

Port Authority of Guam Port Modernization Program
Final Environmental Assessment



Prepared for:

U.S. Department of Transportation Maritime Administration (MarAd), Lead Federal Agency
The Port Authority of Guam

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1 ACRONYMS AND ABBREVIATIONS

ACBM	Asbestos Containing Building Materials	FTA	Federal Transit Administration
ANSI	American National Standards Institute	GAR	Guam Administrative Rules and Regulations
APE	Area of Potential Effect	GBSP	Guam Bureau of Statistics and Plans
APM	Adaptive Program Management	GCA	Guam Code Annotated
ARC	ARC Environmental Services, Inc.	GCMP	Guam Coastal Management Program
ARPA	Archaeological Resources Protection Act	GDPW	Guam Department of Public Works
BMPs	Best Management Practices	GEPA	Guam Environmental Protection Agency
CAA	Clean Air Act	GFD	Guam Fire Department
CAAA	Clean Air Act Amendments	GHPO	Guam Historic Preservation Office
CBP	Customs and Border Patrol	GOS	Gate Operating System
CCD	Coastal Zone Consistency Determination	GPA	Guam Power Authority
CCMA	Center for Coastal Monitoring and Assessment	GTP	Guam Transportation Program
CCTV	Closed Circuit Television	GWA	Guam Waterworks Authority
CEQ	Council on Environmental Quality	HAPC	Habitat Areas Of Particular Concern
CFR	Code of Federal Regulations	HPS	High-Pressure Sodium15
CFS	Container Freight Station	HT	High Tide
CIS	Customs Inspection Station	HTL	High Tide Line
CNMI	Commonwealth of the Northern Marianas Islands	HUD	U.S. Department of Housing and Urban Development
CO	Carbon Monoxide	IBC	International Building Code
Cr/Hs	Coral Reef/Hard Substrate	ICRMP	Integrated Cultural Resources Management Plan
CVN	Carrier Vessel Nuclear	JGPO	Joint Guam Program Office
CWA	Clean Water Act	KD	Known Distance
CY	Cubic Yards	kg	Kilograms
DAWR	Guam Department of Agriculture, Division of Aquatic and Wildlife Resources	kV	Kilovolt
dB	Decibel	kWH	Kilowatt Hour
dBA	"A" Weighted Decibels	La	Lagoon
DO	Dissolved Oxygen	LAN	Local Area Networks
DoD	Department of Defense	LBP	Lead-based Paint
DoN	Department Of Navy	LC	Load Center
DOT	U.S. Department of Transportation	L _{dn}	Day-night Noise Level
DPW	Guam Department of Public Works	L _{eq}	Equivalent Sound Level
EA	Environmental Assessment	L _{max}	Maximum Sound Level
EFH	Essential Fish Habitat	LOS	Level of Service
EIS	Environmental Impact Statement	Ma	Mangrove
EPP	Environmental Protection Plan	MarAd	U.S. Department of Transportation Maritime Administration
EQMR	Equipment Maintenance and Repair	mg/m ³	Milligrams Per Cubic Meter
ERL	Effects Range Low	MHW	Mean High-Water
ERM	Effects Range Median	MLLW	Mean Lower Low Water
Es	Estuarine	MSFMCA	Magnuson-Stevens Fishery Management And Conservation Act
ESA	Environmental Site Assessment	MTSA	Maritime Transportation Security Act
FAA	Federal Aviation Administration	MW	Moment Magnitude
FEMA	Federal Emergency Management Agency	NAAQS	National Ambient Air Quality Standards

FHWA	Federal Highway Administration	NAVMAG	Naval Magazine
FIRM	Flood Insurance Rate Maps	SHPO	State Historic Preservation Office
FEP	Fishery Ecosystem Plan	SIP	State Implementation Plan
NEPA	National Environmental Policy Act	SO ₂	Sulfur Dioxide
NESHAPS	National Emission Standards For Hazardous Air Pollutants	SPCC	Spill Prevention Control and Countermeasures
NH ₄ ⁺	Ammonium Nitrogen	SQG	Sediment Quality Guidelines
NHPA	National Historic Preservation Act	SVOC	Semi-Volatile Organic Compounds
NMFS	National Marine Fisheries Service	T&E	Threatened and Endangered
NO ₂	Nitrogen Dioxide	TEQ	Toxic Equivalency Quotient
NO ₃ ⁻ +NO ₂ ⁻	Nitrate + Nitrite Nitrogen	TOS	Terminal Operating System
NOAA	National Oceanic And Atmospheric Administration	TPH	Total Petroleum Hydrocarbons
NO _x	Nitrogen Oxides	TPY	Tons Per Year
NPDES	National Pollutant Discharge Elimination System	TSS	Total Suspended Solids
NPS	National Park Service	TTIP	Territorial Transportation Improvement Program
NS&T	National Status and Trends	USACE	U.S. Army Corps of Engineers
O ₃	Ozone	USC	U.S. Code
OCR	Optical Character Recognition	USCG	U.S. Coast Guard
OSHA	Occupational Safety and Health Administration	USEPA	U.S. Environmental Protection Agency
PAG	Port Authority of Guam	USES	U.S. Endangered Species
PAHs	Polyaromatic Hydrocarbons	USFWS	U.S. Fish and Wildlife Service
PB	Parsons Brinckerhoff	UXO	Unexploded Ordnance
PBESLs	Pacific Basin Environmental Screening Levels	V/C	Volume To Capacity Ratio
PCBs	Polychlorinated Biphenyls	VOC	Volatile Organic Compounds
PCR	PCR Environmental, Inc.	VPD	Vehicles Per Day
PM ₁₀	Particulate matter diameter of 10 microns or less	WERI	Water and Environmental Research Institute
PM _{2.5}	Particulate matter diameter of 2.5 microns or less	WIMS	Weigh-In-Motion Station
PO ₄₃ ⁻	Phosphate Phosphorous	WOUS	Wetlands/Waters of the United States
POL	Petroleum, Oil, Lubricant	ZID	Zone of Initial Dilution
PPM	Parts per Million	µg/m ³	Micrograms Per Cubic Meter
Pr	Patch Reefs		
PSI	Pounds Per Square Inch		
RCRA	Resource Conservation and Recovery Act		
Reefers	Refrigerated Containers		
ROD	Record of Decision		
RORO	roll-on/roll-off		
RSLs	Regional Screening Levels		
RWUMP	Guam Recreational Water Use Management Plan		
SAFETEA	Safe Accountable Flexible Efficient Transportation Equity Act		
SAP	Port Security Action Plan		

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1.0 EXECUTIVE SUMMARY

The United States Department of Transportation's (DOT) Maritime Administration (MarAd) is serving as lead federal agency under the National Environmental Policy Act (NEPA) (42 U.S.C. §4321 *et seq.*) for the *Port of Guam (Port) Modernization Program (Port Modernization Program) Environmental Assessment (EA)*.

In 2008, the Port completed the *Jose D. Leon Guerrero Commercial Cargo Port Master Plan Update Report* which detailed the existing conditions of the Port's facilities, forecasted future demand and analyzed the ability of the existing facilities to meet the projected demand. The report concluded that the existing Port facilities need to be modernized, existing operations would improve efficiency by being reconfigured, new facilities need to be constructed and existing infrastructure needs to be upgraded to meet demand forecasts. In particular, current Port facilities would be unable to meet future peak demand associated with construction of the Department of Defense's (DoD) *Guam and Commonwealth of the Northern Marianas Islands Military Relocation Program (Guam Military Relocation Program) (Joint Guam Program Office, July 2010a)*. The Port Modernization Program analyzed in this EA would implement some of the recommendations of the Master Plan; other Program elements would be constructed at a later date and analyzed in a separate review process.

Specifically, the scope of the Port Modernization Program analyzed in this EA is to modernize facilities and configure operations in order to create sufficient capacity to support projected cargo handling demand, while maintaining ongoing Port operations.

- *Modernize Existing Facilities* – Since the late 1960s, few major capital improvements have been made to existing facilities. In some cases equipment or facilities are no longer functional and/or are out of compliance with current codes and standards. The Port Modernization Program would replace or modernize existing facilities.
- *Reconfigure Existing Operations* – The Port's current terminal yard (Terminal Yard) configuration limits cargo handling efficiency and capacity. The Terminal Yard would be reconfigured to co-locating related functions and reconfigure internal circulation patterns. The Terminal Yard would be expanded into the Port's identified Expansion Area.
- *Create Sufficient Cargo Handling Capacity to Meet Future Demand* – Cargo handling and capacity constraints limit the Port's ability to effectively serve current demand and support anticipated future cargo growth. Cargo handling efficiency would be improved by reconfiguring existing operations, installing new automated equipment and creating a new terminal gate system.
- *Maintain Port Operations During Redevelopment Activities* – Redevelopment activities associated with the Port Modernization Program would be staged and phased to minimize disruptions to existing, ongoing Port operations.

For purposes of this *Port of Guam Modernization Program Environmental Assessment*, two action alternatives (the Proposed Action and Alternative 1) and a No Action Alternative have been developed by MarAd. The Proposed Action and Alternative 1 represent alternatives to redevelop the site that would support the defined purpose and need for the project; although the Proposed Action is proposed as the plan that best meets the goals of the Port Modernization Program.

- *Proposed Action* – The Proposed Action would modernize, improve, and reconfigure the Port’s existing 52-acre Terminal Yard and develop a 19-acre Expansion Area with new cargo storage facilities in order to increase cargo-handling capacity and operating efficiency.
- *Alternative 1* – Alternative 1 would include systematic and coordinated replacement and/or repair of deteriorated or inefficient facilities within the Port’s existing 52-acre Terminal Yard; no development in the Expansion Area would occur which would limit the Port’s ability to increase cargo-handling capacity and operating efficiency compared to the Proposed Action.
- *No Action Alternative* – The No Action Alternative assumes that neither the Proposed Action or Alternative 1 would be approved or implemented and the site would remain in its current configuration. The No Action Alternative further assumes deteriorating facilities would be repaired and replaced, but only as failures occur over time. Existing facilities and their operations that currently result in environmental degradation (i.e. of storm water and air quality) would continue under the No Action Alternative.

The EA evaluates the potential environmental consequences of the Proposed Action and Alternatives on 18 resource areas including: air quality; noise; hazardous materials and waste; safety and security; utilities and public services; geology and soils; surface water, storm water and floodplains; groundwater; sediment quality; wetlands and coastal waters; terrestrial resources; benthic resources; essential fish habitat; sensitive species; traffic; cultural and historic resources; land use and coastal zone consistency; visual resources; and, socioeconomic resources and environmental justice. With implementation of the identified mitigation measures, no significant environmental impacts are identified for any of the resource areas analyzed.

The Proposed Action would not result in irreversible or irretrievable commitment of resources for the following resource areas: air quality; noise; hazardous materials and waste; safety and security; utilities and public services; geology and soils; floodplains; groundwater; sediment quality; wetlands and coastal waters; essential fish habitat; sensitive species; traffic; cultural and historic resources; visual resources; and, socioeconomic resources and environmental justice.

The Proposed Action could result in irreversible or irretrievable commitment of resources for the following resource areas, if not offset by the identified measures:

- *Surface Water, Storm Water and Benthic Resources* – The Proposed Action would result in the loss of approximately 1,530 square feet (0.035 acres) of land below the high-tide line (HTL) due to placement of rip-rap associated with the proposed outfalls. Marine survey results indicate the soft-bottom habitat in this area is degraded. Existing benthic species in the area of construction could be disturbed or displaced. Rip-rap would provide hard-bottom habitat and increase immediate species diversity and utilization after construction is completed. Construction of the proposed outfalls would be conducted in compliance with Guam EPA (GEPa) and U.S. Army Corps of Engineers (USACE) permits. These permits may include compensation for loss of land below the HTL.
- *Terrestrial Resources* – The Proposed Action could result in the potential disturbance of roosting areas for migratory birds. Roosting areas for non-threatened or endangered migratory shorebird species would be identified during a field survey prior to construction as requested by Guam Department of Agriculture, Division of Aquatic and Wildlife Resources (DAWR). If found,

roosting areas would be evaluated for potential direct impacts from construction and operational activities. To the extent feasible, construction activities would avoid direct impacts during the nesting season. To the extent feasible, operational controls would be installed to minimize stray light from construction activities.

Elimination of the majority of the existing vegetation in the Expansion Area to the Terminal Yard (vegetation in the areas within 50 feet of the shoreline, except for immediately surrounding the storm water outfalls, would be retained). Most of the Expansion Area is of low value to native plants and wildlife as a result of past disturbance, as well as the high percentage of non-native species in this area. The area to be cleared of vegetation is not expected to provide habitat for any threatened and endangered species.

- *Land Use* – The Proposed Action would result in the conversion of approximately 19-acres of primarily vegetated area in the Expansion Area to Terminal Yard operations use. This area has been previously disturbed and impacted by human activities and does not contain threatened and endangered species.

2.0 PURPOSE AND NEED

2.1 Purpose and Need

The U.S. Department of Transportation's (DOT) Maritime Administration (MarAd) is serving as lead federal agency under the National Environmental Policy Act (NEPA) (42 U.S.C. §4321 *et seq.*) for the *Port of Guam (Port) Modernization Program (Port Modernization Program) Environmental Assessment (EA)*. MarAd, as NEPA Lead Agency, must identify the purpose of and need for the Port Modernization Program.

The overall purpose of the Port Modernization Program is to update facilities and configure operations in order to create sufficient capacity to support projected cargo handling demand, while maintaining ongoing Port operations.

- *Modernize Existing Facilities* – The Port's facilities were put into service in 1969. Since that time, few major capital improvements have been made to existing facilities, with the exception of a container yard expansion in 1990-1991 and replacement of a 560-foot section of wharf in 1993 at Berths F-5 and F-6. As a result, the majority of the Port's facilities and equipment have deteriorated, as documented in the *Jose D. Leon Guerrero Commercial Cargo Port Master Plan Update Report (Master Plan)* published in 2008 (PAG, 2008). In some cases equipment or facilities are no longer functional and/or are out of compliance with current codes and standards. Deficiencies noted in the Master Plan indicate that the Port's commercial cargo facilities are aging and in need of substantial renovation and modernization. Among the Master Plan's findings were deficiencies related to crane condition and operation; a general state of disrepair for facilities and infrastructure; a limited queuing length for truck entry or exit at gates; significant corrosion of gates and fences; lack of cargo storage space availability; and, land use conflicts and incompatibilities.
- *Reconfigure Existing Operations* – The Port's current terminal yard (Terminal Yard) configuration limits cargo handling efficiency and capacity. The Master Plan recommended that the Terminal Yard be reconfigured to relocate all activities and personnel not directly required for cargo handling operations to a location outside of the terminal fence, access gates be constructed separately for non-cargo versus cargo-related functions, cargo storage area be expanded, and certain existing buildings be demolished and their uses relocated.
- *Create Sufficient Cargo Handling Capacity to Meet Future Demand* – Cargo handling and capacity constraints limit the Port's ability to effectively serve current demand and support anticipated future cargo growth. In particular, current Port facilities would be unable to meet future peak demand associated with construction of the DoD's *Guam and Commonwealth of the Northern Mariana Islands (CNMI) Military Relocation Program (Guam Military Relocation Program)* (Joint Guam Program Office, July 2010a). An analysis of future demands and existing capacity constraints performed for the Master Plan indicate that peak future demand generated by the Guam Military Relocation Program, as well as other background growth, would exceed existing throughput capacity.
- *Maintain Port Operations During Redevelopment Activities* – Redevelopment activities associated with the Port Modernization Program must be staged and phased to minimize disruptions to existing, ongoing Port operations.

In order to achieve the purpose of the Port Modernization Program, the following program elements are needed:

- The Terminal Yard needs to be reconfigured and potentially expanded in order to handle future cargo storage and processing needs;
- Commercial and non-commercial operations need to be separated;
- Security and communications infrastructure needs to be improved;
- Terminal and general purpose lighting levels need to be improved;
- Terminal operations and cargo tracking systems need to be automated;
- Code deficiencies need to be corrected; and,
- Utility infrastructure needs to be upgraded and/or replaced.

Adoption and implementation of the Port Modernization Program constitutes a federal action and must be assessed in accordance with NEPA. The intent of NEPA is to protect, restore, and enhance the environment by requiring all federal agencies and programs that they fund to consider the environmental impacts of their Proposed Action and reasonable alternatives to these actions.

For purposes of this EA, two action alternatives (the Proposed Action and Alternative 1) that achieve the stated Purpose and Need of the Port Modernization Program have been developed and analyzed. A No Action Alternative, which is required by NEPA but does not achieve the stated Purpose and Need, has also been developed and analyzed.

2.2 EA Approach

2.2.1 Environmental Review Process and Purpose

As stated previously, MarAd is serving as lead federal agency under NEPA for the Port Modernization Program.

MarAd has determined that an EA is the appropriate level of review for the Proposed Action. An EA is a document used to determine if an agency will need to prepare either an Environmental Impact Statement (a more detailed environmental analysis) or issue a Finding of No Significant Impact (FONSI). EAs are concise public documents that include a brief discussion of the need for the proposal, a description of alternatives for implementing the proposal, and an analysis of potential significant environmental consequences.

This EA evaluates the potential for significant environmental consequences associated with the Port Modernization Program under the Proposed Action and Alternatives; describes proposed mitigation for identified impacts; and, identifies any known irreversible and irretrievable significant environmental consequences.

This EA has been prepared in accordance with NEPA and its implementing regulations (Council on Environmental Quality (CEQ), 40 CFR 1500-1508), DOT Order 5610.1C and MAO No. 600-1 (Procedures for Considering Environmental Impacts).

2.2.2 Relevant Prior and Ongoing Environmental Review

Environmental review under NEPA has been accomplished for prior actions that pertain to the Port Modernization Program and other actions in the area. The following environmental document(s) are hereby incorporated by reference into this EA, because they contain certain information applicable to this EA.

CNMI Military Relocation Record of Decision

Guam and CNMI Military Relocation: Relocating Marines from Okinawa, Visiting Aircraft Carrier Berthing, and Army Air and Missile Defense Task Force Record of Decision (ROD), Joint Guam Program Office, September 2010.

In September 2010, the Department of the Navy issued the Guam Military Relocation Record of Decision (ROD) that documented the Navy's decisions on the selected action, based on the evaluation contained in the *Guam and CNMI Military Relocation Final Environmental Impact Statement (EIS)* (Joint Guam Program Office, September 2010c). The selected action would generally accomplish the following tasks:

1. Marine Corps
 - Develop and construct facilities and infrastructure to support approximately 8,600 Marines and their 9,000 dependents relocated from Okinawa, Japan, to Guam.
 - Develop and construct facilities and infrastructure to support training and operations on Guam and Tinian (CNMI) for the relocated Marines.
2. Navy
 - Construct a new deep-draft wharf with shoreside infrastructure improvements creating the capability in Apra Harbor, Guam to support a transient nuclear powered aircraft carrier.
3. Army
 - Develop facilities and infrastructure on Guam to support relocating approximately 600 military personnel and their 900 dependents to establish and operate an Army Air and Missile Defense Task Force.

The Guam Military Relocation ROD is based on the Guam Military Relocation Final Environmental Impact Statement (FEIS) and Addendum to the Guam and CNMI Military Relocation FEIS (Joint Guam Program Office, July 2010) analysis of potential impacts that would result from the Proposed Action associated with the military relocation from Okinawa, Japan, to the island of Guam (Guam Military Relocation Program). Further, the FEIS specifically analyzed indirect impacts to the Port of Guam facilities and facilities in the vicinity of the Port Modernization Program site. Impacts identified in the Guam Military Relocation FEIS that relate to the Port Modernization Program include (but are not limited to): increased marine vessel activity at the Port associated with transportation of construction materials, equipment and household goods; air quality emissions associated with additional marine vessel activity and construction-related truck trips on the Port site; and, transportation-related impacts associated with additional construction-related truck trips on roadways near the site. Where appropriate, the analysis from the Guam Military Relocation FEIS has been referenced in this document.

The Guam Military Relocation FEIS concluded that movement of military and commercial vessels into and out of the Port will have less than significant impacts. The FEIS assessed impacts based upon a targeted 2014 completion date for the Marine Corps relocation effort. The ROD states that the DoD will implement an adaptive program management (APM), which will likely have a offsetting effect in slowing the construction pace and the movement of military construction material through the Port, further reducing impacts to commercial Port resources.

The recently enacted Supplemental Appropriations Act of 2010 Public Law 111-212 includes a provision authorizing DoD to transfer \$50 million to MarAd to carry out Port of Guam Improvement Enterprise Program planning, design, and construction of projects to improve facilities, relieve port congestion, and provide greater access to Port facilities at the Port of Guam.

The Proposed Action described in the Guam Military Relocation ROD would occur with or without implementation of the Proposed Action of the Port Modernization Program analyzed in this EA. However, the Proposed Action analyzed in this EA is intended, in part, to accommodate the increase in Port activity associated with military relocation to Guam.

Live-Fire Training Range Complex Supplemental Environmental Impact Statement (SEIS), Carrier Vessel Nuclear SEIS, and Guam and CNMI Divert Activities and Exercises EIS

Environmental review is currently underway for several actions that pertain to the Port Modernization Program. These include the: *Live-Fire Training Range Complex SEIS*, *Carrier Vessel Nuclear SEIS*, and *Guam and CNMI Divert Activities and Exercises EIS*. The actions addressed in these environmental documents are described and cumulatively assessed with the Proposed Action in **Section 6.0**, Cumulative Effects, Irreversible and Irretrievable Commitment of Resources, in this EA.

Guam Transportation Improvement Projects

The Guam Department of Public Works (GDPW) prepares the Territorial Transportation Improvement Program (TTIP), in accordance with the requirements of the Safe Accountable Flexible Efficient Transportation Equity Act (SAFETEA). The TTIP provides a near-term improvement program that identifies GDPW's priorities for expenditure of funds for a 4-year period. This program is a subset of the long-range Guam Transportation Program (GTP) (see **Section 6.0**, Cumulative Effects, Irreversible and Irretrievable Commitment of Resources, for the on-going and future projects from the most recent (2009) TTIP). The projects identified in the TTIP were assumed as pipeline projects in the Guam Military Relocation EIS transportation analysis. A cumulative analysis of transportation effects was provided in the Guam Military Relocation EIS that included the military build-up, together with the proposed Port Modernization Program and other reasonably foreseeable actions (see **Section 5.3.1**, Traffic, of this EA for details).

3.0 BACKGROUND

This section provides a summary of the current conditions on the Port Authority of Guam’s (PAG) *Jose D. Leon Guerrero Commercial Port* (Port) and relevant background information related to the proposed Port Modernization Program. Changes to current conditions associated with the Proposed Action and Alternatives are introduced in **Sections 4.0**. Detailed descriptions of existing site conditions in relation to specific elements of the environment and an analysis of the environmental consequences of the Proposed Action and Alternatives are provided in **Section 5.0**.

3.1 Current Conditions

3.1.1 Location

Guam is an unincorporated territory of the United States and is the largest island in the Marianas Archipelago in the Pacific Ocean (see **Figure 3-1**). Its population is currently approximately 178,000 residents comprised mostly of civilians, but also including military personnel and their dependents from the U.S. military bases located on the island.

Figure 3-1, Guam Vicinity Map



Source: <http://www.geographicguide.com/oceania-map.htm>.

The Port, which is governed by the PAG, is located on the western coast of Guam. The Port facility is situated on Cabras Island near the City of Piti and is protected by the approximately 2.8-mile-long Glass Breakwater within the inner reaches of Outer Apra Harbor (see **Figure 3-2**).

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Figure 3-2, Port of Guam Vicinity Map



Source: EA Engineering, Science, and Technology and GoogleEarth, 2012.

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The Port is the only commercial port facility on the island of Guam and is the largest U.S. deepwater port in the Western Pacific Region. The Port currently has containerized, break-bulk, unitized, cruise ship, and fishery cargo operations onsite.

The Port, located along major Pacific shipping and air routes, is a transportation hub linking the Commonwealth of the Northern Marianas, the Micronesian islands, and the expanding Far East markets with the United States and the rest of the world.

3.1.2 Site Character

Port

The Port of Guam site is comprised of the Terminal Yard, the Terminal Expansion Area, the Marine Industrial Facilities Area and the Glass Breakwater Area Facilities, as shown on **Figure 3-2**.

- The 52-acre Terminal Yard is where the Port's commercial cargo operations are located.
- The 39-acre Terminal Yard Expansion Area is vacant PAG-owned land designated for terminal use.
- The 50-acre Marine Industrial Facilities Area is where liquid fuel, fishing, and marine industrial operations are located.
- The Glass Breakwater Area Facilities are a mix of liquid fuel operations, fishing, and recreational uses.

The Port Modernization Program site includes the 52-acre Terminal Yard and a 19-acre portion of the Expansion Area, as described in the Terminal Yard and Expansion Area discussions that follow.

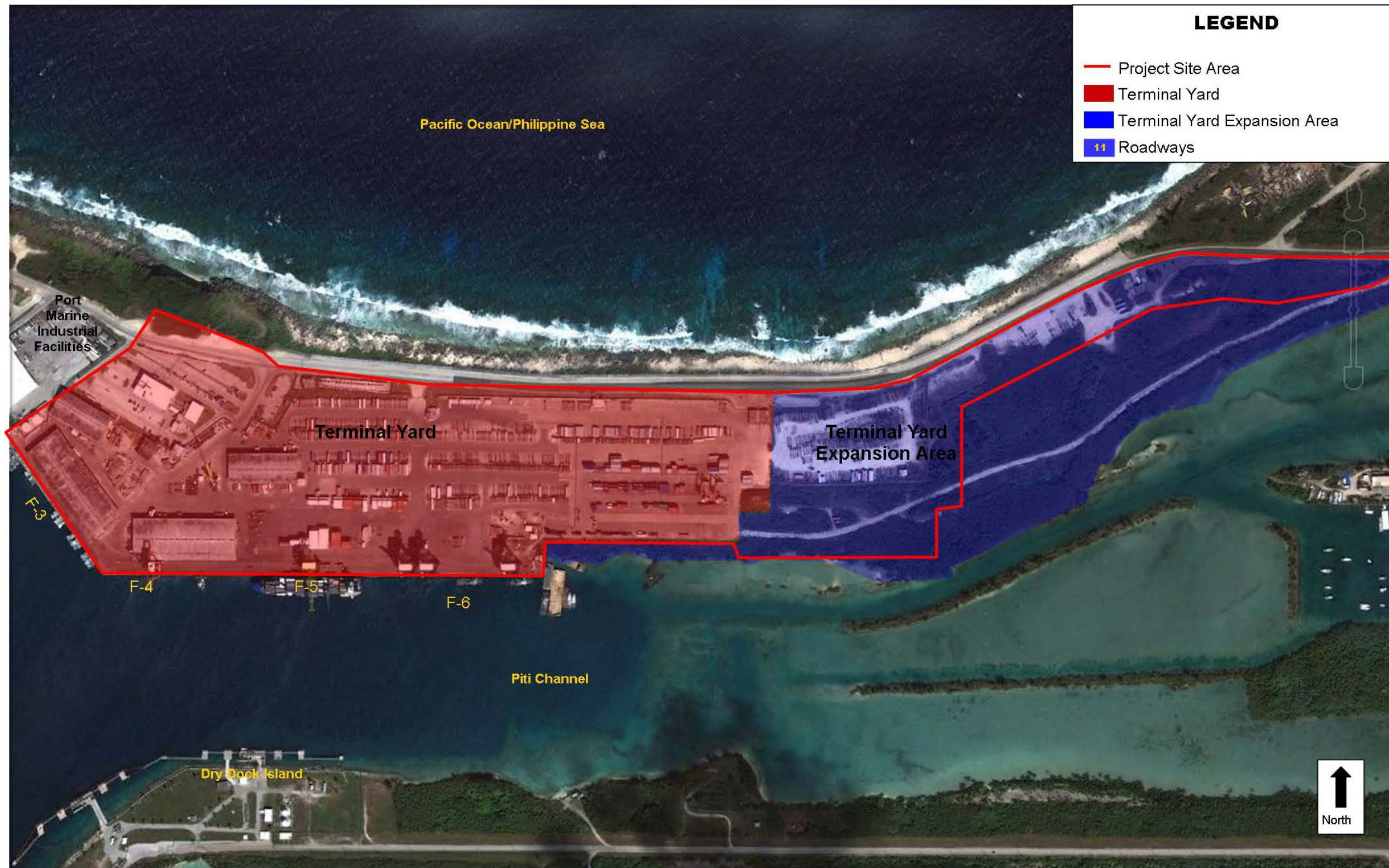
Terminal Yard

The Port's existing Terminal Yard occupies approximately 52 acres of land (see **Figure 3-3**). The Terminal Yard currently provides 26.5 acres of storage in the secure yard area for containers, automobiles, and general cargo; the remaining approximately 25.5 acres of the Terminal Yard is outside the secure yard area and includes office space, maintenance shops, parking, and tenant facilities. The Terminal Yard is primarily developed with industrial buildings and paved cargo/container shipping facilities. The shoreline of Apra Harbor which borders the south of the Terminal Yard is primarily developed in bulkhead and wharf structures. The Terminal Yard has four cargo handling wharfs onsite (Berths F-3 through F-6).

Most of the building structures in the Terminal Yard were built and put into service in the late 1960s. Currently approximately 29 upland buildings/structures are located within the Terminal Yard (see **Figure 3-4** for a listing and location of existing buildings and structures).

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Figure 3-3, Current Site Conditions



Source: EA Engineering, Science, and Technology and GoogleEarth, 2012.

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Figure 3-4, Existing Port Buildings



Source: EA Engineering, Science, and Technology and GoogleEarth, 2012.

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Expansion Area

An additional 39 acres of primarily vacant land is located to the east of the Terminal Yard and has been designated by the Port for future expansion (see **Figure 3-3**); 19 acres of the undeveloped 39 acres is proposed to be redeveloped as part of the Proposed Action (Expansion Area) (see **Figure 3-3**). The Unitek Waste Transfer Facility is located in the Expansion Area.

3.1.3 Current Roadway Network/Access

Route 11 provides the only roadway access to the Port and the site. Route 11 crosses the Piti Channel Bridge onto Cabras Island providing a direct connection to the Port (see **Figure 3-3** and **3-4**). Route 11 links directly from Route 1, which is the major arterial serving the west side of Guam.

Truck access to the Port is provided by an entrance and exit gate located at the northeastern corner of the existing Terminal Yard (see Structure 26 on **Figure 3-4**). Based on information provided by Port operations staff (PAG, 2008), processing times at the gate for inbound vehicles typically ranges from three to five minutes. Outbound processing times are relatively short at typically one minute. Approximately 150 trucks enter and exit the Port on a typical weekday.

(See **Section 5.3.1**, Traffic, for additional information.)

3.1.4 Current Facilities and Equipment

The majority of the existing operational facilities in the Terminal Yard was put into service in 1969, and has undergone few significant modernization or improvement since that time, with the exception of a container yard expansion in 1990-1991 and replacement of a 560-foot section of wharf in 1993 at Berths F-5 and F-6. According to a survey completed in support of the Port's *Master Plan*, the majority of the facilities and equipment in the Terminal Yard is at the end of its useful life, in disrepair, or undersized to meet forecasted demand (PAG, 2008).

Container handling equipment includes one operational PAG-owned rail-mounted gantry crane, two unused rubber tire gantry cranes, one unused mobile harbor crane, five top lifters, four side loaders, 15 fork-lifts, and 32 yard tractors. In addition, there are four tenant-owned operational cranes at the Port waterfront.

The Terminal Yard provides 26.5 acres of storage for containers, automobiles, and general cargo, including stalls for chassis-mounted containers and stalls equipped for refrigerated containers (reefers).

The Port has five berths designated for cargo handling and two fuel piers as described below (see **Figure 3-2**). Four are located within the Port Modernization Program site and three are located adjacent to the site on property owned by PAG:

On-site Berths/Piers

Berth F-3 is primarily used for fishing vessels and tenants conducting fishing operations, and also serves passenger vessels and general cargo.

Berths F-4, F-5 and F-6 are adjacent to the Terminal Yard and accommodate container ships, general cargo vessels, and passenger ships.

Adjacent Berths/Piers

Pier F-1 is operated by Tristar Terminals Guam (Tristar), and handles liquid bulk cargo and liquefied petroleum gas.

Berth F-2 is used to repair vessels for the fishing industry, and is leased on a long-term basis to the CASAMAR purse seiner fishing repair facility.

Golf Pier is operated by Mobil Oil Guam, and is used to load and unload liquid bulk tankers. Other Port tenants use Golf Pier to unload liquefied petroleum gas and cement.

3.1.5 Current Utility Systems

Water Supply (Domestic Water and Fire Water)

The Guam Water Authority (GWA) provides water service to the Port and the site. Total yearly water consumption at the Port is approximately 87.5 million gallons (based on data obtained from PAG between October 15, 2009 and October 15, 2010) (PAG, 2008). Limitations of the existing water supply system include: leakages due to aging infrastructure, outages due to supply issues and maintenance activities; and, routing issues. Also the current configuration of the main water line routing through the site makes maintenance and repairs difficult, and causes disruptions to existing operations. The fire protection water system does not currently meet code requirements.

Electrical Power

The Guam Power Authority (GPA) provides electrical power to the Port and the site. Port monthly usage currently ranges from 352,000 kilowatt hour (kWH) to 474,000 kWH (based on information obtained from PAG between October 2009 and October 2010) (PAG, 2008). Port electrical power is limited by the capacity of the GPA overhead supply line.

Sanitary Sewer and Wastewater Treatment

The Port's sewer and wastewater system processes approximately 50,000 gallons per day. The sewage and wastewater is conveyed to the GWA Hågatña Treatment Plant for treatment.

Storm Water Management

A gravity drainage system consisting of gutters, inlets, catch basins, and underground piping collects storm water on the Port Modernization Program site and conveys it to eight existing outfalls that discharge into Apra Harbor without water quality treatment.

(See **Section 5.2.2.**, Surface Water, Storm Water and Floodplains, for additional information.)

3.1.6 Surrounding Area/Surrounding Uses

North – Route 11 is located immediately to the north of the Port Modernization Program site and the Philippine Sea lies north of Route 11 (see **Figure 3-2**).

