly engineered, has environmental, economic, and social benefits. Described above, the BU site identified as a candidate for placement of the new work dredged material as part of the Proposed Project Alternative is the BMC. The ecological function of this habitat variety (i.e., islands, bays, and open-water lakes) serves to support aquatic life in the region. Improvement of this area through beneficial use would serve to enhance the fisheries of the surrounding areas, thus providing support to commercial and recreational fishermen. Restoration of the area would also provide additional storm protection of the coastal region of Louisiana and Hancock County (Anchor QEA LLC, 2017, Appendix F). Many of the evaluated projects in conjunction with the Proposed Project Alternative seek to restore physiography, topography, bathymetry, and coastal processes in the Mississippi Sound and adjacent mainland to historic conditions (e.g., pre-Katrina) and maintain/protect their condition. Together, such actions would result in cumulative benefits to these resources.

Table 5.4-11
Cumulative Impacts to Physiography, Topography, Bathymetry, and Coastal Geologic Processes

Action	Physiography, Topography, Bathymetry	Coastal Geologic Processes
Applicant's Proposed Project Alternative	Local changes would have negligible impacts on the regional physiography, topography, and bathymetry (material placement and port expansion, including impact to approximately 282 acres of Mississippi Sound bay bottom); removal and placement of approximately 7.68 mcy in new work and 486,000 cy to 1.3 mcy every year in maintenance; benefit from potential placement of approximately 7.11 mcy of new work material in the BMC (if approved and authorized for use), which would replenish sediments, provide storm protection, and reduce erosion rates	Short-term increase in sediment rework and suspension; potential impact on sediment net transport direction; placement of dredged material at the proposed BU site would potentially reduce erosion rates along Mississippi Sound shoreline and abate subsidence; potential impact on sediment net transport direction; positive impact of breakwater including shoreline protection from erosion and storm surge; breakwater minor impact on hydrodynamics
Ward Investments Project	Would fill 432 acres of wetlands or floodplain	N/A
Proposed Widening of the Pascagoula Lower Sound/Bayou Casotte Channel	Bathymetry in the dredging corridor will be permanently changed from a current depth of 9 to 13 feet to –42 feet MLLW, consistent with the authorized depth of the existing channel; changes would not impact areas outside of the physical disturbance and permanent alteration would be minor; temporary increase in elevation at dredge material placement sites	No significant impacts anticipated to overall coastal processes in the Mississippi Sound; placement of dredged sediments in the LZA site may have a positive effect by placing more sand into the littoral drift along Horn Island, thus slightly reducing erosion; sediments not appropriate for the LZA site are to be placed in the Pascagoula ODMDS
Turkey Creek Ecosystem Restoration	N/A	No impacts
Deer Island Restoration	N/A	No impacts
Forrest Heights Levee Improvement	N/A	N/A
MsCIP Barrier Island Restoration (Ship Island and Cat Island)	N/A	N/A
Coast-wide Beach and Dune Restoration	Benefits through construction of a 30-mile long dune field 50 feet seaward of the existing seawall and about 2 feet above the existing berm with a width of approximately 60 feet	Benefit to dune-building processes through installation of dunes and sand fencing
CIAP Projects	N/A; however, anticipated return to near historic conditions for restoration activities	N/A; however, anticipated benefits from restoration activities

Table 5.4-11, cont'd

Action	Physiography, Topography, Bathymetry	Coastal Geologic Processes
FNC Channel Modification with Bend Easing	Local changes during construction would have negligible impact; beneficial use of dredged material in the BMC would replenish sediments, provide storm protection, and reduce erosion rates	Short-term increase in sediment rework and suspension; potential impact on sediment net transport direction; placement of dredged material would potentially reduce erosion rates along Mississippi Sound shoreline and abate subsidence in BMC; potential impact on sediment net transport direction; widening and deepening the FNC and increase in vessel traffic may cause localized sediment deposits and increases in channel sedimentation which may increase the frequency of maintenance dredging; bend easing improvements would cause minimal changes in bathymetry
MDOT's I-310 Project	N/A	N/A
KCS Rail Improvements Project	N/A	N/A
Courthouse Road Flood Damage Reduction	N/A	N/A
Shearwater Bridge Storm Damage Reduction	N/A	N/A
Long Beach Canals	No changes to water surface elevations along Turkey Creek anticipated; potential rise in water level downstream at Bayou Portage; 263,000 cy of sediment removal	N/A
Harrison County Beaches Ecosystem Restoration and Hurricane Storm Damage Reduction	Development of 26 miles of dune system with 5-foot height, crest-width 10 feet, and 1:3 side slopes; placement of approximately 681,000 cy of sand sourced from established borrow areas a minimum of 1,500 feet offshore	Long-term benefit through restoration of dune system; beach-dune system provides increased overall stability of beach ecosystem through provision of sand reserves that act as a buffer to resist erosive events; facilitation of dune building through sand fence installation
Port of Gulfport Restoration: 24-acre fill	Fill of 24 acres of Mississippi Sound open-bay bottom and to elevation +14 feet (NAVD 88) raise West Pier	N/A
Port of Gulfport Restoration: 60-acre fill	Fill of 60 acres of Mississippi Sound open-bay bottom with placement of fill material from elevation +3.0 feet (NAVD 88) up to elevation +14 feet (NAVD 88)	N/A
Gulfport Small Craft Harbor Redevelopment	Dredging of approximately 38,000 cy of sand and silt within 50 feet of existing harbor bulkheads; dredged material placed in upland dewatering site on western portion of Jones Park, then transported by truck and disposed in Harrison County Development Commission Upland Disposal Area C-1	N/A

Table 5.4-11, cont'd

Action	Physiography, Topography, Bathymetry	Coastal Geologic Processes
Maintenance Dredging	Evaluated maintenance dredging projects have not and are not anticipated to individually or cumulatively have significant adverse impacts on physiography, topography, bathymetry, and coastal geologic processes in the study area	Negligible anticipated impacts from maintenance dredging activities on coastal geologic processes; continued effects on sediment transport as past
Gulfport Harbor Navigation Channel Widening Project	Permanent change in bathymetry at location of channel widening; short-term change to bathymetry in dredged material disposal areas	N/A
Qualitative Summary of Cumulative Impacts	Local changes of evaluated projects would have negligible impacts on the regional physiography, topography, and bathymetry (due to dredging, channel modifications, material placement, and port expansion)	Because of the relatively small portion of the Mississippi Sound to be impacted by evaluated projects, consequences to tides and currents would be negligible; existing alterations to sediment transport patterns would be continued and offset to some unknown degree from beneficial use and benefits from CIAP and MsCIP projects

5.4.8 Energy and Mineral Resources

Potential impacts to energy resources resulting from implementation of the Proposed Project Alternative are not anticipated. A review of state published oil and gas records shows that one well is located on the Port's property (Mississippi State Oil and Gas Board, 2013). As noted in Section 3.9, no producing wells occur in Harrison County, and therefore, the well located on the Port's property is assumed to be nonproducing. No substantial impacts to mineral resources are anticipated beyond normal construction operations. Consumptive use of construction products, such as sand, gravel, and cement, would constitute an irretrievable commitment of these mineral resources. Shoreline protection components of this Project would have a long-term positive effect on the availability of sand and gravel, due to decreased shoreline erosion anticipated by the installation of the eastern breakwater. Incorporation of suitable materials dredged during Project construction for expansion of the Port facilities, to the extent practicable, would reduce the Project's overall consumption of construction sand and gravel required for the construction process. Additional fill material would also be obtained from permitted sites located in coastal counties of Mississippi or from sources along the Tennessee-Tombigbee River.

Similar to the Proposed Project Alternative, past, present, and reasonably foreseeable future actions in the study area are also likely to have limited impacts to energy and mineral resources, as shown in Table 5.4-12. Construction projects and operations (e.g., dredging) have and will continue to require combustion of fossil fuels and use of energy resources, as well as the incorporation of mineral resources in construction. In particular, MDOT's I-310 Project will require considerable expenditure of energy resources, but the completed project will provide a more efficient road network and reduced congestion, which will result in long-term conservation of energy. Demand on energy and mineral resources is also anticipated to increase over the project duration due to the general growth of Harrison County and the region. The Proposed Project Alternative would not contribute negative cumulative impacts to energy resources and insubstantial adverse impacts to mineral resources, which would be offset to some degree by the reuse of suitable dredged materials and shoreline protection benefits. Cumulative impacts to energy and mineral resources would result from increased demand and consumption of these resources; however, the effects are anticipated to be minor.

Table 5.4-12
Cumulative Impacts to Energy and Mineral Resources

Action	Energy and Mineral Resources
Applicant's Proposed Project Alternative	No impact to energy production; no substantial impacts to mineral resources beyond normal construction operations; shoreline protection components would have a long-term positive effect on the availability of gravel, due to decreased shoreline erosion from construction of the breakwater
Ward Investments Project	N/A
Proposed Widening of the Pascagoula Lower Sound/Bayou Casotte Channel	N/A
Turkey Creek Ecosystem Restoration	N/A
Deer Island Restoration	N/A
Forrest Heights Levee Improvement	N/A
MsCIP Barrier Island Restoration (Ship Island and Cat Island)	N/A
Coast-wide Beach and Dune Restoration	N/A
CIAP Projects	N/A
FNC Channel Modification with Bend Easing	N/A
MDOT's I-310 Project	No anticipated adverse impact; construction will require considerable expenditure of energy resources, but completed project provides more efficient road network and reduced congestion, with long-term conservation of energy
KCS Rail Improvements Project	N/A
Courthouse Road Flood Damage Reduction	N/A
Shearwater Bridge Storm Damage Reduction	N/A
Long Beach Canals	N/A

Table 5.4-12, cont'd

Action	Energy and Mineral Resources
Harrison County Beaches Ecosystem Restoration and Hurricane Storm Damage Reduction	N/A
Port of Gulfport Restoration: 24-acre fill	No substantial increase in energy consumption; energy consumption primarily fossil fuels used to operate construction equipment and trucks transporting containers to and from the Port post-construction
Port of Gulfport Restoration: 60-acre fill	No significant increase in energy consumption; energy consumption primarily fossil fuels used to operate construction equipment and trucks transporting containers to and from the Port post-construction
Gulfport Small Craft Harbor Redevelopment	N/A
Maintenance Dredging	N/A
Gulfport Harbor Navigation Channel Widening Project	N/A
Qualitative Summary of Cumulative Impacts	PGEP and evaluated projects would result in a negligible cumulative increase in the consumption of energy and mineral resources

5.4.9 Soils

No impacts to prime and unique farmlands are anticipated from the Proposed Project Alternative (see Section 4.10), and as such, the Proposed Project Alternative would not contribute negative cumulative impacts to the study area's soil resources, including prime and unique farmlands. Some evaluated projects in the study area include floodplain restoration and may result in the restoration of hydric soils, but would have no impact to prime or unique farmlands based on publicly available information (Table 5.4-13). In Harrison County, 11 mapping units are designated prime farmland, 2 units are prime farmland if drained, and 7 units are farmland of statewide importance. Current and future growth and development, such as MDOT's I-310 Project, could have an adverse impact on soil resources, albeit to an unknown extent. MsCIP and CIAP projects that promote shoreline protection, conservation and restoration of soil resources, such as the Coast-Wide Beach and Dune Restoration, Deer Island Ecosystem Restoration, and Turkey Creek Ecosystem Restoration, have had and will continue to have cumulative benefits to soil resources in the study area.

Table 5.4-13
Cumulative Impacts to Soils

Action	Soils
Applicant's Proposed Project Alternative	No impacts to prime or unique farmland soils anticipated
Ward Investments Project	Would fill 432 acres of wetlands or floodplains using 950,000 cy of native soil, clean sandy clay, concrete, and other materials for the development of streets, utility lines, various buildings, a rail yard, parking areas, and stormwater management facilities which would modify existing soils
Proposed Widening of the Pascagoula Lower Sound/Bayou Casotte Channel	No significant adverse impacts to geology placement of approximately 3.4 mcy of new work sediments at LZA site and/or ODMDS, including about 125,000 cy of littoral sands for beneficial use
Turkey Creek Ecosystem Restoration	Restores historical soils
Deer Island Restoration	Restores historical soils
Forrest Heights Levee Improvement	Adds fill material to existing levee
MsCIP Barrier Island Restoration (Ship Island and Cat Island)	No impacts
Coast-wide Beach and Dune Restoration	Restores historical soils; sand obtained from borrow areas historically used located offshore of the mainland or from upland commercial sources
CIAP Projects	N/A; however, anticipated improvements to soils and soil conservation from land acquisition, conservation easements, preservation, restoration, and flood improvement activities
FNC Channel Modification with Bend Easing	No impacts to prime or unique farmland soils anticipated
MDOT's I-310 Project	Existing soil conditions affected temporarily by construction activities (site preparation); usable excavated soils reused as on-site fill, where practical; erosion and sedimentation controls
KCS Rail Improvements Project	No impacts anticipated
Courthouse Road Flood Damage Reduction	N/A
Shearwater Bridge Storm Damage Reduction	N/A
Long Beach Canals	N/A
Harrison County Beaches Ecosystem Restoration and Hurricane Storm Damage Reduction	N/A
Port of Gulfport Restoration: 24-acre fill	No impacts on prime or unique farmlands; the MSPA has a Storm Water Pollution Prevention Plan (SWPPP) for construction; once construction is complete, an updated SWPPP will be submitted as required; MSPA managed erosion, sedimentation, and stormwater runoff in accordance with MDEQ stormwater requirements

Table 5.4-13, cont'd

Action	Soils
Port of Gulfport Restoration: 60-acre fill	No impacts to prime or unique farmland; the MSPA has a SWPPP for construction; once construction is complete, an updated SWPPP will be submitted as required; MSPA managed erosion, sedimentation, and stormwater runoff in accordance with MDEQ stormwater requirements
Gulfport Small Craft Harbor Redevelopment	No impacts on geology; temporary impacts on soils during construction
Maintenance Dredging	Relocation of material from dredged channel to previously authorized open-water disposal areas; no significant impacts
Gulfport Harbor Navigation Channel Widening Project	Short-term localized impacts to sediments at disposal sites; potential beneficial impacts from disposal as beach nourishment
Qualitative Summary of Cumulative Impacts	No cumulative adverse impacts to soil resources are anticipated; restoration projects (CIAP and MsCIP) and beneficial use of dredged material could have cumulative beneficial effects on soil resources by enhancing historic sediment transport processes, reducing erosion, and protecting soils; adverse impact from projects involving fill of wetlands would be mitigated to limit cumulative impact on hydric soil resources

5.4.10 Groundwater and Surface Water Hydrology

Construction and operation activities associated with the Proposed Project Alternative are not expected to result in impacts to groundwater and surface water hydrology (see Section 4.11). No groundwater withdrawals are anticipated for the Project. In addition, no apparent private, public, or industrial water wells registered with the State of Mississippi would be destroyed and/or affected from the Proposed Project Alternative based on their proximity and screened depths below surface grade. Proposed construction would not penetrate the coastal lowlands (citronelle) aquifer system, and no impacts would be anticipated. Possible impacts to shallow groundwater on land exist from the potential release of petroleum products during construction and hazardous material spills from shipping interests. The use of BMPs that meet local, state, and Federal requirements would be developed and implemented as part of the Spill Response Plan for the Project to address potential hazardous material spills. In addition, in the event that the Port ships hazardous materials as cargo, packages for hazardous material must conform to standards set by Research and Special Programs Administration of the DOT and IMO.

Seven of described past, present, and reasonably foreseeable future actions in the study area target floodplain, wetland, and/or stream restoration as well as bank stabilization and are likely to have beneficial impacts to groundwater recharge capabilities and surface water hydrology; however, these benefits are not quantifiable at this time (Table 5.4-14). Adverse cumulative impacts to groundwater and surface water hydrology have and will continue to result from projects, such as the DPC, that propose to discharge fill into wetlands.

Since Hurricane Katrina made landfall on August 29, 2005, the USACE permitted actions in the study area, which roughly correlates to HUC 03170009 (Coastal Mississippi) include authorizing 548.78 acres of wetland habitat to be filled, 4,534,500.51 cu ft of dredged material to be removed, 2.09 acres of dredge fill, 1,135.39 acres of dredged material removal, and construction of 11,210.50 feet of linear structures and 1,234.45 acres of nonlinear structures within waters of the U.S. (see Table 5.4-14). Undoubtedly, these projects have and will affect groundwater and surface water hydrology at the local scale and potentially regionally, although this impact is indeterminable. Effects would be offset through mitigation where projects require such action; however, projects with smaller impacts that do not require mitigation would contribute incrementally greater adverse cumulative effects on this resource in the study area.

Table 5.4-14
Cumulative Impacts to Groundwater and Surface Water Hydrology

Action	Groundwater and Surface Water Hydrology
Applicant's Proposed Project Alternative	No impacts during construction and operation activities; possible impacts to shallow groundwater exist from the potential release of petroleum products during construction and hazardous material spills from shipping
Ward Investments Project	Proposal to fill 432 acres of wetlands or floodplains, adversely affecting hydrology
Proposed Widening of the Pascagoula Lower Sound/Bayou Casotte Channel	No significant adverse impacts to the hydrodynamics of the Mississippi Sound, including tides, currents, and salinity patterns; placement of beneficial use material will help restore littoral drift
Turkey Creek Ecosystem Restoration	Wetland restoration improves filtration; no impacts anticipated on water circulation
Deer Island Restoration	Wetland restoration improves filtration; no anticipated effect on water circulation
Forrest Heights Levee Improvement	Improvement in Turkey Creek flow
MsCIP Barrier Island Restoration (Ship Island and Cat Island)	No adverse impacts; preservation of Mississippi Sound circulation
Coast-wide Beach and Dune Restoration	No impacts
CIAP Projects	Benefits from bank stabilization, restoration, and flood reduction activities
FNC Channel Modification with Bend Easing	No impacts during construction and operation activities; possible impacts to shallow groundwater exist from the potential release of petroleum products during construction and hazardous material spills from shipping; however modification of the FNC would reduce the risk of spills during operation activities
MDOT's I-310 Project	Project designed to result in negligible changes to the base floodplain
KCS Rail Improvements Project	No impacts anticipated
Courthouse Road Flood Damage Reduction	Flood reduction through stormwater drainage improvements; benefits from wetland restoration
Shearwater Bridge Storm Damage Reduction	N/A

Table 5.4-14, cont'd

Action	Groundwater and Surface Water Hydrology
Long Beach Canals	Significant reduction in water-surface elevation and flooding along Canal 2 upstream of Menge Avenue to 28th Street in the cities of Gulfport and Long Beach; significant improvements in floodwater conveyance; increased circulation and tidal exchange
Harrison County Beaches Ecosystem Restoration and Hurricane Storm Damage Reduction	N/A
Port of Gulfport Restoration: 24-acre fill	No impact to groundwater resources
Port of Gulfport Restoration: 60-acre fill	No impact to groundwater resources
Gulfport Small Craft Harbor Redevelopment	No impacts on groundwater; temporary impacts to surface water
Maintenance Dredging	N/A
Gulfport Harbor Navigation Channel Widening Project	N/A
Qualitative Summary of Cumulative Impacts	No significant cumulative adverse impacts on groundwater and surface water hydrology anticipated in the study area, including inland and the Mississippi Sound, from the evaluated projects due to the primary influence of tides, winds, and salinity from the Gulf; potential significant cumulative benefits from storm protection, flood reduction, and restoration projects that enhance or maintain groundwater and surface water hydrology

Although the Proposed Project Alternative would not contribute to detrimental cumulative impacts to groundwater and surface water hydrology, other past, present, and reasonably foreseeable future projects in the study area would have both adverse and beneficial cumulative impacts.

5.4.11 Hazardous, Toxic, and Radioactive Waste

A review of the database records and research on the environmental history of the Project area was conducted to identify spills or events that may have contributed to the contamination of sediments at the Port. None were identified and no regulated sites on the waterway, or in close proximity in the surrounding upland areas, were identified at proposed Project construction locations (see Appendix F). The potential for encountering HTRW through dredging operations is unlikely. Although operational impacts associated with the Proposed Project Alternative would include an increased risk of hazardous materials spills, even without the PGEP, freight truck and freight rail traffic at the Port are anticipated to increase over time, which would increase the risk of fuel spills or other HTRW releases. Risk would further be correlated with freight type and the frequency of future HTRW transport. Increased freight truck and freight rail traffic under the Proposed Project Alternative, as discussed in Section 4.4.4, would increase this risk to an unknown extent. Federal requirements would be developed and implemented as part of the Spill Response Plan to address potential spills and further reduce risk. Also, in the event that the Port ships hazardous materials as cargo, packages for hazardous material must conform to standards set by Research and Special Programs Administration of the DOT and IMO.

Evaluation of the effects of past, present, or reasonably foreseeable future actions on HTRW is limited, with minimal to no effect noted where such evaluation has been completed (Table 5.4-15). MDOT's I-310 Project would contribute direct beneficial impacts through the remediation of two potentially contaminated sites. Further, I-310 would allow for more efficient conveyance of freight truck traffic and reduce the risk of potential fuel spills or other HTRW releases related to vehicular accidents. As such, the Proposed Project Alternative, in combination with the evaluated projects in the study area, would not contribute to detrimental cumulative impacts from HTRW, and moreover, would reduce the risk of HTRW contamination or remediate contaminated sites, providing cumulative benefits, as described in Table 5.4-15.

Table 5.4-15
Cumulative Impacts to Hazardous, Toxic, and Radioactive Waste

Action	Hazardous Materials
Applicant's Proposed Project Alternative	Low probability for encountering hazardous materials or waste during construction; limited potential exists to encounter hazardous material during construction and dredging; unknown increase in risk of fuel or other HTRW spill due to increases in freight truck and freight rail traffic
Ward Investments Project	N/A
Proposed Widening of the Pascagoula Lower Sound/Bayou Casotte Channel	HTRW sites have been remediated or require no additional remediation
Turkey Creek Ecosystem Restoration	N/A
Deer Island Restoration	N/A
Forrest Heights Levee Improvement	N/A
MsCIP Barrier Island Restoration (Ship Island and Cat Island)	N/A
Coast-wide Beach and Dune Restoration	N/A
CIAP Projects	N/A
FNC Channel Modification with Bend Easing	Limited potential exists to encounter hazardous material during construction and dredging; FNC modification would reduce operational impacts due to reduction in need to lighter or offload cargo offshore by allowing larger ships to call at the Port; however, a greater number of vessels expected overall; unknown increase in risk of fuel or other HTRW spill due to increases in freight truck and freight rail traffic
MDOT's I-310 Project	Positive impact; two potentially contaminated sites to be remediated by MDOT to the satisfaction of MDEQ
KCS Rail Improvements Project	No impacts anticipated
Courthouse Road Flood Damage Reduction	N/A

Table 5.4-15, cont'd

Action	Hazardous Materials
Shearwater Bridge Storm Damage Reduction	N/A
Long Beach Canals	N/A
Harrison County Beaches Ecosystem Restoration and Hurricane Storm Damage Reduction	N/A
Port of Gulfport Restoration: 24-acre fill	No impacts anticipated
Port of Gulfport Restoration: 60-acre fill	No impacts anticipated
Gulfport Small Craft Harbor Redevelopment	No impacts anticipated
Maintenance Dredging	Contractor responsible for proper storage and disposal of any hazardous materials; potential for spill or pollution; potential for resuspension of HTRW from channel bottom
Gulfport Harbor Navigation Channel Widening Project	N/A
Qualitative Summary of Cumulative Impacts	Increased cumulative risk of spills within Mississippi Sound and inland from anticipated rise in vessel, road, and rail traffic; increase cumulative risk of HTRW issues; existing and future regulations would minimize or reduce risk

5.4.12 Water and Sediment Quality

Construction of the Proposed Project Alternative would lead to localized, short-term degradation of water quality, such as minor increases in turbidity during dredging and placement operations. Increased turbidity resulting from maintenance dredging would last longer than that experienced at present during maintenance dredging periods on the narrower channel. However, turbidity increases would still only last days, be localized to the area nearby where sediment is disturbed, and would meet regulated standards. No significant changes to water exchange and inflow patterns would occur, since the Project footprint does not include any major freshwater tributaries; thus, no consequent change in salinity is anticipated. Additionally, increased depths from channel modifications and Port expansion could result in lower DO concentration in those areas. No measurable impacts from chemical contaminants, like heavy metals, synthetic organic compounds, and nutrients, are expected to occur. Although unquantifiable, reduced risk of HTRW spills would result in lower probability of water and sediment contamination. Maintenance dredging and dredged material placement may create localized increases in algal concentrations, but any increases are not expected to be spatially extensive or persistent enough to impact the study area.

Seven of the described past, present, and reasonably foreseeable future projects in the study area target floodplain, wetland, stream restoration, and bank stabilization activities that are likely to contribute beneficial long-term cumulative impacts to water and sediment quality in the study area. Generally, construction-related activities for evaluated projects, whether within or adjacent to waterbodies, are anticipated to have minor to negligible adverse impacts to water and sediment quality that are temporary and localized, and are often offset by long-term benefits (Table 5.4-16).

Table 5.4-16
Cumulative Impacts to Water and Sediment Quality

Action	Water and Sediment Quality
Applicant's Proposed Project Alternative	Localized change in sediment transport; placement of dredged material is not expected to measurably affect water exchange or inflow; temporary turbidity increases; low DO during dredging; increased volume of stormwater runoff might increase turbidity lower levels of oxygen; increased vessel trips may raise the risk of spills
Ward Investments Project	Would fill 432 acres of wetlands or floodplains, having potential adverse impacts on water quality; mitigation for wetland impacts are required
Proposed Widening of the Pascagoula Lower Sound/Bayou Casotte Channel	Temporary impacts to water quality (temperature, salinity, DO, TSS) during dredging and subsequent dredged material placement due to water column mixing; permanent effects on water temperature in dredged areas; temporary decrease in DO and increase in TSS levels during dredging operations, similar to that associated with existing dredging activities; lead and dioxin in some sediment samples exceed criteria levels; prior to placement of dredged material, concurrence with the EPA as to whether or not these findings meet guidance for the Limiting Permissible Concentration for lead and dioxin congeners in sediments
Turkey Creek Ecosystem Restoration	Improved water quality
Deer Island Restoration	Temporary negative impacts to water quality due to construction; significant long-term water quality improvements
Forrest Heights Levee Improvement	Improved overall water quality from clearing and snagging
MsCIP Barrier Island Restoration (Ship Island and Cat Island)	Temporary negative impacts due to construction but overall long-term improvements through estuarine restoration
Coast-wide Beach and Dune Restoration	Minimal impacts to water quality during construction; turbidity localized to construction activities short-term; BMPs would minimize adverse effects
CIAP Projects	Benefits from bank stabilization, riparian area preservation, stormwater drainage improvement, and restoration activities
FNC Channel Modification with Bend Easing	Localized change in sediment transport; placement of dredged material is not expected to measurably affect water exchange or inflow; temporary turbidity increases; low DO during dredging; increased volume of stormwater runoff might increase turbidity lower levels of oxygen; increased vessel trips may raise the risk of spills
MDOT's I-310 Project	No direct lasting effect on any waterways in basin; no adverse effects on sensitive water resources
KCS Rail Improvements Project	No impacts anticipated
Courthouse Road Flood Damage Reduction	Benefits from repairs that reduce sediment movement and turbidity that resulted from the failure of the drainage channel

Table 5.4-16, cont'd

Action	Water and Sediment Quality
Shearwater Bridge Storm Damage Reduction	Temporary impairment of water quality during construction from erosion of fill material, minimized by BMPs; long-term water quality benefit by reducing erosion of fill material
Long Beach Canals	Water quality benefits from increased circulation and tidal exchange
Harrison County Beaches Ecosystem Restoration and Hurricane Storm Damage Reduction	Temporary and minimal adverse water impacts
Port of Gulfport Restoration: 24-acre fill	No adverse impacts to water quality; impacts minimized by SWPPP and erosion, sedimentation, and stormwater runoff managed in accordance with MDEQ requirements; BMPs minimize impacts; mitigation benefits from water quality enhancement features within the commercial small craft harbor and off-site wetland restoration
Port of Gulfport Restoration: 60-acre fill	No adverse impacts to water quality; impacts minimized by SWPPP and erosion, sedimentation, and stormwater runoff managed in accordance with MDEQ requirements; BMPs minimize impacts; mitigation benefits from water quality enhancement features within the commercial small craft harbor and off-site wetland restoration
Gulfport Small Craft Harbor Redevelopment	Temporary minor impacts during construction including suspension of sediments in the water column, soil erosion, and potential sedimentation of the harbor and Mississippi sound, as well as potential discharge of construction-related pollutants; minimized by SWPPP, BMPs, and National Pollutant Discharge Elimination System, USACE, and MDMR permits, and other state and Federal regulations
Maintenance Dredging	Temporary and short-term impairment of water quality in immediate vicinity of dredge and open-water disposal areas from turbidity; increase <50 nephelometric turbidity units above background outside a 750-foot mixing zone; comply with conditions of State Water Quality Certification
Gulfport Harbor Navigation Channel Widening Project	Temporary localized disruption to in-situ parameters (i.e., DO, turbidity, conductivity, salinity, temperature) during dredging and disposal; potential for temporary increase in nutrients and permanent increase in bottom salinity
Qualitative Summary of Cumulative Impacts	Cumulative increase in area with temporary and localized impacts to sediment and water quality from construction and dredging activities; cumulative adverse effect anticipated to be minor and minimized by existing regulations; cumulative benefits to water and sediment quality from MsCIP and CIAP projects as well as beneficial use of dredged material

Since Hurricane Katrina made landfall on August 29, 2005, the USACE permitted actions in the study area, which roughly correlates to HUC 03170009 (Coastal Mississippi) include authorizing 2,739.01 acres of wetland habitat to be filled, 126,366,891.8 cu ft of dredged material to be removed, 0.09 acres of dredge fill, 3,382.9 acres of dredged material removal, and construction of 40,972.28 of linear structures and 90.77 acres of nonlinear structures within waters of the U.S. (see Table 5.4-16). Undoubtedly, these projects have and will affect water and sediment quality at the local scale and potentially regionally; although this impact is indeterminable.

Water and sediment quality would be affected by activities resulting from the Proposed Project Alternative. However, effects on water quality and sediment would be localized, temporary in nature, have infrequent return intervals, and of short duration. Therefore, these impacts are not anticipated to contribute, in combination with other past, present, and reasonably foreseeable future projects, to cumulative effects on water and sediment quality in the study area.