East – Approximately 39 acres of Port-owned undeveloped land is located to the east of the existing Terminal Yard (of which 19 acres is the proposed Expansion Area). Further east is the Cabras Island Power Plant and the Piti Island Power Plant. Oil reserve tanks owned by the Tri-Star Company are located adjacent to the Piti Island Power Plant. Approximately two miles east is the Village of Piti.

South – The Piti Channel is located to the south of the site. Further to the south is an area called Dry Dock Island which is accessed via Route 18. The western portion of this peninsula is used for operations by the US Naval Base Guam. The Marianas Yacht Club is located on the southern tip of Dry Dock Island. Further southwest of the site (across Apra Harbor) is the main operations and housing area (Lockwood Terrace) of the US Naval Base Guam.

West – The Port’s Marine Industrial Terminal is located immediately to the west of the Terminal Yard and includes an oil tank farm. Further to the west along the Glass Breakwater are the Port’s Glass Breakwater Area Facilities. Uses in this area are primarily industrial and recreational uses including a seaplane ramp, the Golf Pier (operated by Mobil Oil), Hotel Wharf (wharf), Family Beach (picnic area, recreational area), and Dog Leg Pier (dilapidated pier).

(See **Section 5.3.3**, Land Use and Costal Zone Consistency, for additional information.)

3.2 Port Master Plan

In April 2008, the Port issued the final *Jose D. Leon Guerrero Commercial Port of Guam Master Plan Update 2007 Report (Master Plan)* (PAG, 2008). The recommendations and updates in the Master Plan address future improvements, modernization, reconfiguration and expansion based on typical commercial growth at the Port, as well as the impending military relocation from Okinawa, Japan to Guam. The Port *Master Plan* estimated that nearly \$200M in capital improvement upgrades to the Port facilities are needed to support projected growth, including the military build-up on the island of Guam (as described in detail in **Section 2.2.2**).

There would be three phases to the Port improvement program: IA, IB, and II, as follows:

Phase IA: The focus for Phase IA of the Master Plan is on productivity and efficiency improvements, such as new equipment, systems, and buildings, and terminal modernization and new yard capacity. Elements include demolition of buildings; installation of utilities; terminal yard paving and upgrade of pavement; installation of high mast lighting; installation of water, sewer, storm water, and fire protection systems including installation of new storm water outfalls into Apra Harbor; installation of security systems; and, new cargo handling and equipment systems. The project would significantly increase the operating efficiency and capacity of the terminal by an eastward extension of useable terminal area and through modernization of upland Port facilities, equipment, utilities, and systems, including new gate systems with automated gate technology and modern truck scanning equipment. Phase IA is the subject of this Port Modernization Program Environmental Assessment (EA).

Phase IB: The focus of Phase IB of the Master Plan is on structural refurbishment of existing docks (F4, F5, and F6), modernization of terminal areas to the west and acquisition of cranes. It includes dredging to increase berth depths at F4, F5, and F6 to -42 feet (-13 meters) mean lower low water and security equipment and process improvements to meet International Ship and Port Facility Security Code requirements. Construction would last approximately two years. The preliminary design, preparation of

permit applications, and the National Environmental Policy Act (NEPA) process would start as soon as funding has been identified.

Phase II: The focus of Phase II of the Master Plan is on construction of a new berth F7 and additional terminal capacity to the east to meet long-term growth. Creation of the new berth F7 would require some land reclamation (i.e. placement of fill in Apra Harbor), removal of existing derelict vessels, and the addition of 900 feet (274 meters) of berthing/wharf space. Dredging would also be included. Execution of this phase is likely 20 or more years into the future and funding has not been identified.

The components of the Port Master Plan that have been incorporated into the Proposed Action are outlined in **Section 4.2**.

3.3 Port Historic and Forecasted Throughput Capacity

In the Port's *Master Plan* (described in detail in **Section 3.2**), the PAG analyzed historic vessel and cargo activity and forecasted vessel/cargo demand through 2027, based upon information available at the time the document was issued. In 2010, the *Guam Military Relocation Final Environmental Impact Statement* (FEIS) (described in detail in **Section 2.2.2**) was issued which provided updated forecasts of the impacts to Port activities from the proposed military build-up activities. Highlights of the peak vessel calls to the Port from this data are provided below.

3.3.1 Historic Operations

The historic vessel calls indicate the number of ships processed through the Port facility during a given year from 1995-2010. The following highlights the historic peak vessel calls:

The peak number of total vessel calls at the Port occurred in 1995 when a total of 2,924 vessels were processed through the facility, including cargo container vessels, break-bulk, roll-on/roll-off (RORO), bulk vessels, barges and fishing vessels.

The peak number of cargo container vessel calls (151) occurred in 1998. Historic data regarding the amount of container boxes processed through the Port was not available.

The peak number of break-bulk vessels calls (477) occurred in 1995. Historic data regarding the amount of break-bulk tonnage processed through the Port was not available.

3.3.2 Forecasted Operations

Based on projections provided in the Port Master Plan (April 2008) and Joint Military Buildup FEIS (July 2010), the forecasted vessel calls indicate the number of ships processed through the Port facility during a given year from 2012-2027. The following highlights the forecasted peak vessel calls:

Projected peak container vessel calls was forecasted to occur in 2015 and was estimated to be approximately 269 vessels; approximately 116 more vessel calls than during the historic peak of 151 in 1998. It was forecasted that the projected peak amount of container cargo would be 190,000 boxes per year and would also occur in 2015.

Projected peak break-bulk vessel calls was forecasted to occur in 2012 and was estimated at approximately 532 vessels; approximately 55 more vessel calls than during the historic peak of 477 that occurred in 1995. It was forecasted that the projected peak amount of break-bulk would be 316,000 tons and would occur in 2012.

The data indicates that the total forecasted peak number of cargo container and break-bulk vessel calls would be approximately 171 more than historic peak activity. The peak number of barge and fishing vessel calls was not forecasted but the historic levels of barge and fishing vessel calls have been decreasing.

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4.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

4.1 Background

4.1.1 Introduction

This chapter of the Environmental Assessment (EA) describes the Proposed Action and Alternatives for the Port Modernization Program. Please see **Chapter 1** of this document for an **Executive Summary** of the findings of this EA and **Chapter 5** for a detailed presentation of the affected environment and significant environmental consequences of the Proposed Action and Alternatives.

The NEPA regulations recommend that an EA describe and analyze all appropriate “action” and “no action” alternatives. An action alternative is a viable development option for the proposed site that would achieve the purpose and need of the project and the proponent’s objectives. A no action alternative describes and analyzes what would occur on the site if none of the action alternatives were implemented.

For purposes of this *Port of Guam Port Modernization Program Environmental Assessment*, two action alternatives (the Proposed Action and Alternative 1) and a No Action Alternative have been developed by US Department of Transportation Maritime Administration (MarAd). The Proposed Action and Alternative 1 represent alternatives to redevelop the site that would support the defined purpose and need for the project (as stated in **Section 2.0**).

Proposed Action – The Proposed Action would modernize, improve, and reconfigure the Port’s existing 52-acre Terminal Yard and develop a 19-acre Expansion Area with new cargo storage facilities in order to increase cargo-handling capacity and operating efficiency. This alternative is described in detail in **Section 4.2**.

Alternative 1 – Alternative 1 would include systematic and coordinated replacement and/or repair of deteriorated or inefficient facilities within the Port’s existing 52-acre Terminal Yard; no development in the Expansion Area would occur. This alternative is described in detail in **Section 4.3**.

No Action Alternative – The No Action Alternative assumes that neither the Proposed Action or Alternative 1 would be approved nor implemented and the site would remain in its current configuration. The No Action Alternative further assumes deteriorating facilities would be repaired and replaced, but only as failures occur over time. Existing facilities and their operations that currently result in environmental degradation (i.e. of storm water and air quality) would continue under the No Action Alternative. This alternative is described in detail in **Section 4.4**.

The Proposed Action and Alternative 1 are analyzed for full-build-out in 2016. The actual build-out period could vary depending upon specific economic, market, and military relocation program conditions.

4.1.2 Alternatives Considered and Eliminated from Further Evaluation

Two additional potential alternatives were considered during the early planning phases of the Port Modernization Program: (1) construct a new commercial Port facility at a new site and (2) modernize

and reconfigure existing facilities and expand the Terminal Yard area to the west. However, for reasons cited below neither of these potential alternatives were advanced for analysis in this EA.

Construct a New Commercial Port Facility at Another Location

The Port Modernization Program analyzed the potential to develop a new port facility at a new, undeveloped site on Guam. Construction of a new commercial port facility at another site was rejected for the following reasons: lack of an available waterfront site in close proximity to the existing port; prohibitive cost; lack of sufficient personnel to operate a new port as well as the existing port; much greater environmental impact as compared to modernizing and expanding the existing port; and the time needed to obtain permits and approvals would not meet the urgent need for port modernization.

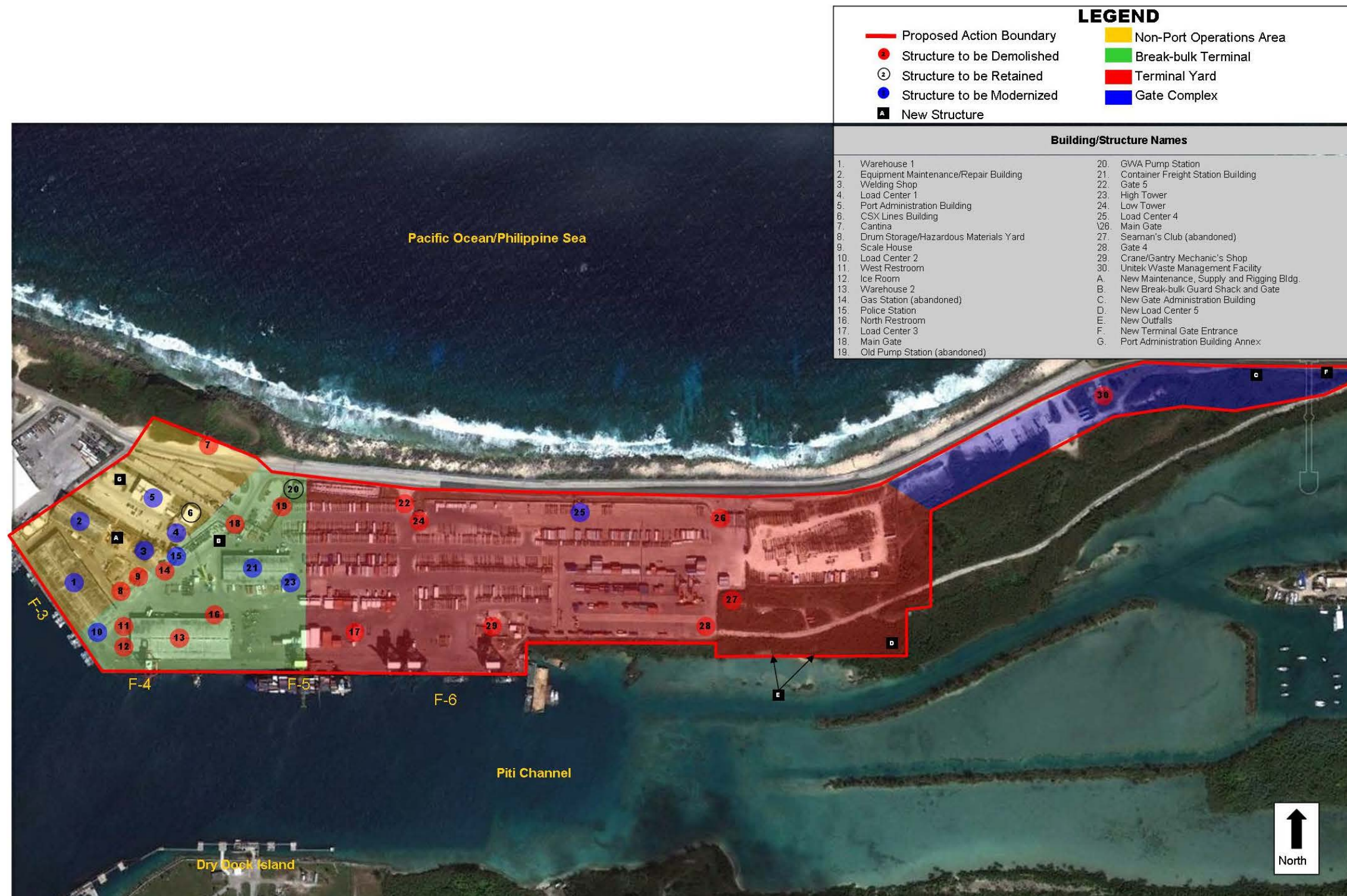
Modernize the Existing Port Facilities and Expand the Existing Terminal Yard to the West

The Port Modernization Program analyzed the potential to modernize the existing Terminal Yard, reconfigure existing operations and expand the Port's Terminal Yard to the west. This alternative was considered, but was rejected for the following reasons: demolition of buildings and removal and relocation of fuel storage facilities currently located in the area to the west would be required; Berths F-1 to F-3 would need to be reconstructed and dredging would be required; and, much greater environmental impact as compared to expanding the Terminal Yard to the east.

4.2 Description of Proposed Action – Modernize Facilities, Reconfigure Operations, and Extend Terminal Operations to the Expansion Area

The Proposed Action would modernize, improve, reconfigure and develop the Port facilities and operations on the site (i.e. the 52-acre Terminal Yard and 19-acre Expansion Area) in order to increase its cargo-handling capacity and operating efficiency (see **Figure 4-1**). Extension of the Terminal Yard to the Expansion Area would not only increase operational capacity of the entire Port facility in the long-term, but would allow construction activities to be phased and staged with minimal disruption to existing Port operations.

Figure 4-1, Proposed Action



Source: EA Engineering, Science, and Technology and GoogleEarth, 2012.

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The Proposed Action includes the following elements:

- Expand the existing 52-acre Terminal Yard by developing 19-additional paved acres in the Expansion Area to the east of the Terminal Yard for a total operations area of 73-acres (site) in order to handle projected future cargo storage and processing needs;
- Construct a new Break-bulk Terminal area in the western portion of the Terminal Yard (west of Berths F-4 to F-6) that would consolidate break-bulk activities currently occurring in various locations across the Terminal Yard;
- Create a Non-Port Operations Area to the east of the proposed new Break-bulk Terminal to isolate these activities from the remainder of the Port to improve efficiency and security;
- Construct new entrance and exit gates and truck routing in order to increase processing efficiency and reduce truck queuing times;
- Demolish, expand, and refurbish certain existing buildings, and construct new buildings;
- Install or upgrade certain existing utilities;
- Install oil/water separators in the eight existing storm water outfalls into Apra Harbor and construct two new storm water outfalls into the harbor with oil-water separators; and,
- Construct new safety, security improvements.

Although increased capacity and efficiency would be required to support the Guam Military Relocation Program, improvements associated with the Port Modernization Program would be required with or without this related project.

Separate ongoing maintenance activities, improvements and upgrades that would occur on the Port site concurrent with the Proposed Actions including:

- Equipment upgrades;
- Ongoing maintenance of existing marine facilities;
- Realignment of existing petroleum oil lubricant pipeline; and,
- Ground strengthening activities (including stone columns, vibro-compaction, deep soil mixing, compaction, grouting or pre-loading).

See **Section 4.6**, Separate Ongoing Maintenance Activities and Equipment Upgrades, for additional details.

4.2.1 Construction Timeframe

For purposes of this EA analysis, construction activities associated with the Port Modernization Program are assumed to commence in 2012 and would be scheduled to be completed by 2016. Development of the 19-acre Expansion Area portion of the site (to the east of the Terminal Yard) would allow the Port to phase and stage construction activities associated with the Proposed Action with minimal disruption to

on-going operations. The actual build-out period could vary depending upon specific economic, market, and military relocation program conditions.

4.2.2 Demolition and Grading Activities

As shown on **Figure 4-1**, the Proposed Action would require demolition of the following upland structures listed below to accommodate Port Modernization Program activities. (In the following description, numbers in parenthesis beside structure names reflect identifiers on **Figure 4-1**.) Existing uses housed in the facilities would be temporarily relocated prior to demolition activities. No existing uses are assumed to be permanently displaced as a result of redevelopment activities.

Non-Port Operations Area (West of the Break-bulk Terminal)

Under the Proposed Action, the following structures would be demolished in the Non-Port Operations Area:

- Cantina (abandoned) (7);
- Drum Storage/Hazardous Materials Yard (8); and,
- Scales (9).

As necessary, pavement within the Non-Port Operations Area would be removed and repaved.

New Break-bulk Terminal

The following structures would be demolished to accommodate the new Break -Bulk Terminal in 9.3 acres east of the Non-Port Operations Area on the site:

- Warehouse 2 (13);
- West and North Restrooms (11 and 16);
- Ice Room (12);
- Abandoned Gas Station (14);
- Existing Break-bulk Gate (18); and,
- Abandoned Guam Waterworks Authority (GWA) Pump Station (19).

As necessary, pavement within the Break-bulk Terminal area would be removed and repaved.

Terminal Yard

The following structures would be demolished to accommodate the reconfigured cargo operations in the central portion of the Terminal Yard:

- Crane/Gantry Mechanic's Shop (29);
- Load Center 3 (17);
- Gate 5 (22);
- Low Tower (24);
- Old Seaman's Club (27);
- Gate 4 (28); and,
- Existing Main Gate (26).

As necessary, pavement within the Terminal Yard would be removed and repaved.

Other miscellaneous structures in the Terminal Yard would also be demolished including: miscellaneous fencing; wheel stops; signage; concrete slabs/walls; approximately 48 light poles; and, miscellaneous subsurface utilities. No in-water structures are proposed to be demolished as part of the Proposed Action.

Expansion Area

The following structures would be demolished to accommodate the reconfigured Terminal Yard operations in the 19-acre Expansion Area portion of the site:

- Unitek Waste Transfer Facility (30).

The 19-acre Expansion Area would be re-graded and paved to accommodate the Proposed Action and allow for wheeled and grounded container storage. Approximately 145,000 cubic yards (CY) of grading would be required. The depth of re-grading would range from 0 to 20 feet. Soil not reused on the site would be transported to a temporary soil stockpile facility at an adjacent Port property for later reuse.

4.2.3 Development Characteristics

With implementation of the Proposed Action, the general character of the Terminal Yard portion of the site would be similar to existing conditions. The Terminal Yard would continue to be developed with Port operations and equipment, as shown on **Figure 4-1**. (In the following description, numbers in parenthesis beside structure names reflect identifiers on **Figure 4-1**.) The addition of cargo container storage in the proposed 19-acre Expansion Area portion of the site would represent a continuation of the character of the existing Terminal Yard. Following is a description of the specific development characteristics of the Proposed Action:

Non-Port Operations Area (West of the Break-bulk Terminal)

Under the Proposed Action, non-Port related functions would be relocated to the area west of the proposed new Break-bulk Terminal and fenced to isolate these activities from the remainder of the Port. The separation of non-Port-related activities from Port operations would improve operational efficiency and address security deficiencies, specifically:

- The Warehouse 1 space (1) would be modernized and reconfigured to house commercial tugboat operations and Customs and Border Patrol (CBP).
- The Welding Shop (3) would be modernized and reconfigured to allow for installation of a bridge crane.
- The Port Police Station (15) would be modernized.
- The Equipment Maintenance and Repair (EQMR) building (2) would be modernized and reconfigured with expanded operations to be accommodated in an adjacent new Maintenance, Supply, and Rigging Building (A). Adjacent EQMR restroom facilities would be expanded.

New Break-bulk Terminal

All existing break-bulk operations would be reconfigured and relocated in the 9.3-acres east of the Non-Port Operations Area in a new Break-bulk Terminal. Relocating and reconfiguring operations would improve efficiency and increase capacity, specifically:

- A new Break-bulk Guard Shack and Gate (B) and a canopy covering for in-bound and out-bound gate lanes and pedestals would be constructed.
- The Port Administration Building (5) would be modernized and a new Port Administration Building Annex (G) constructed in order to provide additional office and functional space.
- The Container Freight Station (21) building would be modified to accommodate new uses once the container freight station function is relocated to the non-Port operations area.

Terminal Yard

The remaining Terminal Yard area would be reconfigured to maximize the efficiency of container handling operations, specifically:

- The High Tower (23) would be upgraded in order to improve facilities and provide additional office space for the Port operations control center.

Expansion Area

The approximately 19-acre undeveloped Expansion Area would be re-graded and paved to accommodate container storage and terminal operations, specifically:

- A new Load Center 5 (D) would be constructed to address power requirements for the Expansion Area and proposed gate complex. Existing Load Centers 1 (4), 2 (10), and 4 (25) in other portions of the site would be reconfigured to accommodate revised site power distribution and backup power requirements.
- A new Terminal Gate (F) and Gate Administration Building (C) would be constructed at the proposed new gate complex in the Expansion Area. Inbound and outbound optical character recognition (OCR) facility canopies would be constructed.
- Parking facilities would be constructed to accommodate expanded requirements at the west end of the site and at the gate administration building. Parking facilities at the gate administration building would allow for parking of in-bound trouble-trucks. Parking facilities for yard tractors and bomb carts would be constructed at the east end of the Expansion Area.
- Two new storm water outfalls (E) would be constructed in the Expansion Area to manage runoff from the 19-acres of new impervious area in the Expansion Area.

Overall Site

With the Proposed Action, certain improvements would occur throughout the Terminal Yard and Expansion Area including:

- New lighting masts would be constructed throughout the site to improve lighting and safety conditions.
- As necessary, existing pavement would be removed and replaced.
- As necessary, existing fencing would be removed and replaced and existing perimeter security gaps would be fenced.

4.2.4 Throughput Capacity

With implementation of the Proposed Action, the throughput capacity of the Port facilities would increase by modernizing facilities, reconfiguring operations and expanding Terminal Yard facilities. The proposed improvements to the Port facilities are intended to provide sufficient capacity to meet projected peak demand identified in the Port's *Master Plan* (Port of Guam, 2008).

4.2.5 Roadway Access

Under the Proposed Action, the existing Main Gate (26) located in the northeastern portion of the Terminal Yard would be demolished and a new truck entry and exit Terminal Gate (F) would be constructed in the eastern portion of the proposed Expansion Area (see **Figure 4-1**). Five entrance and exit lanes would process routine and oversized trucks simultaneously, reducing truck idling times and increasing the terminal's operating efficiency. The new Terminal Gate (F) would direct trucks to enter a queuing lane area off of Route 11 and pass through an inbound optical character recognition station.

Out-bound processing efficiency would be increased by including a Customs Inspection Station and (CIS) and customs offices at the exit gates and accommodating a weigh-in-motion station (WIMS) east of the exit gates.

An emergency gate for reconfigured access/egress through Route 11 would be constructed at the southeast end of the Expansion Area.

4.2.6 Security

The Proposed Action would provide security and safety improvements, including new security cameras and upgraded general purpose and high mast lighting across the Terminal Yard and Expansion Area. The existing lighting poles in the Terminal Yard would be removed and replaced with fifteen, 100-foot-tall high mast lighting poles to improve poor existing lighting conditions. Four similar lighting poles and fixtures would also be added in the Expansion Area.

Warehouse 1 (1), would be reconfigured to house commercial tugboat operations and customs and border patrol uses and would be fenced off to isolate these non-Port related functions from the remainder of the Port. The separation of non-Port-related activities from Port operations would improve deficiencies in Port security identified in the Master Plan. The entrance and exit to Warehouse 1 (1) would be realigned to maintain separation from Port activities.

Communications and electrical conduits would be added to all of the terminal lighting poles for placement of security cameras and wireless antennae. Duct banks and manholes would be constructed for all existing and new buildings and facilities.

4.2.7 Utility Upgrades

Under the Proposed Action, existing deteriorating and poorly routed utility lines in the Terminal Yard would be removed and replaced. Several thousand feet of new utility lines (electric, storm water, domestic water, fire protection, sanitary sewer, and communications) would be installed in the Expansion Area following grading activities. Utility trench depths would range from 3 to 10 feet.

Storm Water

Storm water improvements under the Proposed Action would include the installation of new storm water drainage lines and two new outfalls (E) into Apra Harbor in the proposed Expansion Area. The new storm water lines and outfalls would be intended to accommodate additional storm water runoff from the additional approximately 19-acres of impervious surface assumed to be added in the Expansion Area under the Proposed Action. Storm water collection system piping would originate at the northeastern portion of the new gate complex and the north end of the Expansion Area and would terminate along the southern border (mid-east location) of the Expansion Area. Oil/water separators would be added to the storm water collection system to provide treatment prior to discharge. The piping would converge on two outfalls, which would extend into Apra Harbor and terminate atop flow-dissipating riprap before discharge into the harbor.

Oil/water separators would be added to the eight existing storm water outfalls to provide treatment prior to discharge into Apra Harbor.

Domestic Water

To address existing issues with deteriorating infrastructure and routing issues, the Proposed Action assumes the existing main water supply trunk line in the Terminal Yard would be removed and re-routed to the right-of-way along Route 11. New water supply lines and storage tanks would be installed in the Expansion Area for the expanded and reconfigured fire protection and domestic water systems. Supply lines would be re-routed and meter locations would be changed to bypass leaking and aging components. New water lines would be provided for new buildings and facilities.

Fire Protection

Fire protection system improvements under the Proposed Action would include new fire mains connected to the relocated main north of the secured Terminal Yard in the Route 11 right-of-way. Fire protection systems would be supplied to all buildings, container and break-bulk terminals, and Port service stations. Fire-fighting water pressure would be improved to meet code requirements through installation of storage tanks and pumps. A new Fire Pumps Building (H) would be constructed in the new Gate Complex.

Sanitary Sewer

New sanitary sewer infrastructure would be developed in the eastern portion of the Expansion Area to support new operations in this area. The existing Terminal Yard would continue to use much of the existing sewer system. The proposed new sewer lines would connect to the proposed new Terminal Gate Administration Building and future Customs and Border Patrol Building and drain to a new sewer manhole. Treatment would continue to be provided at GWA Hågatña Treatment Plant.

See **Section 5.1.5**, Utilities, for additional details.

4.2.8 Permit Requirements

The key permits and approvals required for the Proposed Action include:

- *Section 404 (of the Clean Water Act) Permit* – This permit, issued by the USACE, is required due to the placement of fill (rip-rap) for construction of the proposed storm water outfalls.
- *Section 401 (of the Clean Water Act) Water Quality Certification* – This permit, issued by Guam Environmental Protection Agency (GEPA), is required to certify that construction of the Proposed Action would comply with water quality standards and aquatic resource protection requirements.
- *Coastal Zone Consistency Determination* – This approval, issued by Guam Bureau of Statistics and Plans (GBSP), is required to confirm that the Proposed Action is consistent with the policies of the Guam Coastal Management Program (GCMP).
- *National Pollutant Discharge Elimination System (NPDES) Permit* – This permit, issued by GEPA, certifies that the discharges from the proposed storm water outfalls (point sources) are in compliance with Guam Water Quality Standards.
- *Clearing and Grading Permit* – This permit, issued by Guam Department of Public Works (DPW), certifies that construction of the Proposed Action is in compliance with Guam Soil and Sedimentation Control Regulations.
- *Environmental Protection Plan (EPP)* – This permit, issued by GEPA, certifies that construction of the Proposed Action will include appropriate environmental protection measures to avoid or minimize environmental impacts.
- *Building Construction Permit* – This permit, issued by DPW, ensures that construction of the Proposed Action is in compliance with and conforms to building zone and other applicable standards and requirements.

4.3 Alternative 1 – Replace/Repair Facilities within the Existing Terminal Footprint







Redevelopment with Alternative 1 would include systematic and coordinated replacement and/or repair of deteriorated or inefficient facilities and equipment within the Port's existing 52-acre Terminal Yard. The proposed development of 19-acres of the Expansion Area to the east of the Terminal Yard would not occur and would remain in its existing condition (see **Figure 4-2**). Under Alternative 1, the Port's cargo-handling capacity and operating efficiency would be improved as compared to existing conditions and would create sufficient capacity to meet peak demand, but without the new terminal gates and parking facilities in the Expansion Area, longer waiting times for vessel berths and longer truck queuing lines could result, as compared to the Proposed Action.

Without the development of the 19-acres of Expansion Area, the Port would have less flexibility to phase and stage construction activities resulting in more disruptions to Port operations as compared to the Proposed Action. It is assumed that under Alternative 1, the Port could extend work hours to run 24-hour shifts during the peak demand period.

Alternative 1 would include the following elements:

- Systematic and coordinated replacement and/or repair of deteriorated or inefficient facilities;
- The existing 52-acre Terminal Yard would remain and no construction activities would occur in the 19-acres of Expansion Area;
- Existing break-bulk and cargo container operations would not be reconfigured or consolidated and would remain in their current locations;
- Entrance and exit gates would be upgraded to address existing security issues, but would remain in their current configuration;
- Existing deteriorating buildings and facilities would be refurbished or demolished/reconstructed as described under the Proposed Action, and certain uses would be relocated;
- Installation or refurbishment of deteriorating water, sewer, and electrical system utilities would occur as described under the Proposed Action;
- New oil/water separators would be installed at existing storm water outfalls, but no new storm water system outfalls would be constructed; and,
- New safety and security improvements would be constructed as described under the Proposed Action to meet federal regulations, but existing safety operations (such as gate operations) would not be relocated.

Figure 4-2, Alternative 1

LEGEND	
	Alternative 1 Boundary
	Terminal Yard
	New Structure
	Structure to be Demolished
	Structure to be Retained
	Structure to be Modernized

Building/Structure Names	
1. Warehouse 1	17. Load Center 3
2. Equipment Maintenance/Repair Building	18. Main Gate
3. Welding Shop	19. Old Pump Station (abandoned)
4. Load Center 1	20. GWA Pump Station
5. Port Administration Building	21. Container Freight Station Building
6. CSX Lines Building	22. Gate 5
7. Cantina	23. High Tower
8. Drum Storage/Hazardous Materials Yard	24. Low Tower
9. Scale House	25. Load Center 4
10. Load Center 2	26. Main Gate
11. West Restroom	27. Seaman's Club (abandoned)
12. Ice Room	28. Gate 4
13. Warehouse 2	29. Crane/Gantry Mechanic's Shop
14. Gas Station (abandoned)	30. Unitek Waste Management Facility
15. Police Station	A. New Maintenance, Supply and Rigging Building
16. North Restroom	B. Port Administration Building Annex



Source: EA Engineering, Science, and Technology and GoogleEarth, 2012.

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4.3.1 Construction Timeframe

Under Alternative 1, construction activities at the Port of Guam site would commence in 2012 and would be scheduled to be completed by 2016, similar to the Proposed Action. To the extent feasible, redevelopment activities would be phased and staged to minimize impacts to on-going Port operations. Because the proposed Expansion Area would not be developed under Alternative 1, the Port would have reduced flexibility for staging and phasing. As a result, temporary outages and impacts to existing operations would likely be greater than under the Proposed Action.

4.3.2 Demolition and Grading Activities

As shown on **Figure 4-2**, Alternative 1 would require demolition of the following upland structures to accommodate repair/replacement of existing facilities. Existing uses housed in the facilities would be temporarily relocated prior to demolition activities. No existing uses are assumed to be permanently displaced as a result of redevelopment activities.

Terminal Yard

Under Alternative 1, the following structures would be demolished in the existing Terminal Yard to improve mobility on the site and accommodate the replacement or repair of existing facilities:

- Cantina (7);
- Drum Storage/Hazardous Materials Yard (8);
- Warehouse 2 (13);
- North and West Restrooms (11 and 16);
- Ice Room (12);
- Abandoned Gas Station (14);
- Abandoned Guam Waterworks Authority (GWA) pump station (19);
- Crane/Gantry Shop (29); and,
- Scales (9)

As necessary, pavement removed and replaced. Other miscellaneous structures would also be demolished including: miscellaneous fencing; wheel stops; concrete slabs/walls; approximately 48 light poles; and, miscellaneous subsurface utilities. No in-water structures are proposed to be demolished as part of Alternative 1.

4.3.3 Development Characteristics

After implementation of Alternative 1, the general character of the Terminal Yard would be similar to existing conditions and the site would continue to be developed with Port operations and equipment. Efficiencies in building operation and layout, and vehicular circulation would not be realized to the same extent as under the Proposed Action. The proposed 19-acre of the Expansion Area would remain undeveloped, as under existing conditions. Existing break-bulk and container operations would remain in their current configuration. Existing gate access points and security operations configurations would remain as under existing conditions.

- The Warehouse 1 space (1) would be modernized and reconfigured to house commercial tugboat operations and CBP.

- The Welding Shop (3) would be modernized and reconfigured to allow for installation of a bridge crane.
- The EQMR building (2) would be modernized and reconfigured. Adjacent EQMR restroom facilities would be expanded.
- A new Maintenance, Supply and Rigging Building (A) would be constructed to accommodate the relocated Crane/Gantry Mechanic's Shop.
- The Port Administration Building (5) would be modernized and a Port Administration Building Annex (G) constructed in order to provide additional office and functional space.
- The Port Police Station (15) would be modernized.
- The High Tower (23) would be upgraded in order to improve facilities and provide additional office space for the Port operations control center.
- The Container Freight Station Building (21) would be modernized.

4.3.4 Throughput Capacity

With implementation of Alternative 1, the throughput capacity of the Port facilities would increase by modernizing facilities and equipment, but capacity would be less than under the Proposed Action. It is anticipated that repaired/replaced facilities as provided under Alternative 1 would have sufficient capacity to meet projected peak demand, but could result in longer waiting times for vessel berths and longer truck queues, as compared to the Proposed Action. To meet projected peak demand, some adjustments to operating hours and shift schedules could be required.

4.3.5 Roadway Access

Under Alternative 1, roadway access and terminal gates would remain in their current configuration. Improvements to operational efficiency and reduction to truck queuing wait times would not be realized under Alternative 1. Existing traffic congestion from waiting times would continue and would be anticipated to increase as vessel and cargo volumes increase.

4.3.6 Security

Under Alternative 1, existing deficiencies in perimeter security, as noted in the Port's *Master Plan*, would be addressed and brought up to Department of Homeland Security and other federal standards and regulations, similar with the Proposed Action. Perimeter security would be completed and security infrastructure upgraded. The configuration of security operations would remain as under existing conditions and would not be reconfigured to improve efficiency, as assumed under the Proposed Action.

4.3.7 Utility Upgrades

Under Alternative 1, only the following limited utility upgrades would be constructed.

Storm Water

Storm water improvements under Alternative 1 would not include new outfalls as were described under the Proposed Action. Oil/water separators would be added to the eight existing storm water outfalls to provide treatment prior to discharge into Apra Harbor.

Domestic Water

Improvements to deteriorating domestic water utility system features as proposed under the Proposed Action would occur under Alternative 1.

Fire Protection

Improvements to deteriorating fire protection utility system features as proposed under the Proposed Action would occur under Alternative 1.

Sanitary Sewer

Improvements to deteriorating sanitary sewer utility system features as proposed under the Proposed Action would occur under Alternative 1.

4.3.8 Permit Requirements

The key permits and approvals required for Alternative 1 include:

- Section 401 (of the Clean Water Act) Water Quality Certification
- Coastal Zone Consistency Determination
- Environmental Protection Plan
- Building Construction Permit

4.4 No Action Alternative

Under the No Action Alternative, the Port's operations would remain as described under existing conditions (see **Section 3.1**). Facilities in the Terminal Yard would not be modernized or systematically replaced, operations would not be reconfigured to improve efficiency and the Expansion Area would not be developed. The No Action Alternative assumes that deteriorating facilities would be repaired and replaced, but only as failures occur over time. The throughput capacity of the Port's operations would not change from existing conditions and would not be anticipated to be sufficient to meet projected demand. Existing facilities and their operations that currently result in environmental degradation (i.e. traffic congestion) would continue.

The No Action Alternative would include the following elements:

- The existing 52-acre Terminal Yard would remain and no construction activities would occur in the 19-acre Expansion Area;

- Entrance and exit gates would be upgraded and improved to address existing security issues, but would remain in their current configuration;
- Existing deteriorating buildings and facilities would be repaired or replaced only as failures occur;
- New safety and security improvements would be constructed as described under the Proposed Action to meet federal regulations, but existing safety operations would not be relocated;
- Installation or refurbishment of deteriorating water, sewer, and electrical system utilities would occur as described under the Proposed Action;
- New storm water oil/water separators would not be installed at existing outfalls; and,
- Existing break-bulk and cargo container operations would not be reconfigured or consolidated and would remain in their current locations.

4.4.1 Construction Timeframe

Repairs of existing Terminal Yard equipment and facilities would occur over time as failures occurred. Outages and impacts to operations would be unplanned and could impact ongoing operations.

4.4.2 Demolition and Grading Activities

Re-grading activities in the Expansion Area, as described under the Proposed Action, would not be required under the No Action Alternative as no construction activities would occur in this area. Existing equipment and facilities would be demolished and repaired as failures occur over time.

4.4.3 Development Characteristics

With the No Action Alternative, development characteristics of the site would remain as under current conditions (see **Section 3.1**).

4.4.4 Throughput Capacity

Throughput capacity of the Port's facilities under the No Action Alternative would not significantly change from current conditions (see **Section 3.1**). Repair and replacement of existing facilities as failures occur over time would not be anticipated to substantially improve throughput capacity. The throughput capacity of the Port's facilities would not be sufficient to meet projected demand, particularly from the Guam Military Relocation Program, resulting in potential project and construction delays.

4.4.5 Roadway Access

Roadway access and terminal gates would remain in their current configuration, as described under current conditions (see **Section 3.1**). Improvements to operational efficiency and reductions in truck queuing wait times with the Proposed Action would not be realized under the No Action Alternative. Existing traffic congestion and delays from truck queuing lines would continue.

4.4.6 Security

Existing deficiencies in perimeter security, as noted in the Port's *Master Plan*, would be addressed and brought up to Department of Homeland Security and other federal standards and regulations. Perimeter security would be completed and security infrastructure upgraded. The configuration of security operations would remain as under current conditions (see **Section 3.1**) and would not be reconfigured to improve efficiency, as assumed under the Proposed Action.

4.4.7 Utility Upgrades

Improvements to deteriorating water, electric, sewer, and storm water system utilities would occur as failures happen over time. No oil/water separators would be installed at existing outfalls, however.

4.4.8 Permit Requirements

The Port would obtain permits, as necessary, to support demolition, replacement, and/or repair of existing facilities as failures occur over time.

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4.5 Comparison of the Proposed Action and Alternatives

Table 4-1, Port Authority of Guam Port Modernization Program EA Comparison of Alternatives

Project Element/Feature	Existing Conditions	Proposed Action Modernize Facilities, Reconfigure Operations, and Expand Terminal Yard to the Expansion Area	Alternative 1 Replace/Repair Facilities within the Existing Terminal Yard	No Action Alternative
Site Area	52 acres	71 acres	Same as current conditions.	Same as current conditions.
Capacity – Containers	120,000 lifts 204,000 TEU (twenty-foot equivalents)	200,000 lifts	Replacement/repair of existing facilities would result in an increase in capacity and would be sufficient to meet projected demand under current and forecasted carrier operations.	Same as current conditions.
Capacity – Break-bulk	155,000 tons	350,000 tons	Replacement/repair of existing facilities would result in an increase in capacity and would be sufficient to meet projected demand.	Same as current conditions.
Facility Capacity Sufficient to Meet Anticipated Demand	No	Yes	Yes	No
Container Terminal Yard Storage Size	26.5 acres	47.8 acres	Same as current conditions.	Same as current conditions.
Construction Timeframe	N/A	2012-2016	2012-2016	Repairs would take place over time as failures occurred.
Operations	Operations are decentralized and inefficient due to Terminal Yard congestion and	Terminal operations would be reconfigured to consolidate and co-locate all break-bulk operations in the eastern portion of the site and container operations in the	Same as current conditions. Existing facilities would be replaced and/or improved to increase existing capacity at a level sufficient to meet projected demand. Operations	Same as current conditions.

Project Element/Feature	Existing Conditions	Proposed Action Modernize Facilities, Reconfigure Operations, and Expand Terminal Yard to the Expansion Area	Alternative 1 Replace/Repair Facilities within the Existing Terminal Yard	No Action Alternative
	configuration.	western portion of the site, improving efficiency and increasing capacity.	could not be consolidated or co-located and would not be as efficient as under the Proposed Action.	
Demolition of Buildings	N/A	Demolition of certain existing buildings, gates, light poles, slabs, and walls would occur to accommodate redevelopment and increase yard capacity.	Demolition of certain existing buildings, gates, light poles, slabs, and walls would occur to accommodate redevelopment and increase yard capacity.	No demolition activities would be anticipated.
Gate Complex and Truck Queuing	Inbound and outbound gates are not separated resulting in inefficient operations and long traffic queues.	Inbound and outbound gates would be automated, separated, increased in number, and reconfigured resulting in more efficient operations, reduced traffic queues, and less congestion within the Terminal Yard.	Inbound and outbound gates would remain in their current configuration and number.	Same as current conditions.
Security/Safety Improvements and Communications	Perimeter security is incomplete, security infrastructure is deficient and security operations are inefficient. Inefficiencies currently contribute to traffic congestion on adjacent roadways.	Perimeter security would be completed, security infrastructure would be upgraded, and security operations would be reconfigured to increase efficiency and reduce traffic congestion.	Perimeter security would be completed and security infrastructure upgraded to meet federal requirements. Security operations would not be reconfigured resulting in less efficiency and more traffic congestion than under the Proposed Action.	Perimeter security would be completed and security infrastructure upgraded to meet federal requirements. Security operations would not be reconfigured resulting in less efficiency and more traffic congestion than under the Proposed Action.
Utility Improvements	Certain existing utility infrastructure (water, electrical, and wastewater	Certain existing utility infrastructure in the Terminal Yard would be replaced or upgraded as	Deteriorating utility infrastructure would be replaced or upgraded as	Utility infrastructure would be repaired in-place as failures

Project Element/Feature	Existing Conditions	Proposed Action Modernize Facilities, Reconfigure Operations, and Expand Terminal Yard to the Expansion Area	Alternative 1 Replace/Repair Facilities within the Existing Terminal Yard	No Action Alternative
	services) in the Terminal Yard is aging or undersized to meet anticipated future demand.	redevelopment activities occurred. New utilities would be provided in the Expansion Area.	part of redevelopment.	occurred over time.
Storm Water System Improvements	Eight outfalls are located in Port property. Storm water is collected in catch basins and discharged to Apra Harbor/Piti Channel without water quality treatment.	Two additional outfalls would be constructed to manage storm water for the Expansion Area. Oil/water separators would be installed to provide treatment for existing and new outfalls prior to discharge.	Additional outfalls would not be constructed, because no new impervious surface area would be constructed. Oil/water separators would be installed to provide treatment for existing outfalls prior to discharge.	Same as current conditions.

Source: EA Engineering, Science, and Technology, 2012.

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4.6 Separate Ongoing Maintenance Activities and Equipment Upgrades

Separate ongoing maintenance activities and equipment/utility upgrades known to be planned on the site are discussed in this EA on a cumulative basis together with the Alternatives. These separate activities would occur independent of the Proposed Action. Separate projects/activities known to be planned on the site are described below.

4.6.1 Equipment Upgrades

The PAG has analyzed different types of container handling systems, including rubber tire gantry (RTG), top-pick, combined (wheeled chassis and top-pick), and reach stacker for potential equipment upgrades at the Port. This equipment upgrade would be managed by the Port and is separate from the Proposed Action in this Port Modernization Program. A combined (wheeled chassis and top-pick) container handling system was selected by the Port as the preferred system, because it would allow the Port to accommodate shipper preferences for wheeled and grounded systems. The equipment replacement program would be phased to limit outages and impacts to ongoing operations.

4.6.2 Ongoing Maintenance of Existing Marine Facilities

Concurrent with the Proposed Action, PAG would continue to perform ongoing maintenance and repair of existing marine facilities not included in the scope of the Port Modernization Program. Maintenance and repair projects would include: concrete repairs; structural repairs and cathodic protection - protecting a metal from electrochemical corrosion by using it as the cathode - of Berths F-3, F-4, F-5, and F-6; repairs and rehabilitation of dock and related structures; addition of concrete spalls at Berths F4 and F6; repairs to existing storm water outfalls; and, bottom and other miscellaneous debris removal.

4.6.3 Realignment of Existing Petroleum Oil Lubricant Pipeline

Installation of new utility infrastructure would cross the existing Tristar Terminals Guam (Tristar) underground petroleum oil lubricant (POL) lines. It is anticipated that as part of an agreement between PAG and Tristar, Tristar would install a bypass line allowing fuel to be routed around the terminal expansion areas. Tristar would purge the abandoned lines and cap them. PAG would cut and remove interfering sections of the lines to allow the Proposed Action to be implemented.

Lines under the existing concrete pavement would be abandoned in place and filled with grout. Lines that are in non-paved expansion areas would be removed. However, at this time, the agreement between PAG and Tristar, including disposition of the lines, has not been finalized. Once the agreement between PAG and Tristar has been finalized, PAG will prepare the appropriate level of supplemental environmental documentation.

4.6.4 Ground Strengthening Activities

As described later in **Section 5.2.1**, Geology and Soils, of this EA, liquefaction potential exists at Berths F4 and F6. Some form of ground improvements would be required in these areas with or without the Proposed Action, such as the use of the following:

- stone columns;
- vibro-compaction;
- deep soil mixing;
- compaction grouting; or,
- preloading.

During site-specific design and engineering, the type, location, and extent of ground improvements would be determined.

5.0 AFFECTED ENVIRONMENT & ENVIRONMENTAL CONSEQUENCES

This section provides a summary of the affected environment and probable environmental consequences of the Port Modernization Program Proposed Action and Alternatives for the elements of the environment identified by U.S. Department of Transportation's Maritime Administration (MarAd). These are the elements where there is a potential for the proposed project to significantly affect the environment. As appropriate, relevant mitigation measures to address environmental consequences have been identified. For each element of the environment, impacts are analyzed for the Proposed Action, Alternative 1 and the No Action Alternative.

Section 5.0 is broken down into three subsections: **Section 5.1**, Physical Resources, **Section 5.2**, Natural Resources and **Section 5.3**, Human Resources.

- **Section 5.1 Physical Resources**
 - 5.1.1 Air Quality
 - 5.1.2 Noise
 - 5.1.3 Hazardous Materials and Waste
 - 5.1.4 Safety and Security
 - 5.1.5 Utilities and Public Services
- **Section 5.2 Natural Resources**
 - 5.2.1 Geology and Soils
 - 5.2.2 Surface Water, Storm Water and Floodplains
 - 5.2.3 Groundwater
 - 5.2.4 Sediment Quality
 - 5.2.5 Wetlands and Coastal Waters
 - 5.2.6 Terrestrial Resources (including Migratory Bird Treaty Act)
 - 5.2.7 Benthic and Marine Resources
 - 5.2.8 Essential Fish Habitat
 - 5.2.9 Federally Threatened and Endangered Species
- **Section 5.3 Human Resources**
 - 5.3.1 Traffic
 - 5.3.2 Cultural, Historic and Section 5(f) Resources
 - 5.3.3 Land Use and Coastal Zone Consistency
 - 5.3.4 Visual Resources
 - 5.3.5 Socioeconomic Resources and Environmental Justice

5.1 Physical Resources

5.1.1 Air Quality

This section describes existing air quality conditions on and in the vicinity of the Port Modernization Program site. Potential environmental consequences to existing air quality conditions associated with construction and operation of the proposed Port Modernization Program are analyzed.

5.1.1.1 Introduction

Regulatory Framework

Various federal and local regulations related to air quality would apply to the Port Modernization Program, as summarized below:

Air Quality Standards

Two agencies have jurisdiction over the ambient (outdoor) air quality at the Port Modernization Program site and in the site vicinity: The U.S. Environmental Protection Agency (USEPA) and Guam EPA (GEPA). These agencies establish standards that govern both the concentrations of pollutants in the outdoor air and the emissions from sources of air contaminants. The most significant of the ambient air quality standards are the USEPA's National Ambient Air Quality Standards (NAAQS), which have been established at pollutant concentrations that are protective of human health and welfare, based on health-based or environmentally-based criteria or guidelines. GEPA has established ambient standards which generally mirror the NAAQS.

The pollutants for which standards have been established are called criteria pollutants. USEPA and GEPA ambient air quality standards are shown in **Table 5.1.1-1**. The measurements of these criteria pollutants in ambient air are expressed in units of parts per million (ppm), milligrams per cubic meter (mg/m³), or micrograms per cubic meter (µg/m³). The air quality in a region is a result not only of the types and quantities of atmospheric pollutants and pollutant sources in an area, but also surface topography, the size of the topological air basin, and the prevailing meteorological conditions.

NAAQS have been established for six pollutants: ozone (O₃), carbon monoxide (CO), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), particulate matter less than 10 microns (PM₁₀) and less than 2.5 microns (PM_{2.5}), and lead (Pb). Primary standards have been established to protect public health including protecting the health of "sensitive" populations such as asthmatics, children and the elderly. Typical sensitive land uses protected by the primary standards are public accessible areas used by these populations such as residences, hospitals, libraries, churches, parks, playgrounds and schools. Secondary standards are intended to protect the public's welfare and account for air pollutant effects on soil, water, visibility, materials, vegetation, and other aspects of the general welfare.

Table 5.1.1-1, Federal and Guam Ambient Air Quality Standards

Pollutant and Averaging Time	Primary Standard ¹	Secondary Standard ¹
Carbon Monoxide		
8-Hour Maximum	9 ppm ³	—
1-Hour Maximum	35 ppm ³	—
Nitrogen Dioxide		
Annual Arithmetic Mean	53 ppb ²	53 ppb
1-Hour	100 ppb ¹¹	—
Ozone		
8-Hour Average	0.075 ppm ⁴	0.075 ppm
Particulate Matter⁸		
PM ₁₀ —24-Hour Average	150 ⁵	150
PM _{2.5} —Annual Arithmetic Mean	15 ¹²	15
PM _{2.5} —24-Hour Average	35 ⁶	35
Lead		
Rolling 3-month Average	0.15 ⁷	0.15
Sulfur Dioxide		
Annual Arithmetic Mean ⁹	80 ²	—
24-Hour Maximum ⁹	365 ³	—
3-Hour Maximum	—	0.5ppm ³
1-Hour	75 ppb ¹⁰	—

Sources: 40 CFR 50 and Guam Air Pollution Control Standards and Regulations, 2012.

1. All concentrations in micrograms per cubic meter of air (µg/m³) or, except where noted, in parts per million (ppm).
2. Not to be exceeded during any calendar year.
3. Not to be exceeded more than once a year.
4. Standard attained when 3-year average of annual 4th-highest daily maximum 8-hour concentration is below 0.08 ppm.
5. Not to be exceeded more than once per year.
6. Standard attained when the annual highest 98th percentile of 24-hour concentration over 3 years is below 35 µg/m³.
7. Not to be exceeded during any calendar quarter.
8. PM₁₀—particulate matter diameter of 10 microns or less; PM_{2.5}—particulate matter diameter of 2.5 microns or less.
9. Revoked in 2010 except in areas originally designated non-attainment under the 1971 standards.
10. Standard attained when the highest 99th percentile of 1-hour concentrations over 3 years is below 75 ppb.
11. 98th percentile averaged over 3 years
12. Annual mean, averaged over 3 years

Attainment and Non-Attainment Areas

A status of “attainment” for a given pollutant indicates that the air quality in an area complies with the NAAQS for that pollutant. If the area does not meet the NAAQS for a particular pollutant, the area is designated “non-attainment” for that pollutant. Typically, a plan, called a State Implementation Plan (SIP), is developed and implemented by each state or territory for non-attainment areas to reduce ambient pollutant concentrations below the NAAQS and bring the area back into attainment with the NAAQS. When the air in a non-attainment area has been cleaned up to the point that the standard is no longer exceeded for a specified period, the area is redesignated as “attainment” – this redesignation requires a maintenance plan (typically covering the first 10 years after redesignation) to ensure that ambient concentrations do not deteriorate back to non-attainment levels. These redesignated areas are called “maintenance areas” for the duration of the maintenance plan.

Conformity

A demonstration of “Conformity” is required for all federal actions in designated non-attainment and maintenance areas to ensure that such actions taken by or through federal agencies conform to an applicable SIP. Federal actions can include the issuance of permits, funding of projects, etc. Conformity must be addressed in two areas: Transportation Conformity and General Conformity.

- The Transportation Conformity process ensures that federal roadway and highway projects comply with an area’s Transportation Improvement Plan in non-attainment or maintenance areas (i.e., this process evaluates all “on-road” activities).
- The General Conformity process ensures that projects that have “non-road” components (such as construction equipment, marine vessels, mining equipment, etc.) conform to the applicable SIP or Maintenance Plan for the area (i.e., this process evaluates all “non-road” equipment associated with the federal action).

Projects are considered to be in conformity when they do not: 1) cause or contribute to any new violation of the NAAQS, 2) increase the frequency or severity of any existing violation of the NAAQS, or 3) delay timely attainment of the NAAQS. If direct and indirect emissions from a federal action do not exceed the *de minimis* thresholds a General Conformity Determination is not required. Under the General Conformity Rule, the *de minimis* emissions level applicable to the two nonattainment areas on Guam is 100 tons per year (TPY) for SO₂.

Port Modernization Program Site

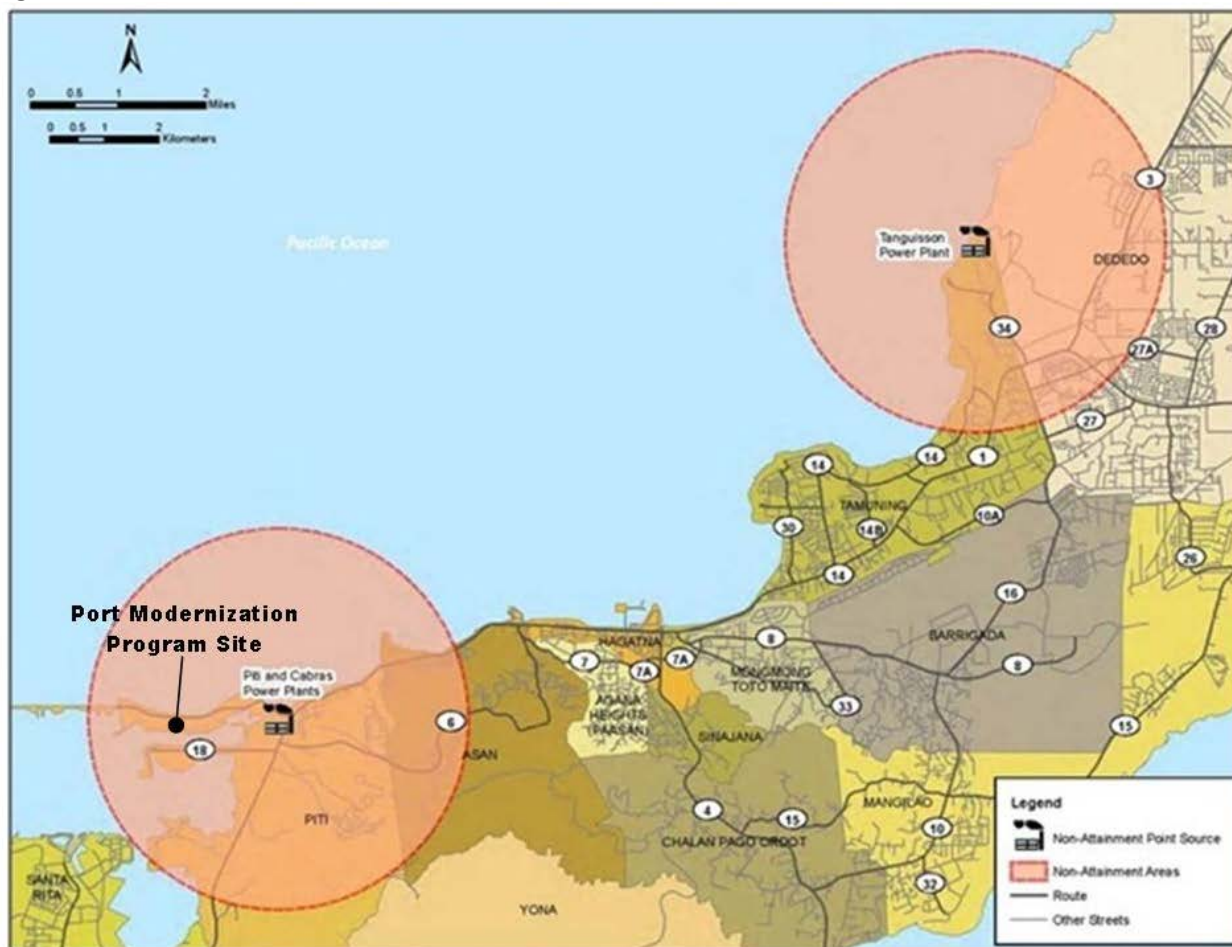
The Port Modernization Program site is in a designated non-attainment area for SO₂ (see **Figure 5.1.1-1**). The area is designated non-attainment for SO₂ as a result of monitored and modeled exceedences in the 1970s, primarily from the nearby Piti Power Plant. Since that time, changes have been made to this power generation facility. In accordance with 40 Code of Federal Regulations (CFR) Parts 80 and 86, the plant was rebuilt in the 1990s, upgrading its emission controls. Based on these improvements, Guam has submitted a redesignation request to USEPA for the Piti area. The pending redesignation request shows that the area around the Piti power plant is now in attainment. In addition, as the plant is located on the western side of the island and the trade winds blow persistently from east to west, the impact of the SO₂ emission on sensitive use areas on Guam is reduced. Mobile sources, such as marine vessels and vehicles, are also a minor contributor to SO₂ emissions.

On June 3, 2010, USEPA issued a new NAAQS for SO₂, setting the one-hour SO₂ primary standard at 75 ppb, a level designated to protect against short-term exposures ranging from five minutes to 24 hours. USEPA retained the 0.5 ppm 3-hour secondary standard but revoked the 1971 annual and 24-hour standards. However, the 1971 standards remain in effect for the Guam nonattainment areas until a new SIP is approved by EPA.

The primary contributors of SO₂ in the environment are from burning fossil fuels such as fuel oil like that used by power plants, gasoline used by vehicles and diesel fuel used by vehicles and non-road engines. One way that USEPA limits SO₂ emissions in the ambient air is to require the use of low sulfur fuels in power plants. It also requires the production and use of gasoline with a low sulfur content (termed “Tier 2 Standards”) and diesel fuel with low sulfur content. These requirements were promulgated as part of the Clean Air Act (CAA) (42 U.S.C. §7401 *et seq.*), and implemented in the CFR. These low sulfur fuels are readily available in the continental U.S. but not on U.S. Pacific Island Territories.

Although Guam is in nonattainment for SO₂ in the two areas around the Piti and Tanguisson Power Plants, USEPA has issued a waiver to Guam that conditionally and partially exempts Guam from the requirements to use low sulfur fuels in its power plants, and conditionally exempts fuel that is used island-wide in vehicles and vessels. In its decision to grant the partial waiver, USEPA cited both economic and environmental reasons for granting the waiver. Furthermore, the DoD is working with relevant stakeholders to establish and coordinate an island wide switch to ultra low sulfur diesel fuel (Joint Guam Program Office, July 2010a,b).

Figure 5.1.1-1, SO₂ Nonattainment Areas



Source: Parsons Brinckerhoff, 2011.

Stationary Source Permits

The CAA sets permit rules and emission standards for stationary pollution sources of certain sizes. An air permit application is submitted by the prospective owner or operator of an emitting source in order to obtain approval of the source construction permit. A construction permit generally specifies a time period within which the source must be constructed.

Permits should be reviewed for any modifications to the site or the air emissions sources to determine permit applicability. USEPA oversees the programs that grant stationary source operating permits (Title V) and new or modified major stationary source construction and operation permits. The New Source Review (NSR) program requires new major stationary sources or major modification of existing major stationary sources of pollutants to obtain permits before initiating construction. The New Source Performance Standards apply to sources emitting criteria pollutants, while the National Emission Standards for Hazardous Air Pollutants apply to sources emitting Hazardous Air Pollutants (HAPs).

HAPs, also known as toxic air pollutants, are chemicals that can cause adverse effects to human health or the environment. The CAA directed USEPA to set standards for all major sources of air toxics. USEPA established a list of 188 HAPs that includes substances that cause cancer, neurological, respiratory, and

reproductive effects. The Title V major source thresholds for pollutant emissions that are applicable to Guam are:

- 100 tons per year (TPY) for any criteria pollutant
- 25 TPY total HAPs
- 10 TPY for any one HAP

USEPA also established Prevention of Significant Deterioration (PSD) regulations to ensure that air quality in attainment areas does not significantly deteriorate as a result of construction and operation of major stationary sources, and to allow future industrial growth to occur. A typical major PSD source is classified as anything with the potential to emit 250 TPY of any regulated pollutant in an attainment area.

However, for several types of major source operations, including fossil fuel-fired steam electric plants of more than 250 million British Thermal Units (Btu) per hour heat input, 100 TPY is the major PSD source threshold.

Guam has adopted the USEPA-established stationary source regulations discussed previously and acts as the administrator to enforce stationary source air pollution control regulations in Guam.

Since Guam has two nonattainment areas for the SO₂ NAAQS, major new sources or major modifications to existing major sources located in nonattainment areas must meet the more stringent nonattainment NSR requirements. Neither the proposed action, nor the alternative involve stationary sources expected to have annual emissions exceeding 250 or 100 tpy of attainment pollutants, and are therefore not considered major stationary sources and do not fall under the permitting requirements discussed here (see **Section 5.1.1.3**).

Key Definitions

The following key definitions apply to the descriptions and analysis in this section:

- *Attainment Area* – A status of “attainment” for a given pollutant indicates that the air quality in an area complies with the NAAQS for that pollutant.
- *Non-attainment Area* – A status of “non-attainment” for a given pollutant indicates that the air quality in an area does not comply with the NAAQS for that pollutant.
- *State Implementation Plan (SIP)* – A plan that is developed and implemented to reduce ambient pollutant concentrations below the NAAQS in a non-attainment area and to bring the area back into attainment with the NAAQS.
- *Maintenance Area* – Areas that were formerly non-attainment areas but were redesignated as attainment areas within the previous 10 years and are covered by a maintenance plan to ensure continued attainment with the NAAQS.
- *Conformity* – All federal actions exceeding the *de minimis* levels in non-attainment areas require a Conformity Determination to ensure that such actions taken by federal agencies conform to the applicable SIP.

Methods and Study Area

Following is a description of the methods used for the air quality analysis in this Environmental Assessment (EA).

The air quality analysis associated with the operational phase of the Proposed Action is directly related to the amount of vehicular traffic and the associated number of marine vessels processed at the facility. The Port, in collaboration with the Joint Guam Program Office, has forecasted marine vessel operations data through 2027 that includes both vessel trips associated with projected Port commercial growth and vessel trips associated with the Guam Military Relocation Program, as described in **Section 3.3.2, Forecasted Operations**.

As described in **Section 2.2.2**, in September 2010 the *Guam and CNMI Military Relocation: Relocating Marines from Okinawa, Visiting Aircraft Carrier Berthing, and Army Air and Missile Defense Task Force Record of Decision (ROD)* was issued by the Joint Guam Program Office. This ROD (and the supporting EIS and Addendum) provided analysis of potential impacts that would result from the proposed military relocation from Okinawa, Japan, to the island of Guam (Guam Military Relocation Program). The Guam Military Relocation Program Environmental Impact Statement (EIS) included a comprehensive air quality analysis for Guam, including the Apra Harbor region where the Port is located. Data from this recent analysis was used as a baseline and as a basis of comparison to determine the potential for impacts associated with the Port Modernization Program, including:

- Information regarding existing air quality conditions on Guam and in Apra Harbor area (Joint Military Program Office, *Guam and CNMI Military Relocation EIS*, July 2010, Volume 2, Section 5).
- Data from the *Guam Military Relocation EIS* regarding environmental consequences associated with Guam Military Relocation Program construction and operation and general background growth (Joint Military Program Office, *Guam and Commonwealth of the Northern Marianas Islands (CNMI) Military Relocation EIS*, July 2010, Volume 6, Section 7). The air quality analysis of environmental consequences in the Guam Military Relocation EIS included assumptions relevant to the Port Modernization Program, as described in detail in **Section 5.1.1.3**.
- A qualitative discussion of construction-related air quality impacts associated with the Port Modernization Program as compared to the project peak associated with the Guam Military Relocation Program (Joint Military Program Office, *Guam and Commonwealth of the Northern Marianas Islands (CNMI) Military Relocation EIS*, July 2010, Volume 6, Section 7).

5.1.1.2 Affected Environment

This section describes the existing air quality conditions on and in the vicinity of the Port Modernization Program site.

Existing On-Site Emission Sources

Air pollutant emissions on the Port Modernization Program site associated with existing and planned new operations are from on-road and non-road sources. On-road source pollutant emissions include, but are not limited to PM₁₀, PM_{2.5}, NO_x, CO, and SO₂ from vehicles such as cars and trucks. Non-road sources of emissions on the Port Modernization Program site include, but are not limited to PM₁₀, PM_{2.5},

NO_x, CO, and SO₂ from sources such as marine vessels, cargo handling equipment and heavy duty vehicles.

Existing Emission Sources in the Vicinity

Stationary sources of emissions in the vicinity of the Port Modernization Program site include the Piti Power Generation Plant located less than 0.5 miles to the east. This power plant has two large (45.2 megawatt) slow speed diesel generators. This power generation plant has a Title V permit. The existing permitted annual emissions for the Piti Power Generation Plant are shown in **Table 5.1.1-2**.

Table 5.1.1-2, Piti Power Station Existing Permitted Annual Emissions (Tons Per Year)

SO ₂	CO	PM ₁₀	NO _x	VOC
17,577.5	1,140.6	1,364.0	12,341.8	877.8

Source: *Guam and CNMI Military Relocation Final EIS, July 2010.*

Other sources of emissions in the vicinity include the Naval Base Guam facility located southwest of the site across Apra Harbor.

Existing Air Quality Conditions

The local government of Guam has not collected ambient air quality data since 1991. Therefore, no existing ambient air quality data are available that reflect current air quality conditions with respect to NAAQS.

Historical data are available from 1972 through 1991, when ambient air quality data were collected at a number of sites through a USEPA-sponsored monitoring program. The monitored pollutants were total suspended particulate (TSP), SO₂, NO₂, and NO_x. In 1991, PM₁₀ was monitored in addition to total suspended particles. As indicated earlier, the Port Modernization Program site is located in an area designated non-attainment for SO₂; the site area is considered an attainment area for all other criteria pollutants.

In 1999, the Guam Power Authority (GPA) established a network of five stations to measure SO₂ for one year, from the fall of 1999 through the summer of 2000. None of these monitors were placed close to a major stationary source and the observed SO₂ concentrations at these stations were all far below the 24-hour SO₂ NAAQS.

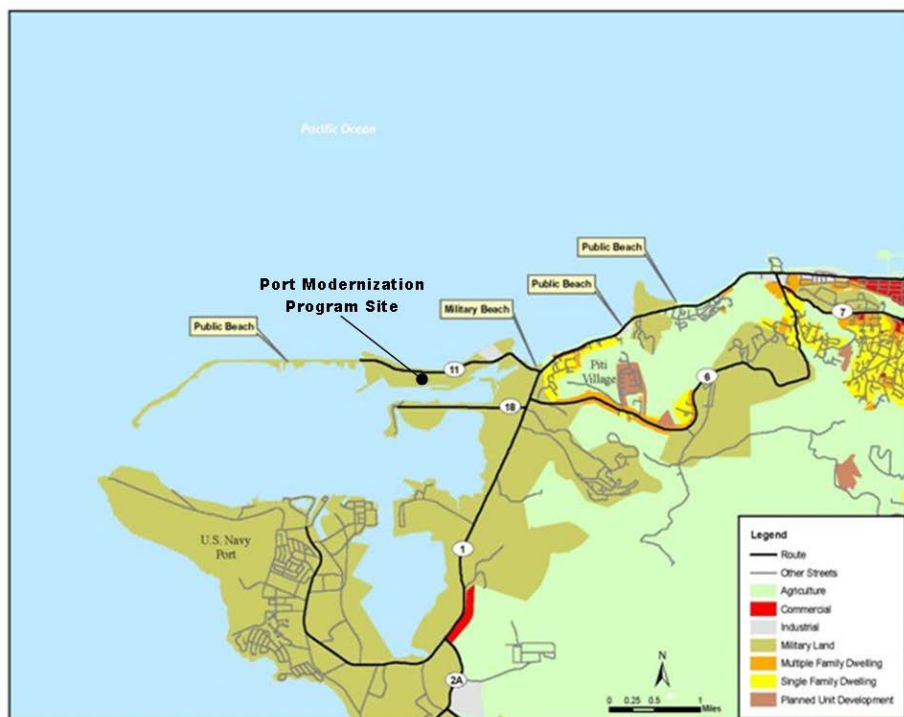
Because of the lack of ambient monitoring data, the existing air quality conditions on Guam cannot be evaluated by a direct comparison of the ambient pollutant concentration levels with the NAAQS. Instead, the existing air quality conditions around the site were based on a summary of major emission sources.