5.4.13 Commercial and Recreational Navigation

The Proposed Project Alternative would increase throughput to up to 1.7 million TEUs annually by 2060, yielding 2,833 container vessel trips per year, or 7.8 trips per day. This represents a commercial ship traffic increase of TEUs by 680 percent over baseline conditions or an increase of 70 percent over the No-Action Alternative in 2060. Recreational navigation would be affected since longer travel times may be required during construction.

In combination with the Proposed Project Alternative, past, present, and reasonably foreseeable future projects incrementally contribute to increased commercial and recreational traffic in the Mississippi Sound. Although most of these projects in the study area do not quantify and/or address potential impacts to commercial and recreational navigation in available documents (Table 5.4-17), they are unlikely to result, or have resulted, in significant adverse effects to commercial and recreational navigation based on the proposed activities. Waterborne projects within the Mississippi Sound involving dredging or construction vessels may result in temporary and short-term delays in commercial and recreational vessels during operation, provided other ships and boats have to avoid or maneuver around equipment. In the case of navigational channels, dredging operations produce positive impacts through increased navigational depths, such as in the GIWW. Commercial and recreational navigation in the Port and surrounding study area have been enhanced by several past projects. The Gulfport Small Craft Harbor Redevelopment constructed 318 boat slips and 88,642 square feet of piers to benefit commercial and recreational navigation. The Gulfport Harbor Navigation Channel Widening project provided long-term improvements in commercial vessel traffic and improved navigational safety. Benefits are also anticipated from completion of the Restoration Project, which would increase Port throughput to an estimated 250,000 to 400,000 TEU. Under the No-Action Alternative, which includes completion of both the Restoration Project and the KCS Rail Improvements Project, throughput is estimated to increase up to 176,000 TEUs from baseline (see Section 4.14.1.3).

Table 5.4-17
Cumulative Impacts to Commercial and Recreational Navigation

Action	Commercial and Recreational Navigation
Applicant's Proposed Project Alternative	Vessel traffic up to 7.8 daily trips in 2060; recreational boaters using the Yacht Club and Gulfport Small Craft Harbor may encounter delays while yielding to larger ships transitioning the FNC; vessel fleet size would increase
Ward Investments Project	N/A
Proposed Widening of the Pascagoula Lower Sound/Bayou Casotte Channel	No adverse impacts to commercial navigation; two-way traffic and additional nighttime transits will allow more flexibility in vessel arrival and departure times; no significant effect on the Port's commodity base; deliveries of liquefied natural gas will be expedited with fewer diversions to alternate ports; no significant effect on charter or recreational boats
Turkey Creek Ecosystem Restoration	N/A
Deer Island Restoration	N/A
Forrest Heights Levee Improvement	N/A
MsCIP Barrier Island Restoration (Ship Island and Cat Island)	N/A
Coast-wide Beach and Dune Restoration	N/A
CIAP Projects	N/A
FNC Channel Modification with Bend Easing	Vessel traffic would increase; all ATONs along the FNC would require relocation or replacement; recreational boaters using the Yacht Club and Gulfport Small Craft Harbor may encounter delays while yielding to larger ships transitioning the FNC; vessel fleet size would increase
MDOT's I-310 Project	N/A
KCS Rail Improvements Project	N/A
Courthouse Road Flood Damage Reduction	N/A
Shearwater Bridge Storm Damage Reduction	N/A
Long Beach Canals	N/A
Harrison County Beaches Ecosystem Restoration and Hurricane Storm Damage Reduction	N/A
Port of Gulfport Restoration: 24-acre fill	N/A
Port of Gulfport Restoration: 60-acre fill	N/A
Gulfport Small Craft Harbor Redevelopment	N/A; however, construction of 318 boat slips and 88,642 square feet of piers benefit commercial and recreational navigation

Table 5.4-17, cont'd

Action	Commercial and Recreational Navigation
Maintenance Dredging	Temporary and short-term adverse effect during operation; restricted maneuverability of the dredging equipment may result in vessels waiting for short periods of time; no significant adverse impacts; Improved navigation after completion of dredging activities due to increased navigational depths within channel
Gulfport Harbor Navigation Channel Widening Project	Long-term improvement in commercial vessel navigation resulting from increased channel width and improved navigational safety
Qualitative Summary of Cumulative Impacts	Cumulative benefit to commercial and recreational navigation from channel improvement, Port expansion, and redevelopment; maintenance dredging would have short-term negligible effects but contribute to cumulative benefits through increased navigational depths; vessel traffic is projected to increase throughout the study area

Cumulative impacts on navigation could occur if projects were to result in increased vessel traffic within the study area. The Proposed Widening of the Pascagoula Lower Sound/Bayou Casotte Channel would enhance navigation at Bayou Casotte Harbor and in the Mississippi Sound by allowing two-way traffic and additional nighttime transits that provide more flexibility in vessel arrival and departure times; expedited deliveries of liquefied natural gas; increased efficiencies that reduce operating costs for vessel operators; more availability of terminals; and reduced transit restrictions that increase the Bayou Casotte Harbor efficiency and channel activities and maintain vessel safety. Vessel traffic accessing the ports of the Mississippi Sound is anticipated to increase in the future, even without the PGEP. Increased vessel traffic could have adverse cumulative effects, such as more frequent delays accessing ports and greater congestion and navigational issues along the GIWW. The PGEP is not anticipated to contribute to, but rather should alleviate, potential adverse cumulative effects.

In combination with other past, present, and reasonably foreseeable future projects in the study area, the Proposed Project Alternative would not contribute to cumulative negative effects to commercial and recreational navigation, and collectively, cumulative benefits to commercial and recreational navigation in Mississippi Sound would result from the combined enhancements provided by the evaluated projects.

5.4.14 Ecological Setting

No direct impacts to the habitat subtypes described in Sections 3.15 and 4.15 or other terrestrial or wetland vegetation communities are anticipated from the PGEP, as no new activities would occur in vegetated environments within the Project area. The expansion of the Port would increase the industrial land uses of the greater Gulfport metropolitan area and would contribute to ongoing residential and commercial growth and development, which may indirectly lead to impacts to terrestrial vegetation communities. Continued moderate economic growth in the study area, which is anticipated with or without the PGEP, would perpetuate ongoing residential and commercial growth and development, having potential cumulative adverse impacts on the ecological setting of the study area. Many of the MsCIP and CIAP past, present, and reasonably foreseeable future projects in the study area target floodplain, beach, dune, stream and/or wetland restoration, as well as bank stabilization, as shown in Table 5.4-18. These projects have and should continue to have beneficial impacts to the ecological setting of the study area, conserving and restoring diverse habitat types, many of which are threatened by development. Nonetheless, these benefits are not quantifiable at this time. Because the Proposed Project Alternative would not directly impact the ecological setting of the Mississippi Sound and have negligible potential indirect impacts, contribution to negative cumulative impacts from the Proposed Project Alternative are not expected.

Table 5.4-18
Cumulative Impacts to Ecological Setting

Action	Ecological Setting
Applicant's Proposed Project Alternative	Indirect impacts through promoting industrial, commercial, and residential development
Ward Investments Project	Proposal to fill 432 acres of wetlands or floodplains, having potential adverse impacts on ecological setting
Proposed Widening of the Pascagoula Lower Sound/Bayou Casotte Channel	Permanent conversion of 87.6 acres of shallow habitat to deeper habitat, short-term turbidity increase during construction and placement operations resulting in temporary impacts to primary production and aquatic species; temporary burial of benthic organisms at disposal sites resulting in species composition changes and increased volume of ballast water discharge and potential associated invasive species
Turkey Creek Ecosystem Restoration	Positive habitat benefits; restoration of 689 acres of regionally significant coastal wet pine savannah habitat; Average Annual Functional Units increase of 1,565
Deer Island Restoration	Direct positive benefit via improved estuarine functions; restored 128 acres of emergent tidal marsh habitat, 78 acres coastal maritime forest, 86 acres of beach habitat, and 30 acres of dune habitat
Forrest Heights Levee Improvement	Clearing and snagging improve Turkey Creek and adjacent habitats
MsCIP Barrier Island Restoration (Ship Island and Cat Island)	Positive habitat benefits; restoration of 456 acres of tidal habitat and 694 acres of nontidal habitat
Coast-wide Beach and Dune Restoration	Positive habitat benefits
CIAP Projects	Positive ecological benefits from conservation, preservation, and restoration activities
FNC Channel Modification with Bend Easing	Indirect impacts through promoting industrial, commercial, and residential development
MDOT's I-310 Project	N/A
KCS Rail Improvements Project	No impacts anticipated
Courthouse Road Flood Damage Reduction	Benefits from restoration and maintenance of storm drainage for upland areas on landward side of road so as to prevent flooding from extreme rain and storm events that could otherwise result in erosion of upland resources; positive effects from marsh restoration
Shearwater Bridge Storm Damage Reduction	N/A
Long Beach Canals	Benefits from increased circulation and tidal exchange

Table 5.4-18, cont'd

Action	Ecological Setting
Harrison County Beaches Ecosystem Restoration and Hurricane Storm Damage Reduction	Numerous benefits from dune restoration and planting of 125 acres of native vegetation
Port of Gulfport Restoration: 24-acre fill	Loss of 24 acres or 0.002% Mississippi Sound open-water habitat; benefits from mitigation plan in accordance with Permit MS96-02828-U to mitigate for these losses (e.g., contribution of $94,000 to MDMR Coastal Preserve acquisition program); no impacts to vegetation anticipated
Port of Gulfport Restoration: 60-acre fill	Loss of 60 acres or 0.005% of Mississippi Sound open-water habitat; benefits from mitigation plan in accordance with Permit MS96-02828-U to mitigate for these losses (e.g., contribution of $1,000,000 to MDMR Coastal Preserve acquisition program); mitigation result in estuarine benefits
Gulfport Small Craft Harbor Redevelopment	N/A
Maintenance Dredging	N/A
Gulfport Harbor Navigation Channel Widening Project	N/A
Qualitative Summary of Cumulative Impacts	PGEP would not contribute to adverse impacts on ecological setting; cumulative adverse impacts from evaluated projects would be offset by mitigation; anticipated cumulative benefit to ecological setting from restoration, protection, and conservation projects

5.4.15 Wetlands and Submerged Aquatic Vegetation

No wetland or SAV habitat occurs within the Project area. These resources occur within the study area, though they are present in small, localized patches and complexes. Most wetlands occur inland or within the estuaries of St. Louis Bay or Biloxi Bay, outside the Project area. Most evaluated projects would yield positive wetland benefits. Many of the MsCIP and CIAP projects target ecosystem restoration (e.g., floodplain, watershed, wetland, dune, beach, etc.), which would contribute to long-term beneficial impacts to wetlands and SAV habitat within the study area. A few other past, present, and reasonably foreseeable future projects will have or have had direct wetland or SAV impacts, as detailed in Table 5.4-19. Since Hurricane Katrina made landfall on August 29, 2005, the USACE permitted actions in the study area, which roughly correlates to HUC 03170009 (Coastal Mississippi) include authorizing 2,739.01 acres of wetland habitat to be filled, 126,366,891.8 cu ft of dredged material to be removed, 0.09 acres of dredge fill, 3,382.9 acres of dredged material removal, and construction of 40,972.28 of linear structures and 90.77 acres of nonlinear structures within waters of the U.S. (see Table 5.4-19). The Proposed Project Alternative would not contribute to negative cumulative effects to wetlands and SAV habitat in the study area.

Table 5.4-19
Cumulative Impacts to Wetlands and Submerged Aquatic Vegetation

Action	Wetlands and Submerged Aquatic Vegetation
Applicant's Proposed Project Alternative	No impacts are expected; no wetland or SAV habitat occurs within 5 miles of the proposed Project area
Ward Investments Project	Proposal to fill 432 acres of wetlands or floodplains in the Turkey Creek watershed
Proposed Widening of the Pascagoula Lower Sound/Bayou Casotte Channel	No adverse impacts on freshwater or terrestrial plant communities; potential beneficial impacts due to dredged material placement at LZA site and littoral drift of sandy material and subsequent vegetative succession
Turkey Creek Ecosystem Restoration	Significant direct positive benefits via improved wetland functions and restoration of lost wetlands
Deer Island Restoration	Significant direct positive benefits via improved wetland functions and restoration of lost wetlands
Forrest Heights Levee Improvement	Direct loss of up to 3.5 acres of nontidal wetlands associated with levee construction
MsCIP Barrier Island Restoration (Ship Island and Cat Island)	Significant direct positive benefits via barrier island restoration and protection, which sustains marsh; could restore conditions conducive to SAV establishment; minor localized and temporary turbidity impacts
Coast-wide Beach and Dune Restoration	No impacts
CIAP Projects	Benefits from preservation, conservation, and restoration activities
FNC Channel Modification with Bend Easing	No impacts are expected; SAV may be affected by increased erosion or turbidity due to changes in vessel traffic or size
MDOT's I-310 Project	Fill 162.09 acres of wetlands, including hydric flatwoods, cypress/gum slough and emergent marsh of medium to high quality
KCS Rail Improvements Project	No impacts anticipated
Courthouse Road Flood Damage Reduction	Restoration of 14,200 square feet of wetlands
Shearwater Bridge Storm Damage Reduction	N/A
Long Beach Canals	N/A
Harrison County Beaches Ecosystem Restoration and Hurricane Storm Damage Reduction	N/A
Port of Gulfport Restoration: 24-acre fill	No adverse impacts; benefits from wetland restoration at Wolf River Coastal Preserve
Port of Gulfport Restoration: 60-acre fill	No adverse impacts anticipated; benefits from wetland restoration at Graveline Bayou
Gulfport Small Craft Harbor Redevelopment	Impacts to waters of the U.S. from dredging, construction of bulkheads, piers, decks, and platforms, and stabilizing the shoreline along 20th Avenue; widening 20th Avenue and stabilizing the shoreline in that area impacted 0.96 acre of shallow water marine habitat
Maintenance Dredging	No impacts to wetlands or SAV

Table 5.4-19, cont'd

Action	Wetlands and Submerged Aquatic Vegetation
Gulfport Harbor Navigation Channel Widening Project	No known SAV beds impacted; possible loss of isolated plants or small unmapped patches within dredging footprint
Qualitative Summary of Cumulative Impacts	PGEP not anticipated to contribute to cumulative impacts; adverse impacts to wetlands and SAV from other projects to be offset through mitigation, and as such, no adverse cumulative impact anticipated unless mitigation unsuccessful; cumulative benefit to wetlands and SAV from CIAP, MsCIP, and beneficial use that would promote direct and indirect restoration and protection

5.4.16 Terrestrial Wildlife

Under the Proposed Project Alternative, impacts to terrestrial wildlife are not anticipated for generalist species, nor are ongoing operations expected to have direct or indirect impacts to terrestrial wildlife, which are acclimated to existing operations at the Port. Temporary impacts from increased turbidity caused by dredged placement activities could include decreased foraging success of diving and plunging bird species that utilize shallow-water areas for feeding. These species most likely would be temporarily displaced to nearby foraging habitat. The placement of dredged material as described in the DMMP (Appendix F) may have temporary direct and indirect negative impacts on terrestrial wildlife and avian species caused by noise, activity, and loss of habitat; however, long-term benefits, as discussed below, would result from these activities where beneficial use promotes ecosystem restoration.

Generally, past, present, and reasonably foreseeable future projects in the study area have or will negatively impact native wildlife species, albeit to differing degrees, due to the degradation, destruction, or fragmentation of habitat; though the cumulative extent of this impact is difficult to ascertain because of uncertainties associated with many of the evaluated projects. The majority of the projects are located in an industrialized area with limited high-quality or unique natural habitat in their vicinity, which reduces the overall effect of such impacts. Some projects, such as MDOT's I-310 Project, Forrest Heights Levee Improvement, and projects discussed in Section 5.1.1 and Table 5.4-20, do, however, result in the loss of wetland habitat, upon which many terrestrial species depend. Furthermore, the Gulfport Small Craft Harbor Redevelopment project resulted in the permanent loss of 5.17 acres of upland beach habitat, which negatively affected some terrestrial species. Loss of habitat is anticipated from continued moderate development in the Gulfport metropolitan area. In addition to impacts on habitat area or quality, the noise and activity associated with each project would temporarily deter birds and terrestrial wildlife from using habitat in and nearby the construction and/or operational areas. Beneficial use efforts have the potential to create, restore, and protect viable terrestrial wildlife habitats. Long-term beneficial effects would be expected via provision of increased habitat for foraging, burrowing, resting, roosting, breeding, and nesting (Brandon and Price, 2007). Additionally, terrestrial wildlife have and will continue to benefit from stabilization, conservation, and restoration projects included in MsCIP and CIAP, as detailed in Table 5.4-20.

Overall, the cumulative impact of past, present, and reasonably foreseeable future projects on terrestrial wildlife includes both positive and negative impacts, the combined effect of which is indeterminable based on available data, but would depend on the net balance of these impacts. Given that the Proposed Project Alternative would only cause temporary, localized impacts to terrestrial wildlife and long-term benefits are anticipated from beneficial use of dredged material, it is not anticipated to noticeably contribute to negative cumulative impacts to terrestrial wildlife in the study area.

Table 5.4-20
Cumulative Impacts to Terrestrial Wildlife

Action	Terrestrial Wildlife
Applicant's Proposed Project Alternative	No impacts due to urbanization and industrialization of the Project area; temporary impacts due to noise and construction activity associated with placement of dredged material; potential long-term beneficial effects of placement of dredged material at a BU site include increased habitat for foraging, burrowing, resting, roosting, breeding, and nesting
Ward Investments Project	N/A; however, would fill 432 acres of wetlands or floodplains with adverse impacts on terrestrial wildlife
Proposed Widening of the Pascagoula Lower Sound/Bayou Casotte Channel	Temporary disruption of wildlife during dredging but no long term impacts
Turkey Creek Ecosystem Restoration	Positive habitat benefits
Deer Island Restoration	Provides valuable stopover habitat within the Mississippi Flyway Corridor
Forrest Heights Levee Improvement	Slight degradation of existing biological resources due to enlarged footprint of levee; resources of Turkey Creek improved
MsCIP Barrier Island Restoration (Ship Island and Cat Island)	Positive habitat benefits; provides valuable stopover habitat within the Mississippi Flyway Corridor
Coast-wide Beach and Dune Restoration	Temporary and localized adverse impacts from displacement during construction; long-term positive habitat benefits; provides valuable roosting, nesting, foraging, stopover habitat within the Mississippi Flyway Corridor
CIAP Projects	Positive ecological benefits from preservation, conservation, and restoration activities
FNC Channel Modification with Bend Easing	Temporary impacts of placement of dredged material due to noise, activity, and loss of habitat (if thin layer placement is used); long-term beneficial effects, if beneficial use at BMC, include increased habitat for foraging, burrowing, resting, roosting, breeding, and nesting; channel modification would temporarily deter wildlife from using areas during dredging
MDOT's I-310 Project	Temporary and localized adverse impacts on terrestrial wildlife during fill activities of 162.09 acres of wetlands, including hydric flatwoods, cypress/gum slough and emergent marsh of medium to high quality
KCS Rail Improvements Project	No impacts anticipated; project activities will occur within the existing KCS right-of-way, which has been developed and maintained since the early 1900s
Courthouse Road Flood Damage Reduction	Potential positive habitat benefits from marsh restoration (e.g., shorebird and migratory bird habitat)

Table 5.4-20, cont'd

Action	Terrestrial Wildlife
Shearwater Bridge Storm Damage Reduction	N/A
Long Beach Canals	Temporary displacement during construction; long-term benefits from increased circulation and tidal exchange (e.g., improved shorebird foraging areas)
Harrison County Beaches Ecosystem Restoration and Hurricane Storm Damage Reduction	Short-term, localized displacement of shorebirds during construction; long-term benefits through restoration of dune ecosystem; creation of foraging and roosting habitats for various shore and migratory birds and other coastal wildlife species
Port of Gulfport Restoration: 24-acre fill	No impacts
Port of Gulfport Restoration: 60-acre fill	No impacts anticipated
Gulfport Small Craft Harbor Redevelopment	Permanent loss of 5.17 acres of upland beach habitat and excavation of 0.96 acre of existing shoreline
Maintenance Dredging	Temporary impacts on bird foraging, nesting, and roosting behavior during dredge and placement; temporary disruption of wildlife during dredging but no long-term impacts
Gulfport Harbor Navigation Channel Widening Project	Temporary and negligible disruption to birds roosting on the western end of Ship Island during nearby dredging activities
Qualitative Summary of Cumulative Impacts	PGEP would contribute short-term and localized impacts, which are not expected to contribute to cumulative adverse effects on terrestrial wildlife, and beneficial use of dredged materials would provide cumulative benefits; impacts from other construction and maintenance dredging projects would also have similar impacts and contribute minimally to cumulative effects; cumulative benefits to terrestrial wildlife are anticipated from restoration, conservation, protection, and beneficial use actions

5.4.17 Aquatic Ecology

The assessment of potential impacts to aquatic communities, fisheries, and EFH is based on scientific literature and recent studies. For this evaluation, temporary and long-term impacts to aquatic communities, fisheries, and EFH have been presented in Section 4.18 and are summarized herein. The Proposed Project Alternative would directly affect the aquatic communities in Mississippi Sound by the loss of 196.5 acres of estuarine mud and sand bottom habitat, which would be removed with the expansion of the West and East piers, creation of breakwaters, and North Harbor fill, and permanent conversion of 85 acres to deeper habitat, thus reducing the amount of food and habitat available to some aquatic communities. However, the area involved would be a small fraction (0.04 percent) of the total available habitat within the entire system and only a portion of the proposed impact area contains valuable benthic habitat for species such as the Gulf sturgeon (refer to Appendix L). For the Proposed Project Alternative, new work dredged material that is structurally suitable would be used for fill on the Project site, while the remaining new work material would be evaluated for potential beneficial use and possible placement at a designated or candidate BU site. At this time, it is intended that all new work dredged material would be placed in the BMC. Placement of dredged materials at the BMC would result in benefits to aquatic resources due to restoration, protection, and creation of viable habitats.

The primary concern associated with open water habitats is increased turbidity, which occurs as a result of sediment release during dredging and construction activities. Turbidity in estuarine and coastal waters generally has complex implications for a range of organisms (Hirsch et al., 1978; Stern and Stickle, 1978; Wright, 1978; Wilber et al., 2005). Suspended material can both benefit and adversely impact aquatic communities. Increased turbidity can decrease light available for photosynthetic activity, reducing plankton production. Conversely, the decrease in primary production can be offset by an increase in nutrient primary productivity that is released into the water column during dredging activities when the water clears (Morton, 1977; Newell et al., 1998). Under the Proposed Project Alternative, the impacts to phytoplankton and algae from construction, dredging within the Project area, and dredged material placement of new work and maintenance material would be temporary. Increased sedimentation would impact juvenile and adult finfish by disrupting foraging and feeding patterns; however, these impacts would also be temporary and short term. While elevated turbidity will impact the adult stages of filter-feeding organisms, such as oysters and copepods, by clogging filtering mechanisms, impacts would be short-term and localized over the 50-year Project life.

Considering past, present, and reasonably foreseeable future projects in the study area, impacts to benthic communities would generally be associated with dredging and placement activities. Those projects involving a modification (e.g., widening) of an existing navigational channel, such as the FNC Channel Modification with Bend Easing and Gulfport Harbor Navigation Channel Widening Project, could result in the permanent conversion of shallow, primarily silty clay soft bottom, to a deeper hypoxic habitat. Bottom habitat in the littoral zone and open-water disposal areas would be buried during dredged material placement affecting benthic communities and oyster reefs; however, these sites are approved and active sites for maintenance dredging material placement. Buried organisms would be negatively impacted, but recolonization would occur.

Similarly, dredging operations have or would temporarily reduce the quality of EFH where present in the vicinity of any of the evaluated projects, such as the FNC Channel Modification with Bend Easing. Some projects, such as the Proposed Widening of the Pascagoula Lower Sound/Bayou Casotte Channel and as detailed in Table 5.4-21, cause the permanent conversion of shallow, primarily silt and clay soft bottom habitats to deeper, hypoxic habitat, which reduces the functionality and ability of this natural community type to support aquatic species including federally managed fisheries. While the overall cumulative conversion of estuarine mud and sand bottom habitat may be considered minor on a project-by-project basis and even collectively across all evaluated projects when compared to the entire 470,000-acre Mississippi Sound, of which approximately 452,000 acres is estuarine mud and sand bottom, the habitat conversion represents a net loss of a more productive habitat (when compared with a deeper, dredged channel bottom). Fish and shellfish species would temporarily shift feeding habitats during dredging operations to undisturbed areas until dredging and/or construction activities have been suspended and habitat recovery has occurred. Dredged material placement for any of the evaluated projects is not anticipated to cause long-term contamination problems for EFH based on available information.

An increase in throughput under the Proposed Project Alternative may result in the increase of spills or the introduction of an invasive species via ballast water. As documented with the Deepwater Horizon oil rig explosion and oil spill, large spills, such as those from loaded ships, can have devastating impacts to aquatic communities. Smaller releases of crude oil or petroleum products impact shallow sessile or dermal organisms, birds and other coastal wildlife, and littoral habitats. Mobile organisms, such as fish and many shellfish generally avoid oil spills, since the products generally float. However, releases of soluble products can have impacts to the entire water column. Due to the increased throughput, the risk of spills larger than existing conditions is possible. Vessel traffic, as a result of implementing the evaluated projects and continued moderate economic growth, may increase the volume of ballast water discharged into the Sound and the associated potential for release of invasive species. The USCG mandatory ballast water management protocols would be in place for all vessels; therefore, minimal cumulative impact from ballast water and invasive species is anticipated.

Past, present, and reasonably foreseeable future projects in the study area are unlikely to contribute long-term, adverse cumulative impacts to aquatic resources, as detailed in Table 5.4-21. Moreover, long-term beneficial cumulative impacts would result from MsCIP, CIAP, and other projects that aim to restore wetlands, watersheds, and barrier islands that affect circulation and aquatic ecology within the Mississippi Sound. The Proposed Project Alternative would permanently alter estuarine mud and sand bottom habitat by filling during construction and result in temporary and localized disturbances and impacts due to dredging and placement. As part of the proposed Project, new work dredged material is to be used beneficially in a permitted BU site, similar to BMC (currently in permitting process). Allocating dredged material for beneficial use not only reduces the level of traditional placement disruptions, but when properly engineered, has environmental, economic, and social benefits. The ecological functions of the 30,290-acre BMC BU site provide support for aquatic life in the region. This area within the Breton NWR and 210,000-acre estuary controls salinities for portions of the Mississippi Sound. Improvement of this area through beneficial use would serve to enhance the fisheries of the surrounding areas, thus providing support to commercial and recreational fishermen (CH2M HILL, 2011). Therefore, the Proposed Project Alternative would not contribute detrimental cumulative impacts to aquatic resources in the area.

Table 5.4-21
Cumulative Impacts to Aquatic Ecology

Action	Aquatic Ecology
Applicant's Proposed Project Alternative	Loss of 196.5 acres of estuarine mud and sand bottom habitat and permanent conversion of 85 acres to deeper habitat; temporary and localized turbidity increases during project construction, dredging within the project area, and dredged material placement; removal of benthic community; burial of benthic organisms at placement areas; slight increase in the probability of a petroleum spill with increase in vessel traffic; positive benefit if dredged material to be used beneficially within the BMC
Ward Investments Project	N/A; however, would fill 432 acres of wetlands or floodplains with adverse impacts to aquatic ecology; proposed mitigation would be through on-site restoration, enhancement, and preservation to offset unavoidable impacts to wetlands
Proposed Widening of the Pascagoula Lower Sound/Bayou Casotte Channel	Impacts to open-water communities as a result of increased turbidity during dredging localized around the immediate area of dredging and placement and limited to duration of the plume at a given site; potential temporary reduction in quality of EFH and displacement of individual species; permanent conversion of 87.6 acres of shallow habitat to deeper habitat and temporary burial of benthic organisms in placement sites; no long-term effects on benthic organisms are expected due to motility, rapid recovery of benthic communities following temporary, short-term impacts in the immediate vicinity of the area dredged; no long-term turbidity impacts on artificial reefs because of their distance from the proposed project area.
Turkey Creek Ecosystem Restoration	Positive habitat benefits; improved water quality
Deer Island Restoration	Restores diverse habitat to juvenile species; direct positive benefit via improved estuarine functions
Forrest Heights Levee Improvement	Slight degradation of existing biological resources due to enlarged footprint of levee; resources of Turkey Creek improved
MsCIP Barrier Island Restoration (Ship Island and Cat Island)	Placement of approximately 22 mcy of sand in Camille Cut and replenishment of the southern shoreline of East Ship Island and beach-front placement of sand along the eastern shoreline of Cat Island; convert open water to beach habitat; temporary and localized minor impacts during placement activities
Coast-wide Beach and Dune Restoration	No impacts anticipated
CIAP Projects	Positive ecological benefits from preservation, conservation, and restoration activities
FNC Channel Modification with Bend Easing	Loss of estuarine mud and sand bottom habitat and permanent conversion of deeper habitat; temporary and localized turbidity increases during project construction, dredging within the project area, and dredged material placement; removal of benthic community; burial of benthic organisms at placement areas; slight increase in the probability of a petroleum spill with increase in vessel traffic; positive benefit if dredged material to be used beneficially within the BMC

Table 5.4-21, cont'd

Action	Aquatic Ecology
MDOT's I-310 Project	N/A; however, would fill 162.09 acres of wetlands, including hydric flatwoods, cypress/gum slough and emergent marsh of medium to high quality; fill would cause loss of habitat, injury or death of less mobile species and displacement of mobile species; would be required to obtain permits from the USACE and appropriate state agencies, and consult with the EPA, the FWS, and NOAA Fisheries as applicable
KCS Rail Improvements Project	No impacts anticipated; project activities occurred within the existing KCS right-of-way, which has been developed and maintained since the early 1900s
Courthouse Road Flood Damage Reduction	Potential positive habitat benefits from marsh restoration (e.g., nursery areas for fishes, shellfish, and crustaceans)
Shearwater Bridge Storm Damage Reduction	Improved health from stabilization of the bridge abutments and shoreline armoring
Long Beach Canals	Temporary and localized displacement of fauna during construction; long-term benefits from increased circulation and tidal exchange (e.g., fish allowed to migrate upstream)
Harrison County Beaches Ecosystem Restoration and Hurricane Storm Damage Reduction	N/A
Port of Gulfport Restoration: 24-acre fill	Reduction of open water habitat in the Mississippi Sound; the MSPA has taken steps to mitigate loss of open water habitat by implementing a comprehensive mitigation plan that enhances estuarine habitat; temporary localized impacts due to increase in turbidity during construction; mobile aquatic organisms avoid project area during construction; permanent loss of 24 acres of Mississippi Sound; no long-term impacts to aquatic resources
Port of Gulfport Restoration: 60-acre fill	Reduction of open water habitat in the Mississippi Sound; the MSPA has taken steps to mitigate loss of open water habitat by implementing a comprehensive mitigation plan that enhances estuarine habitat; temporary localized impacts due to increase in turbidity during construction; mobile aquatic organisms avoid project area during construction; permanent loss of 60 acres of Mississippi Sound; no long-term impacts to aquatic resources
Gulfport Small Craft Harbor Redevelopment	Temporary impacts to immobile species and temporary adverse impacts on habitat quality due to turbidity during dredging
Maintenance Dredging	Temporary and minor adverse impact through disruption; nonmotile benthic fauna lost but should repopulate within several months; temporary displacement of motile species during operations
Gulfport Harbor Navigation Channel Widening Project	Short-term minor displacement and loss of infaunal and epifaunal benthic invertebrates, mollusks, and crustaceans, displacement of fish, and temporary and negligible impacts to foraging behavior and activity patterns of marine mammals during dredging and disposal activities with quick recovery; temporary adverse impacts to EFH in vicinity of dredging activities; beneficial impact to nearshore habitats through renourishment and protection from erosion with dredge material placement near Cat Island and the Chandeleur Islands

Table 5.4-21, cont'd

Action	Aquatic Ecology
Qualitative Summary of Cumulative Impacts	Fill actions would have cumulative adverse impact of removing estuarine mud and sand bottom habitat and wetlands; dredging would result in conversion to deeper habitat; dredging and placement would result in temporary and localized turbidity increases, removal of benthic community, burial of benthic organisms at placement areas; no long-term impacts are anticipated from construction, dredging, and placement activities and thus should not have a net cumulative adverse effect; cumulative increase in vessel traffic in the study area would increase the risk of pollution; restoration, stabilization, protection, and beneficial use actions would have a cumulative beneficial effect on aquatic ecology

5.4.18 Threatened and Endangered Species

The USFWS and NMFS have identified 22 federally listed threatened and endangered species as potentially occurring in the study area (see Section 3.19 and Table 3.19-1). Of these, 14 could potentially occur in the PGEP Project area and include 2 birds (piping plover and rufa red knot), 6 marine mammals (West Indian manatee, blue whale, finback whale, humpback whale, sei whale, and sperm whale), 5 reptiles (Kemp's ridley, hawksbill, green, leatherback, and loggerhead sea turtles), and 1 fish species (Gulf sturgeon).