In an effort to improve air quality and reduce emissions including SO₂, the government of Guam (in collaboration with other stakeholders such as the USEPA, DoD, GEPA, and GPA) is currently working on a plan to implement an island-wide transition from high sulfur fuels to ultra-low sulfur diesel. The target date for the transition is December 2012.

Sensitive Land Uses

As stated in the Regulatory Framework discussion in **Section 5.1.1.1**, public land uses protected by NAAQS are typically residences, hospitals, libraries, churches, parks, playgrounds and schools. No such land uses are located on the Port Modernization Program site. The nearest sensitive land uses (i.e., land uses that are sensitive to air pollutants) to the Port are a military beach, located approximately 0.5-mile east of the Port, and residences in Piti Village, located approximately 0.75-mile east of the Port (see **Figure 5.1.1-2**). There also are three public beaches that are located approximately 1.5 and 2.25 miles northeast of the Port, and 1.25 miles west of the Port.

Figure 5.1.1-2, Sensitive Land Uses



Source: Parsons Brinckerhoff, 2011.

Climate

The climate of Guam is almost uniformly warm and humid throughout the year. Afternoon temperatures are typically in the middle or high 80s (Fahrenheit) and nighttime temperatures typically fall to the low 70s or high 60s. Relative humidity commonly ranges from about 65 to 75 percent in the afternoon, to 85 to 100 percent at night.

The dominant winds on Guam are trade winds that blow from the east or northeast. The trade winds are strongest and most constant during the dry season (January to April), when wind speeds average 15 to 25 miles per hour. During the rainy season (mid-July to mid-November), the trade winds often subside. The weather may be dominated by westerly moving storm systems that bring heavy showers or steady, and sometimes torrential, rain.

5.1.1.3 Environmental Consequences

This section describes potential environmental consequences to air emissions during construction and operation of the proposed Port Modernization Program under the Proposed Action and Alternatives. Construction and operational activities associated with the Proposed Action and Alternatives are not anticipated to result in significant air quality impacts.

Evaluation Criteria

The environmental consequences on local and regional air quality conditions near a proposed action are determined based upon the increases in regulated pollutant emissions relative to existing conditions and ambient air quality. Specifically, effects on air quality in NAAQS non-attainment areas would be considered significant if the net increases in pollutant emissions from the Proposed Action resulted in any one of the following scenarios:

- Cause or contribute to a new violation of any national or state ambient air quality standard;
- Increase the frequency or severity of existing violations;
- Expose sensitive receptors to substantially increased pollutant concentrations; or,
- Exceed any evaluation criteria established by a SIP.

Proposed Action

As stated previously, the air quality impacts associated with the Proposed Action are directly related to the amount of vehicular traffic and the number of marine vessels processed at the Port. The *Guam Military Relocation EIS* analysis included assumed vehicular traffic associated with the Port's forecasted vessel traffic including both Guam Military Relocation Program-related vessels as well as other commercial vessel traffic forecasts provided by the Port.

Since the construction materials for the Guam Military Relocation and the associated growth in goods would arrive in Guam via the port prior to distribution throughout the island, data from the *Guam Military Relocation EIS* analysis included assumptions relevant to the construction and operation of the Port Modernization Program, including:

- Construction materials for development of the Guam Military Relocation Program would arrive at the Port of Guam via marine vessels during the buildup period (2012-2016). After arrival at the Port of Guam via marine vessels, construction materials would be conveyed via truck to construction sites in different areas of the island. The air quality analysis included assumptions for Guam Military Relocation Program construction traffic from the Port site on Route 11 to other areas of the island where the Guam Military Relocation Program construction activities would occur (Joint Military Program Office, *Guam and Commonwealth of the Northern Marianas Islands (CNMI) Military Relocation EIS*, July 2010, Volume 6, Section 7).
- The increases in population associated with Guam Military Relocation Program and anticipated general population growth would increase the amount of goods imported to the island (i.e., household goods, cars) during and subsequent to the buildup period (2012-2016). The goods would be imported to the island via marine vessel at the Port of Guam and transported to other parts of the island via truck. The Guam Military Relocation Program EIS marine traffic analysis included assumptions for emissions from assumed vessel traffic associated with imports of

goods to the island (Joint Military Program Office, *Guam and CNMI Military Relocation EIS*, July 2010, Volume 2, Section 14).

- The Guam Military Relocation Program EIS analysis included assumptions for general air quality conditions based on projected increases in population (Joint Military Program Office, *Guam and CNMI Military Relocation EIS*, July 2010, Volume 7, Section 4).

In the Guam Military Relocation Program EIS, the Port Modernization Program project was noted to be anticipated to result in a beneficial effect on air quality by increasing throughput efficiencies and reducing vehicular idling times. Further, the Guam Military Relocation Program EIS concluded that the Guam Military Relocation Program in addition to all known reasonably foreseeable projects on the island (including the Port Modernization Program project) would have an adverse cumulative impact when combined with the past, present, and reasonably foreseeable actions on Guam identified above but the impact would be less than significant. The degree of additive impact resulting from the Guam Military Relocation Program was considered to be low and would not appreciably impact the trend of improving air quality on Guam over time.

Construction Effects

The Proposed Action would result in on-going, phased construction activities over the buildout period. As described below, construction emissions for the Proposed Action would generally include on-road emissions, non-road emissions and marine vessel emissions.

- On-road emissions associated with proposed construction activities would generally include transit related activities consisting of vehicles bringing materials to and from the site and transporting materials within the site. The majority of construction material trips to the site are assumed to be via marine vessel or barge.
- Non-road emissions would include construction equipment such as bulldozers, backhoes, cranes excavators, dump trucks, pavers, and mobile generators.
- Marine vessel emissions associated with proposed construction activities would generally include vessels bringing materials and equipment to and from the site.

Construction activities would result in soil disturbance, dust, emissions from equipment and vehicles and emissions from marine vessels would create a temporary additional burden in the local airshed. Air pollutants generated by construction of the Proposed Action would primarily include fugitive dust (PM₁₀) from ground disturbance activities, and PM_{2.5}, CO, NO_x and SO₂ from combustion of fossil fuels.

An air emissions analysis of the direct, construction related activities was conducted for the Proposed Action (see **Appendix M**). Construction activities will occur in calendar years 2013 and 2014. Estimates of the actual amounts of criteria pollutants emissions associated with construction activities was based on the type, quantity and use of construction equipment to be involved in the Proposed Action. The total operating hours for each piece of equipment required were calculated based on 8 hours per day and 5 days per week working schedule. The calculated operating hour data were used with criteria pollutants emissions factors and equipment loading factors provided in the *Non-road Engine and Vehicle Emissions Study Report* developed by EPA.

The estimated annual emissions due to construction equipment for the Proposed Action are provided in **Table 5.1.1-3**.

Table 5.1.1-3: Construction Equipment Annual Emissions

CY	Construction Equipment Emissions Inventory (tons per year)					
	CO	VOC	NO _x	SO _x	PM ₁₀	PM _{2.5}
2013	43.2	7.71	64.8	5.54	7.56	7.56
2014	21.5	3.87	32.6	2.79	3.79	3.79
<i>de minimis</i> level	100	100	100	100	100	100

Source: EA Engineering, 2012.

Activities related to the construction of the Proposed Action would cause short-term, minor adverse impacts to air quality. Maximum annual estimated emissions of carbon monoxide, volatile organic compounds, nitrogen oxides, particulate matter, and fine particulate matter precursor pollutants from the construction will be less than the relevant General Conformity *de minimis* thresholds. Thus, no further analysis is necessary to demonstrate that the project conforms to the applicable SIP.

Considering the temporary nature of construction emissions, the transient nature of emission sources and measures identified to reduce dust and vehicle/equipment emissions, and distance between the site and the closest sensitive land uses, significant air quality impacts associated with construction would not be anticipated.

Operational Effects

Operations on the Port Modernization Program site after construction of the Proposed Action would result in activities similar to existing conditions including on-road emissions (such as cars and trucks) and non-road sources of emissions (such as marine vessels, cargo handling equipment and heavy duty vehicles).

As indicated in **Section 5.3.1**, the traffic volumes on Route 11 which serves the Port would be reduced over existing conditions (from 9,100 vehicles per day (VPD) to 8,900 VPD) after the completion of the Guam Military Relocation Program which would generate temporary increases in traffic (and emissions) on Route 11 during construction. Vehicular traffic generated from general Port operations (minus the Guam Military Relocation Program-related traffic) would only anticipate minimal increases over existing conditions.

The Proposed Action would increase cargo handling efficiency decreasing the time needed to move cargo through the Port. New entrance and exit gates would decrease truck idling times and increase inbound and outbound truck processing efficiencies. Improved cargo handling times, decreased truck idling times, and increased inbound and outbound processing efficiencies would decrease truck queuing and reduce emissions as compared to existing conditions.

Because the Proposed Action represents a continuation and modernization of existing Port uses, and proposed improvements are intended (in part) to improve operations (including reduction in idling truck emissions) only minimal increases in air quality emissions over existing conditions are anticipated. No significant air quality impacts to sensitive uses are anticipated due to the minimal increases in area emissions and the distance from the Port Modernization Program site to nearby sensitive land uses.

Conformity Compliance

Given that the Proposed Action represents a continuation and modernization of existing Port uses, and proposed improvements are intended (in part) to improve existing queuing conditions (and associated truck idling emissions) and inefficient equipment, proposed modernization of Port operations would not cause or exacerbate an exceedance of the applicable SO₂ NAAQS. Due to the improvements associated with the Proposed Action and Alternatives, indirect (operational phase) emissions will be lower than with the No-Action Alternative, and calculated direct (construction phase) emissions will be below the General Conformity *de minimis* thresholds. As such, the Proposed Action would comply with the USEPA General Conformity Rule.

Alternative 1

Construction and operational environmental consequences related to air quality under Alternative 1 would generally be similar to those described for the Proposed Action.

Under Alternative 1, Port operations would not be reconfigured and a new terminal gate complex would not be constructed; therefore, improvements to traffic queuing and the associated air quality benefits on the site realized under the Proposed Action would not occur under Alternative 1.

No Action

Under the No Action Alternative, traffic conditions would be similar to existing conditions and no new air quality environmental consequences would be anticipated. Onsite improvements to traffic queuing and the associated air quality benefits realized under the Proposed Action would not occur.

5.1.1.4 Mitigation Measures

The following mitigation measures are proposed by the Proponent to address potential air quality impacts to during construction of the Proposed Action:

During Construction

- Construction activities at the Port Modernization Program site would be conducted consistent with best management practices related to control of construction equipment emissions and fugitive dust.
- The Port could implement a construction traffic plan for workers and truck deliveries to minimize disruption to traffic flow and increases in queuing (and associated vehicle idling emissions) for existing tenants of the port. This plan could consider the need for special signage, flaggers and parking for construction workers.
- The Port in conjunction with the DoD could implement adaptive program management (APM), which will likely have an offsetting effect in slowing the construction pace and the movement of military construction material through the Port, further reducing impacts to air quality.

5.1.2 Noise

This section describes existing noise conditions on and in the vicinity of the Port Modernization Program site. Potential environmental consequences to existing noise conditions associated with construction and operation of the proposed Port Modernization Program are analyzed.

5.1.2.1 Introduction

Regulatory Framework

Federal and Guam regulations regarding noise that would apply to the Port Modernization Program are described in this section. Common noise descriptors (such as L_{eq}) are defined in the key definitions section that follows.

- *Construction Noise* – There are no local requirements for construction noise that would apply to the proposed construction activities. Construction noise is typically confined within the project boundary, occurs during daylight hours and is only present during the period of construction.
- *Operational Noise* – For purposes of this analysis, USEPA guidance is used. An exterior noise L_{dn} (day-night noise level) of 65 A-weighted decibels (dBA) is the noise impact threshold above which adverse effects on sensitive receivers (see the next section for a definition of sensitive receivers) are expected to occur, as defined by the USEPA. Sensitive land uses which receive noise below the 65 dBA L_{dn} are considered to be not adversely impacted by noise.
- *Traffic Noise* – For purposes of this analysis, Guam Department of Public Works (GDPW) policy, which is based on Federal Highway Administration (FHWA) guidance is used. Under GDPW policy, loudest hourly noise level L_{eq} standards are established for traffic noise relative to land use activity categories, as summarized in **Table 5.1.2-1**.

Table 5.1.2-1, Activity Categories and Noise Abatement Criteria

Category	L_{eq} dBA	Description of Activity Category
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, places of worship, libraries, and hospitals.
C	72 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	--	Undeveloped lands
E	52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Source: Joint Guam Program Office, 2010a. Volume 6, Section 8

Key Definitions

The following definitions apply to the descriptions and analysis in this section. Noise is defined as unwanted sound. Exposure to high levels of noise over an extended period can cause health hazards, such as hearing loss and loss of sleep. The most common human response to environmental noise is

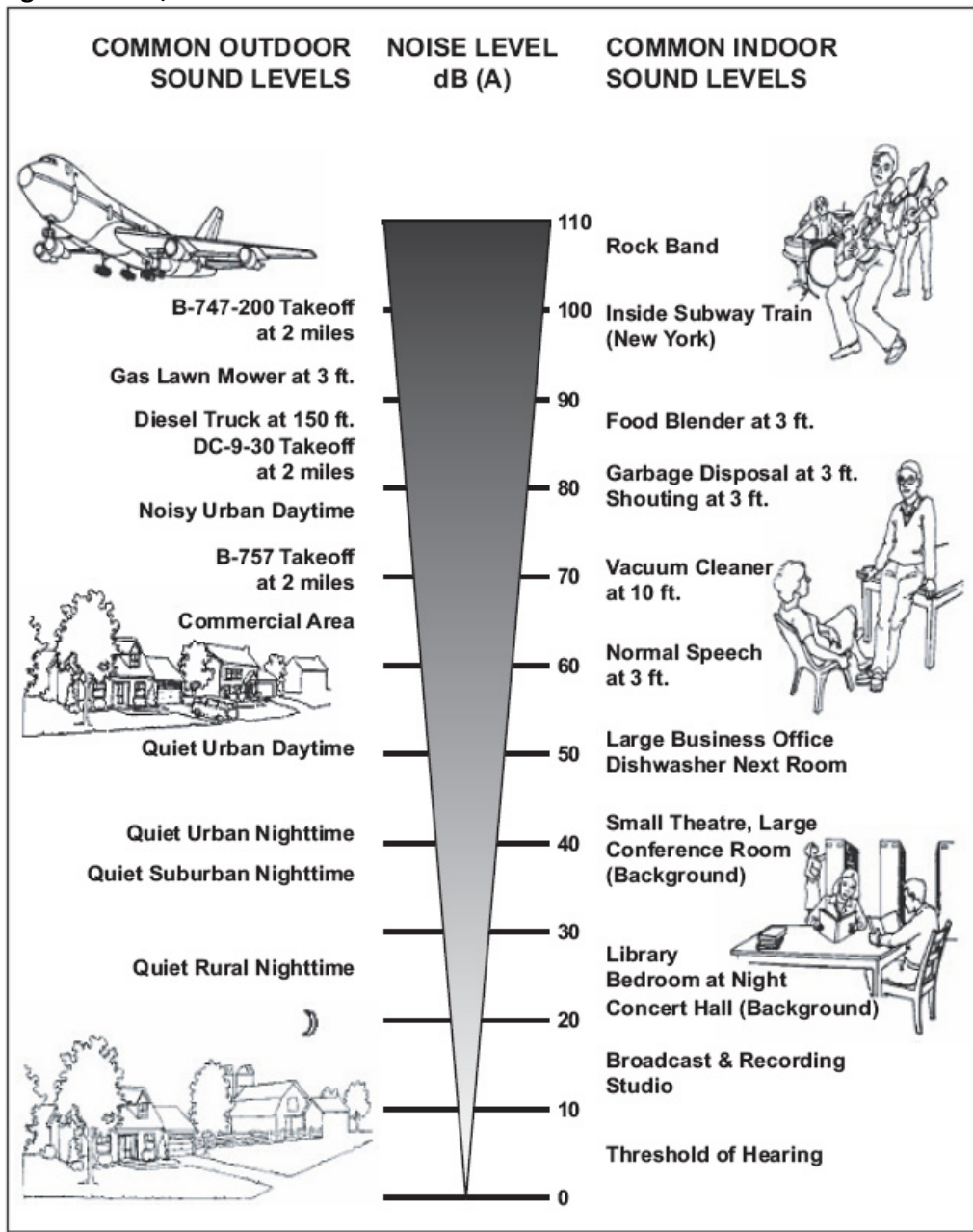
annoyance. How an individual responds to the sound source will determine if the sound is viewed as annoying noise.

In assessing the impact of noise upon the environment, the nature and level of activities that generate the noise, the pathway through which the noise travels, the sensitivity of the receptor, the period of exposure and the increase over ambient noise levels are all considered. Sensitive receptors to noise can be specific (i.e., schools, parks or hospitals) or broad (i.e., nature preserves or designated districts) areas in which occasional or persistent sensitivity to noise above ambient levels exists.

Noise is measured with instruments that record instantaneous sound levels in decibels (dB). Sound level descriptors are ways of measuring and describing noise, including factors that account for sound duration, magnitude, frequency and pitch. Following are the most common sound level descriptors.

- *dB* – Sound is measured in decibels (dB), a logarithmic ratio between pressures caused by a given sound spectrum.
- *dBA* – Environmental noise is measured as “A-weighted” sound level in decibels, symbolized as dBA. The A-weighted scale represents noise using the scale that corresponds closest to the range and characteristics of the human ear. People generally cannot detect a change of 1 to 3 dBA. A change of 5 dBA in a given noise source or environment is likely to be perceived by most people under normal listening conditions. A 10 dBA increase in level appears to double the loudness, while a 10 dBA decrease halves the apparent loudness. **Figure 5.1.2-1** identifies sound levels of typical noise sources and activities in dBA.
- *L_{eq}* – Equivalent sound level (*L_{eq}*) is a common descriptor for measuring fluctuating sounds, such as traffic.
- *L_{dn}* – Day-night sound level (*L_{dn}*) is a descriptor that averages all events over a full 24-hour period and is measured in decibels (dBA). Events occurring between 10:00pm and 7:00am are increased by 10 dBA to account for greater sensitivity to noise.
- *L_{max}* – Maximum sound level is the highest A-weighted integrated sound level measured during a single event in which the sound level changes value with time (e.g. an aircraft overflight).

Figure 5.1.2-1, Common Noise Levels



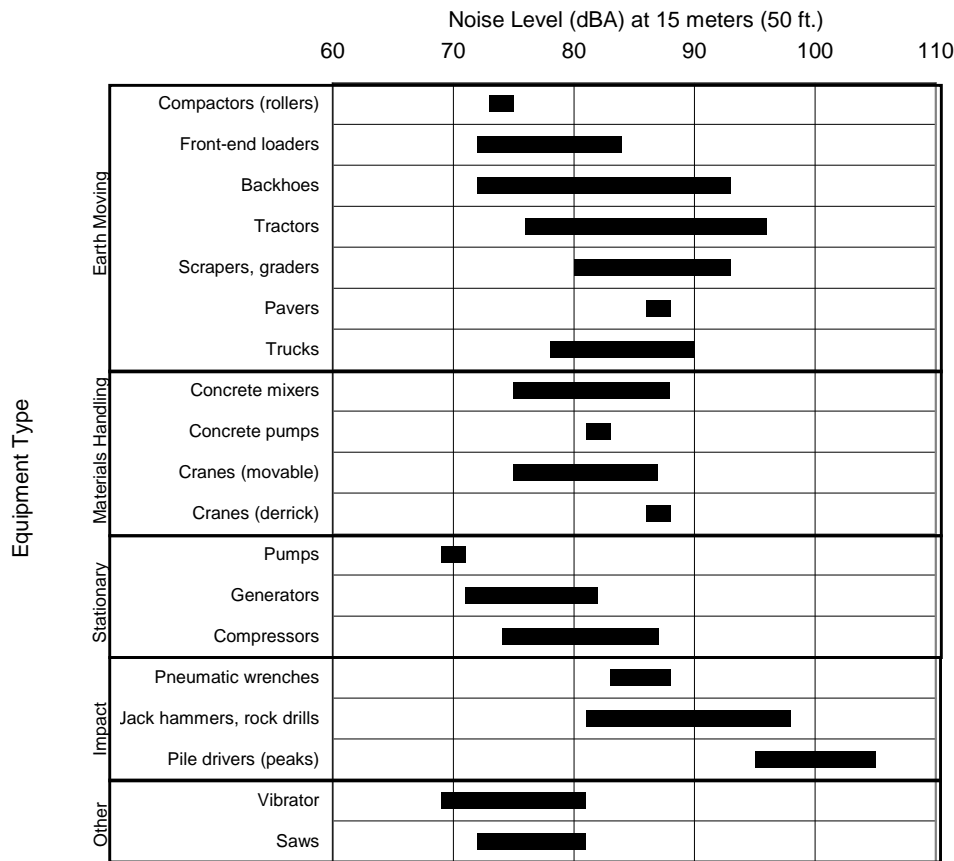
Sources: Landrum and Brown, 2002.

Noise attenuation is logarithmic rather than linear. For example, a doubling of traffic volumes will result in a 3 dBA increase in traffic-dominated noise environments. For line sources, such as streets, noise levels decrease by 3 to 5 dBA for every doubling of distance from the source. For point sources, noise levels decrease more rapidly at approximately 6 dBA for every doubling of distance from the source. Topography, existing structures, foliage and the type of ground cover (paved or vegetated) on the site also play a role in noise attenuation characteristics. Anthropogenic structures (like buildings) or naturally occurring topographic features (such as hills and berms) can reduce noise by physically blocking the sound transmission when located between the noise source and receiver. Foliage, if dense, can provide slight reductions in noise levels. The type of ground cover between the receiver and the

noise source can have a significant effect on noise transmission. For example, sound will travel very well across reflective surfaces such as water and pavement, but can be attenuated when the ground cover is field grass, lawns, or even loose soil.

Construction noise is generated by the use of heavy equipment on job sites. Construction noise is typically short-term and occurs intermittently during daytime hours. **Figure 5.1.2-2** illustrates typical construction equipment noise levels at 50 feet from the source. This equipment typically exceeds the ambient sound levels at 50 feet from the source by 20 to 25 dBA in an urban or industrial environment and up to 30 to 35 dBA in a quiet suburban area.

Figure 5.1.2-2, Typical Construction Noise Levels at 50 feet from the Source



Source: USEPA, 1971.

Methods and Study Area

Following is a description of the methods used for the noise analysis in this EA.

Existing noise levels at the Port Modernization Program site were established by taking noise level measurements. Noise levels were measured at three Port locations on August 18 and 19, 2009 by staff at Parsons Brinckerhoff to assess existing noise conditions at the Port. Noise levels on the Port Modernization Program site would be higher than noise levels at offsite locations (and represent worst-case results) because the monitoring sites are closer to the noise sources. Noise monitoring results are provided in **Section 5.1.2.2**.

Projected noise effects were qualitatively evaluated for the Proposed Action and Alternatives based on projected vehicular and vessel traffic (see **Section 5.3.1**, for additional information regarding traffic).

5.1.2.2 Affected Environment

This section describes the existing noise conditions on and in the vicinity of the Port Modernization Program site.

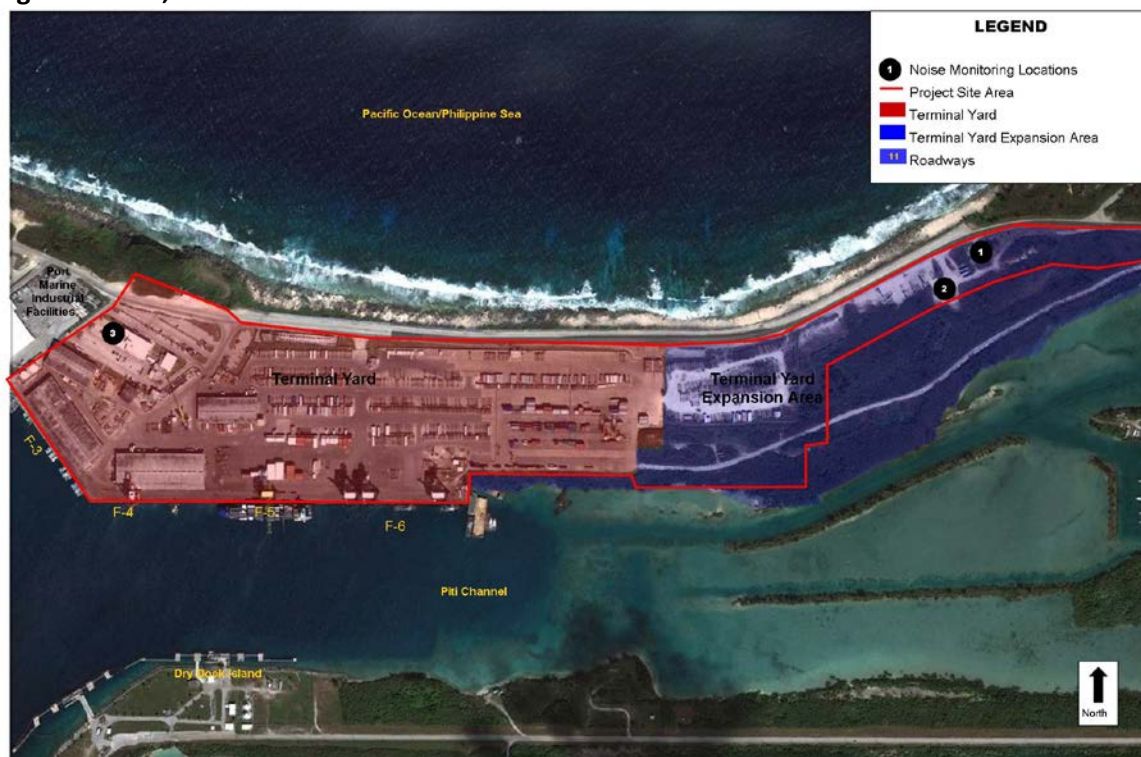
On-site Noise Conditions

The existing noise environment on the Port Modernization Program site is consistent with that of an industrial marine port, and generally includes noise from unloading/loading of vessels; crane operations; cargo ship engines/generators; truck traffic; equipment back-up alarms; and, idling trucks queuing along Route 11. Noise levels also include instantaneous noise events (e.g. clangs and bangs from a dropped container or hatch cover) that are short in duration. These instantaneous noise events often produce noise levels that are audible; however, they occur over a short duration.

As stated previously, noise levels were measured at three Port locations on August 18 and 19, 2009 (Parsons Brinckerhoff, 2011), to assess existing noise conditions at the Port. Noise measurement locations are shown in **Figure 5.1.2-3** and a summary of measurement activities at each of the locations follows:

- *Measurement Site 1 (Unitek Hazardous Waste Management Station)* – A short-term 20-minute noise measurement and a 24-hour noise measurement were taken at a hazardous waste management station in the northeast corner of the Port Modernization Program site. The measurements were taken approximately 75 feet from Route 11. Noise from Port activities (cranes, ship engines, truck traffic, etc.) and non-Port sources were observed during the noise measurements. Non-Port noise sources included the nearby power plants and waves crashing at a nearby beach.
- *Measurement Site 2 (Vegetated Site)* – A short-term 20-minute measurement was taken off of Route 11 at an opening in the vegetation approximately 350 feet west of Measurement Site 1. The area is used for temporary truck and equipment storage. The sound level meter was placed approximately 200 feet from Route 11. Noise from Port activities and non-Port sources were observed during the noise measurements. Non-Port noise sources included wind, nearby power plants, and waves crashing at a nearby beach.
- *Measurement Site 3 (Port Administrative Offices)* – A short-term 20-minute noise measurement was conducted in a grassy area near the Port Administrative Offices. This location was chosen, because it is used by Port employees during breaks. Noise from Port activities (cranes, air conditioning unit, trucks on Route 11 and within the Port), and automobiles in the parking lot adjacent to the Port Administrative Offices, were recorded during the measurements.

Figure 5.1.2-3, Noise Measurement Locations



Source: EA Engineering, Science, and Technology, 2012 and Parsons Brinckerhoff, 2011.

Noise levels recorded at the three measurement locations are presented in **Table 5.1.2-2**.

Table 5.1.2-2, Summary of Measured Existing Noise Levels at the Port of Guam

Site #	Land Use	8-Hour Day- and Nighttime Noise Criteria L_{eq}^1	Approximate Distance from Route 11 (feet)	Date	Time	L_{eq}	Est L_{dn}
1	Industrial	65	75	8/19/09	9:45 AM	59.6	61
2	Industrial	65	200	8/18/09	4:45 PM	50.4	52
3	Industrial	65	115	8/18/09	5:19 PM	60.6	62

Source: Parsons Brinckerhoff, 2011.

Note 1: An exterior noise L_{dn} (day-night noise level) of 65 dBA is the noise impact threshold above which adverse effects on sensitive receivers are expected to occur, as defined by the USEPA.

Off-site Noise Conditions

The existing noise environment in the vicinity of the Port Modernization Program site is typical of an industrial area. The sources of noise in the vicinity include: traffic noise from Route 11 and Route 1; cargo and military vessels in Apra Harbor; operations of the adjacent power plants, located approximately 1,500 and 1,800 feet east from the site, respectively; and, operations noise from Navy Base Guam, located approximately 1.2 miles to the southwest, including aircraft activity and weapons training.

Sensitive Land Uses

The definition of a noise sensitive receiver is any property where frequent exterior human use occurs and where an increase in noise levels could create environmental consequences. No sensitive land uses are located onsite or in the immediate vicinity of the site. The nearest sensitive land uses to the Port Modernization Program site boundary are:

- *Military Beach* – approximately 0.5 mile east of the site;
- *Pedro Santos Park* – approximately 0.65 mile east of the site;
- *Hoover Park* – approximately 0.65 mile southeast of the site; and,
- *Family Beach* – 1.25 miles west of the site.

The nearest residential uses are located in the Village of Piti (approximately 0.71 mile from the site) and Lockwood Terrace military housing at Naval Base Guam (approximately 2.04 miles southwest from the site).

5.1.2.3 Environmental Consequences

This section describes potential environmental consequences to the noise environment during construction and operation of the proposed Port Modernization Program under the Proposed Action and Alternatives. Noise generated from the Proposed Action and Alternatives would be consistent in character to existing noise and would not be anticipated to result in new significant noise impacts, as described in this section.

Evaluation Criteria

Noise impact analyses typically evaluate potential changes to the existing noise environment (i.e. adding a new type of land use or increase in the level of noise from expansion of current land uses) that would result from implementation of a project that increase annoyance or affect human health. Annoyance is a subjective impression of noise. Effects would be adverse if noise exposure is anticipated to be increased to unacceptable noise levels near sensitive uses. Projected noise effects were evaluated qualitatively for the Proposed Action and Alternatives.

Proposed Action

Construction Effects

Construction Activities – During construction of the Proposed Action, noise levels would increase from existing conditions as a result of construction-related activities including trucks and construction vehicles, construction equipment, building demolition and renovation, pile driving, excavation, paving, and installation of utilities. Noise generated by construction activity would move to different locations on the site in accordance with various projects and would vary depending on the type of construction equipment and the operation being performed. These construction-related noise impacts would be short-term in duration and intermittent in occurrence over the 2012-2016 build-out period.

As stated in **Section 5.1.2.2**, the closest sensitive land use is over 0.5 miles from the Port Modernization Program site boundary. **Table 5.1.2-1** shows L_{max} (maximum dBA) noise levels associated with construction equipment at 50 feet. Point sources of noise, such as construction equipment, create noise levels that dissipate 6 dBA with every doubling of distance. For example, pile drivers emit the loudest

noise levels at between 95-100 dBA L_{max} at 50 feet from the source. Since noise dissipates at 6 dBA with every doubling of distance, noise from the pile driving activities would be approximately 59-69 dBA L_{max} at the closest sensitive receiver, the Military Beach located approximately 2,600 feet away. Therefore, noise generated from construction activities associated with the Proposed Action would not be anticipated to result in significant impact on sensitive receivers in the vicinity of the site.

Construction Traffic – As discussed in **Section 5.3.1**, Traffic, construction activities associated with the Proposed Action would generate additional vehicular trips on Route 11, which would result in increased traffic noise along the roadway to the entrance of the Port. No sensitive receivers are located along Route 11 between the Route 1/11 intersection and the entrance to the Port. Family Beach, a recreational area, is located along Route 11 approximately 1.2 miles west of the entrance to the Port. Increases in construction traffic noise would not be anticipated to be noticeable at Family Beach due to the distance between the entrance to the Port and the site. No other sensitive receivers are located in the vicinity of the site near Route 11. Therefore, noise generated from construction traffic associated with the Proposed Action would not be anticipated to result in significant impact on sensitive receivers in the vicinity of the site.

Operational Effects

Operational Activities – During operations of the Proposed Action (after the completion of construction activities), noise levels and the character of the noise from Port operations would be similar to existing conditions, and would include unloading/loading of vessels; crane operations; equipment back-up alarms; and, cargo ship engines/generators.

As stated in **Section 5.1.2.2**, the closest sensitive land use is over 0.5 miles from the Port Modernization Program site boundary; therefore, operational noise levels would be anticipated to be similar to existing conditions with the proposed modernization (L_{dn} dBA ranges between 52-62 on the Port Modernization Program site) and would be well below USEPA threshold levels (of 65 L_{dn} dBA) for operational activities before reaching the nearest sensitive uses over 0.5 miles away. Therefore, noise generated from operational activities associated with the Proposed Action would not be anticipated to result in significant impact on sensitive receivers in the vicinity of the site.

Operational Traffic – As discussed in **Section 5.3.1**, Traffic, operation activities associated with the Proposed Action would generate additional vehicular trips on Route 11 resulting in increases in traffic noise. As discussed in **Section 5.3.1**, the number of vehicles per day on Route 11 would be anticipated to increase from 9,100 vehicles per day (VPD) under existing conditions to 14,000 VPD during the peak of the Guam Military Relocation Program and then level off to approximately 8,900 VPD in 2030 (an improvement over existing conditions). As described in **Section 5.1.2.1**, a doubling of traffic volumes (or a 100 percent increase) would result in a 3 dBA increase in the noise environment, which is generally not perceptible to the human ear; therefore, the anticipated increases in traffic on Route 11 would not be anticipated to generate significant changes to the noise environment at the closest sensitive receivers located over 0.5 miles away from the site. Therefore, noise generated from operational traffic associated with the Proposed Action would not be anticipated to result in significant impact on sensitive receivers in the vicinity of the site.

Under the Proposed Action, Port operations would be reconfigured to maximize efficiency and a new terminal gate complex would be constructed to improve traffic queuing. Under this Alternative, existing noise associated with idling trucks along Route 11 would be reduced.

Alternative 1

Construction and operational noise environmental consequences associated with Alternative 1 would generally be similar to those described for the Proposed Action.

Under Alternative 1, Port operations would not be reconfigured and a new terminal gate complex would not be constructed; therefore, improvements to traffic queuing realized under the Proposed Action would not occur under Alternative 1. Under this Alternative, existing noise associated with idling trucks along Route 11 would continue.

No Action

Under the No Action Alternative, the noise environment would be similar to the existing conditions; no new noise environmental consequences would be anticipated. Improvements to traffic queuing realized under the Proposed Action would not occur. Under this Alternative, existing noise associated with idling trucks along Route 11 would continue.

5.1.2.4 Mitigation Measures

The following mitigation measures are proposed by the Proponent to address potential noise impacts to during construction and operation of the Proposed Action:

During Construction

No environmental consequences associated with the noise environment are anticipated; therefore, no mitigation measures are proposed.

Following Construction

No environmental consequences associated with the noise environment are anticipated; therefore, no mitigation measures are proposed.

5.1.3 Hazardous Materials and Waste

This section describes the presence of existing recognized environmental conditions, including hazardous materials and waste, on and in the vicinity of the Port Modernization Program site. Potential environmental consequences related to recognized environmental conditions with construction and operation of the proposed Port Modernization Program are analyzed. This section is based upon the following reports: *Phase I Environmental Site Assessment (Appendix B)*; *Phase I Environmental Site Assessment Addendum (Appendix B)*; *Phase II Environmental Site Assessment (Appendix C)*; and, *Asbestos, Lead-based Paint and Other Hazardous Materials Survey (Appendix D)*.

5.1.3.1 Introduction

Regulatory Framework

GEPA has been authorized by the USEPA to administer most regulations regarding the management of hazardous waste and materials on Guam, including:

In 1976, the federal government passed the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. §6901 et seq., which gave the USEPA greater ability to regulate hazardous waste from “cradle-to-grave.” The USEPA authorized the GEPA to develop Guam’s Hazardous Waste Management Program and regulations. GEPA’s regulations adopt the federal regulations by reference with some adjustments in stringency (22 Guam Admin R. & Regs. §30101 et seq.). The regulations apply to the management of potentially dangerous and harmful chemicals, such as industrial chemicals/solvents, petroleum products, and pesticides. The PAG has been identified as a RCRA small quantity hazardous waste generator.

Under GEPA’s regulations, hazardous waste generators are divided into two main categories: major and small quantity generators. Major generators of hazardous waste are those who generate 100 kilograms (kg) or more of hazardous waste in any calendar month; small quantity generators produce less than 100 kg. Major generators, transporters and facilities that store, treat or dispose of hazardous waste are required to notify GEPA and USEPA of their status. The Unitek Waste Management facility, within the Expansion Area, has been identified by the USEPA as a major quantity hazardous waste generator. The regulations require all hazardous waste handlers to submit an annual report on the types and quantities of hazardous waste generated or otherwise handled each year.

The GEPA regulations govern the management of solid waste (22 Guam Admin R. & Regs. §20101 et seq.). These statutes and regulations require the issuance of permits for land disposal of solid waste on any private, commercial or government property.

The GEPA assists the USEPA in implementing the federal Spill Prevention Control and Countermeasure (SPCC) regulations, (40 CFR Part 112). These regulations define the requirements for storage and containment of oil and hazardous substances to minimize the potential for releases into the environment, groundwater or surface waters.

The Guam Department of Labor, Division of Occupational Safety and Health, has been authorized by the USEPA and U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) to administer the following regulations regarding asbestos:

- Asbestos in buildings is currently regulated by the USEPA, under authority of the CAA, the Toxic Substances Control Act (TSCA) (15 U.S.C. §2601 *et seq.*) and the National Emission Standards for Hazardous Air Pollutants (NESHAPS)(40 CFR Part 61).
- OSHA and the Government of Guam Department of Labor Division of Occupational Safety and Health regulate occupational exposure to asbestos.

Key Definitions

The following key definitions apply to the descriptions and analysis in this section:

- *Hazardous Waste* –any waste that can be dangerous or potentially harmful to human health or the environment.
- *Recognized Environmental Conditions* –the presence, or likely presence of any hazardous materials or waste on a site under conditions that indicate an existing release, a past release or a material threat of a release of any hazardous materials and waste products into structures on the property or into the ground, groundwater or surface water of the property. The term includes hazardous substances or petroleum products even under conditions in compliance with laws. It is not intended to include *de minimis* conditions that generally do not present a threat to human health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies. Conditions determined to be *de minimis* are not recognized environmental conditions.
- *Screening Levels* – tools, such as the USEPA Region 9 Regional Screening Levels (RSLs) and Pacific Basin Environmental Screening Levels (PBESLs) applicable in Guam, used for site "screening" and as initial cleanup goals, if applicable. Screening levels are not *de facto* cleanup standards and should not be applied as such. The screening level's role in site "screening" is to help identify areas, contaminants, and conditions that require further regulatory attention at a particular site. Generally, at sites where contaminant concentrations fall below screening levels, no further action or study is warranted, so long as the exposure assumptions at a site match those taken into account by the screening level calculations. Chemical concentrations above the screening level would not automatically designate a site as "dirty" or trigger a response action; however, exceeding a screening level suggests that further evaluation of the potential risks by site contaminants is appropriate. Screening levels are also useful tools for identifying initial cleanup goals at a site. In this role, screening levels provide long-term targets to use during the analysis of different remedial alternatives. By developing screening levels early in the decision-making process, design staff may be able to streamline the consideration of remedial alternatives.
- *Permissible Exposure Limits* – Permissible exposure limits is a legal limit for exposure of an employee to a chemical substance or physical agent. Permissible exposure limits are established by OSHA.

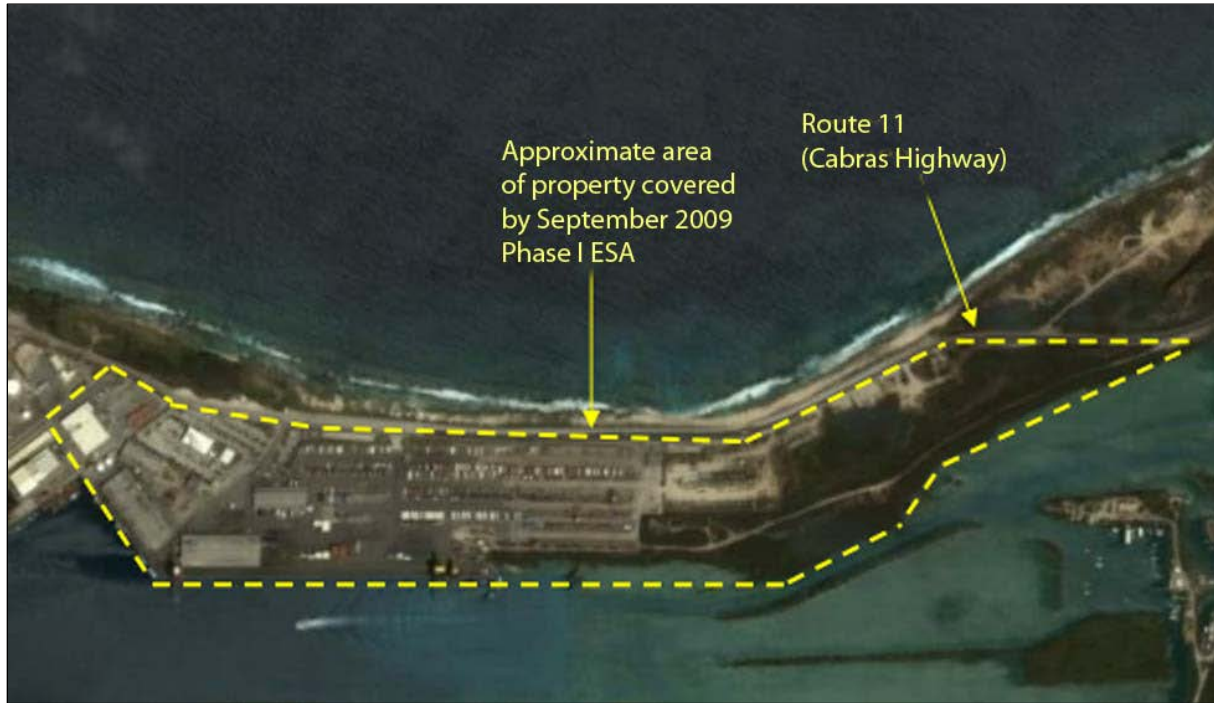
Methods and Study Area

Following is a description of the methodology used for the hazardous materials and waste analysis in this EA. Four hazardous materials and waste assessments have been completed to characterize conditions in the area of the Port Modernization Program site, as described below. The assessments included physical site reconnaissance, records review (site photographs and data collection), interviews

with relevant Port and Port tenant personnel and sub-surface sampling and testing. The study area generally included the 56-acre Terminal Yard and the 39-acre Terminal Yard Expansion Area (see **Figure 5.1.3-1**).

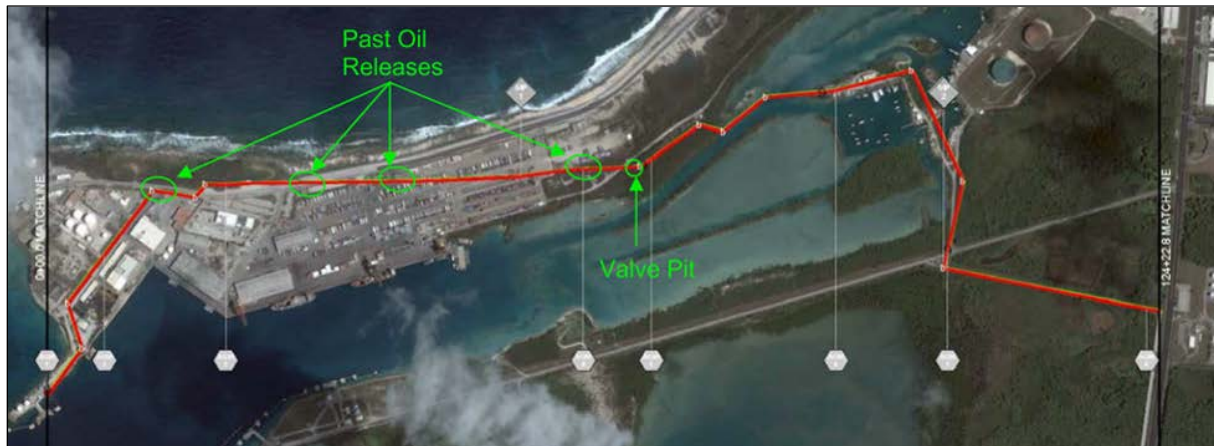
- *Phase I Environmental Site Assessment (ESA)* – conducted by AMPRO, Inc. and Unitek Environmental Guam in September 2009 to identify the potential for the presence of contaminated soil and/or groundwater on and in the vicinity of the Port Modernization Program site (see **Appendix B**). The *Phase I ESA* covered approximately 90 acres of property including adjacent undeveloped parcels to the east of the terminal yard. Analysis was based upon site reconnaissance, records review and interviews.
- *Addendum to Phase I ESA* – conducted by PCR Environmental, Inc. (PCR) in August 2010 to provide additional information to the *Phase I ESA* regarding the potential presence of contaminated materials at the Unitek Waste Transfer Facility and in the vicinity of the Tristar underground petroleum, oil, lubricant (POL) pipelines that traverse the Port property (see **Figure 5.1.3-2** and **Appendix B**). Analysis was based upon site reconnaissance, records review and interviews.
- *Phase II (ESA)* – conducted by AMEC Earth and Environmental, Inc in January 2012 (see **Appendix C**). As a result of recommendations from the *Phase I ESA* and *Phase I ESA Addendum*, a *Phase II ESA* was completed including soil and groundwater sampling to characterize the type and extent of potential for soil and groundwater contamination in the area of the Port Modernization Program site. Analysis was based upon site reconnaissance, records review, interviews and sub-surface soil, groundwater and soil vapor testing.
- *Asbestos, Lead-based Paint and Other Hazardous Materials Survey* – Surveys to investigate the presence of asbestos containing materials (ACBM), lead-based paint (LBP), polychlorinated biphenyls (PCBs), mercury, and other potentially hazardous materials were conducted by Aurora Industrial Hygiene, Inc. (Aurora) in December 2010 (see **Appendix D**). The surveys were performed in buildings and structures to be demolished as part of the Port Modernization Program. Analysis was based upon site inspections and records reviews.

Figure 5.1.3-1, Approximate Boundary of September 2009 Phase I ESA



Source: Figure 2, Appendix B.

Figure 5.1.3-2, Route of Tristar (Formerly Shell Oil) POL Pipelines and Known Locations of Past Oil Releases



Source: Figure 9, Appendix B.

5.1.3.2 Affected Environment

This section describes the existing recognized environmental conditions on and in the vicinity of the Port Modernization Program site, as identified in the *Phase I ESA*, *Phase I ESA Addendum*, *Phase II ESA*, and, *Asbestos, Lead-based Paint and Other Materials Survey (Appendices B, C & D)*.

Historic and Existing Uses

The U.S. government has extensively used Apra Harbor and the area in which the Port is located for military operations, since Guam became a U.S. possession in 1898. The area where the Port is located was previously occupied by the U.S. Navy and transferred to the Government of Guam by the U.S. Department of the Interior in 1969 and in the mid-1980s.

The majority of the Port Modernization Program site has been used for over 100 years for military, industrial and marine industrial purposes. As a result of those uses, portions of the site are affected by soil and groundwater contamination from historical releases of petroleum or other hazardous substances. Hazardous substances such as asbestos or lead-based paint are present in buildings or other structures located on the site.

Existing uses on the site are primarily industrial or marine industrial and include above-ground and underground fuel storage tanks, maintenance and repair shops, fuel storage, a gas station (abandoned), fuel-powered container handling equipment, and underground POL pipelines. The underground POL pipelines are currently owned by Tristar Terminals Guam (Tristar) and were formerly owned by Shell Oil. The active pipelines consist of three cast-iron pipes that run underground beneath the Terminal Yard for approximately one-quarter mile and then travel approximately six miles to a bulk storage facility in Agat. For approximately one-quarter mile, the POL pipelines run below the Terminal Yard (see **Figure 5.1.3-2**).

Assessment and Survey Findings

Phase I ESA

In September 2009, a *Phase I ESA* (see **Appendix B**) was completed to identify the potential for the presence of contaminated soil and/or groundwater on and in the vicinity of the Port Modernization Program site based on historic data, interviews and site visits. Results of the initial *Phase I ESA* indicated the following potential environmental conditions:

- Existing Port operations use a variety of paint-related chemical products and mechanical lubricant and fluids during day-to-day operations on the site. The PAG and PAG tenants of the site currently manage hazardous materials and waste in compliance with all relevant federal and Guam regulations.
- Existing buildings and facilities on the site could contain asbestos and/or lead-based paint. The *Phase I ESA* recommended that a survey be performed to determine the locations and quantities present. This survey was subsequently completed (see the *Phase I ESA Addendum* summary later in this section or **Appendix B**).
- Numerous incidents were noted where POL pipeline damage and fuel line failures caused an unknown quantity of fuel to be released beneath the Port (see **Figure 5.1.3-2**). As a result of these releases, Shell Oil has previously conducted clean-up activities and is currently continuing to test soil and groundwater to fully determine the extent of contamination and need for remediation. Due to the potential size of releases from the known number of release areas, it is anticipated that oil contamination may be present along the entire route of the lines at the Port Modernization Program site.

- The former gas station located to the east of the Welding Shop experienced pipeline leaks in the early and mid-1990s, which may have affected soil and groundwater.
- Unitek currently operates the Unitek Waste Transfer Facility, an oil recycling facility that was constructed in the late 1980s, in the northeastern portion of the Expansion Area. A waste oil spill occurred at this location in 1997. The spill was cleaned up without obtaining data documenting the cleanup and without obtaining a letter approving the cleanup from GEPA.
- Transformers in the area of the Proposed Action were placed after 1979 and are unlikely to contain PCBs. However, past shipyard activities and the former military presence at the Port indicate a potential for soil PCB contamination.
- There is a potential for lead contamination due to leaking lead acid automotive batteries, lead-based paints, and weathering of metallic spare parts and stock items from historic uses.
- There is a potential for pesticide contamination due to historic military use of pesticides to eradicate mosquitoes and use by the U.S. Navy to control insect infestations beneath buildings.
- Large quantities of debris and solid waste deposits (including waste material from typhoons) were identified as being located in the Expansion Area.
- Live Unexploded Ordnance (UXO) was not found during ferrous metal magnetometer site scans conducted in conjunction with the *Phase I ESA*. However, based on the historic military activities on the site, UXO could be encountered.
- The *Phase I ESA* identified contaminants of concern including volatile organic compounds, heavy metals, total petroleum hydrocarbons, polyaromatic hydrocarbons (PAHs), PCBs, and chlorinated pesticides. A *Phase II ESA* was recommended and was subsequently completed (see the *Phase II ESA* summary later in this section or **Appendix C**).

Phase I ESA Addendum

Findings of the *Phase I ESA* included a recommendation for the completion of a *Phase I ESA Addendum* (see **Appendix B**) to provide additional detail regarding potential environmental conditions at the Unitek Waste Management Facility and along the POL pipeline alignment. Results of the *Phase I ESA Addendum* indicated the following potential environmental conditions:

- The additional analysis provided in the *Phase I ESA Addendum* confirmed the potential presence of recognized environmental conditions at the Unitek Waste Management Facility and along the POL pipeline alignment and recommended sub-surface testing of soils and groundwater in a *Phase II ESA*.
- The Unitek facility, constructed in the late 1980s as a Transport Storage Disposal Facility for Guam's hazardous waste was found to not have a USEPA RCRA Part B Operating Permit for the storage of hazardous wastes. It is unknown if the facility has subsequently obtained a RCRA Part B permit. The facility has been and is currently being used for used oil recycling.

Phase II ESA

Findings from the *Phase I ESA* and *Phase I ESA Addendum* recommended completion of a *Phase II ESA* including sub-surface sampling of soil and groundwater (see **Appendix C**). The *Phase II ESA* included collection and analysis of 183 soil samples and 14 groundwater samples from a total of 113 soil borings and test pits and the collection and analysis of 12 soil vapor samples. Sample locations were selected in areas where environmental impacts have or may have occurred as reported in the *Phase I ESA* (see **Appendix A and B**).

Analytical results for soil, groundwater, and soil vapor were compared to USEPA Region 9 RSLs and PBESLs. The number of samples with detections of the contaminants of concern was considered relatively low (5 to 56 percent for all constituents except arsenic) and the number of samples with concentrations above the screening levels was also considered very low (0 to 29 percent for all constituents except pesticides).

- *TPH, Pesticides and Metals* – Analysis of samples collected from the soil identified widespread, but generally low, impacts by total petroleum hydrocarbons (TPH), pesticides, and metals.
 - The highest concentrations of TPH were reported along the Tristar fuel pipelines, former Guam Water Authority (GWA) pump station, and the proposed pipeline bypass along Highway 11.
 - Organochlorine pesticides, primarily aldrin and dieldrin, were detected at concentrations that exceeded the RSLs and/or PBESLs beneath the building foundations at Warehouse 2, the abandoned GWA pump station, the Low Tower, Crane Mechanic’s Shop area, and the former Seaman’s Club building.
 - The widespread occurrence of arsenic in soil at the site appeared to be indicative of background concentrations rather than pesticide use.
 - Chromium and zinc were detected in soil at concentrations that exceeded the PBESLs in shallow samples collected near the abandoned tanks and in the scrap metal and debris area near the Old Seaman’s Club. These elevated concentrations were considered likely related to the presence of deteriorating metal debris (including the tanks) near the sample locations.
- *VOCs* – With one exception, no volatile organic compounds (VOCs) were detected in soil at concentrations that exceeded screening levels.
 - No PCB compounds were detected in soil at concentrations that exceeded screening levels.
 - PAHs were detected at concentrations that met or exceeded the RSLs and/or PBESLs in only three samples, all of which corresponded to elevated TPH concentrations.
 - Dioxins and furans were detected at low levels which did not exceed the RSL or the calculated toxic equivalency quotient (TEQ) in the two soil samples collected near the reported location of a former incinerator.
- *Groundwater* – Groundwater samples were collected primarily from locations that have known, suspected, or potential releases of fuel hydrocarbons, and detections of TPH in groundwater samples were observed in each area tested.
 - The highest detections of TPH were reported in the groundwater samples from the fuel pipeline corridor and “dog leg” easement, high mast lighting locations, and the abandoned GWA Pump Station oil/water separator.

- Benzene was the only VOC detected in groundwater at concentrations that exceeded the RSL; however, benzene was not detected in soil.
- Six metals were detected in groundwater at concentrations which exceeded the RSLs and/or PBESLs in the groundwater sample collected from the Unitek facility, and no PCB compounds were detected in the same groundwater sample.
- *Soil Vapor* – The soil vapor samples were collected in the fuel pipeline corridor and “dog leg” easement, at proposed high mast lighting locations, and in the administration building parking lot.
 - The elevated concentrations of petroleum hydrocarbons, VOCs, and Semi-Volatile Organic Compounds (SVOCs) detected in the soil vapor samples collected along the fuel pipeline corridor and high mast lighting locations were consistent with the presence of fuel hydrocarbons in the soil and/or groundwater as confirmed by the elevated concentrations of these compounds detected in the soil and groundwater samples from nearby borings.
 - When compared to PBESLs for shallow soil vapor, data for the soil vapor samples collected in the administration building parking lot showed the detected concentrations were below levels of concern for potential vapor intrusion for commercial/industrial land use.

Asbestos, Lead-Based Paint and Other Hazardous Materials Survey

Findings of the *Phase I ESA* recommended the completion of a *Asbestos, Lead-based Paint and Other Hazardous Materials Survey* (see **Appendix D**) of the existing buildings on the Port Modernization Program site. Results of the survey found:

- ACBM –Semi-Volatile Organic Compounds (ACBM) were found in four buildings: Administration Building, Warehouse No. 2, Low Tower, and Container Gate Building.
- *LBP* – Lead based paint (LBP) was found in a significant number of structures on the site.
- *PCBs* – Light fixture ballasts inspected during the survey did not contain PCBs; but it is possible that light ballasts that were not inspected could contain PCBs.
- *Universal Waste* – Universal wastes are hazardous wastes that contain mercury, lead, cadmium, copper, and other hazardous substances. Examples of Universal Wastes are batteries and fluorescent tubes. Universal Wastes were found in several onsite buildings.

5.1.3.3 Environmental Consequences

This section describes potential environmental consequences to the recognized environmental conditions during construction and operation of the proposed Port Modernization Program under the Proposed Action and Alternatives. Construction activities associated with the Port Modernization Program would have the potential to disturb recognized environmental conditions and result in a release of hazardous materials or waste into the environment. Based on a review of the analytical results as well as corresponding OSHA exposure limits, the *Phase II ESA* concluded that site conditions should not adversely impact workers health during on-site construction activities with adherence to applicable federal and Guam regulations and BMPs. No significant environmental consequences from operations of the Proposed Action would be anticipated.

Evaluation Criteria

Impacts associated with recognized environmental conditions would be adverse if members of the general public or workers at the Port Modernization Program site were exposed to greatly increased or unacceptable risks. For the Proposed Action, the disturbance of recognized environmental conditions and exposure to the general public and workers during and after construction were evaluated for their potential to introduce new risks or increase existing risks to an unacceptable level. A qualitative analysis is provided of the potential environmental consequences to recognized environmental conditions identified in the environmental assessments conducted for the Port Modernization Program.

Proposed Action

As stated previously, the majority of the Port Modernization Program site has been used for over 100 years for industrial or marine industrial purposes. As a result of those uses, portions of the site are affected by soil, groundwater and/or sediment contamination from historical releases of petroleum or hazardous substances. Implementation of appropriate abatement, demolition and cleanup actions during construction of the Proposed Action would be conducted as part of the phased redevelopment of the site in order to address potential environmental health and hazardous materials issues. These activities are proposed to be performed in compliance with applicable federal and Guam regulations and significant impacts are not anticipated.

Construction Effects

Construction of the Proposed Action would require soil excavation, installation of utilities and high mast lighting, debris removal, grading, and building demolition and renovation. These activities could disturb recognized environmental conditions and expose workers or the environment to hazardous materials and waste, if not mitigated.

Grading – As discussed in detail in **Section 5.2.1**, approximately 145,000 CY of grading would occur in the Expansion Area. Soil not reused on the site would be stockpiled at a Port property located directly north of the Expansion Area, north of Route 11. Excavation, trenching and grading activities could involve potentially contaminated soil and/or groundwater. The *Phase II ESA* concluded that although most of the soil and groundwater samples analyzed contained TPH, PAHs, VOCs, and/or metals at concentrations below the RSLs and/or PBESLs, some samples contained concentrations above their respective RSL and/or PBESL. The presence of these constituents should be considered in the development of a soil or groundwater management plan for future redevelopment. Based on a review of the analytical results as well as corresponding OSHA exposure limits, the *Phase II ESA* concluded that site conditions should not adversely impact workers health during planned on-site construction activities. Soil and groundwater management plans should consider methods to minimize exposure to impacted soil and groundwater by minimizing employees direct contact the soil and groundwater, monitoring for organic vapors and particulates, utilizing dust suppression methods, and continuous monitoring for changed and unanticipated conditions. The following specific recommendations were provided in the *Phase II ESA*:

- Further consideration of the TPH impacts in soil may be needed during future redevelopment work and development of a soil management plan.
- Organochlorine pesticides data should be used in development of a soil management plan for future demolition and/or construction activities at the site.

- The presence of chromium and zinc in soil should be considered in development of a soil management plan for future demolition and/or construction activities at the site.
- The presence of TPH and other fuel related VOCs in groundwater should be considered during future redevelopment work and possible construction dewatering.

Grading and excavation activities would be performed in compliance with applicable federal and Guam regulations to minimize the potential for release of hazardous waste or materials. Soils not reused on the site would be tested for contamination and either transported to the adjacent stockpile site for later reuse or transported offsite for disposal in accordance with applicable laws and regulations.

Building/Structure Demolition – Demolition and renovation of buildings and other structures could potentially involve materials containing ACBM, LBP, PCBs or other hazardous materials. ACBM would be removed prior to demolition or renovation of structures by a certified asbestos removal contractor. Removal, transport and disposal activities would be conducted in accordance with federal and Guam regulations.

LBP would be removed in accordance with USEPA and GEPA training, testing, removal, and disposal requirements. Universal Wastes would be handled and transported in compliance with federal regulations. Transformers and light ballasts would be examined to determine if they contain PCBs prior to renovation or demolition activities. Ballasts or transformers that contain PCBs would be segregated and disposed of in accordance with federal and Guam regulations.

POL Pipelines – Construction activities have the potential to interfere with the underground POL pipelines in the Terminal Yard. Disposition of the fuel lines would be handled in accordance with an agreement to be developed between PAG and Tristar, as part of a separate action. Removal, abandonment-in-place, lowering or other activities related to avoiding interference with the POL pipelines would be conducted according to GEPA regulations.

UXO – Although no unexploded ordnance (UXO) were detected onsite during completion of the environmental site assessments, the potential exists to uncover UXO during construction activities on the site due to historic military uses. UXO monitoring would be conducted during clearing and grubbing activities and during excavations activities that exceed 18 inches in depth.

Operational Effects

Operations on the Port Modernization Program site after construction of the Proposed Action would be expanded but would be similar in character to existing operations. Existing Port operations would continue to use a variety of paint-related chemical products and mechanical lubricant and fluids during day-to-day operations on the site. The PAG and tenants of the site would continue to manage hazardous materials and waste in compliance with all relevant federal and local regulations. No significant environmental consequences from operations of the Proposed Action would be anticipated.

Alternative 1

Construction and operational environmental consequences to recognized environmental conditions associated with Alternative 1 in the Terminal Yard would generally be similar to those described for the Proposed Action within the Terminal Yard area. The potential for environmental consequences in the Expansion Area would not occur under Alternative 1.

No Action

As under Alternative 1, no construction activity would occur in the Expansion Area. The potential for environmental consequences associated with recognized environmental conditions in the Terminal Yard under the No Action Alternative would be generally similar to those described for the Proposed Action. Demolition of buildings/structures, excavation for utilities, and repaving of operations areas would occur over time as failures occurred. The provision of comprehensive soil and groundwater management plans associated with site construction activities would not be anticipated.

5.1.3.4 Mitigation Measures

The following mitigation measures are proposed by the Proponent to address potential environmental consequences associated with recognized environmental conditions during construction and operation of the Proposed Action:

During Construction

- UXO monitoring will be conducted during clearing and grubbing activities and during excavations activities that exceed 18 inches in depth.
- TPH, PAHs, VOCs, and/or metals at concentrations above their respective RSL and/or PBESL are present in soils at some locations on the site. The presence of these constituents should be considered in the development of a soil or groundwater management plan for future redevelopment. Soil and groundwater management plans should consider methods to minimize exposure to impacted soil and groundwater by minimizing employees direct contact the soil and groundwater, monitoring for organic vapors and particulates, utilizing dust suppression methods, and continuous monitoring for changed and unanticipated conditions.
- The presence of TPH and other fuel related VOCs in groundwater should be considered during future redevelopment work and possible construction dewatering.
- Soils excavated during grading activities and not reused onsite would be tested for the presence of contamination and either transported to the onsite soil stockpile for later reuse or sent to a designated disposal facility in accordance with applicable laws and regulations.

Following Construction

- The PAG and tenants of the site will continue to manage hazardous materials and waste in compliance with all relevant federal and Guam regulations.

5.1.4 Safety and Security

This section describes existing safety and security conditions on and in the vicinity of the Port Modernization Program site. Potential environmental consequences to safety and security conditions associated with construction and operation of the Proposed Action and Alternatives are analyzed, including impacts to human health.

Section 5.1.3, Hazardous Materials and Waste, analyzes environmental consequences to human health and the environment associated with hazardous materials and waste management. Impacts of the Proposed Action and Alternatives on staffing levels of the Port Police are described in more detail in **Section 5.1.5**, Utilities and Public Services.

5.1.4.1 Introduction

Regulatory Framework

Safety

- *Occupational Safety and Health Administration (OSHA)* – With the Occupational Safety and Health Act of 1970, (29 U.S.C. §651 *et seq.*) Congress created the OSHA to assure safe and healthful working conditions for working men and women by setting and enforcing standards and by providing training, outreach, education and assistance. OSHA has responsibility to provide, develop, update, and enforce regulations to protect employee safety at the workplace.

Security

- *United States Coast Guard (a department of the U.S. Department of Homeland Security)* – The USCG is responsible for providing the Port with oversight and monitors its compliance with water-side security regulations, including the Maritime Transportation Security Act (MTSA) of 2002 (Pub.L. 107-295). The MTSA is an Act of Congress enacted by the 107th United States Congress to address port and waterway security.
- *Port Police and Security* – The Port Police are functionally responsible for land-side security and protection of life and property through the Port's security rules and regulations, Guam Criminal and Motor Codes, Maritime Security Act and applicable federal and local security programs, laws, rules, and regulations. The Port Authority of Guam (PAG) has established Port Facilities Access procedures for Port operations that include protocols for limiting access to authorized personnel and vehicles and protection of Port properties, employees, visitors, and accountability of cargoes. These procedures are enforced by Port police.
- *Maritime Administration (a department of the U.S. Department of Transportation)* – U.S. Department of Transportation Maritime Administration (MarAd) is responsible for dealing with waterborne transportation and its integration with other segments of the transportation system. MarAd works in many areas, including port operations, vessel operations, national security, and safety.
- *U.S. Customs and Border Protection (a department of the U.S. Department of Homeland Security)* – The U.S. Customs and Border Protection Service provides immigration processing services to foreign merchant marines and cruise ship passengers that arrive at the Port.

- *Guam Customs and Quarantine Agency* – The Guam Customs and Quarantine Agency oversees customs inspection activities involving the safety of goods, commodities, and merchandise that arrive at the Port.
- The PAG has completed a *Port Facility Security Assessment* (PAG, no date) and developed a *Port Facility Security Plan* (PAG, no date) to address deficiencies identified in the assessment. The Port Facility Security Plan, prepared in compliance with the MTSAs, was revised in 2009 and is currently awaiting approval by the USCG. Further, the Port has developed a *Port Security Action Plan* (SAP) (EA Engineering, Science and Technology, 2010) to address security measures during construction.

Key Definitions

The following key definitions apply to the descriptions and analysis in this section:

- *Safety* – A safe environment is one in which there is no, or an optimally reduced, potential for death, serious bodily injury, illness, or property damage. Human health and safety addresses: (1) worker’s health and safety during facilities construction, and (2) public safety during construction activities and during subsequent operations of those facilities. Safety is largely a matter of adherence to regulatory requirements imposed for the benefit of employees and implementation of operational practices that reduce risks of illness, injury, death, and property damage.
- *Security* – In the context of this EA analysis, security refers to the defense, law enforcement, and counterterrorism activities that fall within the PAG’s domain. It includes the protection of the Port facilities, employees, and visitors to the Port; and, inspection and protection of the cargo moving through the Port.

Methods and Study Area

For purposes of this EA analysis, a review of applicable literature was performed and a qualitative discussion of safety and security conditions on the Port Modernization Program site associated with the Proposed Action and Alternatives is provided.

5.1.4.2 Affected Environment

This section describes the existing safety and security conditions on and in the vicinity of the Port Modernization Program site.