None of the five whale species is expected to occur in the Project area, and therefore, no effects to the five whale species are anticipated from the Proposed Project Alternative. Only those species for which potential impacts from the Proposed Project Alternative exists are addressed in detail in this cumulative impacts analysis. Other federally listed and endangered species of potential occurrence in the study area are discussed in Section 3.19 and included in Table 5.4-22 if affected by an evaluated project. Critical habitat has been designated in the study area for the Gulf sturgeon, Unit 8, which includes the Mississippi Sound. Critical habitat for the piping plover, includes Mississippi Units 02–06 (along the coast), with Unit 04 directly west of Gulfport Harbor and Unit 05 directly east of the harbor, Unit 12 (Deer Island), and Unit 14 (Cat Island, East Ship Island and West Ship Island) (see Figure 3.19-1). Potential impacts from the Proposed Project Alternative to threatened and endangered species are summarized below but discussed in detail in the formal BA (Appendix N), in accordance with the USACE requirements pursuant to Section 7(c) of the ESA (as amended), and in Section 4.19. Subsequent discussion includes evaluation of cumulative effects on listed species in general and on a species by species basis, as appropriate.

As previously stated, the criteria for assessing impacts to threatened and endangered species are:

- Loss of or long-term reduction in a population
- Habitat modification that causes a permanent disruption to breeding, foraging, or other life history requirements
- Permanent interference with the movement of native resident or migratory protected species
- Loss of any areas designated as critical habitat

Under the Proposed Project Alternative, new work and maintenance dredging activities have the potential to negatively impact all five federally listed sea turtle species, should they be present in the area. Adverse effects could occur from impingement, temporary physical and behavioral impacts from noise, increased turbidity and re-suspended sediment, and loss of benthic food resources during dredging and placement activities. Potential entrainment of listed sea turtle species and Gulf sturgeon during dredging activities is the most significant potential impact associated with the Proposed Project Alternative. Avoidance, minimization, and other conservation measures formalized by NMFS in the GRBO (NMFS, 2003, 2005, 2007) and adopted for the PGEP would greatly reduce the likelihood of adverse effects to these sea turtle species and the Gulf sturgeon. Should incidental take occur, it is not likely to jeopardize the continued existence or potential recovery of most of the sea turtle species, so that the Proposed Project Alternative may affect, but is unlikely to adversely affect these sea turtle species. However, the dredging activities under the Proposed Project Alternative are likely to adversely affect the Kemp's ridley sea turtle, as further detailed in Appendix N and Section 4.19.

Past, present, and reasonably foreseeable future dredging projects have had and will continue to have potential adverse impacts to sea turtles similar in nature to those discussed for the Proposed Project Alternative and as provided in Table 5.4-22. Although no green, hawksbill, or leatherback sea turtles have been reported taken from recent dredging activities, two incidental takes of Kemp's ridley were reported from 2002 to 2013 within the Gulfport harbor and FNC. For the Gulfport Harbor Navigation Channel Widening Project, 71 Kemp's ridleys, 5 loggerhead, and 1 green turtle were captured and relocated, and 1 loggerhead turtle was taken during dredging operations for this project in 2011 (USACE, 2013b). The potential effects of pile driving on sea turtles would depend on several factors which may include, but are not limited to: species of sea turtle, animal size, and proximity to the underwater noise source; intensity and duration of the pile driving noise; depth of the water column; and type of substrate. Impacts to sea turtles from pile driving activities would be related to the level and duration of the noise exposure along with consideration of the distance between the marine animal and the source. Underwater noise impacts from the installation of pilings would be mitigated through the use of bubble curtains, resonators, or other sound-cancelling options. For the USACE Mobile District, the documented annual incidental take of sea turtles, by injury or mortality, is expected to consist of three Kemp's ridley, three green turtles, one hawksbill, and five loggerhead turtles per fiscal year for all channel dredging and sand mining by hopper dredge activities (NMFS, 2003, 2005, 2007). Gulf-wide, this estimate includes the annual documented incidental take per fiscal year, by injury or mortality from hopper dredging, of 40 loggerhead turtles, 20 Kemp's ridley turtles, 14 green turtles, and 4 hawksbill turtles; as well as noninjurous take of no more than 300 loggerhead, green, hawksbill, and Kemp's ridley sea turtles, and lethal or injurious takes of up to 2 sea turtles from all yearly relocation trawling in the Gulf (NMFS, 2003, 2005, 2007). Further, NOAA Fisheries estimates that approximately 50 percent of takes go undocumented, and have, therefore, included such take in their evaluation in which they determined that anticipated hopper dredging will not jeopardize the continued existence of any listed species (NMFS, 2003, 2005, 2007).

For projects and activities with a Federal nexus (e.g., commercial fisheries, maintenance dredging of Federal channels, etc.), Section 7 consultations have and are anticipated to minimize the cumulative adverse effects of evaluated projects on all listed species. Nonetheless, incidental by-catch from commercial ship trawling, especially shrimping, and other fishing activities, in addition to other threats previously discussed, have and will continue to adversely impact these federally listed sea turtle species, having a cumulative effect of an indeterminable degree. Increased vessel traffic, and commensurate rise in spill risk and contribution of pollutants and trash, would likely present greater risk of incidental take (e.g., vessel collision, poisoning, ingestion or entanglement in marine debris) of federally listed sea turtle species within the study area. Likewise, increased recreational vessel traffic and fishing would contribute to increased risk of incidental take. Regardless, with or without implementation of the Proposed Project Alternative, vessel traffic within the study area will increase in the future, which would have adverse cumulative effects on federally listed sea turtles, such as increased collision risk and higher potential for spills when compared to current conditions. These adverse impacts could be offset to some degree by other projects, such as Deer Island Restoration and MsCIP Barrier Island Restoration (Ship Island and Cat Island), which have and will continue to benefit these sea turtle species.

The Proposed Project Alternative may affect, but is not likely to adversely affect the West Indian manatee, which may migrate through the study area. The major threat to the species is collision with watercraft. Increased commercial and recreational vessel traffic in the foreseeable future would result in cumulative adverse impacts to the species through increased risk of collision. New work and maintenance dredging, construction, and disposal activities would result in localized, temporary impacts (e.g., elevated noise and turbidity) to the species, which would cause avoidance of these areas. Underwater noise from construction activities may disturb these animals and cause them to alter their route. Underwater noise impacts from the installation of pilings would be mitigated through the use of bubble curtains, resonators, or other sound-cancelling options. These temporary impacts may cause the manatee to avoid the area, but would not prevent their passage. The species would still be anticipated to travel across the study area, without impediment to mobility. Based on the lack of spatial overlap in the impact areas, the separation in timing of activities, and the very low likelihood of interaction, direct, indirect, or cumulative adverse impacts on the manatee are unlikely in the study area. Beneficial cumulative effects could result from MsCIP and CIAP projects that protect and restore the marine, estuarine, and freshwater environments that manatees depend on, although benefits would be limited due to the infrequent occurrence of the species. Since 1998, only seven manatee sightings have been reported within the vicinity of the PGEP (Carmichael, 2013), most likely because the species is transient, occurring in the study area intermittently.

Historic adverse impacts to the piping plover have resulted from numerous stressors, such as shorebird hunting, loss or modification of habitat resulting from commercial, residential, and recreational developments, dune stabilization, river impoundment and channelization (eliminating sandbars, encroachment of vegetation, and altering water flows), and draining of wetlands. Under the Proposed Project Alternative, noise impacts to piping plover are anticipated to be minimal and temporary, as these birds would likely acclimate to the disturbance. Evaluated projects have and will result in both beneficial and adverse impacts on the species. For instance, temporary displacement may result from the FNC Channel Modification, Coast-wide Beach and Dune Restoration, and maintenance dredging. Moreover, the Gulfport Small Craft Harbor Redevelopment resulted in the loss of 0.96 acre of shoreline foraging and roosting habitat. However, long-term beneficial cumulative impacts would result from habitat restoration and protection afforded under MsCIP and CIAP projects, which would result in increased habitat availability and decreased rate of habitat loss. A modeling evaluation of impacts to Harrison County beaches showed that the proposed PGEP would not result in significant changes in wave heights or breaking wave angles along the adjacent beaches. As a result, it is unlikely the Proposed Project Alternative would affect piping plover beach habitat (Anchor QEA LLC, 2015). Given the temporary and localized nature of adverse impacts to piping plover from the proposed PGEP and evaluated projects in relation to the benefits from restoration projects, it is reasonable to anticipate cumulative beneficial effects on the species from the evaluated projects.

The proposed PGEP is located within Gulf sturgeon critical habitat Unit 8, which includes areas of the Mississippi Sound. A benthic habitat assessment of the Project area was completed in 2012 (Appendix L), wherein preferred Gulf sturgeon habitat was located in the North Harbor fill area, West Pier Expansion, and west of the West Pier Expansion areas. Impacts to the water quality, sediment quality, and migration habitat PCEs for the Gulf sturgeon would be localized and temporary. Increased vessel traffic that is expected with the Proposed Project Alternative could slightly increase the potential for a petroleum spill impacting Gulf sturgeon. Gulf sturgeon depend on a limited number of benthic organisms for nutrients. The subsequent placement of dredged material under the Proposed Project Alternative would increase the overall habitat that would be permanently changed. Dredging, dredged material placement, and fill operations would temporarily reduce benthic feeding areas, thereby affecting the quality, quantity, and availability of prey. Underwater noise from construction activities, including active dredging, placement activities, and pile driving may disturb Gulf sturgeon and cause them to alter their routes during potential migration through the Project area. Underwater noise impacts from the installation of pilings would be mitigated through the use of bubble curtains, resonators, or other sound-cancelling options.

Permanent habitat impacts from the Proposed Project Alternative are expected because it would fill approximately 155 acres of existing open water for the West Pier Expansion, 15 acres for the East Pier Expansion, 9 acres from the North Harbor fill, and 18 acres from the breakwater. Potential impacts to the Gulf sturgeon from the Proposed Project Alternative include permanent reduction of critical habitat area; temporary degradation of critical habitat due to suspended solids, noise, reduced DO, and burial of benthic organisms (prey items); reduction in the availability of prey for foraging during dredging and placement activities; entrainment during dredging and placement activities; behavioral impacts due to construction noise from pile driving and dredging activities; and reduction in habitat quality around construction areas (e.g., elevated turbidity and low DO during dredging and placement). Any marine species that are exposed to high sound pressure levels during pile installation may change their normal behavior patterns (e.g., foraging). Underwater noise impacts from the installation of pilings would be mitigated through the use of bubble curtains, resonators, or other sound-cancelling options. Potential impacts from other evaluated projects that involve dredge, fill, and/or placement, have been and would be similar to the Proposed Project Alternative, as detailed in Table 5.4-22. Avoidance, minimization, and other conservation measures, as previously discussed for sea turtles and outlined in the BA (Appendix N), would reduce adverse cumulative effects on the Gulf sturgeon.

Other evaluated projects contributing adverse impacts to the Gulf sturgeon include the Gulfport Harbor Navigation Channel Widening Project, Proposed Widening of the Pascagoula Lower Sound/Bayou Casotte Channel, Port of Gulfport Restoration Project, FNC Channel Modification, and maintenance dredging, as detailed in Table 5.4-22. Despite ongoing construction of the Restoration Project over the past several years, Gulf sturgeon monitoring efforts show passage of tagged individuals through the Port and the use of benthic habitat in the immediate vicinity. Additionally, recent unpublished data from ongoing tagging and monitoring studies suggest that Gulf sturgeon utilize the nearshore habitat directly east of the Port and approximately 8 miles east of the Port more than they use the habitat surrounding the Port and west of the Port (Appendix N). This suggests that the existing Port structure may already serve as a signal/indicator for Gulf sturgeon to swim around and stay away from the Port. The potential for impacts to the Gulf sturgeon will vary by time of year for when activities are conducted, given that the species is most likely to occur in the Mississippi Sound in fall and winter months. For the USACE, the documented annual incidental take, by injury or mortality, is expected to consist of two Gulf sturgeon per fiscal year for all channel dredging and sand mining by hopper dredge activities (NMFS, 2003, 2005, 2007). Gulf-wide, this estimate includes the annual documented incidental take per fiscal year, by injury or mortality from hopper dredging, of four Gulf sturgeon; as well as noninjurous take of no more than eight Gulf sturgeon, and lethal or injurious take of up to one Gulf sturgeon, from all yearly relocation trawling in the Gulf (NMFS, 2003, 2005, 2007). Further, NOAA Fisheries estimates that approximately 50 percent of takes go undocumented, and as such included such take in their evaluation in which they determined that anticipated hopper dredging will not jeopardize the continued existence of any listed species or destroy or adversely modify designated Gulf sturgeon critical habitat (NMFS, 2003, 2005, 2007). Maintenance activities using hopper dredging in existing federally authorized channels would comply with GRBO guidelines, which would limit impacts to Gulf sturgeon. Although reduced under the Proposed Project Alternative, the general increase in vessel traffic within the Mississippi Sound would increase the risk for spills, as previously discussed, which could have an adverse cumulative effect on the species. Adverse impacts from these projects would be offset to some degree by benefits from restoration, protection, and conservation projects in MsCIP and CIAP that would positively affect the Gulf sturgeon, as detailed in Table 5.4-22.

Table 5.4-22
Cumulative Impacts to Threatened and Endangered Species

Action	Threatened and Endangered Species
Applicant's Proposed Project Alternative	Temporary impacts from construction, dredging, and placement; short-term increases in turbidity and reduced DO conditions; no significant, long-term impacts to Gulf sturgeon critical habitat; sea turtles, especially Kemp's ridley, most likely to be affected negatively by dredging activities; possibility of entrainment mortality of Gulf sturgeon by dredging equipment
Ward Investments Project	Regulatory compliance would be required under Section 404 of the CWA
Proposed Widening of the Pascagoula Lower Sound/Bayou Casotte Channel	Temporary displacement of some threatened and endangered species during dredging and dredge material placement ; potential incidental take of Gulf sturgeon within its critical habitat; temporary displacement of piping plovers during dredging and dredge material placement; may affect, but is not likely to adversely affect, hawksbill and leatherback sea turtles, but is likely to adversely affect Kemp's ridley, loggerhead, and green sea turtles, and Gulf sturgeon and may adversely affect, but is not likely to destroy or adversely modify, designated critical habitat
Turkey Creek Ecosystem Restoration	Positive habitat benefits to some species, such as Mississippi sandhill crane, red-cockaded woodpecker, gopher tortoise, and others, by restoration of wet pine savannah habitat; improved water quality
Deer Island Restoration	Habitat could benefit threatened and endangered species, such as Gulf sturgeon, piping plover, manatee, and sea turtles; increased piping plover over-wintering habitat; potential temporary impacts to piping plover, manatees, Gulf sturgeon, and sea turtles but species should avoid construction areas due to noise and activity
Forrest Heights Levee Improvement	No impacts anticipated
MsCIP Barrier Island Restoration (Ship Island and Cat Island)	Habitat could benefit threatened and endangered species, such as Gulf sturgeon, sea turtles, and piping plover
Coast-wide Beach and Dune Restoration	Short-term potential displacement during construction and additional unknown impacts requiring consultation; long-term habitat benefits to nesting, roosting, and breeding of listed species, such as piping plovers and least terns, and provision of valuable stopover habitat in the Mississippi Flyway Corridor
CIAP Projects	N/A; however, potential benefits from preservation, conservation, and restoration activities
FNC Channel Modification with Bend Easing	Temporary impacts from construction, dredging, and placement; decreased risk of vessel strikes to mammals due to reduction in vessel traffic; short-term increases in turbidity and reduced DO conditions; sea turtles, especially Kemp's ridley, most likely to be affected negatively by dredging activities; increase in vessel traffic safety slightly reduces probability of a petroleum spill; possibility of entrainment mortality of Gulf sturgeon by dredging equipment
MDOT's I-310 Project	No impact to individuals; impact to potentially suitable habitat for red-bellied turtle and mud salamander
KCS Rail Improvements Project	Project likely to impact, but not adversely impact the federally threatened gopher tortoise
Courthouse Road Flood Damage Reduction	N/A

Table 5.4-22, cont'd

Action	Threatened and Endangered Species
Shearwater Bridge Storm Damage Reduction	N/A
Long Beach Canals	N/A
Harrison County Beaches Ecosystem Restoration and Hurricane Storm Damage Reduction	Benefits to threatened and endangered species, such as piping plovers and least terns
Port of Gulfport Restoration: 24-acre fill	Loss of 24 acres of Gulf sturgeon critical habitat (or 0.005% Mississippi Sound Gulf sturgeon critical habitat); benefits from mitigation plan in accordance with Permit MS96-02828-U to mitigate for these losses (e.g., contribution of $94,000 to MDMR Coastal Preserve acquisition program)
Port of Gulfport Restoration: 60-acre fill	Loss of 60 acres (or 0.012% of Mississippi Sound Gulf sturgeon critical habitat); benefits from mitigation plan in accordance with Permit MS96-02828-U to mitigate for these losses (e.g., contribution of $1,000,000 to MDMR Coastal Preserve acquisition program); mitigation result in estuarine benefits
Gulfport Small Craft Harbor Redevelopment	Temporary loss of shoreline foraging and roosting habitat for federally threatened piping plover from excavation of 0.96 acre of existing shoreline immediately east of the proposed project site to create compensatory shallow water habitat
Maintenance Dredging	Incidental take from injury and mortality of sea turtles and Gulf sturgeon; temporary degradation of Gulf sturgeon critical habitat due to suspended solids, noise, reduced DO, and burial of benthic organisms (prey items); reduction in the availability of prey for foraging during dredging and placement activities; entrainment of Gulf sturgeon and sea turtles during dredging and placement activities; behavioral impacts due to noise from dredging on all listed species; and reduction in habitat quality around dredging areas (e.g., elevated turbidity and low DO during dredging and placement)
Gulfport Harbor Navigation Channel Widening Project	Temporary and minor potential impacts to sea turtles; potential temporary localized disruption to foraging behavior of Gulf sturgeon in dredge/disposal areas and potential for entrainment of sturgeon swimming in the dredging areas; potential temporary disruption of roosting behavior of piping plover at the western end of Ship Island; impacts incurred during dredging activities
Qualitative Summary of Cumulative Impacts	Cumulative impacts would include displacement of piping plover, listed sea turtles, West Indian manatee, and Gulf sturgeon during construction, placement, and dredging activities; degradation of habitat quality by these activities; cumulative increased risk of mortality or injury to listed sea turtles and Gulf sturgeon from impingement or entrainment during dredging activities; avoidance, minimization, and mitigation measures in place to prevent jeopardizing future existence of threatened and endangered species; restoration, stabilization, protection, and beneficial use actions would have cumulative beneficial effects on threatened and endangered species

5.4.19 Cultural Resources

The location for the Proposed Project Alternative has a low probability for containing unrecorded cultural resources sites. Based on the information provided by the MDAH, no cultural resources are listed in the NRHP within the Project area. Past, present, and reasonably foreseeable future projects in the area are also not expected to affect cultural resources, as shown in Table 5.4-23. As such, the Proposed Project Alternative would not contribute to any negative cumulative impacts to cultural resource within the study area. Cumulative adverse effects to cultural resources have occurred in the past and will occur in the future, albeit to an unknown extent; however, it is anticipated that current regulations will protect most cultural resources, such that future impacts would be minor.

Table 5.4-23
Cumulative Impacts to Cultural Resources

Action	Cultural Resources
Applicant's Proposed Project Alternative	No recorded sites listed in the NRHP; probability for unrecorded sites is low; no impacts to terrestrial or submerged sites during construction
Ward Investments Project	N/A; regulatory compliance would be required under Section 404 of the CWA
Proposed Widening of the Pascagoula Lower Sound/Bayou Casotte Channel	Any impacts to previously recorded archaeological site, 22JA516, which is eligible for listing in the NRHP mitigated through Memorandum of Agreement with State Historic Preservation Officer (SHPO), USACE, Jackson County Port Authority, and Choctaw Nation of Oklahoma
Turkey Creek Ecosystem Restoration	No impacts; identified sites would be avoided
Deer Island Restoration	No adverse impacts; cultural resource sites would be protected and identified sites would be avoided
Forrest Heights Levee Improvement	No impacts anticipated
MsCIP Barrier Island Restoration (Ship Island and Cat Island)	Protection benefit to sites on mainland and on island, including Fort Massachusetts and the French Warehouse
Coast-wide Beach and Dune Restoration	Protection benefit to sites on mainland and on island
CIAP Projects	N/A
FNC Channel Modification	No recorded sites listed in the NRHP; probability for unrecorded sites is low; no impacts to terrestrial or submerged sites during construction
MDOT's I-310 Project	No impacts anticipated
KCS Rail Improvements Project	No impacts anticipated
Courthouse Road Flood Damage Reduction	N/A
Shearwater Bridge Storm Damage Reduction	N/A
Long Beach Canals	N/A

Table 5.4-23, cont'd

Action	Cultural Resources
Harrison County Beaches Ecosystem Restoration and Hurricane Storm Damage Reduction	N/A
Port of Gulfport Restoration: 24-acre fill	No impacts
Port of Gulfport Restoration: 60-acre fill	No impacts anticipated
Gulfport Small Craft Harbor Redevelopment	No impacts anticipated
Maintenance Dredging	No impacts anticipated
Gulfport Harbor Navigation Channel Widening Project	No adverse impacts
Qualitative Summary of Cumulative Impacts	No anticipated PGEP impacts; at Port of Pascagoula potential to adversely impact a cultural resource site (22JA516) eligible for listing in the NRHP, with impacts to be mitigated; protection benefits to cultural resource sites from several MsCIP projects; future impacts anticipated to be coordinated with regulatory agencies

5.5 CONCLUSIONS

Cumulative impacts from past, present, and reasonably foreseeable future projects, in combination with the Proposed Project Alternative, are not anticipated to have significant adverse impacts to most environmental resources within the study area, as discussed in the preceding sections. The majority of environmental impacts associated with the projects described in Sections 5.2 and 5.3 will be temporary, and in some cases, result in beneficial impacts to the region. One of the long-term cumulative impacts associated with the evaluated projects will be increased economic opportunity in terms of the number of jobs created and stimulus to the local economy. The Proposed Project Alternative, however, will likely contribute adverse impacts to air quality, traffic, noise, and threatened and endangered species, and could contribute to EJ issues, that in combination with other past, present, and reasonably foreseeable future actions could have an incrementally greater cumulative effect on these resources when compared to the effect of the individual action. It is anticipated that the Proposed Project Alternative, in combination with other evaluated projects, will not have significant cumulative adverse effects on environmental resources.

Existing governmental regulations will address the issues that influence local and ecosystem-level conditions. Natural resources in the area are provided protection through coordination with stakeholder groups, local organizations, and State and Federal regulatory agencies implementing regulations such as the CWA, ESA, NEPA, CZMA, and the CAA. This collaboration and regulation of impacted resources should avoid and minimize impacts that could contribute negative cumulative impacts in the region.

This page intentionally left blank.

6.0 MITIGATION

6.1 SOCIOECONOMICS RESOURCES

6.1.1 Community Values and Environmental Justice Mitigation Measures

Potential impacts to EJ communities within the study area for the No-Action and Proposed Project Alternatives are described in Section 4.3.8 and analyzed in further detail in the CIA (Appendix H). As part of the CIA process, potential mitigation measures were developed to avoid, minimize, and offset impacts to EJ communities. Mitigation measures address potential impacts to income and employment, traffic, air quality, noise, and community cohesion and are described below.

6.1.1.1 Income and Employment

The PGEP will not disproportionately or adversely impact a low-income or minority population (EJ Community). The potential impacts anticipated from the PGEP to income and employment would be beneficial. The EJ Community of the City of Gulfport would have the opportunity to benefit from the increased employment. Some jobs may require technical skills. Local population would be able to fulfill those roles capably, and with specialized job training, a higher percentage of local residents would excel in those future roles.

The MSPA and its Port of Gulfport Restoration Program (PGRP) partnered with the Mississippi Employment Security Commission's Workforce Investment Network Job Centers to inform the public about job opportunities associated with the Port. The national objectives goal of the PGRP is to make available to the greatest extent feasible to low and moderate income persons 51 percent of the jobs created from the Port's restoration project. The Port initiated its "Pathways to the Port" jobs program in order to bring together employers and those interested in a maritime-related career. Through the Pathways program, the Port will help prepare the local workforce for these jobs with individual job readiness assessments and training assistance (Port of Gulfport, 2014).

The continuation of the MSPA's aforementioned job training program as a potential mitigation measure for the No-Action Alternative and Proposed Project Alternative would not only continue to benefit the community, but also provide the Port with a capable, qualified, and competitive workforce into the future.

6.1.1.2 Community Cohesion

The PGEP would increase the viability of the Port and would not change the community's overall sense of place. However, increased traffic could cause neighborhoods to feel more isolated and difficult to navigate for motorist and pedestrians. Traffic analysis indicates that potential impacts to area traffic would be largely a result of background traffic, to which the Port would be one of many contributors. Potential mitigation measures could include flexible scheduling for work hours at the Port, inclusion of the community within the PGEP, community improvement activities (e.g., visual beautification), and development of a plan for continuous outreach between the Port and community leaders to facilitate dialogue and promote community cohesion. Rail traffic could further influence community cohesion as a result of the Proposed Project Alternative; however, study results did not propose mitigation actions.

Proposed mitigation measures for traffic, air quality, and noise are discussed below, as appropriate.

6.2 ROADWAY AND RAIL TRAFFIC

6.2.1 Roadway Traffic Mitigation Measures

Appendix I identified specific road segments whose LOS declines to unacceptable levels (LOS E or F) due to traffic growth, and presented roadway improvements that could restore traffic operations to LOS D or better. This section organizes the list of roadway improvements to identify those that might be a direct result of new traffic generated by the No-Action and Proposed Project Alternatives. Those that are a product of background traffic growth in the Gulf Coast urbanized area and growth in shipping activity constrained by previously approved expansion actions are initially identified so that those explicitly resulting from the Proposed Project Alternative could be separated.

6.2.1.1 Roadway Traffic Mitigation – No-Action Alternative

With completion of the Restoration Project in 2017, under the No-Action Alternative, Port traffic demand is expected to grow, but at a lower rate because the Port footprint will be completely built out with no additional space for new tenants. Table 6.1-1 summarizes which road network improvements would be needed from 2020 to 2060 to maintain an acceptable LOS as a result of increased Port traffic associated with the No-Action Alternative.

6.2.1.2 Roadway Traffic Mitigation – Proposed Project Alternative

Table 6.1-2 summarizes the roadway improvements that would be needed in addition to the No-Action Alternative improvements due to additional traffic generated by the Proposed Project Alternative; however, these improvements would not be the responsibility of the Port. No additional improvements would be needed in 2020 or 2040.

Table 6.1-1
Roadway Improvement Needs – No-Action Alternative

Year Needed	Corridor Name	Location	Potential Improvement	Comments
2020	28th Street	Canal Road Intersection	Eastbound Channelized Through Lane	Could be included with the committed LRP project to add TWLTL to 28th Street from Canal Road to 30th Avenue
2040	28th Street	West of Canal Road to 30th Avenue	Widen 28th Street to 4 lanes with TWLTL	New project needed to handle regional traffic growth beyond 2035 GRPC LRP
2040	Canal Road	28th Street Intersection	Add second southbound left turn lane	Could be included with uncommitted LRP project to add TWLTL to Canal Road from south of I-10 to 28th Street
2060	US 49	25th Street to south of 28th Street	Eliminate on-street parking, restripe existing roadway from 4 to 6 lanes	Low cost project
2060	I-10/US 49 Interchange	Westbound to southbound loop ramp	Close loop ramp, construct left turn lanes on existing westbound to northbound ramp, add traffic signal to US 49 for left turn lanes.	New project needed to handle regional traffic growth beyond 2035 GRPC LRP if planned new I-10 interchanges are not built (Airport Road or I-310)

LRP = Long-range Plan; TWLTL = two-way left-turn lane; GRPC = Gulf Regional Planning Commission

Table 6.1-2
Roadway Improvement Needs – Proposed Project Alternative

Year Needed	Corridor Name	Location	Potential Improvement	Comments
2060	30th Avenue	Northbound at 25th Street	Add northbound right-turn bay	Low cost project
2060	US 49	Southbound at Creosote Road	Widen roadway to add second southbound left-turn lane	Depends on uncommitted GRPC LRP project to widen Creosote Road to 4 lanes from US 49 to Three Rivers Road

LRP = Long-range Plan; GRPC = Gulf Regional Planning Commission

6.2.2 Railroad Traffic Mitigation

While additional train trips would be generated by the Port, the analysis projects the duration of delays and frequency of delays caused by the additional train trips generated by the Proposed Project Alternative should fall within the same thresholds as the No-Action Alternative. Therefore, impacts associated with changes in rail transport activities at the Port are expected to be the same as described for the No-Action Alternative. The slight changes in throughput would not substantially change expected delays at railroad crossings. No mitigation is proposed.