Safety

The health and safety of workers on the Port Modernization Program site are safeguarded by numerous federal and Guam regulations designed to comply with standards issued by the OSHA. These standards specify: the amount and type of training required for industrial workers; the use of protective equipment and clothing; engineering controls; and, maximum exposure limits for workplace stressors. Safety and accident hazards can often be identified and reduced or eliminated. Necessary elements for an accident-prone situation or environment include the presence of the hazard itself together with the exposed (and possibly susceptible) population. The degree of exposure depends primarily on the proximity of the hazard to the population. Activities that can be hazardous include: transportation,

maintenance and repair activities, and the creation of highly noisy environments. The proper operation, maintenance, and repair of vehicles and equipment carry important safety implications. Certain existing facilities and equipment on the Port Modernization Program site, such as certain buildings, utilities, and container handling equipment, have been determined to be in poor condition and are no longer used due to the potential for workplace safety hazards.

Security

The Port's security consists of both security facilities and security personnel. Security-related facilities on the Port Modernization Program site include features such as: cement block walls, metal chain-link fencing, entrance/exit gates, security cameras, and lighting. The Port has 28 security personnel that provide 24-hour security for the Port, as well as off-site Port facilities including Agat and Gregorio D. Perez Marinas, and Harbor of Refuge. The Port has one operational emergency response vehicle for police and security needs, and communication among the force is via walkie-talkie or cellular phones.

The *Port Facility Security Assessment* (PAG, no date) identified the following deficiencies in the Port's security facilities and procedures:

- Security personnel are understaffed. For example, staff often has to be called from leave to provide increased security when cruise vessels arrive.
- The perimeter security walls/fencing was found to be incomplete.
- Inbound and outbound gates are not separated and the entrance/exit gate is not on Port property.
- Existing lighting conditions are poor across the container yard site.
- Multiple uses occur in the same space, causing security issues and potentially impacting cargo and commercial fishing operations. Dedicated facilities for processing of visitors and docking of cruise ships are lacking.
- The Port does not have an electronic system for tracking cargo including containers. All tracking is done manually and documented on paper.
- Security measures in disrepair include security cameras at the gate and piers, and inoperable closed circuit television (CCTV) cameras. The CCTV system also has blind spots and there is insufficient staff to continuously observe the central security monitor.
- The Port receives six to eight cruise ships per year and processing of passengers is difficult. Processing passengers involves the setup of a temporary screening facility a week in advance of ship arrival and the efforts of 17 out of the 28 total security personnel.
- The Port does not have a K-9 Unit. If a K-9 Unit is needed, it is provided by the A.B. Won Pat International Airport (i.e., Guam International Airport) which is located 6.5 northeast of the site.

5.1.4.3 Environmental Consequences

This section describes potential environmental consequences to safety and security conditions during construction and operation under the Proposed Action and Alternatives. Environmental consequences to safety and security conditions from the Proposed Action and Alternatives would not be anticipated to result in new significant impacts, as described in this section.

Evaluation Criteria

Effects on safety and security would be adverse if members of the general public or workers at the Port Modernization Program site were exposed to greatly increased or unacceptable risks. For this Proposed Action, the safety and security of the general public and Port personnel during and after construction were evaluated for their potential to introduce new risks or increase existing risks to an unacceptable level.

Proposed Action

Construction Effects

Safety – Construction activities associated with the Proposed Action could result in the potential for injury, illness, or property damage on the Port Modernization Program site. During all phases of construction, safety standards required by the OSHA would be followed to minimize the potential for adverse safety impacts. Workers would be required to wear protective gear such as ear protection from sound, steel-toed boots, hard hats, gloves, and other appropriate safety gear. The area would be fenced and appropriately marked with signs and placards. Construction areas would be clearly delineated to separate construction sites from active Port operations areas. As a result, significant adverse effects on workplace safety are not anticipated during construction.

Security – Construction activities associated with the Proposed Action, such as demolition of existing fencing or security features, could result in temporary vulnerabilities in the Port's security system, and could present opportunities for illicit entry, thievery, vandalism, etc. The PAG has created a *Security Action Plan* (EA Engineering, Science and Technology, 2010) which establishes security protocols to close potential gaps in security that could arise during construction, such as identification procedures for construction worker and vehicles. Port police and security personnel would implement and enforce these protocols during the build out period of the Proposed Action. As a result, significant adverse effects on security conditions are not anticipated during construction.

Operational Effects

Safety – As under existing conditions, operations at the Port Modernization Program site under the Proposed Action would continue to be performed in compliance with all applicable federal and Guam regulations designed to comply with OSHA standards.

Long-term direct beneficial effects to workplace safety would be anticipated under the Proposed Action as failing and deteriorating facilities, such as certain buildings and utilities that represent potential workplace safety hazards would be replaced with new, modern facilities.

Security – The Proposed Action would improve Port security by upgrading security infrastructure, separating Port and non-Port activities, and upgrading communication systems. Security infrastructure improvements would include:

- A new Terminal Gate and Gate Administration Building would be constructed at the proposed new gate complex in the Expansion Area. Inbound and outbound optical character recognition (OCR) facility canopies would be constructed. These facilities would reduce the need for Port staff to manually track cargo container information.
 - Existing fencing would be removed and replaced and existing perimeter security gaps would be eliminated.
 - Equipment and infrastructure would be upgraded to support security cameras.
 - New general purpose lighting and high mast lighting would be installed across the Terminal Yard and Expansion Area to improve lighting and safety conditions.
 - Port activities would be separated from non-Port activities by creating a new Non-Port Operations Area that would be fenced off from the remainder of the Port and would have a separate entrance gate with security guards.
 - Communication systems would be upgraded and would include new conduits, cables, voice systems, and local area networks (LAN).
 - A new terminal operating systems (TOS) and a new gate operating system (GOS) would be installed that would improve efficiency of processing cargo vessels and vehicles both exiting and entering the Port property.

With implementation of the safety and security features included in the Proposed Action, safety and security conditions would be improved from existing conditions and would address existing security vulnerabilities.

Alternative 1

Construction Effects

Under Alternative 1, environmental consequences associated with safety and security conditions would be similar to those described for the Proposed Action.

Operational Effects

Safety – As under existing conditions, operations at the Port Modernization Program site under Alternative 1 would continue to be performed in compliance with all applicable federal and Guam regulations, and would be designed to comply with OSHA standards.

Long-term direct beneficial effects to workplace safety would be anticipated under Alternative 1 as failing and deteriorating facilities that represent potential workplace safety hazards would be replaced with new, modern facilities.

Security – Alternative 1 would include improvements to Port security that would upgrade security and communications infrastructure. Security infrastructure improvements would include:

- Existing fencing would be removed and replaced and existing perimeter security gaps would be eliminated.
- Equipment and infrastructure would be upgraded to support security cameras.
- New general purpose lighting and high mast lighting would be installed across the Terminal Yard to improve lighting and safety conditions.
- Communication systems would be upgraded, and would include new conduits, cables, voice systems, and local area networks.

With implementation of the safety and security features included in Alternative 1, safety and security conditions would be improved from existing conditions, but would be less than proposed under the Proposed Action.

No Action

Under the No Action Alternative, certain safety and security improvements would be made in order to address existing gaps in the Port security perimeter. Security features and facilities would be replaced or upgraded in order to meet the minimum requirements of applicable regulations. Other failing or deteriorating security features or facilities would be repaired or replaced as failures occurred over time.

5.1.4.4 Mitigation Measures

The following mitigation measures are proposed by the Proponent to address potential safety and security impacts to during construction and operation of the Proposed Action:

During Construction

- The PAG has created a *Security Action Plan* (EA Engineering, Science and Technology, 2010) which establishes security protocols to close potential security gaps that could arise during construction. Port police and security would implement and enforce these protocols during the build-out period of the Proposed Action.
- During all phases of construction, OSHA safety standards and best management practices would be followed to minimize the potential for adverse safety impacts. Workers would be required to wear protective gear, such as: ear protection from sound, steel-toed boots, hard hats, gloves, and other appropriate safety gear.
- Construction areas would be clearly delineated to separate construction sites from active Port operations areas.

Following Construction

- During operation, OSHA safety standards and best management practices would be followed to minimize the potential for adverse safety impacts.

- Security features would improve by upgrading security infrastructure, separating Port and non-Port activities, and upgrading communication systems, and would meet all federal and Guam regulations and requirements.

5.1.5 Utilities and Public Services

Utilities supplied to the Port include water, wastewater, electrical power, and solid waste services. Public services supplied to the Port include fire protection, police protection, and emergency services. Storm water management is discussed in **Section 5.2.2**, Surface Water, Storm Water, and Floodplains, of this document.

5.1.5.1 Introduction

Regulatory Framework

Guam regulations regarding utilities and public services that would apply to the Port Modernization Program are described in this section.

Level of service standards exist for the provision of domestic water:

- Guam Waterworks Authority (GWA) shall maintain a standard water delivery pressure range of a minimum 20 pounds per square inch (PSI) to a maximum of 90 PSI at the customer's meter. (*Guam Administrative Rules and Regulations, Title 28, Chapter 2, Clause 2103*)

The International Building Code (IBC) regulates fire prevention, plumbing, electric, and mechanical components of proposed buildings in Guam (28 Guam Admin. R. & Regs. §2103(I)). Building improvements, including utilities, associated with the Port Modernization Program would meet or exceed IBC requirements.

Key Definitions

The following key definitions apply to the descriptions and analysis in this section:

- *Water Supply* – the potable water supplied to the Port for both domestic use and fire protection.
- *Electrical Power* – electricity provided to the Port for power usage and illumination.
- *Wastewater Treatment* – wastewater from domestic usage conveyed via pipelines from the Port to a central treatment plant.
- *Fire Protection Services* – the provision of fire-fighting services, on land and on-board ship.
- *Police Protection* – the provision of police services, including Port security.
- *Emergency Services* – the provision of emergency medical services, including ambulance transport.
- *Solid Waste Collection and Disposal* – the collection and disposal of solid waste, including general refuse, metallic debris, waste oil, and hazardous materials.

Methods and Study Area

For purposes of this EA analysis, a review of applicable literature was performed, and Port maintenance staff was interviewed (PAG, 2008). A discussion of existing utilities and public services conditions, as well as demands for utilities and public services associated with the Proposed Action and Alternatives is provided.

5.1.5.2 Affected Environment

Utilities

Water Supply (Domestic Water and Fire Suppression)

The GWA provides water service to the Port. The U.S. Navy's Fena Water Treatment Plant treats surface water and serves customers at the Port (GWA, 2006). Water usage and system specifics include:

- *Consumption* – Total yearly water consumption at the Port is approximately 87.5 million gallons (based on data obtained from PAG between October 15, 2009 and October 15, 2010) (PAG, 2008).
- *Combined Fire and Domestic Water System* – Fire protection (fire hydrants and sprinklers) and domestic water systems are provided by the same water supply lines and the fire protection system does not include pumps or storage tanks.
- *Supply Pipes* – Water is supplied via a 16-inch main supply pipe located at the eastern end of the Terminal Yard with distribution via underground piping to the west side of the Terminal Yard. Additional pipes are tapped off of the 16-inch supply line to serve the Port's fire hydrants and buildings. The underground pipes' size progresses from 16 inches to 12 inches to 10 inches in diameter as the underground pipe network extends westward across the Terminal Yard.

According to the 2008 Port Master Plan, limitations of the existing water supply system include the following:

- *Interruption of Port Operations* – A portion of the water line supplying the Port is beneath the container stacking areas in the central portion of the Terminal Yard. If maintenance and repair of this line is needed, Port operations are interrupted.
- *Leakages* – Several components of the existing water system at the Port are in old and in poor condition. Pipe leakage has occurred requiring detection of the location of the leak and subsequent repair. Gate valves for the underground pipe system are in poor condition, sometimes requiring that more than one section of piping be shut down to allow the leak to be repaired.
- *Water Outages* – GWA has water outages that affect the Port approximately three to four times per year. Water service also is interrupted to conduct maintenance and repair activities. Since the fire water and domestic water systems are combined, during a water outage fire fighting capability is greatly reduced.

Electrical Power

The Guam Power Authority (GPA) provides electrical power to the Port. Electrical usage and system specifics include:

- *Supply Line* – a 13.8-kilovolt (kV) overhead electrical line runs along Route 11 from the Piti Substation and supplies electrical power to the site.

- *Consumption* – Port monthly usage currently ranges from 352,000 kilowatt hour (kWH) to 474,000 kWH (based on information obtained from PAG between October 2009 and October 2010) (PAG, 2008).
- *System* – Generators at GPA’s Piti, Cabras, and Tanguisson power plants produce power that is pooled to serve the entire island. Two feeders are connected to the GPA overhead supply line, which in turn, supplies the four electrical substations at the Port. Each substation is backed up by emergency diesel generators.
- *Illumination* – The majority of the Terminal Yard is illuminated by flood lights mounted on thirty 50-foot-high poles and ten 80-foot high poles. The flood lights use 1,000 watt metal halide lamps.

Port electrical power is presently limited by the capacity of the GPA overhead supply line. The current supply capacity is 13.8 kV and 119 amperes, which corresponds to a maximum capacity of 2,840 kilovolt amperes.

Wastewater Treatment

The Port’s wastewater/sewer system consists of gravity-fed 6-inch underground lines (2 to 11 feet below ground level) and sump pits. A central lift station, located near the Port’s main gate, collects the sewage and pumps it to a gravity line beneath Marine Drive. The Port currently generates approximately 50,000 gallons of wastewater /sewage per day (PAG, 2008). The wastewater/sewage is treated at the GWA Hågatña Treatment Plant.

Storm Water Management

A gravity drainage system of underground piping (12 to 30 inches in diameter), sump pits, and surface drainage channels collects storm water and directly discharges it into Apra Harbor without water quality treatment. There are eight outfalls—two outfalls in Berth F-3, four outfalls between F-4 and F-6, and two outfalls in the Cabras Island area. Storm water management is described in further detail in **Section 5.2.2**, Surface Water, Storm Water, and Floodplains, of this EA.

Public Services

Fire Protection Services

Fire protection services are currently provided by the Guam Fire Department (GFD) Station No. 7 located in Piti. The primary assisting unit, Station No. 2, is located east of Piti in the town of Sinajana, approximately 6 miles from the site. A direct link does not currently exist between the Port fire alarm system and local fire stations. Since the fire water and domestic water systems are combined, during a water outage, fire fighting capability is greatly reduced.

Police Protection

The Port Police Department provides police protection services to the Port of Guam. The Port Police Department has a headquarters building located in the northwestern portion of the Terminal Yard. The building houses the police communications, operations, and administrative functions, as well as staff locker/storage rooms.

Emergency Services

Emergency services to the Port are currently managed and provided by GFD. Advanced Life Support Unit No. 2 located at Station No. 7 in Piti provides ambulance and emergency medical services. The closest military hospital is the U.S. Naval Hospital in Agaña Heights, approximately 5 miles from the site, and the nearest civilian hospital is Guam Memorial Hospital in Tamuning, approximately 9 miles from the site.

Solid Waste Collection and Disposal

Guahan Waste Control presently provides general solid waste removal services at the Port. Morrico Equipment services the Port for removal of metallic debris. Dumpsters are provided at specific locations at the Port, and collection is generally available one day a week (and more frequently, as necessary). Solid waste collected at the Port is disposed of at Layon Landfill located in the village of Inarajan, and metallic waste is taken to a vendor recycling processing site. Waste oil and hazardous materials are handled through contracts with Gresco and Unitek. The Unitek waste oil recycling facility is located within the project boundary in the Expansion Area.

5.1.5.3 Environmental Consequences

This section describes potential environmental consequences to the utilities and public services during construction and operation of the proposed Port Modernization Program under the Proposed Action and Alternatives. No significant environmental consequences to utilities or public services from operations of the Proposed Action and Alternatives would be anticipated.

Evaluation Criteria

Impacts associated with utilities and public services would be adverse if increased demands on the utility systems or for additional services could not be addressed by existing facilities, equipment, and staff, and/or mitigated with proposed improvements. For this Proposed Action, the utility systems and public services during and after construction were evaluated for increased demand that could not be adequately mitigated.

Proposed Action

Utilities

Water Supply (Domestic Water and Fire Suppression)

Construction Effects. Construction of the Proposed Action would have the potential to temporarily interrupt water service to existing tenants. Outages would be temporary in nature and phased in order to limit the duration of the interruption to the extent feasible. No significant impacts during construction would be anticipated.

Operational Effects. The Proposed Action would improve the water supply system at the Port by replacing aging infrastructure and re-routing supply lines. Water supply system improvements would include:

- Re-routing and replacement of aged water supply piping and provision of new meters to reduce the potential for leaks and provide the port a direct measure of water used at the facility. The existing water supply trunk line in the Terminal Yard would be removed and re-routed outside the container yard.
- Replacement and rearrangement of valves on underground water pipes to provide zoning of the water supply. Zoning would convey water to specific locations which would minimize water outages during maintenance and repair activities.
- Installation of new water supply lines, pumps, and storage tanks in the Expansion Area to ensure water pressure and flow rate for fire protection and domestic water systems, especially during GWA outages.

The Proposed Action would not result in an increase in demand for domestic water service since no new uses are proposed. The Proposed Action would have a beneficial effect on the water supply system compared to the existing conditions, potentially reducing demand through replacement of aged water supply piping.

Electrical Power

Construction Effects. Construction of the Proposed Action would have the potential to temporarily interrupt electrical service to existing tenants. Outages would be temporary in nature and phased in order to limit the duration of the interruption to the extent feasible. No significant impacts during construction would be anticipated.

Operational Effects. The Proposed Action would expand lighting and back-up power capability, add a new Load Center (LC)/upgrade other LCs, and potentially remove overhead power lines and replace them with underground lines. Electric power system improvements would include:

- Demolition of LC 3 and upgrades to LC 1, 2, and 4.
- Replacement and expansion of general purpose and high mast lighting in the Terminal Yard.
- Installation of a new LC 5 in the Expansion Area. The new LC would provide power to high mast lights, refrigerated containers (reefers), gate control facilities, Gate Administration Building, and CBP Building in the Expansion Area.
- Potential removal of overhead power lines near the new terminal gate and replacement with underground power lines. Should this be required, it would be to remove obstructions thereby providing free clearance to the terminal gate.

The proposed Port Modernization Program would not result in significant additional demands on electric power service and could (if overhead lines are installed underground) have a beneficial effect on power reliability (during storm conditions) compared to existing conditions.

Wastewater Treatment

Construction Effects. Construction of the Proposed Action would have the potential to temporarily interrupt wastewater treatment services to existing tenants. Outages would be temporary in nature and

phased in order to limit the duration of the interruption to the extent feasible. No significant impacts during construction would be anticipated.

Operational Effects. The Proposed Action would extend new sanitary sewer infrastructure to the eastern portion of the Expansion Area. The existing Terminal Yard would continue to use much of the existing sewer system. The proposed new sewer lines would connect to the proposed new Terminal Gate Administration Building and future Customs and Border Patrol Building and drain to a new sewer manhole. The GWA would continue to provide wastewater treatment and significant additional demand for treatment as a result of the Proposed Action would not be anticipated. The Proposed Action would not have an adverse effect on the ability of the GWA to supply wastewater treatment for the Port.

Public Services

Fire Protection Service

Construction Effects. Construction of the proposed Port Modernization Program could result in an increased demand for fire protection services. GFD service calls could increase during construction due to code/safety inspection requirements.

Overall, construction impacts on fire protection services would be short-term and would not be significant. Existing GFD staffing and equipment are expected to be sufficient to handle increased service need for on-site fire protection services over the construction period.

Operational Effects. Fire protection system improvements under the Proposed Action would include the installation of new fire mains connected to the relocated main north of the secured Terminal Yard in the Route 11 right-of-way. Fire protection systems would be supplied to all buildings, container and break-bulk terminals, and Port service stations. Fire-fighting water pressure would be improved to meet code requirements through installation of storage tanks and pumps. The Proposed Action would generate an increase in activity levels on and in the vicinity of the Port, but would not result in a significant increase in demand for GFD-supplied fire protection services compared to existing conditions. Therefore, the Proposed Action would not be expected to have a significant adverse effect on fire protection services.

Police Protection

Construction Effects. Construction activities associated with the Port Modernization Program could result in an increased demand for police services during the construction period. Service calls could increase during construction due to trespassing, construction site theft, vandalism, and traffic incidents due to construction traffic. The construction site would be secured to prevent trespassing, vandalism and to avoid accidents involving the public. Overall, construction impacts on police services would be short-term and would not be anticipated to be substantial. Existing staffing and equipment are expected to be sufficient to handle increased calls for services associated with construction activities over the build-out period.

Operational Effects. The Police Department building at the Port would be upgraded as part of the Port Modernization Program. The Proposed Action would generate an increase in activity levels on and in the vicinity of the Port, but is not anticipated to result in a significant increase in demand for Port police protection services compared to existing conditions. Therefore, the Proposed Action would not be expected to have a significant adverse effect on police protection services.

Emergency Services

Construction Effects. Construction of the proposed Port Modernization Program could result in an increased demand for emergency medical services. GFD service calls could increase during construction due to construction accidents and traffic incidents from construction traffic.

Overall, construction impacts on emergency medical services would be short-term and would not be anticipated to be significant. Existing GFD staffing and equipment are expected to be sufficient to handle increased emergency service needs over the construction period.

Operational Effects. The Proposed Action would generate an increase in activity levels, but would not be anticipated to result in a significant increase in demand for GFD supplied emergency services compared to existing conditions. Therefore, the Proposed Action would not be expected to have a significant adverse effect on emergency services.

Solid Waste Collection and Disposal

Construction Effects. During construction of the Proposed Action, solid waste would be generated by both demolition and construction activities.

To the extent feasible, construction-generated solid waste would be diverted from landfills and sent to recycling. Other means of reducing the solid waste generated by the Port Modernization Program include: on-site source separated recycling; potential reuse of demolition materials onsite, and, salvage and reuse of building components.

Demolition and renovation of buildings and other structures could potentially involve materials containing ACBM, LBP, PCBs or other hazardous materials. See **Section 5.1.3**, Hazardous Materials and Waste, for additional detail.

In general, the Proposed Action would not significantly increase demand for general solid waste or metallic debris collection and disposal services. Therefore, significant adverse effects on the general solid waste or metallic debris collection and disposal services would not be anticipated during construction.

The Unitek waste oil recycling facility would be demolished during construction of the Proposed Action. This facility would likely be relocated elsewhere on the island on non-Port property.

Operational Effects. The Proposed Action would include an increased in the number of facilities associated with operations, but would not result in a significant increase in demand for Guahan Waste Control or Morrico Equipment-supplied general solid waste or metallic debris collection and disposal services compared to existing conditions. Therefore, the Proposed Action would not be expected to have a significant adverse effect on solid waste collection and disposal services.

Alternative 1

The utilities and public services provided under Alternative 1 would differ from the Proposed Action in the following ways:

- The fire system tanks proposed in the Expansion Area under the Proposed Action would not be installed under Alternative 1. Thus, fire-fighting water pressure would remain low and outages of fire-fighting water could continue to exist under Alternative 1.
- The Unitek waste-oil recycling facility that is located in the Expansion Area that would be demolished under the Proposed Action would remain under Alternative 1.

Aside from these differences, overall Alternative 1 would not be expected to result in significant impacts on utilities and public services during construction and operation of the project, similar to the Proposed Action. The Expansion Area would not be developed under Alternative 1; therefore, there would be no impacts to utilities and public services in this area.

No Action

Similar to Alternative 1, the fire system tanks proposed in the Expansion Area under the Proposed Action would not be installed under the No Action Alternative, limiting the fire-fighting system at the Terminal Yard. As with Alternative 1, the Unitek facility in the Expansion Area would remain under the No Action Alternative.

Under the No Action Alternative, demand for utilities and public services would not change from existing conditions. Currently identified utility infrastructure deficiencies would remain and infrastructure would be repaired or replaced as failures occurred over time. Outages to utilities would be greater than under the Proposed Action or Alternative 1.

5.1.5.4 Mitigation Measures

The following mitigation measures are proposed by the Proponent to address potential environmental consequences associated with recognized environmental conditions during construction of the Proposed Action:

During Construction

- To the extent feasible, construction-generated solid waste would be diverted from landfills and sent to recycling. Other means of reducing the solid waste generated by the Port Modernization Program would include on-site source separated recycling, potential reuse of demolition materials onsite, and, salvage and reuse of building components.

5.2 Natural Resources

5.2.1 Geology and Soils

This section describes the existing soil and geologic conditions on the Port Modernization Program site and in the site vicinity, and evaluates the environmental consequences from construction and operation of the Proposed Action and Alternatives. This section is based on the June 2010 *Preliminary Geotechnical Design Report* by PB Americas, Inc. (see **Appendix A**).

5.2.1.1 Introduction

Regulatory Framework

Guam has adopted the 2009 International Building Code (IBC) and the 2009 International Fire Code as the official building code of Guam (Guam Code Ann. tit. 21, ch. 67). The IBC provides guidance on construction methods and best management practices, including measures to address potential site-specific geologic conditions such as seismic hazards.

AGEPA) Environmental Protection Plan (EPP) would be required for clearing, grading, and marine-related construction work (22 Guam Admin. R. & Regs. §45102(c)). EPPs include environmental protection measures to reduce, minimize, or eliminate impacts. EPPs may include erosion and sedimentation control, vegetation, coral/marine resource protection measures, fugitive dust control, solid and hazardous waste management, and disposal procedures.

Construction of the two new proposed storm water outfalls in the Expansion Area would require a USACE Rivers and Harbors Act of 1899 Section 10/404 Clean Water Act (CWA) (33 U.S.C. §1251 *et seq.*) permit. Approval of this permit would allow for the discharge of dredged or fill material (rip-rap at the proposed storm water outfall outlets) into coastal waters and work (to install the storm water outfalls and rip-rap) in these waters. A CWA Section 402 National Pollution Discharge Elimination System (NPDES) permit administered by USEPA with authority delegated to GEPA would be required for the point-source discharge of storm water from the proposed outfalls into surface waters (in this case, coastal waters). A CWA Section 401 water quality certification administered by USEPA with authority delegated to GEPA would also be required for storm water discharged from the site. Implementation of these permit/certification requirements would help maintain acceptable water quality in Apra Harbor.

Key Definitions

The following key definitions apply to the descriptions and analysis in this section:

- *Geological Resources* – geologic resources consist of the earth’s surface and subsurface materials. The characteristics of soils and underlying rocks include stability, slope, compatibility, shear strength and productivity. These resources typically are described in terms of geology, topography, soils, and geologic hazards.
- *Geology* – geology is the study of the earth’s composition and provides information on the structure and configuration of surface and subsurface features. Such information is derived from field analysis based on observations of the surface and borings to identify subsurface composition.

- *Topography* – topography pertains to the general shape and arrangement of a land surface, including its height and the position of its natural and human-made features.
- *Soils* – soils are the unconsolidated materials overlying bedrock or other parent material. Soils typically are described in terms of their complex type, slope, and physical characteristics. Differences among soil types in terms of their structure, elasticity, strength, shrink-swell potential, and erosion potential affect their abilities to support certain applications or uses.
- *Geologic Hazards* – geologic hazards are adverse geologic conditions capable of causing damage or loss of property and life such as earthquakes, volcanic eruptions, tsunamis, and landslides.

Methods and Study Area

The *Preliminary Geotechnical Design Report* (see **Appendix A**) was prepared based on historic data, soil borings, and laboratory test results. The study area for *Preliminary Geotechnical Design Report* analysis was the Port Modernization Program site. The field investigation program conducted in support of the report included 32 borings, consisting of 15 for the wharf and waterfront, seven for various Port structures, five for high-mast light poles, and five offshore borings for the waterfront bulkhead structure.

5.2.1.2 Affected Environment

This section describes the existing geologic and soils conditions on and in the vicinity of the Port Modernization Program site, as identified in the *Preliminary Geotechnical Design Report* (see **Appendix A**).

Regional Geology and Topography

Guam Geology

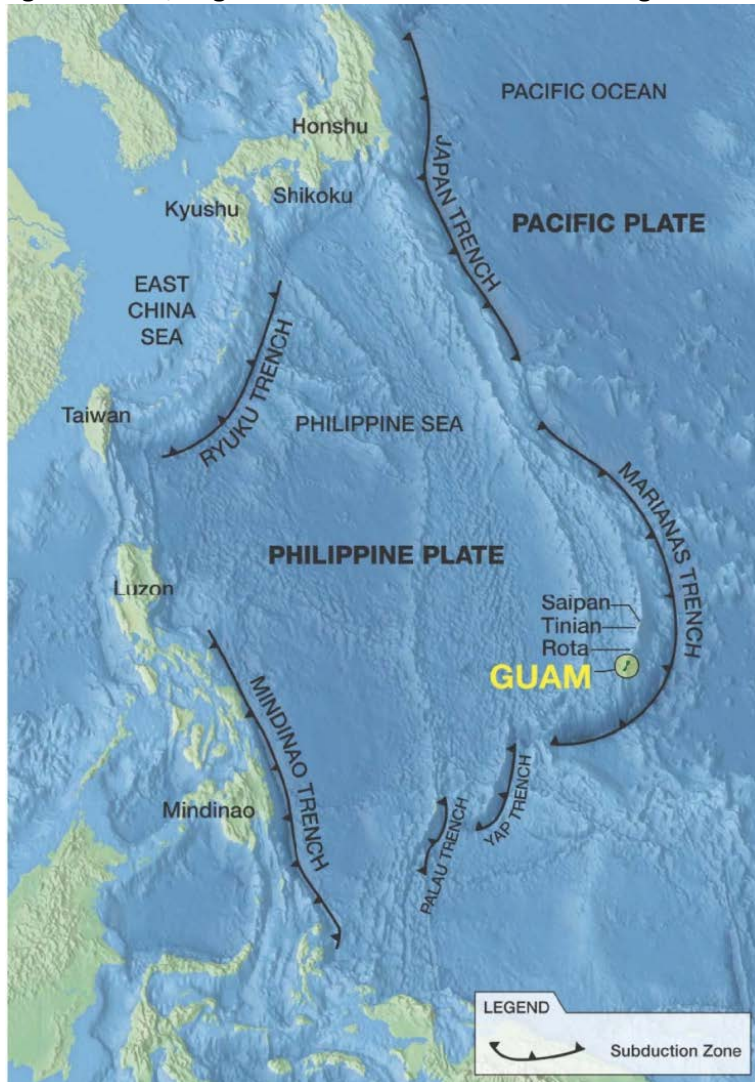
The island of Guam is located in the western Pacific Ocean and is the southernmost island in the Marianas Island chain. Located approximately 1,500 miles south-southeast of Japan and 1,200 miles east of the Philippine Islands, the Marianas Islands constitute the boundary between the Philippine Sea and the Pacific Ocean. Situated along the top of the Marianas ridge, the Marianas Islands comprise a classic island arc structure associated with a region of active tectonic subduction (see **Figure 5.2.1-1**).

The subduction zone is coincident with the Marianas Trench, parallel and east of the Marianas Islands. At this location, oceanic crust of the Pacific Plate is being subducted beneath the Philippine Plate. Guam represents the south end of this island arc system, and as such, the tectonic activity at this end may involve subducting tectonic activity and a component of strike-slip deformation, as the western edge of the Pacific Plate steps further westward toward the Yap Trench and Palau Trench.

The island of Guam can be divided into two broadly defined geologic provinces. The northern half of the island consists of an uplifted and slightly tilted platform of carbonate rocks, almost entirely comprised of various limestones. The southern half of the island, which contains the Port Modernization Program site, consists of volcanic rocks (pyroclastic rocks, basalt, pillow basalt, tuff breccia) and sedimentary rocks (shales, sandstones, limestone, and conglomerate) of volcanic and limestone origin. The boundary between the northern limestone platform and the rocks of the southern part of the island is delineated by the Adelup Fault, which extends between Pago Bay and Adelup point (see **Figure 5.2.1-2**).

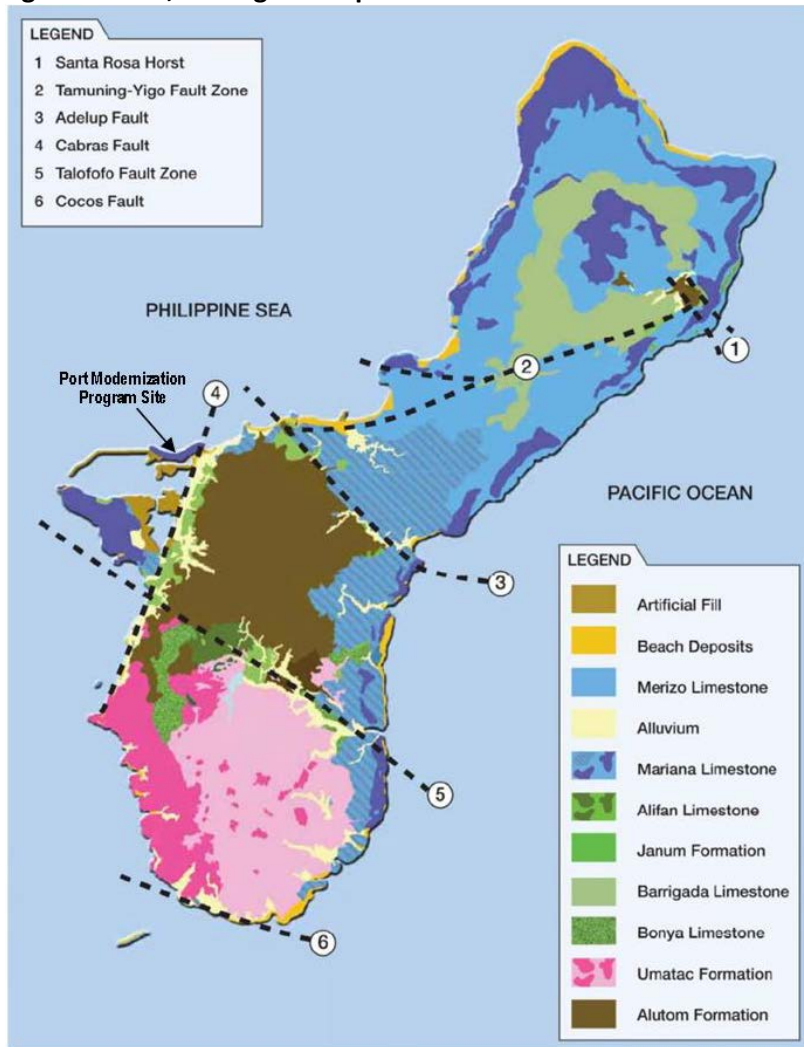
There are three primary structural provinces on Guam (Tracey, 1964, as referenced in **Appendix A**): the northern, central, and southern provinces. A gently sloping limestone platform defines the northern province. The central province, where the Port Modernization Program site is located, is defined by the area between the Adelup Fault and the Talofofu Fault zones. The southern province is the part of the island south of the Talofofu Fault zone (see **Figure 5.2.1-2**).

Figure 5.2.1-1, Regional Location and Tectonic Setting



Source: Figure 4, Appendix A

Figure 5.2.1-2, Geological Map of Guam



Source: Figure 5, Appendix A

The central province, where the Port Modernization Program site is located, is dominated by the folded and jointed rocks of the Alutom Formation. These rocks exhibit fold axes and faulting that trend predominantly northeast-southwest and the dip is generally to the southeast. The central province also includes a limestone plateau on the west side of the island that is geomorphically distinct and has been named the Orote block (Tracey, 1964, as referenced in **Appendix A**). The eastern boundary of the Orote block is formed by the Cabras Fault that extends from the east end of Cabras Island in a south-southwesterly direction to Facpi Point.

Faults have been observed throughout Guam, ranging from features that show small degrees of offset to major linear features that separate rocks of different types and physiographic regions. Brief descriptions of the major faults are presented below and are illustrated on **Figure 5.2.1-2**.

1. *Santa Rosa Horst* – Three high-angle normal faults bound Mount Santa Rosa, delineating a block that has been uplifted relative to the surrounding area.

2. *Tamuning-Yigo Fault Zone* – This fault zone is comprised of high-angle normal faults extending from the west coast of Guam near Tamuning to the alluvial flat of northeastern Guam, at the southwest corner of the Santa Rosa Horst.
3. *Adelup Fault* – The Adelup Fault extends northwest to southeast across the “waist” of Guam and forms the structural boundary between the northern limestone plateau and the central structural province.
4. *Cabras Fault* – Located along the straight coastline of western Guam between Cabras Island and Facpi Point, the presence of the Cabras Fault is inferred. The limestone platform of the Orote peninsula is tilted toward the northeast consistent with fault deformation (Tracey, 1964, as referenced in **Appendix A**). This fault is located immediately southeast of the Port Modernization Program site.
5. *Talofoto Fault Zone* – The Talofoto Fault zone defines the boundary between the central and southern structural provinces of Guam. The fault zone extends from Talofoto Bay to the west end of the Orote peninsula in a west-northwesterly direction, roughly parallel to the Adelup Fault.
6. *Cocos Fault* – The Cocos reef and lagoon on the southern tip of the island appear to have grown on a surface representing a down-dropped block of the Umatac Formation. The linear edge defining the downdropped block is generally parallel to the Talofoto and Adelup Faults, and this edge is the inferred location of the Cocos Fault (Tracey, 1964, as referenced in **Appendix A**).

Port Modernization Program Site Geology

The Port Modernization Program site is located on the west side of Cabras Island just north of the Orote Peninsula. The Port was built as an extension of Cabras Island, a naturally occurring carbonate platform associated with the reef facies of the Mariana limestone. The Port facilities include a breakwater (Glass Breakwater) extending to the west on the north side of the harbor just over 2 miles from the western end of Cabras Island.

The Mariana limestone unit near the site is massive, generally compact, porous, and cavernous white limestone of reef origin. The limestone is comprised mostly of corals in a growth position in a matrix of encrusting calcareous algae. The limestone found on Cabras Island was reportedly quarried in an extensive exposure at the northeastern end of the island. The Orote Peninsula that forms the southern side of the harbor is comprised largely of the same reef facies member of the Mariana limestone. In addition to the older Pliocene and Pleistocene Mariana limestone, modern reefs are present near the Port Modernization Program site. Limestone is exposed at the surface on Cabras Island, east of the Port Modernization Program site, and is typically found relatively close to the surface in the portions of the Port that were originally part of Cabras Island. In other locations, near surface man-made fill material, marine silty sands and coralline gravels typically comprise the stratigraphic sequence that overlays the limestone rock.

Soils and Subsurface Soil Conditions – The subsurface soils underneath the pavement in the Terminal Yard extending from Berths F-4 to F-6 generally consist of fill materials that were placed during construction of the Port in the mid to late 1960’s. The fill materials are composed of dredged materials that consist of dense to very dense silty and sandy limestone gravel fill. The fill depth varies from thin layers on the east (Berth F-6) to a thickness of 14 feet on the west (Berth F-4). Beneath the limestone fill

are old sea floor deposits consisting of a variety of silty sand, relatively clean sand, and silty sandy coral gravel.

Elevation of the top of the coralline limestone formation varies significantly from Berth F-4 (west) to Berth F-6 (east) in the Terminal yard. In general, the depth to coralline limestone becomes shallower progressively towards the eastern section of the Port property (i.e., towards Berth F-6). Based on existing reports, the limestone is known to extend to great depths of a few hundred feet and is part of the Marianas limestone formation that underlies the greater portion of Guam. Marianas limestone is generally moderately hard to hard, with some weak zones and some very hard zones.

The soil and subsurface soil conditions in the Expansion Area are generally similar to the conditions in the Terminal Yard.

Geologic Hazards – Subduction of the Pacific Plate beneath the Philippine Plate (on which Guam is located) forms the Mariana trench (just east of Guam), which is the cause of seismic activity in this region. Guam is in Seismic Probability Zone 4, the zone with the highest probability of ground acceleration caused by seismic activity (36 CES/CEVN 2003).

Historically, major earthquakes and resulting tsunamis have been recorded in 1849, 1902, 1975, and 1978. More recent earthquakes include one on August 8, 1993, with a magnitude of 8.1, and one on October 13, 2001, with a magnitude of 7.0.

The plate tectonic elements in the Guam region have contributed to the seismicity in the area. The vast majority of earthquakes in the region are thrust events that occur along the subduction zone. Historically, subduction zones have been responsible for the largest and most damaging earthquakes in the world. In addition to the subduction zone earthquakes, significant shallow earthquake activity occurs throughout the island arc and within the subducted Pacific plate in the region. Other significant seismic sources that could contribute significantly to the local seismicity and ground motion intensity are the potential active local crustal faults.

The Port Modernization Program site is located in a medium-to-high seismicity region. Seismic design for the Port facility is a critical factor to be considered, as demonstrated by the extensive damage caused by the 1993 earthquake with a moment magnitude (MW) of 7.7 (Vazifdar and Kaldveer 1995, as referenced in **Appendix A**). Significant waterside bulkhead and crane runway were displaced laterally by as much as 18 inches toward the water. Surface pavement cracking and settlements were observed in many locations in the wharf backland area. Much of the structural and pavement damage was due to liquefaction-induced lateral spreading of the loose, coral fill underlying estuarine sediment behind the anchored sheet pile bulkhead. The 2009 IBC recognized Guam's high earthquake risk, and assigned a design level of ground shaking for Guam that was consistent with other seismically active areas around the Pacific Rim, including Japan, Taiwan, and Seattle. The seismic hazards most relevant to the Port of Guam include ground shaking, liquefaction, settlement, and lateral spreading.

- *Ground Shaking* – The entire island of Guam lies within a seismically active area, and the potential for ground shaking at the site exists. The site is located over deposits of relatively soft to loose soils that may amplify earthquake ground motions at various frequencies. Consequently, the near-surface soils at the site could affect the level of earthquake ground shaking felt in the area. Certain soil deposits at the site may be subject to ground motion amplification and subsequent liquefaction during a significant earthquake event.

- *Liquefaction* – When shaken by a significant earthquake, certain soils may lose strength and temporarily behave as if they were liquid. This phenomenon is known as liquefaction. The seismically induced loss of strength can result in loss of bearing capacity for shallow foundations, reduction in vertical and lateral deep foundation capacities, downdrag forces on deep foundations, ground surface settlement, embankment instability, sand boils, and lateral spreading. Seismically induced liquefaction typically occurs in loose, saturated, sandy material commonly associated with recent river, lake, and beach sedimentation. In addition, seismically induced liquefaction can occur in areas of loose, saturated fill.
- *Lateral Spreading* – Lateral spreading is a phenomenon in which lateral ground displacements occur as a result of soil liquefaction. Lateral spreading is typically observed on very gently sloping ground or on virtually level ground adjacent to slopes. Lateral spreading tends to break the upper soil layers into blocks that progressively move downslope during an earthquake. Large fissures at the head of the lateral spread are common, as are compressed or buckled soil at the toe of the soil mass.
- *Settlement* – Portions of the site are underlain by loose/soft compressible deposits. Constructing heavy structures without appropriate support or placing significant heights of fill directly on these soil types could cause varying amounts of settlement. Such settlement could potentially result in damage to structures and utilities.

Erosion – The Port Modernization Program site is located in a highly developed environment where the erosion hazard is considered relatively low; however, certain soil types at the site may be susceptible to erosion when disturbed by construction. When unvegetated and/or disturbed, finer-grained soils could be subject to some degree of erosion during construction.

5.2.1.3 Environmental Consequences

This section describes potential environmental consequences to geologic and soil conditions during construction and operation of the proposed Port Modernization Program under the Proposed Action and Alternatives. Construction activities associated with the Port Modernization Program would have the potential to disturb geologic and soils conditions. With adherence to relevant regulations and laws and application of standard construction best management practices, no significant environmental consequences from operations of the Proposed Action would be anticipated.

Evaluation Criteria

Protection of unique geological features, minimization of soil erosion, and the siting of facilities in relation to potential geologic hazards are considered when evaluating potential impacts of the Proposed Action and Alternatives on geological resources. Generally, impacts can be avoided or minimized if proper construction techniques, erosion-control measures, and structural engineering design are incorporated into project development.

Analysis of potential impacts on geological resources typically includes the following steps:

- Identification and description of resources that could potentially be affected;
- Examination of a proposed action and the potential impacts this action might have on the resource;

- Assessment of the level of potential impacts; and,
- Provision of mitigation measures in the event that potentially adverse impacts are identified.

Effects on geology and soils would be adverse if they would alter the lithology, stratigraphy, and geologic structure that change the soil composition, structure, or function within the environment, and if construction techniques to minimize the potential for impact to proposed structures are not available or feasible.

Proposed Action

Construction Effects

Grading – The Proposed Action would require grading for construction of utilities and facilities throughout the Port Modernization Program site and to achieve suitable finish grades for building construction in the Expansion Area. The Proposed Action would require approximately 145,000 cubic yards (CY) of grading in the Expansion Area. Excavation could extend from 0-20 feet below ground surface. Soil not reused on the site would be transported to a temporary soil stockpile facility for later reuse. The soil stockpile would be located at a Port-owned property located directly north of the Expansion Area, north of Route 11. The soil stockpile would be secured to prevent erosion or dust hazards, in accordance with applicable regulations and best management practices.

As a part of subgrade preparation, all vegetation, organic matters, and other deleterious materials would be removed, as deemed necessary. After stripping and grubbing operations and prior to placement of structural fill, the exposed ground surface should be evaluated by the project Geotechnical Engineer for loose and/or undesirable soil deposits and approved before proceeding with fill placement.

Site grading activities could potentially disturb contaminated soils within the site. Soil management provisions would be adopted to address site construction activities, soil stockpile management, and contaminated soil disposal in relation to cleanup requirements and plans (see **Section 5.1.3**, Hazardous Materials and Waste, for additional information).

Geologic Hazards – Geologic hazard impacts are discussed below in terms of how existing soil and geologic conditions at the site could affect construction activities associated with the Proposed Action.

Ground Shaking

The entire island of Guam lies within a seismically active area, and the potential for moderate to high levels of ground shaking would be considered during the specific design and permit process for future site improvements. Seismic design using the most recent design codes (including the IBC) and generally accepted engineering standards and practices would be conducted as part of the building/infrastructure design and permit process for the Port Modernization Program. With adherence to applicable seismic design and engineering requirements, significant impacts associated with ground shaking would not be anticipated.

Liquefaction

A potential exists for loss of soil strength (loss of bearing capacity for shallow foundations or the reduction in lateral and vertical capacities of deep foundations), ground surface settlement, and lateral displacement of soils supporting the future structures where founded in or over liquefiable soils. The

specific magnitude of settlement, soil movement, and loss of strength would be a function of the soil thickness, soil quality, groundwater level, location, magnitude of the seismic event, and the specific foundation system of the structure.

Liquefaction can result in widespread structural damage of buildings and utilities if not properly mitigated. Damage caused by liquefaction can include: foundation rotation, slope failure, lateral spreading, and post-liquefaction ground subsidence (settlement).

Soil liquefaction, should it occur, would likely lead to consolidation of loose, saturated soil deposits, resulting in some surface settlement at the site. Since subsurface conditions vary across the site, overall settlement would also vary, leading to differential settlements across the site and possibly differential settlements between adjacent foundation elements. Liquefaction-induced ground settlements could cause increased downdrag loading on deep foundations.

Impacts associated with soil liquefaction could be mitigated in a number of ways. Examples of possible mitigation methods include ground improvement, use of deep foundations, and/or designing for potential soil liquefaction impacts. Implementation of specific mitigation measures would be determined during the site-specific building/infrastructure design and permit process for future site improvements. With adherence to applicable seismic design and engineering requirements, significant impacts associated with liquefaction would not be anticipated.

Settlement

Portions of the site are underlain by loose/soft compressible deposits. Constructing heavy structures or placing significant heights of fill directly on these soil types could cause varying amounts of settlement. Such settlement could potentially result in damage to structures and utilities. In order to preclude adverse settlement impacts, typical construction mitigation measures would be implemented; such measures could include using deep foundation systems for heavy structures, preloading a building site prior to construction of relatively light structures on spread foundations, delaying construction until most of the fill-induced settlement has occurred. With adherence to applicable seismic design and engineering requirements, significant impacts associated with settlement would not be anticipated.

Lateral Spreading

Lateral spreading is a phenomenon in which lateral ground displacements occur as a result of soil liquefaction. Lateral spreading would be specifically evaluated during the site-specific design and permit process. Lateral spread displacements could cause significant forces that could result in permanent deformation of piles/drilled shafts used to support structures. Mitigation measures could include stabilizing unsupported slopes by using ground improvement techniques or installing retaining structures at appropriate depths and locations, or by designing foundation systems to resist the lateral loads due to lateral spreading. With adherence to applicable seismic design and engineering requirements, significant impacts associated with lateral spreading would not be anticipated.

Erosion

The Port Modernization Program site is located in an urban environment where the erosion hazard is considered relatively low; however, certain soil types at the site may be susceptible to erosion when disturbed by construction. When unvegetated and/or disturbed, finer-grained soils such as those in the Expansion Area could be subject to some degree of erosion during construction. Erosion impacts from

exposed soil and soil stockpiles could cause onsite transport of sediment (see **Section 5.2.4**, Sediment Quality, for detail). Construction activities would include employing temporary erosion control measures and best management practices to mitigate erosion impacts. A permit for clearing and grubbing from the Guam Department of Public Works would be required.

Construction activities would comply with *GEPA* Soil Erosion and Sedimentation Control regulations, 22 Guam Admin. R. & Regs. §45101 *et seq.*, which apply to clearing or other earthmoving operations that require a permit as provided for in Title 21 Guam Code Annotated, Chapter 66. The contractor would be required to prepare an Environmental Protection Plan prior to construction that would describe site-specific erosion and sediment control measures. For example, silt fencing would be used to contain soil piles and graded areas. In addition, best management practices (BMPs) would be installed at appropriate locations, as necessary, to attenuate storm water runoff from existing parking areas and minimize potential for associated soil erosion and potential transport of storm water pollutants onto the beach and adjacent coastal water.

An Erosion Control Permit would be obtained from GEPA. This permit would include BMPs to be used during construction to prevent soil from entering Apra Harbor and, therefore, prevent significant adverse erosion impacts during construction.

Operational Effects

The preliminary design of the Proposed Action facilities analyzed in the *Preliminary Geotechnical Design Report* (see **Appendix A**) includes seismic design criteria, recommendations for foundation design for buildings and appurtenant structures and for high mast lighting poles, retaining walls, slope stability, and earthwork (backfill materials, soil improvement, and pavement design). Operations of the Proposed Action would not be anticipated to result in adverse impacts to soils and geology and the design would comply with the recommendations made in the *Preliminary Geotechnical Design Report* including seismic design criteria, slope stability recommendations, and International Building Codes.

Storm water runoff generated on the site after construction would be controlled by a permanent system that would reduce the potential for storm water induced erosion. BMPs would also be implemented to control land-side erosion, sediment input and storm water runoff. With proper design, installation and maintenance of the storm water system and BMPs, significant erosion impacts associated with the operation of the Proposed Action would not be anticipated.

Alternative 1

Construction and operational environmental consequences to geologic and soils conditions associated with Alternative 1 would generally be similar to those described for the Proposed Action within the Terminal Yard Area. The potential for environmental consequences to geologic and soils conditions in the Expansion Area would not occur under Alternative 1.

No Action

The potential for environmental consequences associated with geologic and soils conditions under the No Action Alternative would be generally similar to those described for the Proposed Action in the Terminal Yard area. Demolition of buildings/structures, excavation for utilities, and repaving of operations areas would occur over time as failures occurred.

5.2.1.4 Mitigation Measures

The following mitigation measures are proposed by the Proponent to address potential environmental consequences associated with geology and soils during construction and operation of the Proposed Action:

During Construction

- After stripping and grubbing operations and prior to placement of structural fill, the exposed ground surface should be evaluated by the project Geotechnical Engineer for loose and/or undesirable soil deposits and approved before proceeding with fill placement.
- Seismic design using the most recent design codes (including the IBC) and generally accepted engineering standards and practices would be conducted as part of the building/infrastructure design and permit process for the Port Modernization Program.
- Impacts associated with soil liquefaction could be mitigated in a number of ways. Examples of possible mitigation methods include ground improvement, use of deep foundations, and/or designing for potential soil liquefaction impacts. Implementation of specific mitigation measures would be determined during the site-specific building/infrastructure design and permit process.
- In order to preclude adverse settlement impacts, typical construction mitigation measures would be implemented; such measures could include using deep foundation systems for heavy structures, preloading a building site prior to construction of relatively light structures on spread foundations, delaying construction until most of the fill-induced settlement has occurred.
- Lateral spreading mitigation measures could include stabilizing unsupported slopes by using ground improvement techniques or installing retaining structures at appropriate depths and locations, or by designing foundation systems to resist the lateral loads due to lateral spreading.
- Construction activities would include employing temporary erosion control measures and best management practices to mitigate erosion impacts.
- A permit for clearing and grubbing from the Guam Department of Public Works would be required.
- Construction activities would comply with GEPA Soil Erosion and Sedimentation Control regulations, which apply to clearing or other earthmoving operations that require a permit as provided for in Title 21 Guam Code Annotated, Chapter 66. The contractor would be required to prepare an Environmental Protection Plan prior to construction that would describe site-specific erosion and sediment control measures.
- An Erosion Control Permit would be obtained from GEPA. This permit would include BMPs to be used during construction to prevent soil from entering Apra Harbor and, therefore, prevent significant adverse impacts during construction.
- Soils excavated during grading activities and not reused onsite would be tested for contamination and sent to a disposal facility (if contaminated) and or to the adjacent offsite soil

stockpile site. The soil stockpile site would be secured to prevent erosion and dust impacts in accordance with applicable BMPs and regulations.

Following Construction

- A permanent storm water system would be installed in the Expansion Area and improvements would be made to the storm water control system in the Terminal Yard. Together, these systems would minimize the potential for storm water induced erosion impacts.
- BMPs would be implemented to control erosion, sediment input, and storm water runoff.

5.2.2 Surface Water, Storm Water and Floodplains

This section describes existing surface water, storm water, and floodplain conditions on and in the vicinity of the Port Modernization Program site. Potential environmental consequences to surface water, storm water, and floodplains associated with construction and operation of the Port Modernization Program are also analyzed. Information provided in the *Marine Environmental Assessment* (2011) conducted by Marine Research Consultants, Inc. was used to prepare this section (see **Appendix I**).

5.2.2.1 Introduction

Regulatory Framework

Guam EPA (GEPA) has established water quality standards that include general criteria (i.e. water resources should be free of debris, support aquatic life) and specific numerical criteria (i.e. specific microbial or nutrient levels that should not be exceeded in water resources), 22 Guam Admin. R & Regs. §5101 et seq. The purpose of the GEPA water quality standards is to prevent degradation of water resources resulting from pollution sources. The standards identify three classifications of water: marine, surface, and groundwater. The standards define marine waters as all coastal waters offshore of the mean high water mark, such as Apra Harbor. Marine waters are further divided into three categories: M-1 (Excellent), M-2 (Good), and M-3 (Fair).

Construction of the two new proposed storm water outfalls in the Expansion Area would require a USACE Rivers and Harbors Act of 1899 Section 10/404 Clean Water Act (CWA) permit (the Section 10 permit relates to navigable waters; the Section 404 permit to wetlands/waters of the United States (WOUS)). Approval of this permit would allow for the discharge of dredged or fill material (rip-rap at the storm water outfall outlets) in surface waters and work (to install the storm water outfalls and rip-rap) in surface waters. A Section 402 National Pollution Discharge Elimination System (NPDES) Permit administered by USEPA with authority delegated to GEPA would be required for the point source discharge of storm water from the site into surface waters (coastal waters, in this case). A Section 401 water quality certification administered by USEPA with authority delegated to GEPA would also be required for storm water discharged from the site. Implementation of these permit/certification requirements would help maintain acceptable water quality in Apra Harbor.

GEPA regulations require the use of best management practices for temporary erosion, sedimentation, and pollution control during construction (via an Erosion Control Permit and Water Quality Certification), and approved measures for storm water discharge during operation of a project (via a GEPA NPDES Permit).

A GEPA EPP would be required for clearing, grading, and marine-related construction work. EPPs include environmental protection measures to reduce, minimize, or eliminate impacts. EPPs may include erosion, dewatering and storm water management control measures and BMPs that would help minimize impacts on surface waters and storm water.

Both the federal government and Guam have regulations and guidelines regarding development in floodplains. These regulations and guidelines are intended 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 or indirect support of floodplain development wherever there is a practicable alternative.

Key Definitions

The following key definitions apply to the descriptions and analysis in this section:

- *Surface Water* – Surface water is water collecting on the ground or in a stream, river, lake, wetland, or ocean. Surface water is naturally replenished by precipitation and lost through evaporation and seepage into the ground.
- *Storm Water* – is water that originates during precipitation events. Precipitation can be collected and conveyed to a storm water system or can runoff to surface waters such as streams, rivers, and coastal waters. Storm water is generally managed for both quantity of flows and water quality. Storm water flows, which increase in volume with high proportions of impervious surfaces associated with buildings, roads and parking lots, can cause erosion without proper management. Storm water has the potential to introduce sediments and other contaminants that could degrade water quality in surface waters. Storm water management systems convey precipitation away from developed sites and provide flow control and treatment (if required) prior to discharge into appropriate receiving surface waters.
- *Floodplains* – a floodplain is a low-lying area subject to flooding. The Federal Emergency Management Agency (FEMA) maintains Flood Insurance Rate Maps (FIRM) which documents the location of designated floodplain areas.

Methods and Study Area

As a component of the Marine Environmental Assessment (2011) prepared by Marine Research Consultants, Inc., water quality sampling and analysis was conducted (see **Appendix I**) on December 18, 2010. The field surveys (water quality sampling) were conducted pursuant to a USEPA, NOAA National Marine Fisheries Service (NMFS), US Fish & Wildlife Service (USFWS), USACE and GEPA approved Work Plan dated October 2010.

Thirty-four water samples were collected at the location of the proposed storm water outfalls and adjacent areas and analyzed to characterize water quality. Samples also were collected at the effluent from the Cabras Power Plant thermal discharge and along Piti Channel in the area of the proposed storm water outfalls. Samples were analyzed for temperature, phosphate phosphorous (PO_{43+}), nitrate + nitrite nitrogen ($NO_3^-+NO_2^-$), ammonium nitrogen (NH_4^+), dissolved oxygen (DO), salinity, total suspended solids (TSS), turbidity and temperature. The results were compared to GEPA Water Quality Standards.

The water quality samples were collected during a “dry” period defined as a time when there is no visible surface runoff from land into Apra Harbor. These results represent best case conditions. The report indicates samples will be collected during a “wet” period, defined as a time during and following an episode of rainfall of a magnitude sufficient to cause visible runoff into Apra Harbor, at a later date to support preparation of permit applications.

FEMA Flood Insurance Rate Maps for the Port Modernization Program Site were reviewed to determine the presence of floodplains or floodway fringe on the site.

5.2.2.2 Affected Environment

This section describes the existing surface water, storm water, and floodplain conditions on and in the vicinity of the Port Modernization Program site (see **Appendix I** for details).

Surface Water

Apra Harbor is the only surface water body on the Port Modernization Program site. No rivers, streams, or lakes are located on the site.

Water Quality Classification and Setting

Waters in Apra Harbor are designated by GEPA as M-3, marine waters in fair condition. Per GEPA water quality standards, waters in this category are intended for general, commercial, and industrial uses while allowing for protection of marine life, aesthetic enjoyment, and limited body contact recreation. Specific uses include the following: shipping, boating and berthing, industrial cooling water, and marinas. As there is extensive commercial tourist boat traffic in the area, as well as proximity to the Commercial Port, this category is appropriate.

The GPA Cabras Power Plant is located to east of the Port and produces a thermal discharge into Piti Channel/Apra Harbor. Piti Channel also is subject to significant silt introduction by upland runoff during precipitation events.

Water Quality Survey

As a component of the Marine Environmental Assessment (2011) conducted by Marine Research Consultants, Inc.), water quality sampling and analysis was conducted (see **Appendix I**). All sample results were well below Guam Water Quality Standards for Category M-3 Marine Waters. Analysis of water chemistry revealed the following characteristics:

- Slight horizontal gradients of decreasing temperature and increasing salinity occurred with distance from the proposed storm water outfalls into Apra Harbor. Distinct vertical gradients in temperature occurred between surface and bottom samples;
- Temperature is elevated in the surface samples due to solar heating and light density of warm water;
- Water temperature decreased from the Cabras Power Plant effluent through Piti Channel until it reached background temperature at the location of the proposed storm water outfalls;
- Dissolved $\text{NO}_3^- + \text{NO}_2^-$ showed little variation in concentration as functions of distance from the proposed storm water outfalls and the Cabras Power Plant and surface concentrations were elevated over bottom water concentrations;
- NH_4^+ and PO_4^{3-} showed little variation among sampling transects except nearest to the Cabras Power Plant effluent;
- Turbidity and TSS showed slight elevations nearest the shoreline, but were considered low in magnitude; and,

- Vertical profiles through the water column indicated weak stratification in the upper ten feet of depth. Below ten feet in depth, the water column was well mixed and homogeneous with respect to temperature, salinity, pH and dissolved oxygen.

Storm Water

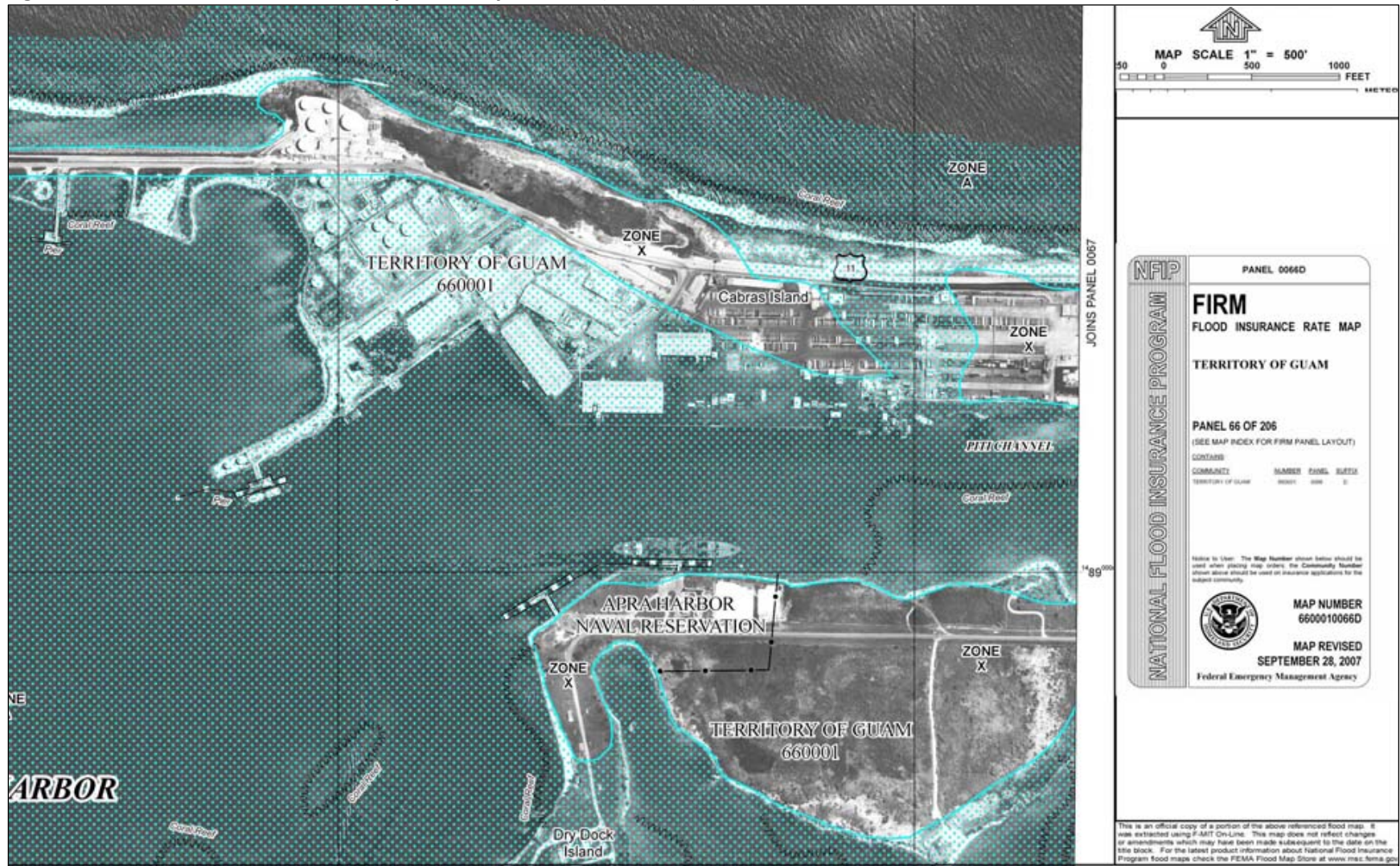
The Port's existing storm water drainage system in the Port Modernization Program site is comprised of a gravity drainage system consisting of gutters, inlets, catch basins, sump pits and 12 underground pipes, approximately 30 inches in diameter. The system collects storm water on the site and conveys it to eight existing outfalls that discharge into Apra Harbor, including two through Berth F-3, four between Berths F-4 to F-6, and two more in the Cabras Island area.

Storm water from the Port Modernization Program site is currently not treated before discharge to Piti Channel/Apra Harbor. At the time the Port was constructed, treatment of storm water runoff before discharge was not required.

Floodplains

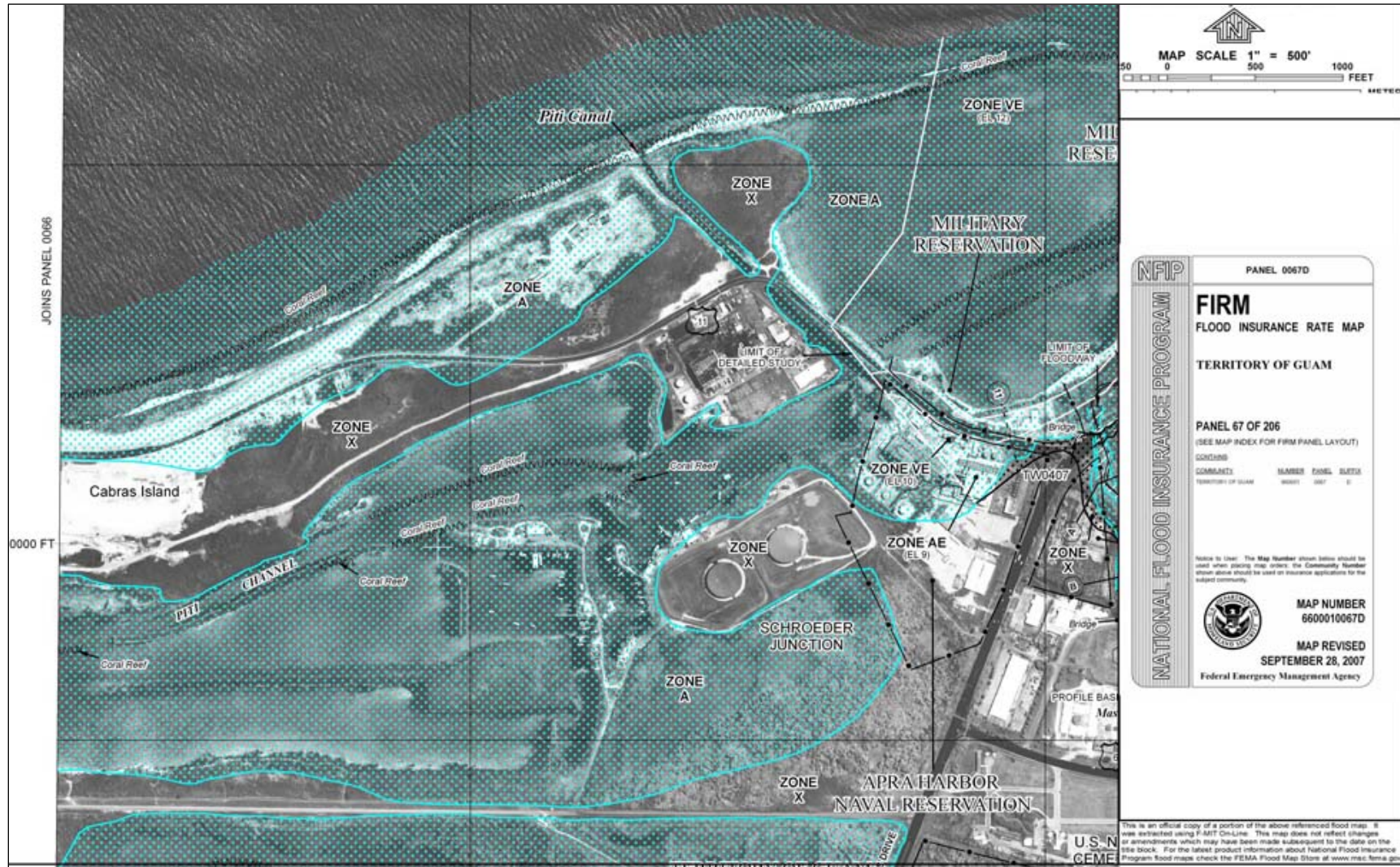
The Port Modernization Program site is primarily located within FEMA Flood Zone A (the 100-year floodway fringe, and considered Special Flood Hazard Areas). This area is shaded in blue on **Figures 5.2.2-1** and **5.2.2-2**. The central portion of the upland areas of the site in the Terminal Yard and Expansion Area are located in Zone X (outside the 100-year floodplain, and considered areas of minimal flood hazard). This area is shaded in gray on **Figures 5.2.2-1** and **5.2.2-2**. The site is not located in a designated floodway, which greatly reduces the potential for flood rise impacts.