6.3 AIR QUALITY

In the long term, the Proposed Project Alternative would be anticipated to have an increase in impacts compared with the No-Action Alternative due to increased cargo transport to and from the Port and increased material volumes for maintenance dredging. Potential measures to reduce impacts are described below.

6.3.1 Greenhouse Gas Emissions Reductions Program

The Port is committed to using methods to minimize GHG emissions including, for example, the use of LED high mast lights and other "green" features to make the Port more energy efficient. The Port also joined the Green Marine Environmental Program in 2013. This program requires a voluntary commitment from participating maritime companies to tangibly and measurably strengthen their environmental performance with respect to priority environmental issues including GHG emissions. The program provides a framework and ranking system for maritime companies to follow to reduce their environmental footprint. Guidance on how maritime companies can improve their environmental performance on 11 topics such as GHG and air pollutant emissions, cargo residues, prevention of spills and leakages, and community impacts is also provided. Participants must demonstrate improvements each year to maintain their certification. Every two years, Green Marine will engage a third-party consultant to conduct an on-site visit to ensure the integrity of the program and certify the Port's self-evaluation.

There are six categories in which the Port is ranked: aquatic invasive species, GHG and air pollutant emissions, spill prevention, dry bulk handling and storage, community impacts, and environmental leadership. Scoring for the Green Marine Program includes Levels 1 through 4 with 1 being the first and lowest level of environmental performance and 4 being the highest level of achievement for environmental performance. The evaluations are submitted in April of each year. In 2013, the Port's first year in the Green Marine Environmental Program, the Port performed a self-evaluation to assess its initial level of environmental performance and scored Level 1 in the six categories.

In 2014, the Port scored Level 1 in environmental leadership, Not Applicable (NA) for invasive species, and Level 3 in spill prevention. At this time, the Port was certified at Level 2 for GHG and air pollutant emissions, dry bulk handling and storage, and community impacts. For Level 2, the Port is ranked on policies and enforcement of: limiting idling of vehicle engines; promoting sustainable transportation practices (e.g., carpooling); implementing measures to reduce congestion and idling during periods of heavy activity; and informing, and when necessary, issuing warnings to ships which emit excessive amounts of smoke. The Port has, by default, reduced emissions as a result of Hurricane Katrina which destroyed many of the Port's on-site vehicles such as fork lifts and trucks. Almost all of the Port's equipment is new dating from 2006, including new propane-driven forklifts. In addition, the Port recently purchased electric carts, replacing on-site trucks, to be used by maintenance staff and crane operators. Another element that is improving emissions at the Port is the purchase and integration of three new electric rail-mounted gantry cranes. The cranes were delivered in March 2016 and as a result, the existing diesel-powered rubber tire gantry cranes are now used as back-up cranes and for special cargo.

To achieve Level 3 for GHG and air pollutant emissions, the Port will be required to conduct an annual audit to determine the amount of CO_2 produced at the Port. The audit includes charting how much fuel is used by all Port vehicles and buildings. This information will be used to determine how much CO_2 is produced and therefore how many MT of GHG were emitted. The audit applies only to Port-owned and operated equipment; equipment owned and operated by tenants is not included in the audit. To achieve a Level 4 certification in the GHG and air pollutant emissions category, an energy performance plan is required. The energy performance plan must comprise the following elements:

Best Practices

- Description of the best practices the Port has put into place to reduce greenhouse gas emissions.
- Distribution and verification procedures for ensuring the implementation of these best practices.
- Identification of persons responsible for applying these procedures.

Reduction Plan

- A list and description of measures to be implemented to reduce GHG and air pollutant emissions related to the Port's activities.
- A quantifiable reduction target (based on intensity).
- Identification of possible improvements.
- Designation of a person responsible for annual follow-up of the reduction plan.

As previously shown, air contaminant emissions from the Proposed Project Alternative would result from the operation of dredges, tugboats, and land-side construction equipment, during construction activities, as well as the increase in freight (truck and rail), container ship, employee, and supplier vehicle traffic powered by internal combustion engines that produce exhaust emissions. Emissions from these sources would result in an increase in GHG emissions that could contribute to global climate change.

Measures that would be used to reduce GHG emissions for the Proposed Project Alternative would consider the equipment used for the Project over the expected life of the Project and the feasibility and practicality of such measures. Alternatives considered for their ability to reduce or mitigate GHG emissions are those that may provide for enhanced energy efficiency, lower GHG-emitting technology, and renewable energy sources, as appropriate, for the construction and operating equipment and vehicles to be used. Efforts to reduce GHG emissions from the construction and operation of the Proposed Project Alternative would include:

Dredging Mitigation Options

- Contract with dredging companies with energy efficient equipment.
- Design of the dredging operation and schedule so as to reduce overall fuel use.
- Repowering/refitting with cleaner diesel engines.
- Selection of newer dredges with more efficient engines, if possible.

Land-side Mitigation Options

- Use of Biodiesel Fuel – Biodiesel can be used directly in the unmodified diesel engines of some construction equipment, trucks, and other heavy vehicles resulting in emissions that are considerably cleaner than from the combustion of conventional diesel. Biodiesel is also considered a greenhouse-neutral fuel. Biodiesel could provide a 4 to 22 percent reduction in CO_2 emissions compared to diesel fuel.
- Conversion to CNG or LPG – CNG could provide about a 27 percent reduction in CO_2 emissions compared to gasoline, and LPG could provide about a 14 percent reduction.
- Repowering/refitting with cleaner, more fuel efficient, diesel engines.
- Use of propane-generated fork-lifts for stevedores (already in place).
- Use of electric reefer plugs instead of gas-powered generators for containers with cargo that require climate control, such as bananas (already in place).
- Use of newer vehicles with more fuel efficient engines, including bio-diesel trucks, if possible (already in place).
- Provision of electric power to tugs and pilots, eliminating the need to run their vessels when in port.
- Installation of automated gates which are fully electronic within five years, thereby reducing idling time.
- Enforcement of idling requirements (no more than 10 minutes) for truckers while in port (already in place).

Freight Traffic Mitigation Options

- Repowering/refitting with cleaner, more fuel efficient, diesel engines.
- Use of hybrid rail engines and other vehicles, as available.
- Use of newer vehicles with more fuel efficient engines, if possible.

Container Ship Mitigation Options

- Use of container ships with more efficient engines and propulsion systems.
- Use of container ships with engine and propulsion systems and design features that follow the IMO guidance for improvements in energy efficiency.

6.4 NOISE AND GROUND-BORNE VIBRATION

6.4.1 Noise

The FTA and FRA require that mitigation measures be considered when a noise assessment suggests either severe or moderate impacts. The Proposed Project Alternative would result in an increase in both severe and moderate impacts to noise-sensitive receptors. The majority of these impacts would occur in the Hattiesburg and Gulfport areas due to the combination of high population densities and numerous at-grade rail crossings (with their associated horn noise).

Reducing horn noise by the use of noise barriers is generally not feasible because they reduce driver visibility at intersections. Residential soundproofing is a mitigation option for smaller scale impacts, but is not feasible in this case due to the large number of impacted receptors. The most feasible noise mitigation measure would likely be the establishments of Quiet Zones in the Greater Gulfport and Hattiesburg areas.

By adopting approved SSMs at each public grade crossing, a Quiet Zone of at least a half-mile long can be established that would preclude the need for use of a horn at rail crossings, and thus eliminate this noise source. These measures would be applicable in addition to the standard safety devices required at most public grade crossings (e.g., stop signs, reflective cross bucks, flashing lights with gates that do not completely block travel over the tracks). The six SSMs identified below have been predetermined by the FRA to fully or in tandem compensate for the lack of a locomotive horn:

1. *Reconstruct the street crossing into an under-over pass.* This measure, while expensive, would completely eliminate the need for a train to sound its horn.
2. *Temporary closure of a public highway-rail grade crossing.* This measure requires closure of the grade crossing one period for each 24 hours, and must be closed the same time each day.
3. *Four-quadrant gate system.* This measure involves the installation of at least one gate for each direction of traffic to fully block vehicles from entering the crossing.
4. *Gates with medians or channelization devices.* This measure keeps traffic in the proper travel lanes as it approaches the crossing. This denies the driver the option of circumventing the gates by traveling in the opposing lane.
5. *One-way street with gates.* This measure consists of one-way streets with gates installed so that all approaching travel lanes are completely blocked.
6. *Pole-mounted wayside warning horns.* This measure places warning horns on signal poles directly at the street crossing in question. The wayside horns are still relatively loud (92 dBA at 100 feet) but can be effectively aimed directly down the affected street to minimize disturbance to adjacent neighborhoods.

The lead agency in designating a Quiet Zone is the local public authority responsible for traffic control and law enforcement on the roads crossing the tracks. In order to satisfy the FRA regulatory requirements, the public transit agency must work closely with the highway/traffic agency while also coordinating with any freight or passenger railroad operator sharing the right-of-way.

6.4.2 Potential Ground-Borne Vibration Mitigation

The proposed increase in rail traffic would occur in an existing corridor, so relocating tracks or creating buffer zones are not viable mitigation options. Regular maintenance could be used as a mitigation measure against the effects of vibration. Maintenance may include regularly scheduled rail grinding, wheel truing programs, use of wheel-flat detectors and general reconditioning programs.

6.5 THREATENED AND ENDANGERED SPECIES

6.5.1 Fish

The proposed Project is located in Critical Habitat Unit 8 for the Gulf sturgeon. Underwater noise levels from construction activities, including active dredging, placement activities, and pile driving may disturb Gulf sturgeon and cause them to alter their routes during potential migration through the Project area. Underwater noise impacts from the installation of pilings would be mitigated through the use of bubble curtains, resonators, or other sound-cancelling options.

7.0 ANY ADVERSE ENVIRONMENTAL IMPACTS THAT CANNOT BE AVOIDED SHOULD THE PROPOSED PROJECT ALTERNATIVE BE IMPLEMENTED

The Proposed Project Alternative would result in minor adverse impacts to air quality, noise levels, regional bathymetry, benthos, and fish, from the dredging and placement of dredged material. Impacts would be similar to those resulting from maintenance dredging operations, although all impacts except for those on bathymetry will be temporary in nature. Air emissions of criteria pollutants and HAPs from dredging operations, construction vessel emissions, and on-road vehicle emissions are unavoidable, but are short term, would equal very small percentages of the total criteria pollutants and HAPs emitted in the study area, and would result in minor impacts. Dredging operations would result in temporary minor noise level increases, but would be compatible with other industrial activities in the study area. The Proposed Project Alternative would result in permanent changes to the regional bathymetry; however, the Project would have a negligible effect on circulation patterns or impacts to currents or tides.

Under the Proposed Project Alternative, an estimated total volume of 7.68 mcy would be dredged, with an additional 486,000 cy to 1.3 mcy to be dredged as part of maintenance work every year. Dredging operations would temporarily increase turbidity levels around the construction area, with impacts on primary productivity, benthic and other aquatic organisms, such as birds and marine mammals. The Proposed Project Alternative would result in the permanent loss of 196.5 acres of estuarine mud and sand bottom habitat to construct the proposed Project and permanent conversion of 85 acres to deeper habitat, less productive hypoxic habitat, reducing the amount of food available for aquatic organisms, and the federally protected Gulf sturgeon. However, this represents a small fraction of the entire ecosystem.

Temporary effects that are unavoidable include turbidity in the water column from the dredging process, which interferes with light penetration and reduces photosynthetic activity by phytoplankton and algae. However, turbidities are localized and can be expected to return to ambient conditions within a few hours. Benthic organisms are expected to re-colonize the dredged area and also the area receiving dredged material rapidly, and fish, birds, and marine mammals are likely to return after dredging operations have ceased. Alternatively, the upwelling of nutrients can enhance the area during dredging as well, increasing productivity. Finfish have the capability to swim away from turbid plumes, and shellfish can filter normally once ambient conditions return.

The remote possibility of a petroleum spill would increase over time, as vessel traffic would be expected to increase, primarily affecting phyto- and zooplankton and juvenile fish and shellfish. Because of high reproductive rates among these lower tiers of the food chain, an impact from an oil spill should be temporary without permanent impacts.

The proposed PGEP could be beneficial to coastal geologic processes, as the eastern breakwater would buffer against shoreline erosion; the breakwater provides the best protection from high wave energy events deriving from the south and east. However, the breakwater and expansion of the West Pier could lead to small-scale deposition zones due to the eddy-effect, but would be a minor impact on the general system's hydrodynamics.

A small, permanent increase in noise would be to be expected with higher throughput at the Port with the PGEP; the closest noise-sensitive receptor is approximately 2,400 feet away, with a daily expected range of 42 to 47 dBA. An increase of 3 dBA can be expected from the expected 367 percent increase of vessels by 2060 (970 more vessels/year), which should not be noticeable. However, underwater noise can be an issue to the migrating West Indian manatee, among other species, which would most likely practice avoidance.

Dredging may cause injury or mortality among the five sea turtle species, only one of which is considered common in the area (Kemp's ridley sea turtle). Section 4.19.2.3 details avoidance, minimization, and conservation measures that can be taken during the hopper dredging process to help prevent sea turtle mortality, such as onboard observers during dredging operations, screening, sea turtle deflecting draghead and dredging pumps, dredge lighting, and relocation trawling, but any expected mortality should not be significant enough to affect long-term populations.

Finally, the reduction of critical habitat for the endangered Gulf sturgeon, and possible burial of sturgeon during the dredging/placement process are permanent environmental impacts that cannot be avoided. The degradation of critical habitat due to suspended solids, reduced oxygen (potentially less than 4 mg/L in areas), and burial of benthic organisms are inevitable short-term environmental impacts to the Gulf sturgeon that cannot be avoided. The existing and future Port facilities are located within Gulf sturgeon critical habitat; however, the recommended dredge placement area (BMC) is located outside the critical habitat boundary.

8.0 ANY IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF RESOURCES INVOLVED IN THE IMPLEMENTATION OF THE RECOMMENDED PLAN

Under NEPA, a review of irreversible and irretrievable effects that result from development of the proposed Project is required (40 CFR §§ 1500–1508). Irreversible commitments of resources are those resulting from impacts to resources so they cannot be completely restored to their original condition. Irretrievable commitments of resources are those that occur when a resource is removed or consumed and will therefore never be available to future generations for their use. For resources or subjects where irreversible or irretrievable effects would result, such effects are discussed with short- and long-term impacts. The labor, capital, and material resources expended in the planning and execution of dredging operations and dredged material placement would be irreversible and irretrievable commitments of human, economic, and natural resources. The bathymetry of the bottom along Mississippi Sound with regards to the Port facilities would be irreversibly altered, but would have no permanent impacts on circulation patterns, currents, or other water movements. Energy resources used by the dredge equipment would be committed during dredging operations.

This page intentionally left blank.

9.0 RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The proposed PGEP would temporarily impact productivity in the study area during construction, dredging operations, and placement of dredged material, by potentially displacing or disturbing marine life and burying benthic organisms. The increased noise levels associated with dredging could disturb the daily activities of species inhabiting the study area, and the physical removal of sediment and placement would negatively impact benthic organisms. These impacts would be temporary in nature and the species affected are expected to return to the area following the completion of construction. A portion of the dredged material would be used for beneficial use at an approved placement area (such as the BMC), which would help maintain sediment budgets in the Project area.

This page intentionally left blank.

10.0 IDENTIFICATION OF THE ENVIRONMENTALLY PREFERRED ALTERNATIVE

The alternatives analysis presented in this EIS (Sections 2.0 and 4.0) provides information necessary to meet the requirements of NEPA (reasonable alternatives), and provide the basis for the USACE to make specific findings under Section 404(b)(1) of the CWA (practicable alternatives). 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. 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.

The "environmentally preferable" alternative promotes the national environmental policy as expressed in NEPA. The USACE regulatory process includes selection of the LEDPA that would minimize the impacts to waters of the U.S., over which USACE has jurisdiction, and that meets the USACE's requirements for analysis of the purpose and need for the proposed project. In general, the selected alternative should minimize damage to the biological and physical environment while protecting, preserving, and enhancing historic, cultural, and natural resources (40 CFR 1508.14).

The Proposed Project Alternative was evaluated in this EIS and compared to the No-Action Alternative to identify the environmentally preferred alternative. As discussed in Chapter 4.0, potential impacts associated with the Proposed Project Alternative are very similar for most resources when compared to the No-Action Alternative. The majority of differences between the Proposed Project Alternative and No-Action Alternative are associated with the expansion of existing Port facilities and the changes associated with increased throughput. For the most part, differences associated with the expansion and increased throughput are the result of increased dredging during construction and potentially during maintenance activities. These increases would be short-term and do not significantly affect the resources long-term. Additionally, the mitigation measures to be implemented as part of the Proposed Project Alternative as described Section 6.0 will avoid or mitigate the short-term adverse effects on the biological and physical environment anticipated during Project construction, dredging, and placement activities.

This page intentionally left blank.

11.0 PERMITS AND APPROVALS REQUIRED

This section provides an overview of laws and regulations potentially affecting the proposed Project, as well as a summary of how these criteria are or will be addressed. The resources protected by these laws and regulations are described in Section 3 – Affected Environment. The potential environmental consequences of the No-Action and Proposed Project Alternatives are evaluated in Section 4, and cumulative impacts are evaluated in Section 5.

11.1 CLEAN AIR ACT GENERAL CONFORMITY AND SECTIONS 176 AND 309 (42 USC 7401 ET SEQ.)

The CAA is a comprehensive Federal law that regulates air emissions from stationary and mobile sources across the U.S. Under the CAA, the EPA develops NAAQS to protect public health and to regulate emissions of hazardous air pollutants. NAAQS have been developed to maintain safe concentrations of ground-level ozone, particulate matter, NO_2, SO_2, carbon monoxide, and lead. Gulfport is in attainment for all NAAQS (EPA, 2013g).

Implementation of the CAA is primarily the responsibility of states through the development of SIPs. These Plans outline how each state will control air pollution in accordance with the CAA. An SIP is a collection of regulations, programs, and policies that a state will use to clean up polluted areas, and is subject to EPA approval. State, local, and tribal governments also monitor air quality, inspect facilities under their jurisdictions and enforce CAA regulations (EPA, 2011b).

States must develop SIPs that explain how each state will implement CAA requirements via a collection of regulations. The General Conformity Rule Section 176(c) of the CAA ensures that the actions taken by Federal agencies in nonattainment or maintenance areas do not interfere with a state's plans to meet national standards for air quality (42 USC 7401 et seq.). Section 309 of the CAA authorizes EPA to comment on the environmental impact of any newly authorized Federal project for construction and any other major Federal agency action significantly affecting the quality of the human environment (42 USC 7401 et seq.).

The requirements of the CAA apply to this EIS. The potential air quality impacts resulting from this Project are discussed in Section 4.5, and air quality data are summarized in Appendix P. No air quality permits are anticipated to be required for this Project. Because the Project is located in Harrison County and the County has been designated in attainment or unclassifiable with the new 8-hour ozone standard, the General Conformity requirements are not applicable, and a General Conformity Determination will not be required.

11.2 SECTION 404 OF THE CLEAN WATER ACT

The Federal Water Pollution Control Act of 1972, as amended in 1977 via the CWA, authorizes the EPA to regulate activities resulting in a discharge to navigable waters. Section 404 of the CWA normally requires an USACE permit for the discharge or deposition of dredged or fill material and for the building of structures in all waters of the U.S., other than incidental fallback (a term that generally refers to material falling back into waters incidentally during an activity designed to remove material, but if in doubt should be clarified during the preparation or review of a permit application). The process used for completion of the proposed Project should be consistent with the guidelines described in Section 404(b)(1) of the CWA. Criteria to be considered in evaluating the No-Action and Proposed Project Alternatives include cost, technology, environmental effects, and logistics. Guidelines prepared for the evaluation of dredge and fill material also indicate that actions subject to NEPA would, in all probability, meet the requirements of the analysis of alternatives specified by Section 404(b)(1) guidelines. As part of its review, the USACE consults with other agencies, including the USFWS and State Historic Preservation Officer (SHPO). The Section 404(b)(1) evaluation report is included in Appendix R, and the Section 404 permit application is included in Appendix A.

11.3 SECTION 10 OF THE RIVERS AND HARBORS ACT

Section 10 of the Rivers and Harbors Act prohibits the construction of structures or obstructions in navigable waters without consent of Congress (33 USC 407). Structures include wharves, piers, jetties, breakwaters, bulkheads, etc. The Rivers and Harbors Act also considers any changes to the course, location, condition, or capacity of navigable waters and includes dredge and fill projects in those waters. The USACE oversees implementation of this law. Permission to install a feature or conduct dredging or filling requires the approval of the Chief of Engineers. The Federal Gulfport Harbor Navigation Project was adopted by the Rivers and Harbors Act approved on July 3, 1930, and the Rivers and Harbors Act approved on June 30, 1948.

The requirements of the Rivers and Harbors Act apply to this EIS. The potential impacts resulting from this Project are discussed in Section 4.0. This EIS is being completed by the USACE, Mobile District, via submittal of a permit application (Appendix A) in accordance with Section 404 of the CWA, which is also being reviewed under Section 10 of the Rivers and Harbors Act of 1899, and Section 103 of the MPRSA.

11.4 SECTION 103 OF THE MARINE PROTECTION, RESEARCH, AND SANCTUARIES ACT

Titles I and II of the MPRSA, also referred to as the Ocean Dumping Act, generally prohibits (1) transportation of material from the U.S. for the purpose of ocean dumping; (2) transportation of material from anywhere for the purpose of ocean dumping by U.S. agencies or U.S.-flagged vessels; and (3) dumping of material transported from outside the U.S. into the U.S. territorial sea. A permit is required to deviate from these prohibitions.

EPA is charged with the development of ocean dumping criteria to be used during the evaluation of permit applications. The MPRSA provisions administered by EPA are published in Title 33 of the U.S. Code (33 USC 1401 et seq.). The MPRSA provisions that address marine sanctuaries are administered by NOAA and are published in Title 16 of the U.S. Code (16 USC 1431 et seq.)

Under Section 103 of the MPRSA, the USACE is authorized to "issue permits, after notice and opportunity for public hearings, for the transportation of dredged material for the purpose of dumping it into ocean waters, where the dumping will not unreasonably degrade or endanger human health, welfare, or amenities, or the marine environment, ecological systems, or economic potentialities."

This EIS is being coordinated with appropriate State and Federal agencies in accordance with the MPRSA and includes an evaluation of the proposed Project's potential impacts to resources protected under this Act. A DMMP (Anchor QEA LLC, 2017) is included in Appendix F. Additionally, Appendix G provides results from sediment sampling and testing conducted by MSPA for all sediment that would be dredged as part of the proposed Project according to requirements of Section 103 of the MPRSA.

Title III of the MPRSA, also referred to the National Marine Sanctuaries Act, allows the Secretary of Commerce to designate any discrete area of the marine environment as a National Marine Sanctuary if certain conditions are met regarding the site's significance, existing state and Federal protections, and size and nature (16 USC 1431 et seq.). The National Marine Sanctuaries Act stipulates that if a Federal action is likely to destroy, cause the loss of, or injure a sanctuary resource, the Secretary must recommend reasonable and prudent alternatives that can be used by the agency, in implementing the action that will protect sanctuary resources. No National Marine Sanctuaries are located near the Port; therefore, the requirements of the act do not apply.

11.5 SECTION 401 OF CLEAN WATER ACT

The Federal Water Pollution Control Act of 1972, as amended in 1977 via the CWA, authorizes the EPA to regulate activities resulting in a discharge to navigable waters. Section 401 of the CWA specifies that any applicant for a Federal license or permit to conduct any activity that may discharge into navigable waters must obtain a certification that the discharge complies with applicable sections of the CWA (33 USC 1251 et seq.). Section 401 of the CWA requires certification that activities, including dredge and fill activities, would not violate water quality standards.

The potential water quality impacts resulting from this Project are discussed in Section 4.13. Pursuant to Section 401 of the Federal Water Pollution Control Act of 1972, the USACE, Mobile District will request water quality certification from the MDEQ, Office of Pollution Control for the proposed Project.

11.6 SECTION 7 OF THE ENDANGERED SPECIES ACT

The ESA, as amended, establishes a national policy designed to protect and conserve threatened and endangered species and the ecosystems upon which they depend (16 USC 1531–1543). The ESA is administered by the Department of the Interior, through the USFWS, and by the U.S. Department of Commerce, through the NMFS. Section 7 of the ESA specifies that any agency that proposes a Federal action that could jeopardize the "continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species" (16 USC 1536 Section 7(a)(2)) must participate in the interagency cooperation and consultation process.

The requirements of the ESA apply to this EIS. The potential impacts to endangered species resulting from this Project are discussed in Section 4.19. A BA stating the USACE's effect determinations for potentially affected federally protected species has been prepared and is provided as Appendix N. The proposed Project will be reviewed by the USFWS and the NMFS to determine compliance with the ESA. After consultation, the Secretary (of Interior or Commerce or both) will issue an opinion on the action. If unacceptable adverse impacts to threatened or endangered species are identified by the USFWS or the NMFS, the Secretary will recommend reasonable alternatives (16 USC 1531 Section 7(b)(3)(A)).

11.7 MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

The MSFCMA (PL 94-265), as amended, provides for the conservation and management of the nation's fishery resources through the preparation and implementation of Fishery Management Plans (FMPs) (16 USC 1801 et seq.). The MSFCMA calls for NOAA Fisheries to work with regional Fishery Management Councils to develop FMPs for each fishery under their jurisdiction.

One of the required provisions of fishery management plans specifies that EFH be identified and described for the fishery, adverse fishing impacts on EFH be minimized to the extent practicable, and other actions to conserve and enhance EFH be identified. The MSFCMA also mandates that NMFS coordinate with and provide information to Federal agencies to further the conservation and enhancement of EFH. Federal agencies must consult with NMFS on any action that may adversely affect EFH. When NMFS finds that a Federal or state action would adversely affect EFH, it is required to provide conservation recommendations.

The proposed Project will result in the permanent loss of 196.5 acres of estuarine mud and sand bottom habitat and therefore the requirements of the MSFCMA are applicable to this EIS. Potential impacts on fish species and associated EFH have been evaluated and are presented in this EIS in Sections 3.18.2 and 4.18.7. Per discussions with NMFS, an EFH Assessment document was prepared (Appendix M). There are no HAPC designated in the proposed Project area (NOAA, 2013). In addition, no EPA Special Aquatic Sites are located in the proposed Project area. Coordination with NMFS with respect to the MSFCMA is ongoing.

11.8 SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT

The NHPA, enacted in 1966 and amended in 1970 and 1980, provides for a NRHP to include districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, and culture (16 USC 470 et seq.). The law seeks to preserve the historical and cultural foundation of the U.S. according to Executive Order 11593, *Enhancement and Protection of the Cultural Environment*. The Federal government will provide leadership in preserving, restoring, and maintaining the historic and cultural environment. The NHPA provides funding for each state to establish a SHPO. The SHPO oversees performance of appropriate surveys to ensure that historic and cultural resources are protected under the law.

The provisions of the NHPA apply and this EIS addresses the process to assure compliance. The potential consequences of the No-Action and Proposed Project Alternatives with respect to cultural resources are evaluated in Section 4.20. No impacts are expected. The proposed Project was reviewed following the USACE NEPA/Section 404 evaluation process. USACE requested SHPO review of archaeological and historical resources and concurrence prior to operations. Compliance with Section 106 of NHPA and the Interim Guidance for Implementing Appendix C of 33 CFR Part 325 is required for any cultural resources located in the permit area. USACE coordinated a “no effect” determination for archaeological and historical resources with SHPO on May 25, 2016 (see Appendix E-2). No comments were received from the SHPO.

11.9 COASTAL ZONE MANAGEMENT ACT

The CZMA was enacted by Congress in 1972 to develop a national coastal management program that comprehensively manages and balances competing uses of and impacts on any coastal area or resource (16 USC 1451 et seq.). The program is implemented by individual state coastal management programs in partnership with the Federal government.

The CZMA outlines two national programs, the National Coastal Zone Management Program and the National Estuarine Research Reserve System. The 34 coastal programs aim to balance competing land and water issues in the coastal zone, while estuarine reserves serve as field laboratories to provide a greater understanding of estuaries and how humans impact them. The overall program objectives of CZMA are to “preserve, protect, develop, and where possible, to restore or enhance the resources of the nation’s coastal zone” (NOAA, 2012b).

The CZMA emphasizes the primacy of state decision-making regarding the coastal zone. Section 307 of the CZMA, called the Federal Consistency Provision, is a major incentive for states to join the national coastal management program and is a powerful tool that states utilize to manage coastal uses and resources and to facilitate cooperation and coordination with Federal agencies. Federal consistency is the CZMA requirement where Federal agency activities (including Federal permits or licenses) that have reasonably foreseeable effects on any land or water use or natural resource of the coastal zone (also referred to as coastal uses or resources and coastal effects) must be consistent to the maximum extent practicable with the enforceable policies of a coastal state’s federally approved coastal management program.

NOAA approved the Mississippi Coastal Program in 1980, which is comprised of a network of agencies with authority in the coastal zone. The MDMR, through the Office of Coastal Zone Management, is the lead agency. The primary authority guiding the Mississippi Coastal Program is the Mississippi Coastal Wetlands Protection Act, which designates allowable use of the state’s tidal wetlands (see Section 11.26, State of Mississippi Regulatory Programs). The MDMR has led a comprehensive planning effort, as described in the Comprehensive Resource Management Plan, which incorporates stakeholder interests in coastal development issues in Mississippi (USACE, 2010a).

The Mississippi’s Coastal Wetland Protection Act Section 49-27-7 exempts municipal or local port authorities from the provisions of the State Act; however, MSPA is not excluded from the Federal coastal consistency requirements. MSPA has submitted a joint application for a DA permit, under Section 10 of the Rivers and Harbors Act of 1899 (33 USC 403), Section 404 of the CWA (33 USC 1344), and Section 103 of the MPRSA of 1972, as amended (33 USC 1413), to USACE, MDMR and MDEQ for dredging and filling of State water bottoms. MSPA is also working with MDMR, in accordance with the Mississippi Coastal Program, Chapter 8, Section 2, Part 1.G.2, on mitigation requirements for filling State water bottoms.

11.10 NATIONAL ENVIRONMENTAL POLICY ACT

NEPA requires that all Federal agencies use a systematic, interdisciplinary approach to protect the human environment. This approach promotes the integrated use of natural and social sciences in planning and decision-making that could have an impact on the environment.

NEPA requires the preparation of an EIS for any major Federal action that could have a significant impact on the environment (42 USC 4321–4347). The EIS must address any adverse environmental effects that cannot be avoided or mitigated, alternatives to the proposed action, the relationship between short-term resources and long-term productivity, and irreversible and irretrievable commitments of resources. According to 40 CFR 1502.9, a supplement to either a DEIS or Final Environmental Impact Statement (FEIS) must be prepared if an agency makes substantial changes in the proposed action that are relevant to environmental concerns, or there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts.

The NEPA regulations provide for the use of the NEPA process to identify and assess reasonable alternatives to proposed actions that avoid or minimize adverse effects of these actions upon the quality of the human environment. "Scoping" is used to identify the range and significance of environmental issues associated with a proposed Federal action through coordination with Federal, state, and local agencies; the general public; and any interested individuals and organizations prior to the development of an EIS. The process also identifies and eliminates, from further detailed study, issues that are not significant or have been addressed by prior environmental review.

This EIS has been prepared in accordance with the NEPA process for Federal regulatory approval of an action that may impact the environment. Specifically, this EIS evaluates the likely environmental consequences of the No-Action and Proposed Project Alternatives, as discussed in Section 4 and cumulative impacts of the Proposed Project Alternative in Section 5.

11.11 FISH AND WILDLIFE COORDINATION ACT OF 1934

The Fish and Wildlife Coordination Act, as amended, requires consultation and coordination with the USFWS and state fish and wildlife agencies, where "waters of any stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted…or otherwise controlled or modified" by an agency under Federal permit or license (16 USC 661–667e). The USACE generally requests a letter from the USFWS for new dredging projects. The USFWS letter identifies fish and wildlife resources that may be impacted by the project's dredging and disposal operations, and identifies threatened and endangered species within the general project area.

This EIS evaluates impacts to fish and wildlife as described in Section 4.17 Terrestrial Wildlife, 4.18 Aquatic Ecology, and 4.19 Threatened and Endangered Species. Informal consultation between the USACE, Mobile District and the USFWS was concluded for the proposed Project as of November 2015 (Appendix E-2).

11.12 MARINE MAMMAL PROTECTION ACT OF 1972

The Marine Mammal Protection Act of 1972 (16 USC 1361 et seq.) established a national policy to prevent marine mammal species and population stocks from declining beyond the point where they ceased to be significant functioning elements of the ecosystems of which they are a part (USACE, 2010a). The Marine Mammal Protection Act prohibits, with certain exceptions, the "take" of marine mammals in U.S. waters and by U.S. citizens on the high seas, and the importation of marine mammals and marine mammal products into the U.S. In the Marine Mammal Protection Act, "take" is defined "as harass, hunt, capture, kill or collect, or attempt to harass, hunt, capture, kill or collect." The Department of Commerce, through the NMFS, is charged with protecting whales, dolphins, porpoises, seals, and sea lions. Walrus, manatees, otters, and polar bears are protected by the Department of the Interior through the USFWS. The Animal and Plant Health Inspection Service, a part of the Department of Agriculture, is responsible for regulations managing marine mammals in captivity.

The requirements of the Marine Mammal Protection Act apply to this EIS. Potential impacts to marine mammals are considered in Section 4.19 of this EIS. Incorporation of the safeguards used to protect threatened and endangered species during Project implementation would also protect marine mammals in the area; therefore, the USACE Mobile District is coordinating with the USFWS and NMFS for concurrence that the Project complies with this Act.

11.13 WATER RESOURCES DEVELOPMENT ACT OF 1986, AS AMENDED

Improvement of the Gulfport Harbor Navigation Project was initially authorized by the Fiscal Year 1985 Supplemental Appropriations Act (PL 99-88). This initial authorization was subsequently modified by WRDA of 1986 (PL 99-662). The WRDA of 1988 (PL 100-676) further modified the authorized Project.

Section 306 (33 USC 2316) of WRDA of 1990 (PALL 101-640) expanded the USACE's mission to include environmental protection, and states "that the Secretary shall include environmental protection as one of the primary missions of the USACE in planning, designing, constructing, operating, and maintaining water resources projects."

This EIS demonstrates compliance with the environmental protection mission of the WRDA.

11.14 ESTUARY PROTECTION ACT OF 1968

The Estuary Protection Act (16 USC 1221 et seq.) highlights the values of estuaries and the need to conserve their natural resources (USFWS, 2013i). It authorized the Secretary of the Interior, in cooperation with other Federal agencies and the States, to study and inventory estuaries of the U.S. and to determine whether such areas should be acquired by the Federal Government for protection. This report to Congress was required by January 30, 1970.

This statute also authorized the Secretary of the Interior to enter into cost-sharing agreements with States and subdivisions for permanent management of estuarine areas in their possession. Federal agencies, including USACE, were required to assess the impacts of commercial and industrial developments on estuaries. Reports submitted to Congress for such projects were required to contain an assessment by the Secretary of the Interior of likely impacts and related recommendations.

The Secretary was also required to encourage state and local governments to consider the importance of estuaries in their planning activities related to Federal natural resource grants. In approving any state grants for acquisition of estuaries, the Secretary was required to establish conditions to ensure the permanent protection of estuaries, including a condition that the lands not be disposed of without the prior approval of the Secretary.

The requirements of the Estuary Protection Act apply to this EIS. This EIS evaluates potential impacts to estuaries as described in Section 4.15. The Department of Interior and other Federal and state agencies are included in the distribution of this EIS, as provided in the Estuary Protection Act.

11.15 FEDERAL WATER PROJECT RECREATION ACT

The Federal Water Project Recreation Act, as amended, declares the intent of Congress that recreation and fish and wildlife enhancement be given full consideration as purposes of Federal water development projects if non-Federal public bodies agree to: (1) bear not less than one-half the separable costs allocated for recreational purposes or 25 percent of the cost for fish and wildlife enhancement; (2) administer project land and water areas devoted to these purposes; and (3) bear all costs of operation, maintenance, and replacement (16 USC 460(L)(12)–460(L)(21)). Cost-sharing is not required where Federal lands or authorized Federal programs for fish and wildlife conservation are involved. This Act also authorizes the use of Federal water project funds for land acquisition in order to establish refuges for migratory waterfowl when recommended by the Secretary of the Interior, and authorizes the Secretary to provide facilities for outdoor recreation and fish and wildlife at all reservoirs under his control, except those within national wildlife refuges. The provisions of this law do not apply to projects constructed under authority of the Small Reclamation Projects Act of August 4, 1954. WRDA altered the cost-sharing provisions with respect to fish and wildlife enhancement components of projects.

The provisions of the Federal Water Recreation Act apply to this EIS, and information regarding recreation and fish and wildlife enhancement within the proposed Project area is contained in Section 4.1.

11.16 ANADROMOUS FISH CONSERVATION ACT

The Anadromous Fish Conservation Act authorizes the Secretary of Commerce, along with the Secretary of Interior, or both, to enter into cooperative agreements to protect anadromous and Great Lakes fishery resources (16 USC 757a–g). The term “anadromous” refers to those fish that spawn in freshwater and live most of their lives in saltwater, such as Gulf Sturgeon and striped bass.

Implementation of the Anadromous Fish Conservation Act occurs through the NMFS within the Department of Commerce and through the USFWS within the Department of Interior. These agencies may enter into agreements with states and other non-Federal interests to conserve, develop, and enhance anadromous fisheries. Pursuant to these agreements, the Secretary may conduct studies, collect data, make recommendations, acquire and manage lands, and accept donations for acquiring or managing lands.

Following the collection of these data, the agency makes recommendations pertaining to the elimination or reduction of polluting substances detrimental to fish and wildlife in interstate or navigable waterways. Joint NMFS and USFWS regulations applicable to this program are published in 50 CFR Part 401.

The Anadromous Fish Conservation Act applies to this EIS. Potential impacts to anadromous fish, potentially occurring within the proposed Project area is contained in Section 4.19. Identified effects will be reviewed by NMFS in accordance with the Anadromous Fish Conservation Act.

11.17 COASTAL BARRIER RESOURCES ACT OF 1982 AND THE COASTAL BARRIER IMPROVEMENT ACT OF 1990

The Coastal Barrier Resources Act (16 USC 3501 et seq.) and the Coastal Barrier Improvement Act of 1990 (PL 101-591) are Federal laws that were enacted on October 8, 1982, and November 16, 1990, respectively (FEMA, 2011). The legislation was implemented as part of a Department of Interior initiative to minimize loss of human life by discouraging development in high-risk areas, reduce wasteful expenditures of Federal resources, and to preserve the ecological integrity of areas Congress designates as a Coastal Barrier Resources System and Otherwise Protected Areas. The laws provide this protection by prohibiting all Federal expenditures or financial assistance, including flood insurance, for residential or commercial development in areas so identified.

Designated Coastal Barrier Resources System units exist within the PGEP study area; however, there would be no impact from Federal expenditures or financial assistance in these areas.

11.18 PORTS AND WATERWAYS SAFETY ACT

The Ports and Waterways Safety Act is designed to promote navigation, vessel safety, and protection of the marine environment (33 USC §§ 1221–1236 [2002]). The Ports and Waterways Safety Act authorizes the USCG to establish vessel traffic service/separation schemes for ports, harbors, and other waters subject to congested vessel traffic. The Ports and Waterways Safety Act was amended by the Port and Tanker Safety Act of 1978.

Under the Ports and Waterways Safety Act, Congress found that increased supervision of vessel and port operations was necessary to reduce the possibility of vessel or cargo loss, or damage to life, property, or the marine environment, and ensure that the handling of dangerous articles and substances on the structures in, on, or immediately adjacent to the navigable waters of the U.S. is conducted in accordance with established standards and requirements (U.S. Commission on Ocean Policy, 2004).

The requirements of the Ports and Waterways Safety Act apply to this EIS. Potential impacts of the No-Action and Proposed Project Alternatives to commercial and recreational navigation are described in Section 4.14. Review of the proposed Project will be conducted by the USACE and USCG for consistency with the Ports and Waterways Safety Act.

11.19 FARMLAND PROTECTION POLICY ACT OF 1981 AND CEQ MEMORANDUM PRIME OR UNIQUE FARMLANDS

In 1980, the CEQ issued an Environmental Statement Memorandum "Prime and Unique Agricultural Lands" as a supplement to the NEPA procedures. Additionally, the FPPA was passed in 1981, requiring consideration of those soils, which the USDA defines as best suited for food, forage, fiber, and oilseed production, with the highest yield relative to the lowest expenditure of energy and economic resources.

No impacts to prime or unique farmland are anticipated for the No-Action and Proposed Project Alternatives; therefore, the provisions of the FPPA do not apply.

11.20 EXECUTIVE ORDER 11988, FLOODPLAIN MANAGEMENT

Executive Order 11988 requires Federal agencies to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. In accomplishing this objective, "each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities" for the following actions:

- Acquiring, managing, and disposing of Federal lands and facilities;
- Providing federally undertaken, financed, or assisted construction and improvements; and
- Conducting Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation, and licensing activities.

Executive Order 11988 applies to this EIS and the USACE, Mobile District will ensure that the proposed Project evaluated in this EIS fully complies with this Executive Order.

11.21 EXECUTIVE ORDER 11990, PROTECTION OF WETLANDS

The purpose of Executive Order 11990 is to "minimize the destruction, loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands." To meet these objectives, this Executive Order requires Federal agencies, in planning their actions, to consider alternatives to wetland sites and limit potential damage if an activity affecting a wetland cannot be avoided. The Executive Order applies to:

- Acquisition, management, and disposition of Federal lands and facilities construction and improvement projects which are undertaken, financed or assisted by Federal agencies; and
- Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation, and licensing activities.

Executive Order 11990 applies to this EIS. The potential effects of the proposed Project on wetlands are discussed in Section 4.16. Effects will be considered during the review of all permits required under the CWA (see Appendices A and R).

11.22 EXECUTIVE ORDER 12898, ENVIRONMENTAL JUSTICE

EJ requires agencies to incorporate into NEPA documents an analysis of the environmental effects of their proposed programs on minorities and low-income populations and communities. EJ is defined by EPA as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of Federal, state, local, and tribal programs and policies."

Executive Order 12898 applies to the EIS and the potential impacts to minority and low-income groups are described in Section 4.3 of this EIS. In response to public and agency comments received during the scoping process, an expanded EJ analysis was conducted. The expanded EJ included interviews with community members or groups and a thorough evaluation of Project-related issues. Results of the expanded EJ are presented in this EIS.

11.23 EXECUTIVE ORDER 13045, PROTECTION OF CHILDREN

On April 21, 1997, President Clinton issued Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks. This Executive Order directs each Federal agency to ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks.

Examples of risks to children include increased traffic volumes and industrial or production-oriented activities that would generate substances or pollutants which children may come into contact with or ingest.

Executive Order 13045 applies to this EIS. Potential impacts of the No-Action and Proposed Project Alternatives on community infrastructure and municipal services, including public safety, potentially occurring in the proposed Project area are discussed in Section 4.2.

11.24 EXECUTIVE ORDER 13186, PROTECTION OF MIGRATORY BIRDS

Executive Order 13186, signed on January 10, 2001, directs each Federal agency taking actions that are likely to have a measurable effect on migratory bird populations to develop and implement a Memorandum of Understanding with the USFWS to promote the conservation of migratory bird populations.

Potential impacts of the No-Action and Proposed Project Alternatives to wildlife, including migratory birds, are evaluated in Sections 4.17 and 4.19. Additionally, USFWS coordination is an integral part of the NEPA process.

11.25 EXECUTIVE ORDER 11593, PROTECTION AND ENHANCEMENT OF CULTURAL RESOURCES

Under Executive Order 11593, the Federal Government shall provide leadership in preserving, restoring, and maintaining the historic and cultural environment of the Nation. Federal agencies shall: (1) administer the cultural properties under their control in a spirit of stewardship and trusteeship for future generations; (2) initiate measures necessary to direct their policies, plans and programs in such a way that federally owned sites, structures, and objects of historical, architectural or archaeological significance are preserved, restored, and maintained for the inspiration and benefit of the people; and (3) in consultation with the Advisory Council on Historic Preservation (16 USC 470i), institute procedures to assure that Federal plans and programs contribute to the preservation and enhancement of non-federally owned sites, structures and objects of historical, architectural or archaeological significance.

The proposed Project was reviewed following the USACE NEPA/Section 404 evaluation process in accordance with the NHPA, as amended, the Archeological and Historic Preservation Act, as amended, and

Executive Order 11593. The potential consequences of the No-Action and Proposed Project Alternatives with respect to cultural resources are evaluated in Section 4.20.

11.26 STATE OF MISSISSIPPI REGULATORY PROGRAMS

Several of the regulatory programs above occur through explicit partnership with and/or implementation by State of Mississippi agencies. In Mississippi, the Mississippi Coastal Program oversees coastal development projects. The following sections describe the regulatory programs in Mississippi.

11.26.1 Dredged Material Placement

Mississippi guidelines include the following related to dredged material placement (USACE, 2010a):

- Dredged material placement sites shall be designated for initial construction as well as future maintenance dredging for all canal or channel projects (Lukens, 2000; EPA/USACE, 2007).
- All dredged material shall be viewed as a potential reusable resource and materials suitable for beach nourishment, construction, or other purposes shall be used immediately for such purposes or stockpiled in existing placement areas or other non-wetland areas for later use.
- Existing upland placement areas shall be used to the fullest extent possible.
- Permanent upland or deep-water placement sites shall be used in preference to coastal wetland placement.
- Areas containing submerged vegetation or regularly flooded emergent vegetation shall not be used for dredged material placement.
- New dredged material proposals shall include a maintenance plan for the shorter of 50 years or the life of the project.

USACE, Mobile District, is coordinating with the appropriate state agencies in regards to these guidelines.

11.26.2 Coastal Wetlands Protection Act

The Coastal Wetlands Protection Act (Miss. Code Ann. § 49-27) is intended to "favor the preservation of the natural state of the coastal wetlands and their ecosystems and to prevent the despoliation and destruction of them, except where a specific alteration of specific coastal wetlands would serve a higher public interest in compliance with the public purposes of the public trust in which coastal wetlands are held."

"Coastal Wetlands" are defined in Miss. Code § 49-27-5 as "all publicly-owned lands subject to the ebb and flow of the tide; which are below the watermark of ordinary high tide; all publicly-owned accretions above the watermark of ordinary high tide and all publicly-owned submerged water-bottoms below the watermark of ordinary high tide and includes the flora and fauna on the wetlands and in the wetlands." It defines a "regulated activity" as "(i) the dredging, excavating or removing of soil, mud, sand, gravel, flora, fauna or aggregate of any kind from any coastal wetland; (ii) the dumping, filling or depositing of any soil, stones, sand, gravel, mud, aggregate of any kind or garbage, either directly or indirectly, on or in any coastal wetlands; (iii) killing or materially damaging any flora or fauna on or in any coastal wetland; (iv) the erection on coastal wetlands of structures which materially affect the ebb and flow of the tide; and (v) the erection of any structure or structures on suitable sites for water dependent industry." "Filling" is defined in § 49-27-5 as "either the displacement of waters by the deposition into coastal wetlands of soil, sand, gravel, shells or other material; or the artificial alteration of water levels or water currents by physical structures, drainage ditches or otherwise."

The Mississippi Coastal Program, Chapter 8, Section 2, Part III.O.1 states "permanent filling of coastal wetlands because of potential adverse and cumulative environmental impacts is discouraged." Furthermore, Mississippi Coastal Program, Chapter 8, Section 2, Part I.G.2 states "as a condition of granting a permit, the Commission may require mitigation as a means of minimizing net adverse impacts on coastal wetlands. The magnitude of any mitigation requirement shall be reasonably related to the magnitude of the activity under consideration."

The Coastal Wetlands Protection Act requires participation in the MDMR's Beneficial Use Program for any project permitted to remove more than 2,500 cy of material from coastal wetlands, if the material is suitable and a BU site is available. In exchange for participating in the Beneficial Use Program, the MDMR reduces the fees typically charged for removal of materials from wetlands.

Coordination with MDMR regarding placement of dredged material in the BMC is ongoing.

11.26.3 Public Trust Tidelands

The Public Trust Tidelands Law (Miss. Code Ann § 29-15) is implemented by the MDMR to execute Mississippi public policy "to favor the preservation of the natural state of the public trust tidelands and their ecosystems and to prevent the despoliation and destruction of them, except where a specific alteration of specific public trust tidelands would serve a higher public interest in compliance with the public purposes of the public trust in which such tidelands are held." This policy is implemented in part through the regulatory provisions of the Coastal Wetlands Protection Act, and in part through the authorization of leases of state public trust tidelands or submerged lands.

This EIS has been prepared by the USACE, for consistency with the above State of Mississippi policies and guidelines, where appropriate.

12.0 PUBLIC INVOLVEMENT, REVIEW, AND CONSULTATION

12.1 PUBLIC INVOLVEMENT PROGRAM

The USACE and MSPA involved the public through public meetings and other outreach throughout the history of this Project. A proactive approach was taken to inform and involve the public, resource agencies, industry, local government, and other interested parties about the Project and to identify any public concerns.

On March 31, 2011, a public scoping meeting was held at the University of Southern Mississippi, Fleming Education Center Auditorium, in Long Beach, Mississippi (Appendix E-3). The purpose of the meeting was to introduce the proposed Project to the public, explain the NEPA process, and solicit public comment regarding the Project. The meeting format included an open house followed by a formal session. The open house provided an opportunity for one-on-one dialogue and information exchange between USACE and meeting attendees. Display stations covered 13 EIS topics, including the NEPA process, project overview, potential environmental concerns, and a schedule for environmental review. USACE and MSPA representatives were available to answer questions. The formal session included presentations on the NEPA process and the proposed Project; a public comment session followed with two court reporters available to transcribe individual verbal remarks. Written comments were collected throughout the scoping comment period, which ended April 14, 2011.

An interagency workshop also took place prior to the public scoping meeting (Appendix E-4). During this meeting, a short presentation was given by the MSPA and Atkins, followed by an open discussion with agency representatives. Agency representatives were given an opportunity to express their concerns and inform the USACE and MSPA of items that will need to be covered in the EIS and points of contact.

In addition to the scoping meeting, a website is maintained and newsletters sent out periodically. The Port EIS website (www.portofgulfporteis.com), containing project information as well as information about the NEPA process, was launched March 11, 2011. The website provides members of the public the opportunity to sign up for the EIS mailing list and submit comments during comment periods. The first edition of the EIS newsletter was sent on March 11, 2011. The newsletter included a description of the proposed action and of opportunities for public involvement, as well as the date, time, and location of the scoping meeting. USACE issued a news release on March 11, 2011, to numerous newspaper, television, and radio stations within the Port area. The news release included description of the proposed action, as well as the date, time and location of the scoping meeting.

On August 9, 2012, following the scoping period for the EIS, a public workshop was conducted at the Westside Community Center in Gulfport, Mississippi (Appendix E-5). Comments raised during the scoping period indicated some confusion regarding the scope of the Project. As a result, it was determined that a public workshop was needed. The workshop allowed an opportunity to provide an overview of the Project, including its scope, the alternatives under consideration, the additional studies that had been or were being conducted, and the Project progress to date. The meeting format included an informal poster session, a formal presentation, and an open-house session to provide an opportunity for discussion and questions and answers. The open-house session was centered on a series of Project posters; attendees had the opportunity to visit the various poster displays and speak directly with Project personnel. Informational sheets were also available to attendees with more-detailed information, the incorporation of relevant projects, container and economic studies, and the special studies that were conducted. Formal public comments were not taken as part of this workshop.

Following the permit application modification in April 2013, it was determined that a second scoping meeting would be held. On May 21, 2013, a public scoping meeting was held at the Courtyard Marriot Gulfport Beachfront Hotel, in Gulfport, Mississippi (Appendix E-6). The purpose of the meeting was to inform and educate the public of changes to the proposed Project and solicit public comment regarding the Project. The meeting format included an open house followed by a formal session. The open house provided an opportunity for one-on-one dialogue and information exchange between USACE and meeting attendees. Display stations at the meeting included the revised study area, Project features, Project alternatives, special studies, and projects in the Port's vicinity. USACE, MSPA, and MDA representatives were available to answer questions. The formal session included a presentation of the proposed permit action and modifications; a public comment session. A court reporter was present at the meeting. Written comments were collected throughout the scoping comment period, which ended June 17, 2013.

Prior to the 2013 scoping meeting another interagency workshop was held (Appendix E-4). The intent of the workshop was to ensure agency representatives understood the proposed changes to the PGEP (addition of modification to the FNC) and to solicit input regarding concerns or issues specifically related to those changes. During the meeting a short presentation was given by Atkins followed by open discussion. Issues raised during the workshop were taken into consideration in the evaluation of potential Project impacts.

The second edition of the EIS newsletter was sent on November 20, 2015. The newsletter included a description of the proposed Project, Project background information, the purpose and need for the proposed Project, information about the NEPA process, directions on how to submit written comments, and the date, time, and location of the public hearing. The Port EIS website was also updated and the DEIS, including appendices, was uploaded and made available for download on October 30, 2015. USACE issued a news release on October 30, 2015, on the USACE Mobile District website. The news release included information on the availability of the DEIS for public review and comment, as well as information about the public hearing including the date, time, location, and the opportunity for hearing impaired or language translation services, if requested. Similar advertisements were published in The Sun Herald on November 22 and November 29, 2015.

A public hearing for the DEIS was conducted on December 8, 2015, to provide information about the proposed Project and to receive public input and comments on the DEIS. An open-house was conducted prior to the formal public hearing, which served as an opportunity for discussion with the USACE and consultants on the Project (Appendix E-7). During the open-house session, the public had the opportunity to view a short video and display stations which included information on the NEPA process, the DEIS, and background of the proposed Project, including projects in the Port's vicinity. A court reporter was present at the formal public hearing to transcribe verbal comments. Written comments were collected throughout the comment period, which ended December 14, 2015. Comments from the public were reviewed and responded to and are included in Appendix E-8.

12.2 REQUIRED COORDINATION

The DEIS was circulated to all known Federal, state, and local agencies. Interested organizations and individuals were also sent notices of availability. On October 30, 2015, copies of the DEIS were made available for public review and comment on the internet at www.PortofGulfportEIS.com and at http://www.sam.usace.army.mil/Missions/Regulatory.aspx and a Notice of Availability was published in the Federal Register (80 FR 66898). A news release was also published by the USACE on October 30, 2015. Hardcopies of the DEIS are available upon request from Mr. Philip A. Hegji, USACE Project Manager. Similar coordination efforts will be conducted for distribution of the FEIS.

12.3 PUBLIC VIEWS AND RESPONSES

Public views and concerns expressed during this study have been considered during the preparation of this EIS. The views and concerns were used to develop planning objectives, identify significant resources, evaluate impacts of various alternatives, and identify a plan that is socially and environmentally acceptable. Important concerns expressed included socioeconomics (EJ), air quality, traffic and transportation, potential impacts to Gulf Sturgeon and aquatic communities, and Mississippi Sound pollutants. The DEIS was submitted for public review on October 30, 2015, and comments were incorporated into subsequent drafts and the final EIS, as outlined in Appendix E-8. Consideration was also given to comments outside of the formal scoping periods (Appendix E-1).

Development of alternatives is explained in Section 2.0. The evaluation of Project-related impacts takes into consideration the expressed objectives, views, and concerns of the resource agencies and public.

This page intentionally left blank.

13.0 LIST OF PREPARERS

Note: This section is available upon request.

This page intentionally left blank.

14.0 LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS TO WHOM COPIES OF THE DRAFT STATEMENT ARE SENT

On October 30, 2015, copies of the DEIS were made available for public review and comment on the internet at www.PortofGulfportEIS.com and at http://www.sam.usace.army.mil/Missions/Regulatory.aspx and a Notice of Availability was published in the Federal Register (80 FR 66898). A news release was also published by the USACE on October 30, 2015. Similar coordination efforts will be conducted for distribution of the FEIS.

This page intentionally left blank.

15.0 REFERENCES

Agency for Toxic Substances and Disease Registry (ATSDR). 1996. Toxicological profile for endrin. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

———. 2002. Toxicological profile for aldrin/dieldrin. Atlanta, GA: Department of Health and Human Services, Public Health Service.

Ahsan, Q., A.F. Blumberg, H. Li, and J. Blaha. 2002. The Calibration/Validation of a Mississippi Sound/Bight Model. Oceans 2002, Conference & Exhibition, October 29–31, Biloxi, Mississippi. Pp. 816–822.

AirNav. 2013a. Gulfport-Biloxi International Airport. http://www.airnav.com/airport/KGPT

———. 2013b. Keesler Air Force Base. http://www.airnav.com/airport/KBIX

———. 2013c. Memorial Hospital Heliport. http://www.airnav.com/airport/MS17

———. 2013d. Gulfport Jail Heliport. http://www.airnav.com/airport/MS89

———. 2013e. Gulf Coast Community Hospital Emergency Heliport. http://www.airnav.com/airport/MS67

———. 2013f. Lundys Heliport. http://www.airnav.com/airport/MS60

American Association of Port Authorities (AAPA). 2010. North America: container port traffic 1990–2010. http://aapa.files.cms-plus.com/PDFs/CONTAINER%20TRAFFIC%20NORTH%20AMERICA%201990%20-%202010%20for%20the%20web.pdf

Anchor QEA LLC. 2017. Dredged Material Management Plan, Port of Gulfport Expansion Project. Prepared for Mississippi State Port Authority-Port of Gulfport. April 2017.

———. 2015. Draft Modeling Evaluation of Impacts to Harrison County Beaches Mississippi State Port Authority at Gulfport. Prepared for Mississippi State Port Authority-Port of Gulfport. February.

Armstrong, N.E., M. Brody, and N. Funicelli. 1987. The ecology of open-bay bottoms of Texas: a community profile. U.S. Department of the Interior Fish and Wildlife Service. Biological Report 85(7.12): 104.

Atkins. 2012. Final environmental impact statement for the proposed widening of the Pascagoula Lower Sound/Bayou Casotte Channel, Jackson County, Mississippi. Prepared for the USACE, Mobile District. August.

Baker. 2011. East Breakwater Configuration Alternatives. Task Order No. 3 (PGRP No. E 101 209) Contract 010-HUD-010.

Baker, T.R., and T. Britt. 1992. Phase I archaeological survey of the proposed USPCI Shuqualak Mountain Facility, near Shuqualak, Noxubee County, Mississippi. Draft document. Prepared for USPCI by Garrow and Associates, Inc., Atlanta, Georgia.

Barraclough, J., and K. Wade. 1986. Geohydrologic summary of herbicide orange sites at Eglin FI and Naval Construction Battalion Center, Gulfport, Mississippi. Final Report. Engineering & Services Laboratory, Air Force Engineering & Services Center. Report AD-A169-534. 95 p.

Bartlett, R.D., and P.P. Bartlett. 1999. A field guide to Texas reptiles and amphibians. Gulf Publishing Company, Houston.

Berman, Bruce D. 1973. Encyclopedia of American Shipwrecks. The Mariners Press Inc., Boston, Massachusetts.

Blumberg, A.F., Q. Ahsan, and J. Lewis. 2000. Modeling hydrodynamics of the Mississippi Sound and Adjoining River, Bays, and Shelf Water. OCEANS 2000 MTS/IEEE Conference and Exhibition, September 11–14.

Bohnsack, J.A. 1989. Are high densities of fishes at artificial reefs the result of habitat limitation or behavioral preferences? *Bulletin of Marine Science* 44(2): 631–645.

Bolam, S.G., and H.L. Rees. 2003. Minimizing impacts of maintenance dredged material disposal in the coastal environment: a habitat approach. *Environmental Management*, Vol. 32, No. 2.

Bolam, S.G., J. Barry, M. Schratzberger, P. Whomersley, and M. Dearnaley. 2010. Macrofaunal recolonization following the intertidal placement of fine-grained dredged material. *Environmental Monitoring and Assessment* 168(1–4): 499–510.

Brandon, D.L., and R.A. Price. 2007. Summary of available guidance and best practices for determining suitability of dredged materials for beneficial uses. U.S. Army Corps of Engineers, Vicksburg, Mississippi. 102 pp.

Bricker, S., C. Clement, D. Pirhall, S. Orlando, and D. Farrow. 1999. National estuarine eutrophication assessment: effects of nutrient enrichment in the nation's estuaries. NOAA, National Ocean Service, Special Projects Office and the National Centers for Coastal Ocean Science, Silver Spring, Maryland.

Bricker, S., B. Longstaff, W. Dennison, A. Jones, K. Boicourt, C. Wicks, and J. Woerner. 2007. Effects of nutrient enrichment in the nation's estuaries: a decade of change. NOAA Coastal Ocean Program Decision Analysis Series No. 26. National Centers for Ocean Science, Silver Spring, Maryland.

Britton, J., and B. Morton. 1989. Shore ecology of the Gulf of Mexico. University of Texas Press, Austin.

Brongersma, L.D. 1972. European Atlantic turtles. *Zool. Verhl*. 121.

Buchman, M.F. 2008. NOAA screening quick reference tables. NOAA Office of Response and Restoration, Report 08-01, Seattle, WA, Office of Response and Restoration Division, National Oceanic and Atmospheric Administration, 34 pages.

Bureau of Labor Statistics (BLS). 2015. Local Area Unemployment Statistics. http://www. bls.gov/ lau/#tables.

Bureau of Ocean Energy Management, Regulation, and Enforcement. 2013. Geographic mapping data in digital format. http://www.data.boem.gov/homepg/data_center/mapping/geographic_mapping.asp

Burke, Joseph, T. Shannon, Brad Daigle, Mike Neely, John Baker, and Kyle Simeral. 2007. Hydrographic Survey of the Mississippi Sound Between Long Beach and Biloxi. U.S. Department of Commerce, National Oceanic and Atmospheric Administration.

Burk-Kleinpeter, Inc., HDR Engineering, Inc., and BMI Environmental Services, LLC. 2011. Kansas City Southern Railway (KCSR) Track Upgrade Project: Hattiesburg to Gulfport, Mississippi Environmental Assessment. Prepared for Mississippi State Port at Gulfport, Mississippi development Authority, and Kansas City Southern Railway. August.

Burrage, D.D., C.Z. Hollomon, and B.C. Posadas. 1999. Mississippi coastal recreational boating access: assessment and projected needs. Mississippi State University Coastal Research and Extension Center. December.

Byrnes, M.R., J.D. Rosati, S.F. Griffee, and J.L. Berlinghoff. 2012. Mississippi Coastal Improvements Program (MsCIP) Littoral Sediment Budget for the Mississippi Sound Barrier Islands. USACE Coastal Hydraulics Laboratory ERDC/CHL TR-12-9. July.

———. 2013. Historical Sediment Transport Pathways and Quantities for Determining an Operational Sediment Budget: Mississippi Sound Barrier Islands. *Journal of Coastal Research* 63(sp1): 166–183.

Cake, E.W., Jr. 1983. Habitat suitability index models: Gulf of Mexico American oyster. U.S. Department of the Interior, Fish and Wildlife Service. FWS/OBS-82/10.57. 37 pp.

Calnan, T.R., R.S. Kimble, and T.G. Littleton. 1989. Benthic macroinvertebrates, pp. 41–72 in W.A. White, T.R. Calnan, R.A. Morton, R.S. Kimble, T.G. Littleton, J.H. McGowen, H.S. Nance, K.E. Schmedes, and others, 1989, Submerged lands of Texas, Port Lavaca area: sediments, geochemistry, benthic macroinvertebrates, and associated wetlands. Bureau of Economic Geology, The University of Texas at Austin.

Caltrans (California Department of Transportation). 2001. Fisheries impact assessment, pile installation demonstration project for the San Francisco – Oakland Bay bridge, east span seismic safety project, August 2001. Prepared for the Federal Highway Administration, Sacramento, California and the Metropolitan Transportation Commission, Oakland, California.

———. 2012. Update to Appendix I Compendium of Pile Driving Sounds Data, in Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish, Sacramento, California.

Carmichael, R. 2013. The Dauphin Island Sea Lab's Manatee Sighting Network. Updated October 31.

CDM Smith. 2012. West Pier storm water quality facilities, pre-design/conceptual report and drawings. Prepared for CH2M HILL and Mississippi State Port Authority. December.

CenterPoint Energy, Inc. 2011. Personal communication with Bobby Fontenot, CenterPoint Distribution Division.

CH2M HILL. 2011. Final Project Management Plan for Selected Beneficial Use Projects Along Coastal Mississippi. Prepared for Gulf of Mexico Foundation and Mississippi Department of Marine Resources (MDMR). September.

———. 2013. Personal communication with Elizabeth Calvit, November 12, 2013.

———. 2016. Personal communication with Elizabeth Calvit, July 20, 2016.Church Angel. 2011. Churches in Gulfport, Mississippi by Denomination. http://www.churchangel.com/ WEBMS/gulfport.htm

Church Angel. 2011. Churches in Gulfport, Mississippi by Denomination. http://www.churchangel.com/ WEBMS/gulfport.htm

City of Biloxi. 2008a. Biloxi general market analysis 2008. http://www.biloxi.ms.us/PDF/GMAfull.pdf

———. 2008b. Mississippi existing conditions, issues, and trends report, City of Biloxi Comprehensive Plan, November. http://www.biloxi.ms.us/PDF/existingconditionsTEXTonly.pdf

———. 2013a. Fire Department. http://www.biloxi.ms.us/firedepartment/

———. 2013b. Police Department. http://www.biloxi.ms.us/policedepartment/

City of D'Iberville. 2011a. Fire Department. Personal communication with Chief Gerald Smith.

———. 2011b. Police Department. Personal communication with Christy Druey, Department Administration.

City of Gulfport. 2007a. Mississippi City Community Plan.

———. 2007b. Old Gulfport Community Plan.

———. 2013a. Census Data. www.gulfport-ms.gov/census.shtml

———. 2013b. Gulfport Fire Department. http://www.ci.gulfport.ms.us/fire/

———. 2013c. Gulfport Police Department. http://www.ci.gulfport.ms.us/police/about.htm

———. 2014. Department of Urban Development. http://www.gulfport-ms.gov/urban_dev.shtml

City of Long Beach. 2011. Long Beach Police Department. Personal communication July 14.

———. 2013. Long Beach Fire Department. http://longbeachfiredepartment.com/

City of Pass Christian. 2011a. Pass Christian Fire Department. http://www.ci.pass-christian.ms.us/

———. 2011b. Pass Christian Police Department. Personal communications with Assistant Chief Thomas Ruspoli, July 12.

Clarke, D.G., and D.H. Wilber. 2000. Assessment of potential impacts of dredging operations due to sediment resuspension. DOER Technical Notes Collection. ERDCTN-DOER-E9. U.S. Army Engineer Research and Development Center, Vicksburg, Mississippi.

Coast Transit Authority and Mississippi Department of Transportation (MDOT). 2011. I-10 corridor park and ride study for the Mississippi Gulf Coast. March 2011.

Coastal Electric Power Association (CEPA). 2012. My Community, Co-op Connections Program. http://www.coastepa.com/home.aspx.

Colson, B.E., and E.G. Boswell. 1985. Water resources overview of the Mississippi Gulf Coast Area. U.S. Geological Survey Open File Report 85-94. Prepared in cooperation with U.S. Army Corps of Engineers, Mobile District, Alabama.

Compagno, L.J.V. 1984. FAO Species Catalogue. Sharks of the world. An annotated and illustrated catalogue of shark species known to date II. Carcharhiniformes. Rome, Italy. *FAO Fish Synopsis* 125:1–249.

Cossman, J.S., J.B. Ritchie, and W.L. James. 2005. Mississippi physicians labor force, a look at primary care physicians. http://www.academia.edu/1314868/Mississippis_Physician_Labor_Force

Council on Environmental Quality (CEQ). 2011. Draft NEPA guidance on consideration of the effects of climate change and greenhouse gas emissions, February 18, 2010.

———. 2014. Revised Draft Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in NEPA Reviews. http://energy.gov/nepa/downloads/revised-draft-guidance-consideration-greenhouse-gas-emissions-and-climate-change-nepa. Accessed January 19, 2014.

———. 2016. Final Draft Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews. https://www.whitehouse.gov/sites/whitehouse.gov/files/documents/nepa_final_ghg_guidance.pdf. Accessed August 15, 2016.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U.S. Fish and Wildlife Service, Washington, D.C. www.npwrc.usgs.gov/resource/wetlands/classwet/index.htm

Daniels, H.V. 2000. Species profile: southern flounder. Southern Regional Aquaculture Center. SRAC Publication No. 726. October.

Davis, R.W., G.S. Fargon, N. May, T.D. Leming, M. Baumgartner, W.E. Evan, L.D. Hansen, and K. Mullin. 1998. Physical habitat of cetaceans along the continental slope on the North-Central and western Gulf of Mexico. *Marine Mammal Science* 14(3): 490–507.

Ditton, R.B., and J.M. Falk. 1981. Obsolete petroleum platform as artificial reef material, pages 96–105 in D.Y. Aska, editor. Artificial Reefs: Conference Proceedings. Florida Sea Grant. Report Number 41.

DMJM Harris/AECOM. 2007. Gulfport Master Plan Update 2007 Final Report. Prepared for Mississippi State Port Authority at Gulfport. Adopted June 2007.

Dobrzynski, T., and K. Johnson. 2001. Regional council approaches to the identification and protection of Habitat Areas of Particular Concern. NOAA/NMFS Office of Habitat Conservation. May.

Dokken, Q.R. 1997. Platform reef ecological and biological productivity: fact or fiction? Pages 12–19. Proceedings: Sixteenth Annual Gulf of Mexico Information Transfer Meeting. OCS Study MMS 97-0038. U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Regional Office, New Orleans.

Duedall, E.W., and M.A. Champ. 1991. Artificial reefs: emerging science and technology. *Oceanus* 34(1): 94–101.

Eckert, S.A. 1992. Bound for deepwater. Natural History, pp. 28–35, March.

Eisler, R. 1991. Cyanide Hazards to Fish, Wildlife and Invertebrates: A Synoptic Review. Contaminant Hazard Reviews. Report 23. Biological Report 85(1.23). U.S. Fish and Wildlife Service. December.

Elliot, J.D., Jr. 1999. European colonization in Mississippi. In Unedited Version of the State Historic Context Document and Comprehensive Historic Preservation Plan for the State of Mississippi for 1997, 1998, 1999. Mississippi Department of Archives and History, Jackson.

Environmental Data Resources, Inc. (EDR). 2011. Port of Gulfport, West Beach Blvd, Gulfport, Mississippi. Inquiry Number 3058388. May 10.

———. 2015. Port of Gulfport, West Beach Blvd, Gulfport, Mississippi. Inquiry Number 4407765. September 10, 2015.

ERDC, Army Engineer Research and Development Center, 2012. Unpublished report, Gulf Sturgeon telemetry study in Mississippi Sound, MS Barrier Islands.

———. 2013. Unpublished report, Gulf Sturgeon telemetry study in Mississippi Sound, MS Barrier Islands.

Federal Aviation Administration (FAA), U.S. Department of Transportation. 2010. Notification of Proposed Construction or Alteration on Airport Part 77. http://www.faa.gov/airports/central/engineering/part77/

Federal Emergency Management Agency (FEMA). 2009. Draft Environmental Assessment: City of Gulfport Small Craft Harbor Redevelopment. Prepared by Nationwide Infrastructure Support Technical Assistance Consultants (NISTAC). FEMA-1604-DR-MS. U.S. Department of Homeland Security, Transitory Recovery Office, Biloxi, Mississippi.

Federal Highway Administration (FHWA). 2010. Mississippi 2010 five percent report. http://safety.fhwa.dot.gov/hsip/fivepercent/2010/index.cfm?state=ms

———. 2011. FHWA-HEP-10-025. Highway Traffic Noise: Analysis and Abatement Guidance https://www.fhwa.dot.gov/environment/noise/regulations_and_guidance/analysis_and_abatement_guidance/revguidance.pdf

———. 2012. Technical guidance for assessment and mitigation of the hydroacoustic effects of pile driving on fish, prepared by ICF Jones & Stokes and Illingworth and Rodkin, Inc.

Federal Railway Administration (FRA). 2000. Horn Noise MS Excel Spreadsheet Model. https://www.fra.dot.gov/eLib/Details/L04091

Federal Register (FR). 1985. 33 CFR Part 51. Coast Guard discharge review board. Final Rule, October 11.

———. 1990. 50 CFR Part 17. Endangered and threatened wildlife and plants; proposed threatened status for the Louisiana black bear. Proposed Designation of Threatened by Similarity of Appearance of all Bears of the Species *Ursus americanus* Within the Historic Range of *U. a. luteolus*. Proposed Rule, June 21.

———. 1992. 50 CFR Part 17. Endangered and threatened wildlife and plants; threatened status for the Louisiana black bear and related rules. Final Rule, January 7.

———. 1993. 40 CFR Part 51, Subpart W – Determining conformity of general Federal Actions to state or Federal implementation plans. Final Rule, November 30.

———. 1996. 24 CFR Part 51, Subpart B – Noise abatement and control. Final Rule, March 26.

———. 2001. 40 CFR Parts 69, 80, and 86; Control of air pollution from new motor vehicles: heavy-duty engine and vehicle standards and highway diesel fuel sulfur control requirements, Final Rule, June 18.

———. 2004. 14 CFR Part 150. Airport noise compatibility planning. Final Rule, September 24.

———. 2007. 40 CFR Parts 59, 80, 85, and 86; Control of hazardous air pollutants from mobile sources, Final Rule, February 26.

———. 2008a. 40 CFR Parts 50 and 58; National Ambient Air Quality Standards for ozone; Final Rule, March 27.

———. 2008b. 40 CFR Parts 9, 85, et al.; Control of emissions of air pollution from locomotive engines and marine compression-ignition engines less than 30 liters per cylinder; Republication, Final Rule, June 30.

———. 2010a. National Ambient Air Quality Standards for ozone. Proposed Rule, January 19.

———. 2010b. 40 CFR Parts 80, 85, 86, et al.; Control of emissions from new marine compression-ignition engines at or above 30 liters per cylinder. Final Rule, April 30.

———. 2010c. 23 CFR Part 772. Procedures for abatement of highway traffic noise and construction noise. Final Rule, July 13.

———. 2012. Implementation of the 2008 National Ambient Air Quality Standards for Ozone: Nonattainment Area Classifications Approach, Attainment Deadlines and Revocation of the 1997 Ozone Standards for Transportation Conformity Purposes. Final Rule, May 21.

———. 2016. 40 CFR Part 93. Determining conformity of Federal actions to state or Federal implementation plans. Final Rule, October 24.

Federal Transit Administration (FTA). 2006. Transit Noise and Vibration Impact Assessment. FTA-VA-90-1003-06.

Fisheries Hydrostatic Working Group (FHWG). 2008. Agreement in Principle for Interim Criteria for Injury to Fish from Pile Driving Activities. June 12, 2008, Memorandum from National Oceanic and Atmospheric Administration Northwest and Southwest Regions, U.S. Fish and Wildlife Service Regions 1 and 8, California/Washington/Oregon Departments of Transportation, California Department of Fish and Game, and Federal Highway Administration.

Fox, D.A., J.E. Hightower, and F.M. Parauka. 2002. Estuarine and nearshore marine habitat use of Gulf Sturgeon from the Choctawhatchee River system, Florida, pp. 111–126. In (W Van Winkle, P.J. Anders, D.H. Secor, and D.A. Dixon, editors): Biology, management and protection of North American sturgeon. American Fisheries Society Symposium 28, Bethesda, Maryland.

Garrison, E.G., C.P. Giammona, F.J. Kelly, A.R. Tripp, and G.A. Wolff. 1989. Historic shipwrecks and magnetic anomalies of the Northern Gulf of Mexico: Reevaluation of Archaeological Resource Management Zone 1, 3 volumes. OCS Study/MMS 89-0024. Prepared for Minerals Management Service, U.S. Department of the Interior, Gulf of Mexico OCS Region, New Orleans, Louisiana by the Texas A&M Research Foundation, College Station.

Germano, J.D., and D. Cary. 2005. Rates and effects of sedimentation in the context of dredging and dredged material placement. DOER Technical Notes Collection (ERDC TN-DOER-E19). U.S. Army Corps of Engineer Research and Development Center. Vicksburg, Mississippi.

Giardino, M.J. 2011. Overview of Hancock County prehistory. Hancock County Historical Society, Bay Saint Louis, Mississippi. http://www.hancockcountyhistoricalsociety.com/history/prehistory.htm

Global Ballast Water Management Programme. 2014. The problem. http://globallast.imo. org/index.asp?page=problem.htm&menu=true#top

Gosselink, J. 1984. The ecology of delta marshes of Coastal Louisiana: a community profile. U.S. Fish and Wildlife Service. FWS/OBS-84/09.

Great Southern Shopping Center (GSSC). 2012. Leasing Opportunities. http://greatsouthernshopping center.com/leasing.php

Green, A., M. Osborn, P. Chai, J. Lin, C. Loeffler, A. Morgan, P. Rubec, S. Spanyers, A. Walton, R.D. Slack, D. Gawlik, D. Harpole, J. Thomas, E. Buskey, K. Schmidt, R. Zimmerman, D. Harper, D. Hinkley, T. Sager, and A. Walton. 1992. Status and trends of selected living resources in the Galveston Bay System. Galveston Bay National Estuary Program Publication GBNEP-19, Webster, Texas.

Grubb, H.F. 1986. Gulf Coast analysis–a regional aquifer-system Mississippi perspective. U.S. Geological Survey Water-Resources Investigations Report 86-4162, Austin, Texas.

Gulf of Mexico Alliance (GOMA). 2011. Application of the Sea-Level Affecting Marshes Model (SLAMM 6) to MS Sandhill Crane NWR. Prepared by Warren Pinnacle Consulting, Inc. 74 pp.

Gulf of Mexico Fisheries Management Council (GMFMC). 2004. Draft Final Environmental Impact Statement for the generic essential fish habitat amendment to the following fishery management plans of the Gulf of Mexico (GOM): Shrimp Fishery of the Gulf of Mexico; Red Drum Fishery of the Gulf of Mexico; Reef Fish Fishery of the Gulf of Mexico; Stone Crab Fishery of the Gulf of Mexico; Coral and Coral Reef Fishery of the Gulf of Mexico; Spiny Lobster Fishery of the Gulf of Mexico and South Atlantic; Coastal Migratory Pelagic Resources of the Gulf of Mexico and South Atlantic. Gulf of Mexico Fishery Management Council, Tampa, Florida.

Gulf Oil Spill Information Portal. 2013. http://gulfoilspill.blogspot.com/p/florida-information.html

Gulf Regional Planning Commission (GRPC). 2003. City of Gulfport road classifications. http://www.grpc.com/pdf/Gulfport%20Road_Street%20Classifications%202003.pdf

Gulfport Metropolitan Planning Organization. 2003. Travel Demand Model: I-10 at Canal Road and SR 601 Interchange Access Request. Prepared for Planning Division, Mississippi Department of Transportation, March.

Gulfport News. 2010. Mississippi awarded $20 million Federal grant for railroad improvement from Port of Gulfport. February 17.

Gulfport School District. 2013. http://www.gulfportschools.org/schools.htm

Gunter, G. 1981. Status of turtles on the Mississippi Coast. *Gulf Research Reports* 7(1): 89–92.

Handley, L., D. Altsman, and R. DeMay (editors). 2007. Seagrass status and trends in the Northern Gulf of Mexico 1940-2002. U.S. Geological Survey Scientific Investigations Report 2006-5287 and U.S. Environmental Protection Agency 855-R-04-003.

Harrison County. 2008. 2030 Harrison County Comprehensive Plan. July 2008. http://www.planharrisoncounty.org/

Harrison County Board of Supervisors. 2013. Fire services. http://co.harrison.ms.us/departments/fire%20services/

Harrison County Development Commission. 2011. Accelerate to 2060 Harrison and Stone Counties, Mississippi: Report 3: Transportation and Utility Infrastructure. http://www.angeloieconomics.com/harrisonstone/documents/Accelerate%20to%202060%20Transportation%20and%20Utility%20Infrastructure%20Report%2004-05-11_final.pdf

Harrison County Library System. 2013. http://www.harrison.lib.ms.us/

Harrison County School District. 2013. http://www.harrison.k12.ms.us/HOME.aspx

Harrison County Sheriff's Department. 2011. http://www.harrisoncountysheriff.com/

Harrison County Utility Authority (HCUA). 2011a. Potable water. http://www.hcua-ms.us/waterservice.html

———. 2011b. Wastewater. http://www.hcua-ms.us/wastewater.html

———. 2011c. Solid Waste. http://www.hcua-ms.us/solidwaste.html

———. 2011d. Stormwater. http://www.hcua-ms.us/stormwater.html

Hastings, M.C., and A.N. Popper. 2005. Effect of Sound on Fish. California Department of Transportation. January.

Havrylkoff, J.M., M.S. Peterson, and W.T. Slack. 2012. Assessment of the seasonal usage of the lower Pascagoula River estuary by Gulf Sturgeon (*Acipenser oxyrinchus desotoi*). *Applied Ichthyology*. Vol 28. pp 681–686.

Heise, R.J., W.T. Slack, S.T. Ross, and M.A. Dugo. 2004. Spawning and associated movement patterns of Gulf sturgeon in the Pascagoula River Drainage. *Transactions of the American Fisheries Society* 133:221–230.

Helmers, D.L. 1992. Shorebird management manual. Western Hemisphere Shorebird Reserve Network. Manomet, Massachusetts. 58 pp.

Hirsch, N.D., L.H. DiSalvo, and R. Peddicord. 1978. Effects of dredging and disposal on aquatic organisms. U.S. Army Corps of Engineers, Waterways Experiment Station. Tech. Rep. DS-78-5.

Hirth, H.F. 1997. Synopsis of the biological data on the green turtle *Chelonia mydas* (Linnaeus 1758). Biological Report 97 (1). U.S. Fish and Wildlife Service, Washington, D.C.

Hoese H.D., and R.H. Moore. 1998. The fishes of the Gulf of Mexico Texas, Louisiana, and Adjacent Waters. Texas A&M University Press, College Station.

Hoke, R. 2012. Rare sea turtle nest discovered in Mississippi. Gulf Restoration Network. http://healthygulf.org/blog/rare-sea-turtle-nest-discovered-mississippi (last accessed May 3, 2017).

Hunt, K.M., and C.P. Hutt. 2010. Mississippi trapper harvest estimates for the 1976–77 to the present trapping seasons. Human Dimensions & Conservation Law Enforcement Laboratory Technical Document #HDCLEL-127. Forest & Wildlife Research Center, Mississippi State. 63 pp.

Institute for Marine Mammal Studies (IMMS). 2011. Sea turtles satellite tracking. http://www.imms.org/satellite_tracking1.php

Institute for Marine Mammal Studies (IMMS). 2011. Sea turtles satellite tracking. http://imms.org/satellite_ztracking_home.php

———. 2013. http://www.imms.org/satellite_tracking6.php (last accessed September 20, 2013).

Intergovernmental Panel on Climate Change (IPCC). 2007a. Fourth Assessment Report: Climate Change 2007. https://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html. Accessed February 16, 2016.

———. 2007b. Climate Change 2007: Synthesis Report. https://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf. Accessed May 3, 2017.

Integrated Taxonomic Information System. 2011. Integrated taxonomic information system on-line database. http://www.itis.gov

International Maritime Organization (IMO). 2010. Information on North American Emission Control Area (ECA) Under MARPOL Annex VI, May 13, 2010.

———. 2012. North American Emission Control Area (ECA) Comes into Effect on August 1, 2012; July 31.

Irion, J.B. 1989. Underwater archaeological investigations Ship Island Pass, Gulfport Harbor, Mississippi. Prepared for U.S. Army Corps of Engineers, Mobile District by GAI Consultants, Inc., Monroeville, Pennsylvania.

Iverson, J.B. 1986. A checklist with distribution maps of the turtles of the world. Paust Printing, Richmond, Indiana.

Johnson, H.N., W.H. McAnally, and S. Ortega-Achury. 2010. Sedimentation Management Alternatives for the Port Of Pascagoula. Prepared for Mississippi Department of Transportation. 76 pp.

Johnson, R. 2013. Mississippi’s 1st sea turtle nest of 2013 found in Pass Christian. http://www.wlox.com/story/22763366/mississippis-1st-sea-turtle-nest-of-2013-found-in-pass-christian

Jones, C., and C.H. Carter. 1989. Annotated checklist of the recent mammals of Mississippi. Occasional Papers. The Museum, Texas Tech University. Number 128. 10 pp.

JWD Group. 2003. Mississippi State Port Authority at Gulfport Master Plan Update. March.

Kansas City Southern Railway (KCS). 2011. Environmental Assessment, Track Upgrade Project: Hattiesburg to Gulfport, Mississippi. Prepared for Mississippi State Port at Gulfport, Mississippi Development Authority, and Kansas City Southern Railway. Prepared by Burk-Kleinpeter, Inc., HDR Engineering, Inc., and BMI Environmental Services, LLC. August.

Kennish, M.J. 1992. Ecology of Estuaries: Anthropogenic Effects. CRC Press, Inc., Boca Raton, Florida.

Leary, C.J., J.L. Dobie, T.M. Mann, P.S. Floyd, and D.H. Nelson. 2008. Conservation biology of freshwater turtles and tortoises: a compilation project of the IUCN/SSC Tortoise and Freshwater Turtle Specialist Group. A.G.J. Rhodin, P.C.H. Pritchard, P.P. van Diijk, R.A. Saumure, K.A. Buhlmann, and J.B. Iverson (editors). Chelonian Research Monographs. Chelonian Research Foundation.

Lefebvre, L.W., T.J. O'Shea, G.B. Rathbun, and R.C. Best. 1989. Distribution, status, and biogeography of the West Indian manatee. Pages 567–610 in C.A. Woods (editor). Biogeography of the West Indies. Sandhill Crane Press, Gainesville, Florida.

Lester, J., and L. Gonzales (editors). 2001. Ebb & flow: Galveston Bay characterization highlights. State of the Bay Symposium V, January 31–February 2. Galveston Bay Estuary Program.

Locke, G. 2010. Letter to Governor of Mississippi "Haley Barbour." U.S. Department of Commerce.

Long Beach Public Library. 2013. http://www.longbeach.lib.ms.us/

Long Beach School District. 2013. http://www.lbsdk12.com/site/default.aspx?PageID=1

Louisiana Department of Wildlife and Fisheries. 2010. Survey of Louisiana recreational boaters. December. http://www.wlf.louisiana.gov/sites/default/files/pdf/publication/33429-survey-louisiana-recreational-boaters/ldwf-boaters-survey-report.pdf

Lukens, J. 2000. National Coastal Program Dredging Policies: An Analysis of State, Territory, and Commonwealth Policies Related to Dredging and Dredged Material Management, Volume I of II. Office of Ocean and Coastal Resource Management Coastal Management Program Policy Series Technical Document 00-02, National Ocean Service, NOAA. April.

Marx, R.F. 1987. Shipwrecks in the Americas. Dover Publications, Inc., Mineola, New York.

Maurer, D., R.T. Keck, J.C. Tinsman, W.A. Leathem, C. Wethe, C. Lord, and T.M. Church. 1986. Vertical migration and mortality of marine benthos in dredged material: a synthesis. International revue gestam *Hydrobiologia* 71:49–63.

May, E.B. 1973. Environmental effects of hydraulic dredging in estuaries. *Alabama Marine Resources Bull*. No. 9:1-85.

McKay, M., J. Nides, W. Lang, and D. Vigil. 2001. Gulf of Mexico Marine Protected Species Workshop, June 1999. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, Louisiana. OCS Study MMS 2001-039. 171 pp.

Meier, M.H. 1989. A debate on responsible artificial reef development. Bulletin of Marine Science 44(2): 1051–1057.

Mickle, P.F., J.F. Schaefer, S.B. Adams, and B.R. Kreiser. 2009. Habitat use of age 0 Alabama shad in the Pascagoula River drainage, USA. *Ecology of Freshwater Fish* 19:107–115.

Miller, M., J. Hutson, and H. Fallowfield. 2005. The adsorption of cyanobacterial hepatoxins as a function of soil properties. *Journal of Water and Health* 03.4:339–347.

Mississippi-Alabama Sea Grant Consortium. n.d. Focus on West Indian Manatees: Protection and Conservation. Mississippi-Alabama Sea Grant Consortium-08-015.

Mississippi Business Journal. 2010. Nearly full strength: Port of Gulfport restoring facilities and total cargo to pre-Katrina level. October 3.

Mississippi Coast Audubon Society. 2010. Birds of the Mississippi Coastal Counties: George, Jackson, Hancock, Harrison, Stone, and Pearl River Counties Checklist. 2 pp.

Mississippi Department of Education. 2012. Mississippi Public School Accountability Standards. http://www.mde.k12.ms.us/docs/accreditation-library/revised-10-9-12-2012-stds.pdf

———. 2013. Office of Research and Statistics, Mississippi Assessment and Accountability Reporting System. http://orsap.mde.k12.ms.us/MAARS/index.jsp

Mississippi Department of Employment Security (MDES). 2013. Covered Employment and Wages Annual 2013. http://mdes.ms.gov/media/35980/CEW_2013.pdf

———. 2015. Area Profile. https://mdes.virtuallmi.com/vosnet/MenuLandingPage.aspx?enc=QR4OZJARREkf7MmF5/FK4RZc/ugkoswW2d87UVIZ65o=

Mississippi Department of Environmental Quality (MDEQ). 2002. Biennial Report of Sand Beaches; Harrison County, 2001: Open-File Report 111B. Mississippi Department of Environmental Quality Office of Geology and Energy and Coastal Geology Division. January 2002.

———. 2004. State of Mississippi Water Quality Assessment 2004 Section 305(b) Report Addendum. 222 pp.

———. 2007. Mississippi Gulf Region Water and Wastewater Plan. http://www.deq.state.ms.us/MDEQ.nsf/page/About_MGRWaterWastewaterPlan2006

———. 2008. Cenozoic stratigraphic units in Mississippi. http://www.deq.state.ms.us/MDEQ.nsf/pdf/Geology_MSCenozoicStratigraphy/$File/MS_Cenozoic_Stratigraphy.pdf?OpenElement

———. 2010. State of Mississippi ground water quality assessment. Pursuant to Section 305(b) of the Clean Water Act. Prepared by the Office of Land and Water Resources Jackson, Mississippi.

———. 2011. Mississippi beach monitoring data. http://opcgis.deq.state.ms.us/beaches/ (accessed May 2017).

———. 2012a. State of Mississippi Water Quality Criteria for Intrastate, Interstate, and Coastal Waters (WPC-2). 40 pp.

———. 2012b. State of Mississippi Water Quality Assessment 2012 Section 305(b) Report. 76 pp.

———. 2015. Mississippi Department of Environmental Quality (MDEQ). 2015. 2015 Air Quality Data Summary. http://www.deq.state.ms.us/MDEQ.nsf/pdf/Air_2015AirQualityDataSummary/$File/2015%20Air%20Quality%20Data%20Summary.pdf?OpenElement. Accessed June 16, 2016.

Mississippi Department of Marine Resources (MDMR). 1999. Mississippi's coastal wetlands. Published by Mississippi Coastal Preserves Program.

———. 2005. Mississippi Gulf Coast National Heritage Area Management Plan. Mississippi Department of Marine Resources, Biloxi.

———. 2011a. Oystering, Marine Fisheries. http://www.dmr.state.ms.us/Fisheries/oystering.htm

———. 2011b. 2011 Comprehensive Annual Report. http://www.dmr.state.ms.us/images/dmr/2011-dmr-annual-report.pdf

———. 2012. Final Revised State of Mississippi Coastal Impact Assistance Plan 2007–2010. Plan Update 1 (November 2012). In Conjunction with Hancock, Harrison and Jackson Counties. Biloxi, Mississippi. http://www.dmr.ms.gov/coastal-management-a-planning/ciap/62-ciap-plan

———. 2015. Artificial Reefs. http://www.dmr.state.ms.us/index.php/marine-fisheries/artificial-reef

Mississippi Department of Public Safety (MDPS). 2011a. Mississippi Bureau of Investigation. http://www.dps.state.ms.us/dps/dps.nsf/webpages/bi_GeneralInformation?OpenDocument&Page=divisions_InvestigationMain

———. 2011b. Mississippi Highway Patrol, http://www.dps.state.ms.us/dps/dps.nsf/webpages/Highway Patrol_HPMain?OpenDocument

Mississippi Department of Revenue. 2011a. 2010–2011 City Millage Rates. http://www.dor.ms.gov/docs/prop_2010_2011_CityMillages.pdf

———. 2011b. 2011 class of counties. www.dor.ms.gov/taxareas/ property/main.html

———. 2012. 2011–2012 County Millage Rates. http://www.dor.ms.gov/docs/prop_millage_2011_2012.pdf

Mississippi Department of Transportation (MDOT). 2008. Reconnecting Mississippi's Coastal Communities through ITS. http://www.mdothwy90.com/Documents/Project_Overview.pdf

———. 2011. Mississippi's unified long-range transportation infrastructure plan (MULTIPLAN). http://sp.mdot.ms.gov/Office%20of%20Highways/Planning/Programs/MULTIPLAN/Apdx%20A%20Multiplan%202035%20Goals.pdf

———. 2012. MDOT Traffic Count Application. http://mdot.ms.gov/applications/trafficcounters/

Mississippi Department of Transportation (MDOT) and Federal Highway Administration (FHWA). 2008. SR 601–I-10 to Wiggins. Draft Environmental Impact Statement. October.

Mississippi Department of Wildlife, Fisheries and Parks (MDWFP). 2005. Mississippi’s comprehensive wildlife conservation strategy 2005–2015. Version 1.1.

———. 2009. Wildlife Research Findings – 2009. Federal Aid in Wildlife Restoration Project W-48-56. Statewide Wildlife Investigations. Annual Performance Report. July 1, 2008–June 30, 2009. 70 pp.

———. 2011a. Wildlife species. http://home.mdwfp.com/WMA/Default.aspx

———. 2011b. Black bear program. http://www.mdwfp.com/Level2/Wildlife/Game/Bear/Default.asp

Mississippi Development Authority (MDA). 2013. Fiscal Year 2012 Economic Contribution Report of Tourism in Mississippi. February. Jackson, Mississippi. http://www.visitmississippi.org/uploads/docs/reports_statistics/ECR_FY_2012_FINAL.pdf

Mississippi Gaming Commission. 2015. Quarterly Survey Information April 1, 2015-June 30, 2015. http://www.msgamingcommission.com/files/quarterly_reports/QRpt2Q15-Property.pdf

Mississippi Gulf Coast Convention and Visitors Bureau. 2012. Overview of the Mississippi Gulf Coast Media Profile Sheet. http://www.gulfcoast.org/includes/media/docs/Media-Profile-Sheet.pdf

Mississippi Institutions of Higher Learning, Center for Policy Research and Planning. 2012. http://www.mississippi.edu/urc/downloads/PopulationProjections.pdf

Mississippi Museum of Natural Science (MMNS). 2001. Endangered species of Mississippi. Dept. of Wildlife, Fisheries, and Parks, Jackson.

———. 2005. Mississippi’s Comprehensive Wildlife Conservation Strategy. Mississippi Department of Wildlife, Fisheries and Parks, Mississippi Museum of Natural Science, Jackson.

———. 2011. Natural Heritage Program. Rare or imperiled plants and animals of Mississippi by county. http://museum.mdwfp.com/science/nhp_online_data.html

Mississippi Natural Heritage Program (MNHP). 2011. Endangered species of Mississippi. Museum of Natural Science, Mississippi Dept. of Wildlife, Fisheries, and Parks, Jackson.

Mississippi Office of Homeland Security. 2011. Mississippi Community Emergency Response Teams (CERT). http://www.homelandsecurity.ms.gov/cit_corps_cert.html

Mississippi Power. 2013. http://www.mississippipower.com/about/about.asp

Mississippi Public Broadcasting News. 2010. More than half of Mississippi's railroad crossings are unprotected. October 14.

Mississippi State Oil and Gas Board. 2013. GIS Database. http://gis.ogb.state.ms.us/MSOGBOnline/

Mississippi State Port Authority (MSPA). 2006. FY 08 Legislative Budget Hearing presentation, September 27.

———. 2010a. Environmental Assessment and Environmental Review Record, Community Development Block Grant Disaster Recovery Project, 24-Acre Fill, New Tenant Terminals and Infrastructure. Prepared for Mississippi Development Authority. December.

———. 2010b. Terminal Tariff No. 6. http://www.shipmspa.com/01312011tariff6.pdf

———. 2012. Revised Terminal Tariff No. 6: Schedule for Charges, Rules and Regulations for Port Terminal Services. http://www.sos.ms.gov/ACProposed/00018442b.pdf

———. 2013a. FAQs and Facts – November 20, 2013. http://www.portofthefuture.com/facts-about-revitalization/

———. 2013b. MSPA Releases 2011 Cargo Figures. February 13.

———. 2014. MSPA Port of Gulfport Restoration Program: Pre-Bid Meeting Ship to Shore Rail Mounted Gantry Cranes, Project No. 034. http://www.portofthefuture.com/wp-content/uploads/2014/01/2014-01-22-Cranes-POTF.com-FINAL-01_22_2014.pdf (January 22, 2014).

Mississippi State University. 2013. Office of the Mississippi State Climatologist. Mississippi State University Department of Geosciences. http://geosciences.msstate.edu/scClimate.htm.

Mistovich, T.S. 1987. Documentary research, submerged cultural resources in the vicinity of Gulfport, Mississippi. Prepared for U.S. Army Corps of Engineers, Mobile District by OSM Archaeological Consultants, Inc., Moundville, Alabama.

Molina, L.K., and D.G. Redalje. 2010. Phytoplankton abundance and species composition in coastal Mississippi waters. Department of Marine Science, The University of Southern Mississippi, Stennis Space Center, Mississippi 39529.

Moncreiff, C., T. Randall, and J. Caldwell. 1998. Mapping of seagrass resources in Mississippi Sound. The University of Southern Mississippi, Institute of Marine Sciences, Ocean Springs. 33pp.

Montagna, P.A., S.A. Holt, and K.H. Dunton. 1998. Characterization of Anthropogenic and Natural Disturbance on Vegetated and Unvegetated Bay Bottom Habitats in the Corpus Christi Bay National Estuary Program Study Area. Final Project Report, Corpus Christi Bay National Estuary Program, Corpus Christi, Texas.

Moore, F.R., P. Kerlinger, and T.R. Simons. 1990. Stopover on a Gulf Coast Barrier Island by Spring Trans-Gulf Migrants. *Wilson Bulletin* 102(3): 487–500.

Moran, D. 1988. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Gulf of Mexico)—red snapper. U.S. Fish Wildl. Serv. Biol. Rep. 82(11.83). U.S. Army Corps of Engineers, TR EL-82-4. 19 pp.

Morang, A., J.P. Waters, and S.M. Khalil. 2012. Gulf of Mexico Regional Sediment Budget. *Journal of Coastal Research* (60): 14–29.

Morton, J.W. 1977. Ecological effects of dredging and dredge spoil disposal: a literature review. Technical Papers U.S. Fish and Wildlife Ser. #94.

Morton, R.A. 2007. Historical changes in the Mississippi-Alabama barrier islands and the roles of extreme storms, sea level, and human activities. U.S. Geological Survey Open-File Report 2007-1161. 38 pp.

Municode. 2013. Gulfport, Mississippi–Code of Ordinances. http://library.municode.com/index.aspx?clientId=15137

Musick, J. 1979. The marine turtles of Virginia with notes on identification and natural history. Educational Series No. 24. Sea Grant Program, Virginia Institute of Marine Science, Gloucester Point.

National Audubon Society. 2011. Gulfport IBA. http://iba.audubon.org/iba/viewSiteProfile.do?siteId=1743&navSite=state

National Ballast Information Clearinghouse (NBIC). 2011. NBIC Online Database. Electronic publication, Smithsonian Environmental Research Center and United States Coast Guard. http://invasions.si.edu/nbic/search.html

National Climate Assessment and Advisory Development Committee (NCAADC). 2013. Draft for Public Comment. Draft Climate Assessment Report. Chapter 17 – Southeast and the Caribbean, v. 11, January. 33 pp.

National Climatic Data Center (NCDC). 2000. 1971–2000 normals for all Mississippi stations. Gulfport Naval Center, Harrison County, Mississippi. Station 223671. http://www.srcc.lsu.edu/climateNormals/

National Fish and Wildlife Laboratory. 1980. Selected vertebrate endangered species of the seacoast of the United States. U.S. Fish and Wildlife Service, Biological Services Program, Washington, D.C. FWS/OBS-80/01.

National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS). 1991. Recovery plan for U.S. population of Atlantic green turtle. National Marine Fisheries Service, Washington, D.C.

National Marine Fisheries Service (NMFS). 2003. Biological Opinion on Dredging of Gulf of Mexico Navigation Channels and Sand Mining ("Borrow") Areas Using Hopper Dredges by COE Galveston, New Orleans, Mobile, and Jacksonville Districts (November 19). Consultation Number F/SER/2000/01287.

———. 2005. Revision 1 to November 19, 2003, Gulf of Mexico Regional Biological Opinion (GOM RBO) on Hopper Dredging of Navigation Channels and Borrow Areas in the U.S. Gulf of Mexico (June 24). Southeast Regional Office, St. Petersburg, Florida. http://el.erdc.usace.army.mil/tessp/pdfs/2005GulfBO.pdf

———. 2007. Revision 2 to the National Marine Fisheries Service November 19, 2003, Gulf of Mexico Regional Opinion (GRBO) to the U.S. Army Corps of Engineers on Hopper Dredging of Navigation Channels and borrow Areas in the U.S. Gulf of Mexico (January 9, 2007). Southeast Regional Office, St. Petersburg, Florida.

———. 2010. Fisheries Economics of the United States, 2009. U.S. Dept. Commerce, NOAA Tech. Memo. NMFS-F/SPO-118.

———. 2012a. Fin Whale (*Balaenoptera physalus*). http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/finwhale.htm

———. 2012b. Sei Whale (*Balaenoptera borealis*). http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/seiwhale.htm

———. 2013a. Proactive Conservation Program: Species of Concern. http://www.nmfs.noaa.gov/pr/species/concern/

———. 2013b. Blue Whale (*Balaenoptera musculus*). http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/bluewhale.htm

———. 2013c. Humpback Whale (*Megaptera novaeangliae*). http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/humpbackwhale.htm

———. 2013d. Sperm Whale (*Physeter macrocephalus*). http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/spermwhale.htm

———. 2013e. Sea Turtles – Office of Protected Resources. http://www.nmfs.noaa.gov/pr/species/ turtles/

———. 2013f. Alabama shad (*Alosa alabamae*). http://www.nmfs.noaa.gov/pr/species/fish/alabama shad.htm

———. 2013g. Dusky shark (*Carcharhinus obscurus*). http://www.nmfs.noaa.gov/pr/species/fish/duskyshark.htm

———. 2013h. Sand tiger shark (*Carcharias taurus*). http://www.nmfs.noaa.gov/pr/species/fish/sand tigershark.htm

———. 2013i. Speckled hind (*Epinephelus drummondhayi*). http://www.nmfs.noaa.gov/pr/species/fish/speckledhind.htm

———. 2013j. Warsaw grouper (*Epinephelus nigritus*). http://www.nmfs.noaa.gov/pr/species/fish/warsawgrouper.htm

———. 2013k. Ivory tree coral (*Oculina varicosa*). http://www.nmfs.noaa.gov/pr/species/invertebrates/ivorytreecoral.htm

———. 2015. NMFS Ocean Acoustics. http://www.nmfs.noaa.gov/pr/acoustics/ (accessed June 2015)

National Oceanic and Atmospheric Administration (NOAA). 2011a. Tides and Currents web page. http://tidesandcurrents.noaa.gov/

———. 2011b. Tides and Currents web page. http://tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?stnid=8735180

———. 2012a. Interim Sound Threshold Guidance. http://www.nwr.noaa.gov/Marine-Mammals/MM-sound-thrshld.cfm (page last updated: January 31).

———. 2012b. Coastal Zone Management Act. http://coastalmanagement.noaa.gov/about/media/CZMA_10_11_06.pdf (accessed September 20, 2013).

———. 2013. Essential Fish Habitat Mapper (v3.0). http://www.habitat.noaa.gov/protection/efh/efhmapper/index.html

Natural Resources Conservation Service (NRCS). 2013. Web Soil Survey. http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. NatureServe, Arlington, Virginia. http://www.natureserve.org/explorer

———. 2011. NatureServe Explorer: An online encyclopedia of life. NatureServe, Arlington, Virginia. http://www.natureserve.org/explorer

Nelson, K. 2011. “BP buys east beach of Cat Island.” *Sun Herald* April 7.

Newcombe, C.P., and J.O.T. Jensen. 1996. Channel suspended sediment and fisheries: a synthesis for quantitative assessment of risk and impact. *North American Journal of Fisheries Management* 16:693–727.

Newell, R.C., L.J. Seiderer, and D.R. Hitchcock. 1998. The impact of dredging works in coastal waters: a review of the sensitivity to disturbance and subsequent recovery of biological resources on the sea bed. *Oceanography and Marine Biology: an Annual Review*. Vol. 36, 127–78.

Newell, R.C., L.J. Seiderer, N.M. Simpson, and J.E. Robinson. 2004. Impacts of marine aggregate dredging on benthic macrofauna off the south coast of the United Kingdom. *Journal of Coastal Research* 20(1): 115–125.

Nybakken, J.W., and M.D. Bertness. 2005. Marine biology: an ecological approach, 6th Edition. Benjamin Cummings, Publisher.

Office of Management and Budget (OMB). 2013. Revised Delineations of Metropolitan Statistical Areas, Micropolitan Statistical Areas, and Combined Statistical Areas, and Guidance on Uses of the Delineations of These Areas. February 28, 2013. https://www.whitehouse.gov/sites/default/files/omb/bulletins/2013/b-13-01.pdf

O'Shea, T.J. and M.E. Ludlow. 1992. The Florida manatee, *Trichechus manatus latirostris*. Pp. 190–200 in S.R. Humphrey (editor), Rare and Endangered Biota of Florida. Vol. I. Mammals. University Press Florida, Gainesville.

Orlando, S.P. Jr., L.P. Rozas, G.H. Ward, and C. J. Klein. 1993. Salinity Characteristics of Gulf of Mexico Estuaries. Silver Spring, Maryland. National Oceanic and Atmospheric Administration, Office of Ocean Resources and Conservation Assessment. 209 pp.

Orth, R.J., T.J.B. Carruthers, W.C. Dennison, C.M. Duarte, J.W. Fourqurean, K.L. Heck, A.R. Hughes, G.A. Kendrick, W.J. Kenworthy, S. Olyarnik, F.T. Short, M. Waycott, and S.L. Williams. 2006. A global crisis for seagrass ecosystems. *Bioscience* 5612:987–996.

Otvos, E.G. 1991. Houston Ridge, SW Louisiana – end link in the late Pleistocene Ingleside barrier chain? – Prairie Formation newly defined. *Southeastern Geology* 31(4): 235–249.

———. 2001a. Stratigraphy and Quaternary Evolution in the Northern Gulf Coastal Plain Framework. Stratigraphic and Paleontologic Studies of the Neogene and Quaternary Sediments in Southern Jackson County, Mississippi. U.S. Geological Survey Open-file Report 01-415-H.

———. 2001b. Quaternary Geology of the Gulf Coastal Plain, R. B. Morrison Editor. Decade of North American Geology Series, v. K-2, p. 583–610, Geological Soc. America.

Pan Isles, Inc. 2011. Ship island history. http://msshipisland.com/?q=ship_island_history

Parry, M.L., O.F. Canziani, J.P. Palutikof, P.J. Van Der Linden, and C.E. Hanson (editors). 2007. Contribution of Working Group II to the Fourth Assessment Report on the Intergovernmental Panel on Climate Change. Section 6.2.4 Thresholds in the behavior of coastal systems, and Section 6.2.5 Observed effects of climate change on coastal systems. Cambridge University Press, Cambridge, United Kingdom and New York, New York, USA. http://www.ipcc.ch/publications_and_data/ar4/wg2/en/ch6s6-2-4.html

Parsons Brinckerhoff. 2012. Gulfport container volume projections. Prepared for the Port of Gulfport Expansion Project. January.

Parsons Brinckerhoff Quade and Douglas, Inc. 2003. Final environmental assessment/finding of no significant impact. Supplement to preliminary environmental assessment: connector between Port of Gulfport and Canal Road/I-10 interchange, Harrison County, Mississippi. U.S. Department of Transportation/Federal Highway Administration and Mississippi Department of Transportation. February 2001.

Pass Christian School District. 2013. http://www.pc.k12.ms.us/

Patrick, Archibald J., and Floyd R. Gilden. 1968. Hydrographic Survey of the Mississippi Sound at Gulfport and Approaches. U.S. Department of Commerce, Environmental Science Services Administration.

Pattillo, M.E., T.E. Czapla, D.M. Nelson, and M.E. Monaco. 1997. Distribution and abundance of fishes and invertebrates in Gulf of Mexico estuaries, Volume II: Species life history summaries. ELMR Rep. No. 11. NOAA/NOS Strategic Environmental Assessments Division, Silver Spring, Maryland. 377 p.

Pearson, C., and M. Forsyth. 2006. Develop Information Base and Management Protocols for the Coast Guard Debris Removal Mission off the Coast of Mississippi. Prepared for U.S. Coast Guard and FEMA by Coastal Environments, Inc., Baton Rouge, Louisiana.

Pearson, C., S.R. James, Jr., M.C. Krivor, S.D. El Darragi, and L. Cunningham. 2003. Refining and revising the Gulf of Mexico Outer Continental Shelf Region High Probability Model for Historic Shipwrecks, 3 volumes. OCS Study/MMS 2003-061. Prepared for Minerals Management Service, U.S. Department of the Interior, Gulf of Mexico OCS Region, New Orleans, Louisiana, by Panamerican Consultants, Inc., Memphis, Tennessee, and Coastal Environments, Inc., Baton Rouge, Louisiana.

Peterson, M.S. 2015.Gulf Sturgeon. http://www.usm.edu/gcrl/public/fish/gulf.sturgeon.php (last accessed on May 15, 2015).

Peterson, M.S., W.T. Slack, J.M. Havrylkoff, P.O. Grammer, and P.F. Mickle. 2015. Final Report (2012 – 2014) Gulf Sturgeon Monitoring Study for the Proposed Port of Gulfport Expansion Project, Gulfport, Mississippi. Department of Coastal Sciences, Gulf Coast Research Laboratory, University of Southern Mississippi and U.S. Army Engineer Research and Development Center, Vicksburg, Mississippi. January 2015.

Pike, J. 2007. GulfGov reports: spending federal disaster aid. www.rockinst.org/gulfgov (September 17).

Popper, A.N., and M.C. Hastings. 2009. The effects of human-generated sound on fish. *Integrated Zoology* 4:43-52.

Port of Gulfport. 2014. Port Landscaping Project. http://shipmspa.com/progress/port-landscaping-project/#sthash.SkyAIDkP.iZIRnEcA.dpbs

———. 2015. Port Landscaping Project. July 24, 2015. http://shipmspa.com/progress/port-landscaping-project/#sthash.SkyAIDkP.iZIRnEcA.dpbs.

Port of Los Angeles. 2008. Berths 97-109 Container Terminal Project Draft Environmental Impact Statement/Report (DEIS/DEIR), April. http://www.portoflosangeles.org/EIR/ChinaShipping/DEIR/deir_china_shipping.asp

Powell, E.N., E.E. Hoffmann, J.M. Klinck, and S.M Ray. 1992. Modeling oyster populations. A commentary on filtration rate. Is faster always better? *Journal of Shellfish Research* 11(2): 387–398.

Rakocinski, C.F., J. Lyczkowski-Shultz, and S.L., Richardson. 1996. Ichtyoplankton assemblage structure in Mississippi Sound as revealed by Canonical Correspondence Analysis. *Estuarine, Coastal and Shelf Science* 43:237–257.

Raines, B. 2011. Mississippi fisherman snag manatee near Deer Island. Mississippi Press. May 19. http://blog.gulflive.com/mississippi-press-news/2011/05/mississippi_fishermen_snag_man.html

Ray, G.L. 2005. Invasive estuarine and marine animals of the Gulf of Mexico. ANSRP Technical Notes Collection (ERDC/TN ANSRP-05-4). U.S. Army Engineer Research and Development Center, Vicksburg, Mississippi.

Rebel, T.P. 1974. Sea turtles and the turtle industry of the West Indies, Florida, and the Gulf of Mexico. Rev. Ed. Univ. Miami Press, Coral Gables, Florida.

Restore the Gulf. 2010. America's Gulf Coast. A long term recovery plan after the Deepwater Horizon oil spill. http://www.restorethegulf.gov/sites/default/files/documents/pdf/gulf-recovery-sep-2010.pdf

Rogillio, H.E., R.T. Ruth, E.H. Behrens, C.N. Doolittle, W.J. Granger, and J.P. Kirk. 2007. Gulf Sturgeon movements in the Pearl River drainage and the Mississippi Sound. *North Amer. J. Fish. Mgmt* 27:89–95.

Rosati, J.D., M.R. Byrnes, M.B. Gravens, and S.F. Griffee. 2009. Mississippi Coastal Improvement Project (MsCIP) Study Regional Sediment Budget for Mississippi Mainland and Barrier Island Coasts. Prepared for USACE, Engineer Research and Development Center, Coastal and Hydraulics Lab (ERDC-CHL). TR-09-X. July.

Ross, J.P. 1982. Historical decline of loggerhead, ridley, and leatherback sea turtles. In K. Bjorndal (editor), Biology and Conservation of Sea Turtles. Pp. 189–195. Smithsonian Institution Press, Washington, D.C.

Ross, S.T. 2001. Inland fishes of Mississippi. University Press of Mississippi.

Ross, S.T., W.T. Slack, R.J. Heise, M.A. Dugo, H. Rogillio, B.R. Bowen, P. Mickle, and R.W. Heard. 2009. Estuarine and coastal habitat use of Gulf sturgeon (*Acipenser oxyrinchus desotoi*) in the North-Central Gulf of Mexico. *Estuaries and Coasts* 32:360–374.

Rozas, L.P., P. Caldwell, and T.J. Minello. 2005. The fishery value of salt marsh restoration projects. *Journal of Coastal Research*. Special Issue 40:37–50. Winter.

Scarborough-Bull, A., and J.J. Kendall, Jr. 1992. Preliminary investigation: platform removal and associated biota. Pages 31–37 in L.B. Cahoon, editor, Proceedings of the American Academy of Underwater Sciences Twelfth Annual Scientific Diving Symposium. University of North Carolina Sea Grant College Program, September 24–27.

Schaefer, J., P. Mickle, J. Spaeth, B.R. Kreise, S. Adams, W. Matamoros, B. Zuber, and P. Vigueira. 2006. Effects of Hurricane Katrina on the fish fauna on the Pascagoula River Drainage. 36th Annual Mississippi Water Resources Conference.

Schmid, K., and E.G. Otvos. 2011. Geology and geomorphology of the Coastal Counties in Mississippi–Alabama. http://geology.deq.state.ms.us/coastal/NOAA_DATA/Publications/Publications/Coastwide/Geology%20and%20Geomorphology%20of%20the%20Coastal% 20Counties.pdf

Schwartz, F. 1976. Status of sea turtles, Cheloniidae and Dermochelidae, in North Carolina. Abstr. In Proceedings and abstracts from the 73rd meeting of the North Carolina Academy of Science, Inc., April 2–3, 1976, at the University of North Carolina, Wilmington, North Carolina. J. Elisha Mitchell *Scientific Society* 92(2): 76–77.

Shabica, S., R. Dolan, S. May, and P. May. 2010. Shoreline erosion rates along Barrier Islands of the North Central Gulf of Mexico. *Environmental Geology* 5(3): 115–126.

Sheridan, P. 1999. Temporal and spatial effects of open water dredged material disposal on habitat utilization by fishery and forage organisms in Laguna Madre, Texas. Final Report to the Laguna Madre Interagency Coordination Team, March.

———. 2004. Recovery of floral and faunal communities after placement of dredged material on seagrasses in Laguna Madre, Texas. *Estuarine Costal and Shelf Science* 59:441–458.

Sheridan, P.F., R.D. Slack, S.M. Ray, L.W. McKinney, E.F. Kilma, and T.R. Calnan. 1989. Biological components of Galveston Bay. Pp. 23–51 in Galveston Bay: Issues, Resources, Status and Management. National Oceanic and Atmospheric Administration Estuary-of-the-Month Seminar Series No. 13, Washington, D.C.

Shinkle, K.D., and R.K. Dokka. 2004. Rates of vertical displacement at benchmarks in the Lower Mississippi Valley and the Northern Gulf Coast. NOAA Technical Report NOS/NGS 50. 135 pp.

Simulation, Training, Assessment & Research (STAR). 2011. Gulfport Restoration Program 2010. April 14. Dania Beach, Florida.

Soil Conservation Service (SCS). 1971. Soil survey of Harrison County, Mississippi. U.S. Department of Agriculture, Mississippi Agricultural and Forestry Experimental Station.

———. 1975. Soil survey of Harrison County. U.S. Department of Agriculture, Mississippi Agricultural and Forestry Experimental Station.

Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Avery, M. Tignor, and H.L. Miller (editors). 2007. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Section 5, FAQ 5.1. Cambridge University Press, Cambridge, United Kingdom and New York, New York.

Southern Mississippi Planning and Development District. 2011a. International Economic Development Council Data Sheets for Hancock, Harrison, and Jackson counties www.smpdd.com/data-center/iedc-data-sets.html

———. 2011b. Comprehensive Economic Development Strategy 2007–2012. http://smpdd.com/assets/Planning/publications/SMPDD_CEDS_2012.pdf

Stanley, D.R., and C.A. Wilson. 1990. A fishery-dependent based study of fish species composition and associated catch rates around oil and gas structures off Louisiana. *Fishery Bulletin*, U.S. 88:719–730.

Stern, E.M., and W.B. Stickle. 1978. Effects of turbidity and suspended material in aquatic environments. Literature Review. Tech. Rpt. D-78-21. U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, Mississippi.

T. Baker Smith. 2006. The Biloxi Marsh Stabilization and Restoration Plan. Prepared for Biloxi Marsh Lands Corporation. June. 55 pp.

Teeter, A.M., G.L. Brown, M.P. Alexandret, C.J. Callegan, M.S. Sarruff, and D.C. McVan. 2003. Windwave resuspension and circulation of sediment and dredged material in Laguna Madre, Texas. ERDC/CHL TR-02-XX. U.S. Army Engineer Research and Development Center, Vicksburg, Mississippi.

Texas Parks and Wildlife Department. 2006. TPWD endangered, threatened and rare species data file.

The Nature Conservancy (TNC). 1999. TNC ecoregions and divisions of the lower 48 United States. Midwest Conservation Science Group.

Thieler, E.R., and E.S. Hammar-Klose. 2000. National assessment of coastal vulnerability to sea-level rise: preliminary results for the U.S. Gulf of Mexico Coast. U.S. Geological Survey, Open File Report 00-179. http://geology.uprm.edu/MorelockSite/morelockonline/3_image/cstvulnGoM.htm

Thomson, D. 2009. Geologic map of Mississippi. Mississippi Office of Geology. http://www.deq.state.ms.us/mdeq.nsf/pdf/Geology_MSGeology1969Map/$File/MS_Geology1969.pdf?OpenElement

Thompson Engineering. 2015. Revised Sediment Sampling Report, Beneficial Use of Dredged Material Evaluation, Port of Gulfport Spool Base, Gulfport, Harrison County, Mississippi. Thompson Engineering Project No.: 14-1101-0352. July 23, 2015.

Titus, J., and C. Richman. 2001. Maps of lands vulnerable to sea level rise: modeled elevations along the U.S. Atlantic and Gulf coasts. *Climate Research* 18:205–228.

Tuberville, T.D. 2000. Southern hognose snake species profile, gopher tortoise council of Florida. http://www.gophertortoisecouncil.org/dox/simus.pdf

Turcotte, W.H., and D.L. Watts. 1999. Birds of Mississippi. University Press of Mississippi. Jackson. 459 pp.

Turner, R., N. Rabalais, B. Fry, N. Atilla, C. Milan, J. Lee, C. Normandeau, T. Oswald, E. Swenson, and D. Tomasko. 2006. Paleo-indicators and water quality change in the Charlotte Harbor estuary (Florida). *Limnology and Oceanography* 51:518–533.

U.S. Air Force. 2012. 81st Medical Group Fact Sheet. http://www.keesler.af.mil/library/factsheets/factsheet.asp?id=4972

U.S. Army Corps of Engineers (USACE). 1935. The Ports of Gulfport and Pascagoula, Mississippi. Port Series No. 19. 105 pp.

———. 1975. A study of the effects of maintenance dredging on selected ecological parameters in the Gulfport Ship Channel, prepared by Water and Air Research.

———. 1976. Gulfport Harbor, Mississippi (Maintenance Dredging). Final Environmental Impact Statement. U.S. Army Corps of Engineers, Mobile District. October.

———. 1998a. Statement of Findings, Regulatory Branch, Operations Division, Mobile District Corps of Engineers. CESAM-OP-S (1145b). Prepared June 18.

———. 1998b. Use of Sediment Quality Guidelines (SQGs) in Dredged Material Management. Dredging Research Technical Note EEDP-04-29.

———. 2001. Project Management Plan – Gulfport Harbor, Mississippi General Reevaluation Report. Prepared by U.S. Army Corps of Engineers, Mobile District. Page 3.

———. 2006a. Final Sediment Quality Characterization of the Gulfport Harbor Federal Navigation Channel. Dredged Material Evaluation – Gulfport Harbor Navigation Channel. U.S. Army Corps of Engineers, Mobile District. 269 pp.

———. 2006b. Draft Environmental Assessment for the Operations and Maintenance of the Federally Authorized Biloxi Harbor Navigation Project (Ott Bayou), Harrison County, Mississippi. U.S. Army Corps of Engineers Mobile District. September. http://www.sam.usace.army.mil/Portals/46/docs/planning_environmental/docs/EA/Ott_Bayou_EA.pdf

———. 2006c. Environmental Assessment and Finding of No Significant Impact: Mississippi Coastal Improvements Program (MsCIP) Near Term Improvements: Hancock, Harrison, and Jackson Counties, Mississippi. Signed June 28.

———. 2006d. Chief's Report: Mississippi Coastal Improvements Project, Hancock, Harrison, and Jackson Counties, Interim Report. Department of the Army, Office of the Chief of Engineers, Washington, D.C.

———. 2006e. Interim Report: Mississippi Coastal Improvements Program (MsCIP), Hancock, Harrison, and Jackson Counties, Mississippi. August. http://www.sam.usace.army.mil/Portals/46/docs/program_management/mscip/docs/interim_report/MsCIP%20INTERIM%20REPORT%20082006.pdf

———. 2008. Draft Environmental Assessment: Maintenance Dredging and Disposal of Dredged Material, Mississippi and Louisiana Portions of the Gulf Intracoastal Waterway Federally Authorized Navigation Project, Hancock, Harrison, and Jackson Counties, Mississippi and Coastal Louisiana. January.

———. 2009a. Comprehensive Plan and Integrated Programmatic Environmental Impact Statement, Mississippi Coastal Improvements Program (MsCIP), Hancock, Harrison, and Jackson Counties, Mississippi. http://www.mscip.usace.army.mil/

———. 2009b. Gulfport Harbor Navigation Channel: Final Supplemental EIS. Prepared by CH2M HILL. February.

———. 2009c. Record of Decision: Mississippi Coastal Improvements Program, Hancock, Harrison, and Jackson Counties, Mississippi. Signed January 14, 2010. http://www.sam.usace.army.mil/Portals/46/docs/program_management/mscip/docs/MsCIP%20final%20signed%20ROD%20Jan%2010.pdf

———. 2009d. Gulfport West & East Ocean Dredged Material Disposal Sites Site Management and Monitoring Plan. September 2009. http://archive.epa.gov/region4/water/oceans/web/html/sites.html#gulfport2

———. 2010a. Pascagoula Harbor Navigation Channel Final Environmental Impact Statement. U.S. Army Corps of Engineers, Mobile District.

———. 2010b. Environmental assessment, Mississippi Coastal Improvements Program (MsCIP)-Barrier Island Restoration Plan, West Ship Island north shore restoration, Mississippi Sound, Harrison County, Mississippi. October.

———. 2013a. USACE Navigation data center. http://www.navigationdatacenter.us/

———. 2013b. USACE Sea Turtle Data Warehouse. http://el.erdc.usace.army.mil/seaturtles/list.cfm?Code=Species&Step=1 (updated February 20, 2013).

———. 2015a. South Mississippi Branch Regulatory Division. Personal communication with Philip Hegji, October 1, 2015.

———. 2015b. Final Report 2014 Mapping of Submerged Aquatic Vegetation Mississippi Coastal Improvements Program (MSCIP) Barrier Island Restoration Project.

U.S. Army Corps of Engineers, Mobile District. March 2015. U.S. Census Bureau. 2008. 2006–2008 American Community Survey (ACS) 3-year estimates. http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml

———. 2010. 2008–2010 American Community Survey (ACS) 3-year estimates. http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml

———. 2012. 2007–2011 American Community Survey (ACS) 5-year estimates. http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml

———. 2013a. 2010 Census. http://www.census.gov/2010census/

———. 2013b. 1990 Census. http://www.census.gov/main/www/cen1990.html

———. 2013c. 2000 Census. http://www.census.gov/main/www/cen2000.html

U.S. Coast Guard (USCG). 2011a. USCG Missions. http://www.uscg.mil/top/missions/

———. 2011b. Ballast water management program. http://www.uscg.mil/hq/cg5/cg522/cg5224/bwm.asp

U.S. Commission on Ocean Policy. 2004. An Ocean Blueprint for the 21st Century. Final Report. Washington, DC, 2004.

U.S. Department of Health and Human Services (HHS). 2014. 2014 HHS Poverty Guidelines: one version of the U.S. Federal poverty measure. http://aspe.hhs.gov/poverty/14poverty.shtml

U.S. Department of Homeland Security. 2011. U.S. Customs and Border Control. http://www.cbp.gov/xp/cgov/toolbox/contacts/ports/ ms/1902.xml

U.S. Department of Housing and Urban Development (HUD). 2011. State of the City Data Systems Building Permits Database. http://socds.huduser.org/permits/index.html

U.S. Department of Veterans Affairs. 2013. VA Gulf Coast Administration. http://www.biloxi.va.gov/

U.S. Environmental Protection Agency (EPA). 1974. Information on levels of environmental noise requisite to protect public health and welfare with an adequate margin of safety. EPA 550/9-74-004. March. NNA19870406.0098.

———. 1976. About sound. Office of Noise Abatement and Control, Washington, D.C. EPA 20460. May.

———. 1999. Ecological condition of estuaries in the Gulf of Mexico. EPA 620-R-98-004. U.S. Environmental Protection Agency, Office of Research and Development, National Health and Environmental Effects Research Laboratory, Gulf Ecology Division, Gulf Breeze, Florida. 80 pp. http://www.gulfbase.org/bay/view.php?bid=mississippi1

———. 2001. An initial survey of aquatic invasive species issues in the Gulf of Mexico Region, Version 4. Prepared by Battelle for the Gulf of Mexico Program U.S. Environmental Protection Agency, EPA/OCPD Contract No. 68 C-00-121. Work Assignment 1-07.

———. 2006a. Volunteer estuary monitoring, a methods manual second edition. Cooperative Agreement #CX825019-01-3 from the U.S. Environmental Protection Agency (EPA), Office of Wetlands, Oceans and Watersheds to The Ocean Conservancy.

———. 2006b. Addendum to Katrina response environmental soil and sediment sampling, Gulf Coast of Mississippi. Memorandum 4SESD-EIB.

———. 2009. Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories. April 2009.

———. 2011a. National coastal assessment database. http://oaspub.epa.gov/coastal/coast.search

———. 2011b. The Plain English Guide to the Clean Air Act. Publication Number EPA-456/K-007-01. April 2007. Last updated November.

———. 2012. National Coastal Condition Report IV. EPA-842-R-10-003. 368 pp. http://www.epa.gov/nccr

———. 2013a. National Coastal Assessment Database. http://oaspub.epa.gov/coastal/coast

———. 2013b. National Recommended Water Quality Criteria. http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm

———. 2013c. Aldrin/Dieldrin Webpage. http://www.epa.gov/oppt/pbt/pubs/aldrin.htm

———. 2013d. Lindane Voluntary Cancellation and RED Addendum Fact Sheet. http://www.epa.gov/oppsrrd1/REDs/factsheets/lindane_fs_addendum.htm

———. 2013e. Polychlorinated Biphenyls (PCBs). Basic Information. http://www.epa.gov/osw/hazard/tsd/pcbs/pubs/about.htm

———. 2013f. DDT – A Brief History and Status. http://www.epa.gov/pesticides/factsheets/chemicals/ddt-brief-history-status.htm

———. 2013g. Currently Designated Nonattainment Areas for All Criteria Pollutants as of July 31, 2013. http://www.epa.gov/oaqps001/greenbk/ancl.html#MISSISSIPPI (accessed September 20, 2013).

———. 2015a. Technology Transfer Network Clearinghouse for Inventories & Emissions Factors http://www.epa.gov/ttn/chief/net/2011inventory.html

———. 2015b. Facility Level Information on Green House gases Tool (FLIGHT) http://ghgdata.epa.gov/ghgp/main.do

———. 2015c. Air Quality Monitoring Information. http://www.epa.gov/airtrends/factbook.html

———. 2015d. Ground Level Ozone, http://www3.epa.gov/airquality/ozonepollution/ Accessed October 6, 2015.

U.S. Environmental Protection Agency (EPA)/U.S. Army Corps of Engineers (USACE). 2007. Identifying, planning, and financing beneficial use projects using dredged material, beneficial use planning manual. EPA 842-B-07-001. Washington, D.C. October.

U.S. Fish and Wildlife Service (USFWS). 1991. Mississippi Sandhill Crane Recovery Plan. U.S. Fish and Wildlife Service, Atlanta, Georgia.

———. 1995. Threatened and endangered species of Texas. U.S. Fish and Wildlife Service, Austin. June.

———. 1996. Piping plover (*Charadrius melodus*), Atlantic Coast Population, Revised Recovery Plan. Hadley, Massachusetts.

———. 2002. Colonial-nesting waterbirds. A Glorious and Gregarious Group. 2 pp.

———. 2009. Mississippi gopher frog recovery action plan. Southeast Region, Jackson, Mississippi Ecological Services Field Office.

———. 2010a. 50 CFR Part 17. Endangered and threatened wildlife and plants review of native species that are candidates for listing as endangered or threatened; Annual Notice of Findings on Resubmitted Petitions; Annual Description of Progress on Listing Actions; Proposed Rule. 75 FR 69222–69294.

———. 2010b. Habitat Descriptions – Federally Endangered and Threatened and Candidate Species of Mississippi. http://www.fws.gov/mississippiES/pdf/T&E%20Species%20Habitat%20info%202010%20updated.pdf

———. 2011a. National Wetland Inventory (NWI). http://www.fws.gov/wetlands/Data/Mapper.html (accessed June 20, 2011).

———. 2011b. Candidate Species – Section 4 of the Endangered Species Act. http://www.fws.gov/endangered/esa-library/pdf/candidate_species.pdf/

———. 2012a. Mississippi list of federally threatened and endangered species by county. July. http://www.fws.gov/mississippiES/pdf/MS%20county%20list%20for%20T&E%20July%202012.pdf

———. 2012b. U.S. Fish and Wildlife Service Announces Critical Habitat Designation for Dusky Gopher Frog. http://www.fws.gov/southeast/news/2012/032.html

———. 2012c. Hawksbill Sea Turtle (*Eretmochelys imbricate*). http://www.fws.gov/northflorida/SeaTurtles/Turtle%20Factsheets/hawksbill-sea-turtle.htm

———. 2013a. Species profile for Red-cockaded woodpecker (*Picoides borealis)*. http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B04F

———. 2013b. Species Profile for West Indian manatee (*Trichechus manatus*). http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=A007

———. 2013c. Species Profile for Alabama red-bellied turtle (*Pseudemys alabamensis*). http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=C01W

———. 2013d. Species Profile for Gopher tortoise (*Gopherus polyphemus*). http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=C044

———. 2013e. Species Profile for Yellow-blotched map turtle (*Graptemys flavimaculata*). http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=C025

———. 2013f. Species Profile for Black pine snake (*Pituophis melanoleucus* ssp. *lodingi*). http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=C029

———. 2013g. Species Profile for Eastern Indigo snake (*Drymarchon corais couperi*). http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=C026

———. 2013h. Species Profile for Pearl darter (*Percina aurora*). http://ecos.fws.gov/species Profile/profile/speciesProfile.action?spcode=E07A

———. 2013i. Estuary Protection Act. http://www.fws.gov/laws/lawsdigest/estuary.html (accessed on September 20, 2013).

———. 2014. Rufa Red Knot Background Information and Threats Assessment Supplement To Endangered and Threatened Wildlife and Plants; Final Threatened Status for the Rufa Red Knot (*Calidris canutus rufa*) [Docket No. FWS–R5–ES–2013–0097; RIN AY17]. http://www.fws.gov/northeast/redknot/pdf/20141125_REKN_FL_supplemental_doc_FINAL.pdf

———. 2015. State Road 30/US 98 Pensacola Bay Bridge Federal Highway Administration, Florida Department of Transportation, Escambia and Santa Rosa Counties, Florida FWS No. 04EF3000-2013-F-0264. Biological Opinion. April 8, 2015.

U.S. Fish and Wildlife Service (USFWS) and Gulf States Marine Fisheries Commission (GSMFC). 1995. Gulf Sturgeon Recovery Plan. Atlanta, Georgia. 170 pp.

U.S. Geological Survey (USGS). 1970. Mobile, Alabama, quadrangle, 1:250K series, Topographic Map. U.S. Department of the Interior, Washington, D.C.

———. 1999. Sea-level rise and coastal forests on the Gulf of Mexico. By K. Williams, Z. Pinzon, R. Stumpf, and E. Raabe. Open-file Report 99-441.

———. 2003. Physiographic regions of the lower 48 states. http://tapestry.usgs.gov/physiogr/physio.html

———. 2007. Assessment of undiscovered oil and gas resources in tertiary strata of the Gulf Coast, 2007. http://pubs.usgs.gov/fs/2007/3066/pdf/FS07-3066_508.pdf

———. 2008. The mineral industry of Mississippi. http://minerals.usgs.gov/minerals/pubs/state/2008/myb2-2008-ms.pdf

———. 2011a. Mississippi geology. Online Spatial Data and Mineral Resources. http://mrdata.usgs.gov/sgmc/ms.html

———. 2011b. Geologic units in Mississippi. http://tin.er.usgs.gov/geology/state/fips-unit.php?state= MS

———. 2011c. USGS online Gulfport water data. http://nwis.waterdata.usgs.gov/nwis/gwlevels/?site_no=302132089084701&agency_cd=USGS

———. 2013a. Water-Data Report 2012, 02489500 Pearl River near Bogalusa, Louisiana. U.S. Department of the Interior, U.S. Geological Survey. Annual Water-Data Report Mapper webpage. http://wdr.water.usgs.gov/

———. 2013b. Water-Data Report 2012. 02479310 Pascagoula River at Graham Ferry, Mississippi. U.S. Department of the Interior, U.S. Geological Survey. Annual Water-Data Report Mapper webpage. http://wdr.water.usgs.gov/

U.S. Global Change Research Program. 2009. Global climate change impacts in the U.S. 196 pp.

University of Southern Mississippi (USM). 2011. Tides: Gulfport Harbor, Mississippi Sound. University of Southern Mississippi Gulf Coast Research Laboratory. http://www.usm.edu/gcrl/MStide/pdf/GulfportHarbor_11.pdf

———. 2013. Gulf Coast Research Lab. Tides Along the Mississippi Coast and Mississippi Sound. Webpage. http://www.usm.edu/gcrl/MStide/ pdf/GulfportHarbor_11.pdf

Upton, H.F. 2011. The Deepwater Horizon Oil Spill and the Gulf of Mexico Fishing Industry. Congressional Research Service.

Valiela, I. 1995. Marine ecological processes, second edition. Spring-Verlag, Inc., New York.

VanDerWal, D., R.M. Forster, F. Rossi, H. Hummel, T. Ysebaert, F. Roose, and P. Herman. 2011. Ecological evaluation of an experimental beneficial use scheme for dredged sediment disposal in shallow tidal water. *Marine Pollution Bulletin* 62(1): 99–108.

Vickerman, Zachary, Miller. 1994. Strategic Plan. Prepared for Mississippi State Port Authority at Gulfport. Adopted August 16.

Virginia Department of Game and Inland Fisheries. 2010. Snake, common rainbow (030046). Fish and Wildlife Information Service (VFWIS) BOVA Booklet. http://www.vafwis.org/fwis/booklet.html?Menu=_Life+History&bova=030046&version=15098

Vitale, L.D., and Q.R. Dokken. 2000. Preliminary observations of fish assemblages associated with a partially removed platform off the Texas coast. In Proceedings: eighteenth annual Gulf of Mexico information transfer meeting, December, 1998. U.S. Department of the Interior, Minerals Management Service. Gulf of Mexico OCS Region, New Orleans, Louisiana. OCS Study MMS 2000-030. 538 pp.

Weddle, R.S. 1985. Spanish Sea: The Gulf of Mexico in North American Discovery, 1500–1685. Texas A&M University Press, College Station.

———. 2011. La Salle's Texas Settlement, Handbook of Texas Online. http://www.tshaonline.org/handbook/online/articles/uel07

Wilber, D.H. and D.G. Clarke. 2001. Biological effects of suspended sediments: a review of suspended sediment impacts on fish and shellfish with relation to dredging activities in estuaries. *North American Journal of Fisheries Management* 21:855–875.

Wilber, D.H., D.G. Clarke, and S.I. Rees. 2006. Responses of benthic macroinvertebrates to thin-layer disposal of dredged material in Mississippi Sound, USA. Marine Pollution Bulletin doi:10.1016/j.marpolbul.2006.08.042.

Wilber, D.H., W. Brostoff, D.G. Clarke, and G.L. Ray. 2005. Sedimentation: Potential biological effects from dredging operations in estuarine and marine environments. DOER Technical Notes Collection (ERDC TN-DOER-E20). U.S. Army Engineer Research and Development Center. Vicksburg, Mississippi.

Wright, T.C. 1978. Aquatic dredged material disposal impacts. U.S. Army Eng. Water Experiment Station Environmental Laboratory, Vicksburg, Mississippi, Technical Report DS-78-1.

Wilbur Smith Associates. 2009. Mississippi statewide trade and transportation assessment. Technical Working Paper 4 – Review of Relevant Freight Initiatives and Studies, Phase 1, Part 1, Task. April.

Wilson, K.V. Jr., M.G. Clair, II, D.P. Turnipseed, and R.A. Rebich. 2009. Development of a Watershed Boundary Dataset for Mississippi: U.S. Geological Survey Open-File Report 2008–1198. 8 pp.

World Register of Marine Species. 2011. Website: http://www.marinespecies.org/

World Trade. 2010. Gulf Port building boom. February 6.

Young, B. 2006. Conservation and management of black bears in Mississippi. Mississippi Museum of Natural Science, Mississippi Department of Wildlife, Fisheries, and Parks.

Young, D., G. Alexander, and D. McDermott-Ehrlich. 1979. Vessel-related contamination of Southern California harbours by copper and other metals. *Marine Pollution Bulletin* 10:50–56.

Zimmerman, R.J., and T.J. Minello. 2010. SL rise impacts on fisheries and ecosystems of the Gulf of Mexico. Presentation to the International Conference on Sea-Level Rise in the Gulf of Mexico. http://www.sealevelrise2010.org/Zimmerman,%20Roger.pdf

16.0 GLOSSARY

The following definitions are for the convenience of those reading this Environmental Impact Statement and do not replace definitions in state, Federal, or local laws, regulations and ordinances.

Alternatives – Combinations of management measures that collectively meet study goals and objectives within the defined study constraints.

Alluvial – Characterizing deposits of soil or gravel that are caused by flowing water.

Artifact assemblage – A collection of artifacts from a particular component, site, or group of sites.

Anadromous – Migrating up rivers from the sea for breeding.

Anoxia – Absence of oxygen.

Anthropogenic – Caused by human activity.

Aquaculture – The science and business of farming marine or freshwater food fish or shellfish, such as oysters, crawfish, shrimp and trout, under controlled conditions.

Aquifer – An underground bed or stratum of earth, gravel, or porous stone that contains water.

Bathymetry – The measurement of depths of water in oceans, seas, and lakes and the information derived from such measurements.

Benthic – Living on or in sea, lake, or stream bottoms.

Best Management Practice (BMP) – A BMP is a design, technique, or landscape addition that reduces pollution in stormwater runoff. BMPs can be structural or non-structural.

Biomass – The total mass of living matter (plant and animal) within a given unit of environmental area.

Brackish marsh – Intertidal plant community typically found in the area of the estuary where salinity ranges between 4 and 15 ppt.

Cheniers – Formed over thousands of years by the deltaic processes of the Mississippi River and other streams and described as a live oak-hackberry forest with live oak and hackberry as the dominant canopy species.

Chert – A hard, fine-grained crystalline siliceous rock formed in limestone and commonly used to manufacture prehistoric implements.

Clean Water Act Section 404(b)(1) – There are several sections of this Act that pertain to regulating discharges into wetlands. The discharge of dredged or fill material into waters of the United States is subject to permitting specified under Title IV (Permits and Licenses) of this Act and specifically under Section 404 (Discharges of Dredge or Fill Material) of the Act.

Coastal Zone Consistency Determination – The U.S. Environmental Protection Agency reviews plans for activities in the coastal zone to ensure they are consistent with federally approved State Coastal Management Programs under Section 307(c)(3)(B) of the Coastal Zone Management Act.

Compensatory mitigation – The restoration (reestablishment or rehabilitation), establishment (creation), enhancement, and/or, in certain circumstances, preservation of aquatic resources for the purposes of offsetting unavoidable adverse impacts that remain after all appropriate and practicable avoidance and minimization has been achieved.

Continental Shelf – The edge of the continent under Gulf waters; the shallow Gulf of Mexico fringing the coast.

Cumulative Impacts – The combined effect of all direct and indirect impacts to a resource over time.

Decomposition – Breakdown or decay of organic materials.

Deltaic Deposits – Mud and sand deposited at the mouth of a river.

Demersal – Dwelling at or near the bottom of a body of water (e.g., a demersal fish).

Dewatering – The process of dredged sediments compacting while losing water after being deposited.

Discharge – The volume of fluid passing a point per unit of time, commonly expressed in cubic feet per second, millions of gallons per day, or gallons per minute.

Dissolved oxygen – Oxygen dissolved in water, available for respiration by aquatic organisms. One of the most important indicators of the condition of a waterbody.

Direct impacts – Those effects that result from the initial construction of a measure (e.g., marsh destroyed during the dredging of a canal). Contrast with “indirect effects.”

Dredged material – Material excavated from waters of the United States or ocean waters. The term dredged material refers to material that has been dredged from a waterbody, while sediment refers to material in a waterbody prior to the dredging process.

Ecological – Refers to the relationship between living things and their environment.

Economic – Of or relating to the production, development, and management of material wealth, as of a country, household, or business enterprise.

Ecosystem – An organic community of plants and animals viewed within its physical environment (habitat); the ecosystem results from the interaction between soil, climate, vegetation and animal life.

Ecosystem restoration – Activities that seek to return an organic community of plants and animals and their habitat to a previously existing or improved natural condition or function.

Egress – A path or opening for going out; an exit.

Embankment – A linear mound of earth or stone existing or built to hold back water or to support a

Endangered species – Animals and plants that are threatened with extinction.

Environmental Impact Statement (EIS) – A document that describes the positive and negative environmental effects of a proposed action and the possible alternatives to that action. The EIS is used by the Federal government and addresses social issues as well as environmental ones.

Environmental Justice (EJ) – The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations and policies.

Estuary – A semi-enclosed body of water with freshwater input and a connection to the sea where fresh water and salt water mix.

Estuarine – Related to an estuary.

Evaporation – The process by which any substance is converted from a liquid state into, and carried off in, vapor; as, the evaporation of water.

Executive Order (EO) – A rule or order having the force of the law.

Exotic species – Animal and plant species not native to the area; usually undesirable (e.g., tamarisk).

Faulting – A fracture in the continuity of a rock formation caused by a shifting or dislodging of the earth's crust, in which adjacent surfaces are displaced relative to one another and parallel to the plane of fracture.

***Federal Register* (FR)** – A daily publication that reports Presidential and Federal Agency documents.

Fishery – Habitat that supports the propagation and maintenance of fish.

Geomorphic – Related to the geological surface configuration.

Geographic information system (GIS) – An information processing technology to input, store, manipulate, analyze, and display all forms of geographically referenced information.

Habitat – The place where an organism lives; part of physical environment in which a plant or animal lives.

Habitat loss – The disappearance of places where target groups of organisms live. In coastal restoration, usually refers to the conversion of marsh or swamp to open water.

Hazardous, toxic, and radioactive waste (HTRW) – Project features must be examined to ensure that their implementation will not result in excessive exposure to pollutants possibly located in the study area.

Herbaceous – A plant with no persistent woody stem above ground.

Holocene – Geological period from about 10,000 B.C. to the present characterized by the recession of glaciers.

Holocene deposits – Deltaic mud that packs down under its own weight.

Hydrocarbons – A group of chemical compounds containing only hydrogen and carbon; these include petrol, diesel, gas, oil, and some solvents.

Hydrology – The pattern of water movement on the earth's surface, in the soil and underlying rocks, and in the atmosphere.

Hypoxia – The condition of low dissolved oxygen concentrations.

Indirect impacts – Those effects that are not as a direct result of project construction, but occur as secondary impacts due to changes in the environment brought about by the construction. Contrast with “direct impacts.”

Infrastructure – The basic facilities, services, and installations needed for the functioning of a community or society, such as transportation and communications systems, water and power lines, and public institutions including schools, post offices, and prisons.

Ingress – An entrance or the act of entering.

Inorganic – Not derived from living organisms; mineral; matter other than plant or animal.

Intertidal – Alternately flooded and exposed by tides.

Invasive species – Organisms that have been introduced into an environment where they did not evolve. Executive Order 13112 focuses on organisms whose presence is likely to cause economic harm, environmental harm, or harm to human health.

Invertebrates – Animals without backbones, including shrimp, crabs, oysters, and worms.

Larvae – The stage in some animal's life cycles between egg and adult (most invertebrates).

Levee – A linear mound of earth or stone built to prevent a river from overflowing; a long, broad, low ridge built by a stream on its flood plain along one or both banks of its channel in time of flood.

Lithic – Stone, or pertaining to stone such as a tool made of stone.

Loamy – Soil composed of a mixture of sand, clay, silt, and organic matter.

Macroinvertebrate – An animal having no backbone or internal skeleton, large enough to be seen without magnification.

Mean high water – The average elevation of the high tides.

Memorandum of Understanding (MOU) – A formal, written agreement between organizations or agencies that presents the relationship between the entities for purposes of planning and management.

Methodology – A set of practices, procedures, and rules.

Monitoring – The process of collecting information to evaluate if objectives and anticipated results of a management plan are being realized, or if implementation is proceeding as planned.

Mudflats – Flat, unvegetated wetlands subject to periodic flooding and minor wave action.

No-Action Alternative – The most likely condition expected to exist if current management practices continue unchanged. The analysis of this alternative is required for Federal actions under the National Environmental Policy Act.

National Environmental Policy Act (NEPA) – Ensures that Federal agencies consider the environmental impacts of their actions and decisions. NEPA requires all Federal agencies to consider the values of environmental preservation for all significant actions and prescribes procedural measures to ensure that those values are fully respected.

Nursery – A place for larval or juvenile animals to live, eat, and grow.

One hundred-year floodplain – These floodplains represent an area of inundation having a one percent chance of being equaled or exceeded in any given year.

Organic – Composed of or derived from living things.

Particulate matter – Fine liquid or solid particles such as dust, smoke, mist, fumes or smog, found in the air or emissions.

Paleoindian – The earliest identified stage of North American Indian chronology, dating from before ca. 10,000–6500 B.C.

Pleistocene – Geological period from about 3,000,000–10,000 B.C. characterized by the appearance and recession of glaciers.

Pollutants – Any substance introduced into the environment that adversely affects the usefulness of a resource or the health of humans, animals, or ecosystems.

Potable water – Water that is fit to drink.

Prehistoric – Human culture which existed prior to written records.

Prime farmland – Land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor, and without intolerable soil erosion. One of the categories of concern in the EIS.

Productivity – Growth of plants and animals.

Record of Decision (ROD) – A public document associated with an EIS that identifies all alternatives and provides the final decision, the rationale behind that decision, and commitments to monitoring and mitigation.

Relative sea level rise – The sum of the sinking of the land (subsidence) and eustatic sea level change; the change in average water level with respect to the surface.

Riparian – Of, on, or relating to the banks of a natural course of water.

Salinity – The concentration of dissolved salts in a body of water, commonly expressed as parts per thousand (ppt). The salinity of ocean water is approximately 35 ppt.

Salt marsh – Intertidal herbaceous plant community typically found in that area of the estuary with salinity ranging from 12 to 32 ppt.

Scoping – Soliciting and receiving public input to determine issues, resources, impacts, and alternatives to be addressed in the draft EIS.

Sea level – Long-term average position of the sea surface.

Sedimentary – Having the quality of being layered. Sedimentary rocks are those that were created through the deposition of layers of materials that were compressed into hard rock.

Sediment plume – Caused by sediment rich rainwater runoff entering the ocean. The runoff creates a visible pattern of brown water that is rich in nutrients and suspended sediments that forms a kind of cloud in the water spreading out from the coastline. Commonly forms at river and stream mouths, near sloughs, and along coasts where a large amount of rain runoff flows directly into the ocean.

Shoaling – The shallowing of an open-water area through deposition of sediments.

Socioeconomic – Involving both social and economic factors.

State Historic Preservation Office(r) (SHPO) – Part of the Mississippi Department of Archives and History committed to the preservation of the state's cultural resources.

Storm surge – An abnormal and sudden rise of the sea along a shore as a result of the winds of a storm.

Subsidence – The gradual downward settling or sinking of the Earth's surface with little or no horizontal motion.

Terrestrial habitat – The land area or environment where an organism lives; as distinct from water or air habitats.

Threatened species – A designation by the U.S. Fish and Wildlife Service when a plant or animal species is likely to become endangered throughout all or a specific portion of its range within the foreseeable future.

Toxicity – The measure of how poisonous something is.

Turbidity – The level of suspended sediments in water; opposite of clarity or clearness.

Unique farmland – Land other than Prime Farmland (see "prime farmland") that is used for the production of specific high-value food and fiber crops, such as citrus, tree nuts, olives, cranberries, fruits, and vegetables.

Upland – A general term for non-wetland elevated land above low areas along streams or between hills.

Water Resources Development Act (WRDA) – A bill passed by Congress that provides authorization and/or appropriation for projects related to the conservation and development of water and related resources.

This page intentionally left blank.

17.0 INDEX

The index below does not include occurrences in the Executive Summary, tables, figures, in-text citations, or references cited in this Environmental Impact Statement.

This page intentionally left blank.