1 **Figure 5.2.2-1, Flood Insurance Rate Map: Territory of Guam (Panel 66)**



2
3 Source: Federal Emergency Management Agency, 2007.

1 **Figure 5.2.2-2, Flood Insurance Rate Map: Territory of Guam (Panel 67)**



2
3 Source: Federal Emergency Management Agency, 2007.

5.2.2.3 Environmental Consequences

This section describes potential environmental consequences to surface water, storm water, and floodplains on and in the vicinity of the Port Modernization Program site during construction and operations under the Proposed Action and Alternatives.

Evaluation Criteria

Effects of the proposed Port Modernization Program on surface water, storm water, and floodplains would be adverse if it results in one or more of the following:

- Reduces water availability or supply to existing users;
- Affects water quality adversely;
- Endangers public health by creating or worsening health hazard conditions;
- Threatens or damages unique hydrologic characteristics; and,
- Violates established laws or regulations adopted to protect water resources.

Proposed Action

The Proposed Action would not be expected to result in significant direct or indirect impacts to surface water, storm water, or floodplains during construction or operation of the project with adherence to BMPs and applicable federal and Guam regulations.

Construction Effects

Surface Water and Storm Water – Construction activities for the Proposed Action would require grading to achieve suitable site topography in the Expansion Area and minor trenching for installation of utilities in the Terminal Yard. A permanent storm water control system would be installed in the Expansion Area, including two new storm water outfalls. Storm water improvements would include the installation of new storm water drainage lines and new outfalls into Apra Harbor. Storm water collection system piping would originate at the northeastern portion of the new gate complex and the north end of the expanded container yard and terminate along the southern border (mid-east location) of the Expansion Area. The piping would converge on two outfalls (30 inches and 36 inches in diameter), which would extend into Apra Harbor and terminate atop flow-dissipating riprap before discharge into Apra Harbor.

During grading operations in the Expansion Area and trenching in the Terminal Yard, there would be an increased potential for short-term erosion and sedimentation when disturbed soils would be exposed to storm water runoff and the potential to affect surface waters in Apra Harbor. Further, soil excavated during grading activities and not reused onsite would be temporarily stockpiled at a location north of the Expansion Area, north of Route 11. Sediment, as well as other pollutants from construction equipment, could temporarily be discharged to Piti Channel/Apra Harbor. With implementation of temporary storm water control management, as well as erosion, sedimentation, and pollutant control BMPs required by GEPA, no significant impact on surface waters would be anticipated during construction.

Construction of the outfalls would require the placement of fill material (rip-rap) and work (to install the outfalls and rip-rap) in Apra Harbor. The use of rip-rap to anchor and protect the storm water outfall structures would be required to maintain the outfalls' structural integrity. The amount of rip-rap placed in Apra Harbor would be the smallest amount necessary to maintain the outfalls' structural integrity.

Based on preliminary designs, installation of the two outfalls would impact an area of approximately 1,530 square feet (combined) and require deposition of approximately 200 cubic yards (combined) of rip-rap material below the high-tide line in Apra Harbor. The placement of additional concrete material below the high-tide line could also be required for construction of the concrete outfalls. Construction activities would be conducted in compliance with federal and Guam water quality regulations, industry BMPs and would be required to obtain the following permit approvals:

- Section 401 Water Quality Certification
- Section 10/404 Permit
- GEPA Environmental Protection Plan

Floodplains – Construction activities for the Proposed Action would require grading to achieve suitable site topography, minor trenching, facility construction and paving in designated FEMA floodplain and floodplain fringe areas. Construction activities would be conducted in compliance with federal and Guam flood management regulations; therefore, no significant impacts to floodplains would be expected during construction of the project.

Operational Effects

Surface Water and Storm Water – Efforts to minimize the extent of impervious surfaces to be installed onsite are currently incorporated into the Proposed Action. The Proposed Action would result in 72.3 acres of impervious area on the Port Modernization Program Site as compared to 51 acres of impervious area under existing conditions; an increase of 21.3 acres. The additional impervious surface area would largely be located in the Expansion Area, as the majority of the Terminal Yard is presently in impervious surfaces. The additional impervious area would increase storm water runoff volume as compared to existing conditions. Although pervious surface does allow storm water infiltration, it also exacerbates erosion and sediment-laden storm water entering surface waters and in highly-compacted soils, the rate of infiltration oftentimes approaches or meets infiltration rates of impervious surfaces. A benefit of the proposed storm water treatment facilities is that they would allow infiltration at managed locations. The Proposed Action would include measures to control the increased storm water volumes and to provide storm water quality treatment before discharge to Apra Harbor. Guam EPA, through 22 GAR, Division 9, Chapter 45 (Soil Erosion and Sediment Control) and 10 GCA, Chapter 47 (Water Pollution Control Act), regulates storm water treatment and erosion and sediment control. Their regulations and permit processes require temporary erosion and sediment controls; Spill Prevention, Control, and Countermeasures planning; and Storm water Pollution Prevention Plans be developed to manage storm water, erosion, sediment and water quality. New storm water management measures include:

- Installation of pipeline infrastructure and two new outfalls (36 inch and 30 inch diameter) with oil/water separators that would discharge storm water from the Expansion Area into Apra Harbor;
- Installation of oil-water separators at eight existing outfalls to provide water quality treatment of storm water prior to discharge into Apra Harbor;
- Diffusion of drainage evenly across the site to avoid concentrating storm water runoff at one point. This would aid in controlling runoff, minimize the size of drainage structures, and avoid drainage system back-up; and,

- Design of the storm water management system to convey drainage away from structures.

The Proposed Action would not be expected to result in adverse impacts to surface water and storm water during operation of the project, since the storm water management system would be designed to accommodate the increased storm water volume and would provide water quality treatment prior to discharge. The Proposed Action would result in beneficial effects on water quality, as compared to existing conditions, with the addition of oil/water separators to existing and proposed outfalls.

A NPDES Operating Permit would be obtained from GEPA for the two new outfalls in the Expansion Area. The outfalls would be operated in compliance with this permit, including periodic water quality monitoring requirements, ensuring that water quality is protected during operation of the outfalls.

Other factors that would contribute to reducing the potential for adverse impacts on surface and storm water include:

- Turbidity and freshwater plumes would be dissipated by wave and current action in Apra Harbor.
- The much larger Masso River watershed upland of Piti Channel is the primary source of suspended sediments in the channel during rain events, and sediment impacts associated with drainage from the Proposed Action would be minor relative to the watershed contribution.
- The zone of initial dilution (ZID) from each of the proposed outfalls generally would be confined by the existing semi-enclosed tidal flat, minimizing the impact area of the outfall plume.

Floodplains – The Proposed Action would place new structures within the floodplain and expand into the adjacent floodway fringe, potentially eliminating some of the flood storage capacity in these areas. Development would occur in accordance with federal and Guam flood management regulations; as a result, no significant impacts to floodplains would be anticipated during operation of the Port Modernization Program.

Alternative 1

Environmental consequences to surface water and storm water resources under Alternative 1 would be similar to the Proposed Action. Under Alternative 1, no new construction would occur in the undeveloped Expansion Area floodplain areas; therefore, the potential environmental consequences identified for the Proposed Action in this area would not occur under Alternative 1. The existing outfalls in the Terminal Yard would be fitted with oil/water separators, which would improve storm water quality discharged from the site, relative to existing conditions. No significant impacts to surface water, storm water, or floodplains from construction or operation of Alternative 1 would be anticipated.

No Action

The No Action Alternative would not generate any new impacts to surface water, storm water, or floodplains. Under this alternative, reconfiguration, modernization, and expansion of the Terminal Yard, and the associated potential for impacts, would not occur. Repair and replacement of deteriorating facilities and utilities at the Port would take place as failures occurred over time. Facilities and utilities would be repaired or replaced within the existing footprint of the Terminal Yard. Under this alternative, storm water conveyed to the eight existing outfalls in the Terminal Yard area would continue to

discharge to Apra Harbor without treatment. Benefits to water quality from installation of the oil/water separators under the Proposed Action and Alternative 1 would not be realized under the No Action Alternative.

5.2.2.4 Mitigation Measures

The following mitigation measures are proposed by the Proponent to address potential impacts to surface water, storm water, and floodplains during construction and operation of the Proposed Action:

During Construction

- A GEPA EPP would be required for clearing, grading, and marine-related construction work. EPPs include environmental protection measures to reduce, minimize, or eliminate impacts. EPPs may include erosion, dewatering, soil stockpile management and storm water management control measures and BMPs that would help minimize impacts on surface waters, storm waters and floodplain areas.
- Temporary storm water management, and erosion, sedimentation, and pollution control measures would be implemented prior to construction activities, per GEPA requirements, which would minimize the potential for sediment and pollutants to be released to wetlands and coastal waters.
- Applicable BMPs would be employed during construction.
- Per Section 404 of the CWA, water quality would be monitored when the proposed storm water pipes and outfalls are being constructed. A Water Quality Plan would also be prepared and implemented during construction, in accordance with the local construction permits (Erosion Control and Clearing and Grading). Adaptive management would be based on the monitoring results to control any detected water quality impacts.

Following Construction

- A permanent storm water control system would be installed in the Expansion Area per GEPA requirements. Improvements would be made to the storm water control system in the Terminal Area. Together, these systems would minimize the potential for storm water impacts on wetlands and coastal waters.
- BMPs would be implemented to control erosion, sediment input and storm water runoff.
- All of the existing storm water outfalls in the Terminal Yard, as well as the two proposed outfalls in the Expansion Area, would be fitted with oil/water separators.
- Neither of the two proposed outfalls would discharge to wetlands or wetland-regulated areas.
- Storm water would be directed to flow-dissipating rip-rap before discharge into Apra Harbor; this would minimize the potential to disrupt sediment and cause turbidity impacts to wetlands and coastal waters.

- The amount of rip-rap placed at the terminus of the two proposed outfalls would be minimized to the greatest extent possible to reduce impacts on WOUS.
- Storm water discharge from the outfalls would be monitored for compliance with NPDES Operating Permit discharge limits to protect water quality. Adaptive management would be based on the monitoring results to control any detected water quilting impacts.

5.2.3 Groundwater

This section describes existing groundwater conditions on and in the vicinity of the Port Modernization Program site. Potential environmental consequences to groundwater associated with construction and operation of the Port Modernization Program are also analyzed. The following section is based upon the *Preliminary Geotechnical Design Report* (2010) prepared by PB Americas, Inc. (see **Appendix A** for the full report).

5.2.3.1 Introduction

Regulatory Framework

A GEPA EPP would be required to obtain a permit for clearing, grading, and marine-related construction work. EPPs include environmental protection measures to reduce, minimize, or eliminate impacts. EPPs may include erosion, dewatering and storm water management control measures and BMPs that would help minimize impacts on groundwater.

Key Definitions

The following key definitions apply to the descriptions and analysis in this section:

- *Water Resources* – include groundwater, surface water, and floodplains. The evaluation of water resources examines the quantity and quality of the resource and its demand for various purposes.
- *Groundwater* – consists of the subsurface hydrologic resources. It is an essential resource often used for potable water consumption, agricultural irrigation, and industrial applications. Groundwater typically can be described in terms of its depth from the surface, aquifer or well capacity, water quality, surrounding geologic composition, and recharge rate.

Methods and Study Area

The *Preliminary Geotechnical Design Report* (see **Appendix A**) was prepared based on historic data, soil borings, and laboratory test results. The study area for the *Preliminary Geotechnical Design Report* analysis was the Port Modernization Program site. The field investigation program conducted in support of the report included 32 borings prepared in 2010.

5.2.3.2 Affected Environment

This section describes the existing groundwater conditions on and in the vicinity of the Port Modernization Program site (see **Appendix A** for details).

Groundwater levels beneath the Port Modernization Program site are relatively shallow. Groundwater was encountered in the site area during subsurface investigations at depths ranging from 6-9 feet below ground surface (BGS). Groundwater on the Port Modernization Program site is brackish to saline in nature due to its close proximity to the ocean and fluctuation with the tides, and is not used for drinking water. Levels of salinity may fluctuate considerably with tidal changes, with greater salinity closer to the seafloor.

The potential for existing groundwater contamination in the area of the Port Modernization Program site is discussed in **Section 5.1.3, Hazardous Materials and Waste**, of this document.

5.2.3.3 Environmental Consequences

This section describes potential environmental consequences to groundwater on and in the vicinity of the site during construction and operation of the proposed Port Modernization Program under the Proposed Action and Alternatives.

Evaluation Criteria

Effects of the proposed Port Modernization Program on groundwater would be adverse if there was a loss of groundwater availability, quality, and/or use.

Proposed Action

The Proposed Action would not be expected to result in significant direct or indirect impacts to groundwater during construction or operation of the project.

Construction Effects

Most construction activities would be conducted above the groundwater table and, therefore, would not affect groundwater resources. However, there would be instances where the installation of structural foundations, such as for high mast lighting and buildings, would encounter groundwater. Dewatering could be required depending on the installation means and methods. Groundwater removed from excavations would be handled and discharged using BMPs to prevent impacts to groundwater resources from dewatering.

Sediment, as well as other pollutants from construction equipment, could temporarily be discharged to surface and groundwater. A GEPA EPP would be developed and implemented that would include environmental protection measures to reduce, minimize, or eliminate impacts to groundwater resources, and would include erosion, dewatering, and storm water management control measures and BMPs. As a result, no significant impacts to groundwater resources would be anticipated during construction.

The potential to encounter existing groundwater contamination in the area of the Port Modernization Program site is discussed in **Section 5.1.3, Hazardous Materials and Waste**, of this document

Operational Effects

Operation of the Proposed Action would not involve withdrawal, discharge, or use of groundwater resources. As under existing conditions, storm water would not be infiltrated, but would be collected from impervious surfaces and conveyed via catchbasins and pipelines to storm water outfalls where it would be discharged into Apra Harbor. Under the Proposed Action, storm water runoff generated from new impervious surfaces, primarily in the Expansion Area, would consist of freshwater containing pollutants. A permanent storm water control system would be installed in the Expansion Area, per GEPA requirements, that would reduce the potential for water quality and quantity impacts on Piti Channel/ Apra Harbor, and on groundwater resources. As a result, no significant impacts to groundwater resources would be anticipated.

Alternative 1

Environmental consequences to groundwater resources under Alternative 1 would be similar to the Proposed Action. No significant impacts to groundwater resources from construction or operation of Alternative 1 would be anticipated.

No Action

The No Action Alternative would not generate new impacts to groundwater resources. Under this alternative, reconfiguration, modernization, and expansion of the Terminal Yard, and the associated potential for impacts on groundwater, would not occur. Repair and replacement of deteriorating facilities and utilities at the Port would take place as failures occurred over time. Facilities and utilities would be repaired or replaced within the existing footprint of the Terminal Yard. No significant impacts to groundwater resources from construction or operation of Alternative 1 would be anticipated.

5.2.3.4 Mitigation Measures

The following mitigation measures are proposed by the Proponent to address potential impacts to groundwater resources during construction of the Proposed Action:

During Construction

- A GEPA EPP would be developed and would include environmental protection measures to reduce, minimize, or eliminate impacts to groundwater resources, such as erosion, dewatering and storm water management control measures and BMPs.

5.2.4 Sediment Quality

This section describes existing sediment quality in the vicinity of the Port Modernization Program site. Potential environmental consequences to sediment quality associated with construction and operation of the Port Modernization Program are also analyzed. The following section is based upon the *Essential Fish Habitat Assessment* (2011) prepared by AMEC (see **Appendix H** for the full report).

5.2.4.1 Introduction

Regulatory Framework

Construction of the two new proposed storm water outfalls in the Expansion Area would require a USACE Rivers and Harbors Act of 1899 Section 10/404 CWA permit. Approval of this permit would allow for the discharge of dredged or fill material (rip-rap at the proposed storm water outfall outlets) into coastal waters and work (to install the storm water outfalls and rip-rap) in these waters. A CWA Section 402 National Pollution Discharge Elimination System (NPDES) permit administered by USEPA with authority delegated to GEPA would be required for the point-source discharge of storm water from the proposed outfalls into surface waters (in this case, coastal waters). A CWA Section 401 water quality certification administered by USEPA with authority delegated to GEPA would also be required for storm water discharged from the site. Implementation of these permit/certification requirements would help maintain acceptable water quality in Apra Harbor, and in turn sediment quality.

A GEPA EPP would be required for clearing, grading, and marine-related construction work. EPPs include environmental protection measures to reduce, minimize, or eliminate impacts. EPPs may include erosion and sedimentation control measures that would help minimize impacts on sediment quality.

Key Definitions

The following key definitions apply to the descriptions and analysis in this section:

- *Sediment* – naturally occurring material that is broken down by processes of weathering and erosion, and is subsequently transported by the action of fluids, such as wind, water, or ice, and/or by the force of gravity acting on the particle itself. For this Environmental Assessment (EA), sediment is material that has been deposited into Apra Harbor.
- *Effects Range Low (ERL) and Effects Range Median (ERM) Sediment Quality Guidelines (SQG)* – As part of the NOAA's National Status Trends (NS&T) Program, since 1991, studies have been conducted to determine the spatial extent and severity of chemical contamination and associated biological effects in coastal bays and estuaries of the U.S. SQGs are tools which relate the concentrations of contaminants in sediment to some predicted frequency or intensity of biological effects, and are intended to either be protective of biological resources, or predictive of adverse effects to those resources, or both. SQGs were developed as informal (non-regulatory) guidelines for use in interpreting chemical data from analyses of sediments.

The NS&T Program has derived a series of numerical SQGs for a variety of chemicals (metals, pesticides, total polychlorinated biphenyls (PCBs), polyaromatic hydrocarbons (PAHs), and one semi-volatile organic compound (SVOC)), based on empirical data from laboratory and field studies.

Several biological approaches have been used to assess marine/estuarine sediment quality relative to the potential for adverse effects on benthic organisms, including the ERL and ERM SQGs (Long et al. 1995) approach. ERLs were established at the lower 10th percentile of the effects data distribution, and typically represent concentrations below which adverse biological effects are unlikely. ERMs were established at the lower 50th percentile of the effects data distribution, and represent concentrations above which adverse biological effects are probable. Concentrations that are between the ERL and ERM represent the concentrations at which biological effects might occur.

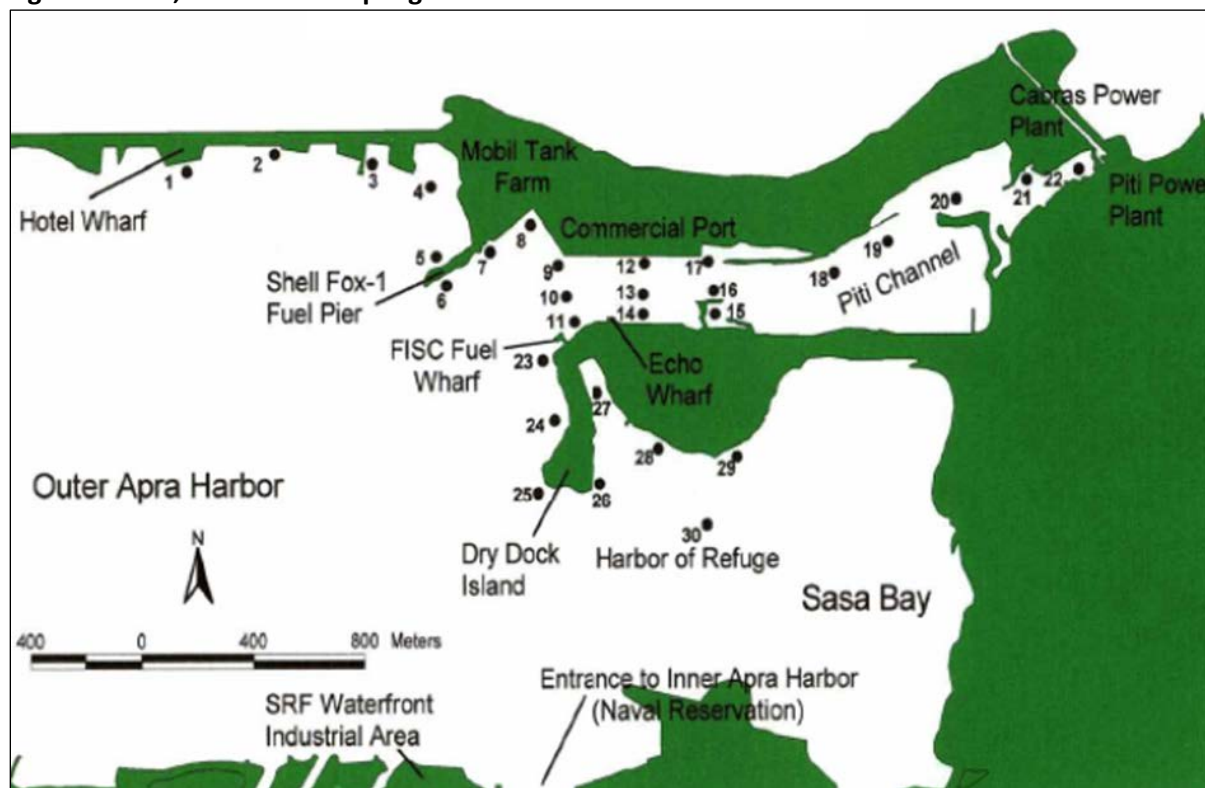
Methods and Study Area

Following is a description of the methods and study area used for the sediment quality analysis in this EA (see **Appendix H** for details).

The most recent sediment data available for the site vicinity was collected in 1997. Sediment surveys were carried out by the Water and Environmental Research Institute of the Western Pacific, University of Guam (WERI) at four harbor locations in Guam to determine the concentrations of heavy metals (i.e. copper, mercury, lead, tin, and zinc), PCBs, and PAHs in bottom sediments. Apra Harbor was one of the survey locations. Between May and June 1997, samples were taken at 30 locations in the Apra Harbor. Several of the sample locations (Stations 12, 16, 17, and 18) were in Piti Channel, in the vicinity of the two new proposed storm water outfalls in the Expansion Area (see **Figure 5.2.4-1** for a map of the sample locations).

Chemical analysis was carried out on the 1997 sediment samples to determine the levels of heavy metals, PCBs, and PAHs in the sediments. The results from the four locations in Guam were compared to one another, and to other locations world-wide to discern the relative level of existing sediment contamination at the Guam harbors. The 1997 sediment contaminant data were then rated by WERI by degree of contamination as: Clean, Light, Moderate, Heavy, or Gross. For this EA, the results were compared to USEPA Region 10 data using NOAA ERL and ERMSQGs.

Figure 5.2.4-1, Sediment Sampling Locations



Source: Figure 5, Appendix H

5.2.4.2 Affected Environment

This section describes the existing sediment quality in Apra Harbor in the vicinity of the Port Modernization Program site (see **Appendix H** for details).

Sediments are a major receptor for many of the more persistent organic and inorganic chemicals introduced into the aquatic environment from both natural and anthropogenic sources. They also play an important role in releasing sorbed (gathered on a surface either by absorption, adsorption, or a combination of the two processes) contaminants back to the overlying water and to the indigenous biota. In highly polluted situations, contaminated sediments may be directly toxic to certain organisms and/or bioaccumulate to excessive levels within others. Common contaminants in this regard are heavy metals, PCBs and PAHs.

The June 2010 essential fish habitat survey results indicated that the dominant substrate at the locations of the proposed storm water outfalls is moderately well sorted coarse sand and very poorly sorted gravel and sand (see **Appendix H**).

The results of the chemical analysis of the 1997 sediment sampling are presented in **Table 5.2.4-1**. Sampling locations in the area of the proposed storm water outfalls in the Expansion Area are Stations 12, 16, 17, and 18. Copper and zinc were classified as Heavy, in terms of the degree of contamination, by WERI. None of the samples taken at the locations nearest the proposed outfalls exceeded the NOAA ERM sediment quality criteria. One station (Station 17) exceeded the NOAA ERL sediment quality criteria for copper.

Sediment quality in the area of the proposed storm water outfalls is considered fair based on the exceedance of the ERL sediment quality criteria for copper only and the low concentrations of other contaminants at sampling stations in the vicinity of the proposed storm water outfalls (see **Appendix H**).

Table 5.2.4-1, Marine Sediment Contaminant Levels (1997) - Apra Harbor, Guam

Site ID	Copper (mg/kg)	Mercury (ug/kg)	Lead (mg/kg)	Tin (mg/kg)	Zinc (mg/kg)	PCBs (mg/kg)	PAHs (ug/kg)
12	9.43	25.4	9.42	0.64	36.4	2.17	140
16	14.5	45.4	9.27	0.62	31.2	2.58	460
17	57.8 (H)	47.3	8.87	5.65 (M)	143 (H)	14.7 (M)	350
18	1.00	6.18	nc	nc	2.3	0.23	20
ERL	34	150	46.7	*	150	22.7	4,022
ERM	270	710	218	*	410	180	44,792

Source: Table 1, Appendix H.

*no guidelines established

ERL = Effects Range Low

ERM = Effects Range Medium

Results above ERL are **bolded**; no values exceeded ERM

H=Heavy; M=Moderate, based on WERI suggested sediment quality criteria; nc = not calculable

5.2.4.3 Environmental Consequences

This section describes potential environmental consequences to sediment quality during construction and operation of the proposed Port Modernization Program under the Proposed Action and Alternatives.

Evaluation Criteria

The evaluation criteria for impacts on sediment quality are based on the potential for the proposed project to result in:

- Adverse impacts on water quality, and in turn sediment quality; and/or,
- Violations of established laws or regulations adopted to protect water resources (which could impact sediment quality).

Proposed Action

The Proposed Action would not be expected to result in significant direct or indirect impacts to sediment quality during construction or operation of the project.

Construction Effects

Construction activities for the Proposed Action would require grading to achieve suitable site topography and installation of a permanent storm water control system, including two new storm water outfalls, in the Expansion Area. Minor trenching for installation of utilities would be required in the Terminal Yard. During grading operations in the Expansion Area and trenching in the Terminal Yard, there would be an increased potential for short-term erosion and sedimentation when disturbed soils would be exposed to storm water runoff. Sediment, as well as other pollutants from construction

equipment, could temporarily be discharged to Piti Channel/Apra Harbor, and could impact sediment quality in the channel and harbor.

With implementation of temporary storm water control required by GEPA, as well as applicable erosion, sedimentation, and pollutant control BMPs, no significant impacts on sediment quality would be expected during construction (see **Section 5.2.2**, Surface Water, Storm Water, and Floodplains for details).

Operational Effects

Under the Proposed Action, storm water runoff generated from new impervious surfaces, primarily in the Expansion Area, would consist of freshwater containing pollutants. Storm water would be discharged from the two new proposed storm water outfalls to Piti Channel/Apra Harbor and could affect water quality, and in turn sediment quality in the channel and harbor.

A permanent storm water control system would be installed in the Expansion Area, per GEPA requirements, that would reduce the potential for water quality and quantity impacts on Piti Channel/Apra Harbor, and on sediment quality in the channel and harbor. The new storm water control system would include oil/water separators to provide treatment of storm water prior to discharge into Piti Channel. BMPs would also be implemented to control land-side erosion, sediment input and storm water runoff. Rip-rap would be placed at the outlets of the outfalls to dissipate energy and reduce the potential to disturb sediment and cause turbidity/release of pollutants into the water. The proposed storm water outfalls would be operated in compliance with a NPDES Operating Permit, including associated periodic monitoring requirements. As a result, operation of the permanent storm water control system in the Expansion Area would not be expected to significantly impact water quality, and in turn sediment quality (see **Section 5.2.2**, Surface Water, Storm Water, and Floodplains for details).

The existing storm water outfalls would be fitted with oil/water separators, which would improve water quality relative to existing conditions; this could result in positive impacts to sediment quality.

Alternative 1

Similar to the Proposed Action, Alternative 1 would not be expected to result in significant direct or indirect impacts on sediment quality in the vicinity of the site during construction and operation of the project. Under Alternative 1, reconfiguration and modernization of the Terminal Yard would occur, similar to under the Proposed Action. However, there would be no expansion of Port facilities into the Expansion Area, including installation of new storm water outfalls. Impacts to sediment quality would be less than with the Proposed Action, because no clearing, grading, and construction, and their associated potential to impact water quality and sediment quality, would occur in the Expansion Area. As under the Proposed Action, the existing storm water outfalls would be fitted with oil/water separators, which would improve water quality relative to existing conditions; this could result in positive impacts to sediment quality.

No Action

The No Action Alternative would not generate any new impacts to sediment quality. Under this alternative, reconfiguration, modernization, and expansion of the Terminal Yard, and the associated impacts on sediment quality, would not occur. Repair and replacement of deteriorating facilities and utilities at the Port would take place as failures occur over time. Facilities and utilities would be repaired

or replaced within the existing footprint of the Terminal Yard. The existing storm water outfalls would continue to discharge untreated storm water to Apra Harbor, which would continue the existing potential negative impacts to sediment quality.

5.2.4.4 Mitigation Measures

The following mitigation measures are proposed by the Proponent to address potential impacts to sediment quality during construction and operation of the Proposed Action:

During Construction

- Temporary storm water management, and erosion, sedimentation, and pollution control measures would be implemented prior to construction activities, per GEPA requirements (i.e. via a GEPA EPP), which would minimize the potential for pollutants to impact sediment quality.
- Applicable BMPs would be employed during construction.
- Per Section 404 of the CWA, water quality would be monitored during construction of the proposed storm water pipes and outfalls. A Water Quality Plan would also be prepared and implemented during construction, in accordance with the local construction permits (Erosion Control and Clearing and Grading). Adaptive management would be based on the monitoring results to control any detected water quality impacts.

Following Construction

- A permanent storm water control system would be installed in the Expansion Area, per GEPA requirements. Improvements would be made to the storm water control system in the Terminal Area. Together, these systems would minimize the potential for storm water impacts on sediment quality.
- BMPs would be implemented to control erosion, sediment input, and storm water runoff.
- All of the existing storm water outfalls in the Terminal Yard, as well as the two proposed outfalls in the Expansion Area, would be fitted with oil/water separators, which would improve water quality discharged from the site, and minimize the potential for impacts on sediment quality.
- Storm water from the two new storm water outfalls would be directed to flow-dissipating rip-rap before discharge into Apra Harbor; this would minimize the potential to disrupt sediment.
- Storm water discharge from the outfalls would be monitored for compliance with NPDES Operating Permit discharge limits to protect water quality, and in turn sediment quality. Adaptive management would be based on the monitoring results to control any detected water quality impacts.

5.2.5 Wetlands and Coastal Waters

This section describes existing wetlands and coastal waters on and in the vicinity of the Port Modernization Program site. Potential environmental consequences to these resources associated with construction and operation of the Port Modernization Program are also analyzed. The following section is based upon the *Delineation of Jurisdictional Waters* (2010) prepared by AMEC (see **Appendix F** to this EA for the full report).

5.2.5.1 Introduction

Regulatory Framework

Various federal and local regulations related to wetlands and coastal waters would apply to the Port Modernization Program, as summarized below (see **Appendix F** for details).

Section 404 of the CWA delegates jurisdictional authority of wetlands to the USACE and the USEPA. Construction of the two new proposed storm water outfalls in the Expansion Area would require a USACE Rivers and Harbors Act of 1899 Section 10/404 CWA permit (the Section 10 permit relates to navigable waters; the Section 404 permit to wetlands/waters of the United States [WOUS]). Approval of this permit would allow for the discharge of dredged or fill material (i. e. rip-rap at the proposed the storm water outfall outlets) in WOUS and work (to install the storm water outfalls and rip-rap) in Navigable WOUS. A CWA Section 402 NPDES permit administered by USEPA with authority delegated to Guam EPA (GEPA) would be required for the point-source discharge of storm water from the proposed outfalls into surface waters (coastal waters, in this case). A CWA Section 401 water quality certification administered by USEPA with authority delegated to GEPA would also be required for storm water discharged from the site.

The GEPA, DAWR, Department of Land Management, and Bureau of Planning are all responsible for local wetland protection and permitting. GEPA has established policies and oversees environmental land use permits to address construction and operational impacts within 30 feet of delineated wetlands. GEPA regulations require the use of BMPs for temporary erosion, sedimentation, and pollution control during construction (via an EPP), and approved measures for storm water discharge during operation of a project (via a NPDES permit).

Key Definitions

The following key definitions apply to the descriptions and analyses in this section (see **Appendix F** for more complete definitions):

- *Waters of the United States (WOUS)* – in broad terms, are comprised of both deep-water aquatic habitats and special aquatic sites, including wetlands. These include “navigable waters” the territorial seas, tidal waters and non-tidal waters (33 CFR Part 328).
- *Navigable WOUS* – those waters subject to the ebb and flow of the tide and/or those presently used, or that have been used in the past, or that are susceptible for use to transport interstate or foreign commerce (i.e. coastal and inland waters, lakes, rivers, and streams that are navigable, and the territorial seas [33 CFR 329.4]).

- *Wetlands* – areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. (33 CFR 328.4) Wetlands include swamps, marshes, and mangroves.

Based on these definitions, wetlands and other non-wetland coastal waters that meet the criteria of WOUS/Navigable WOUS are present on or near the site. These resources could be impacted by the Proposed Action (i.e. construction of the proposed storm water outfalls), and are addressed in this section.

Methods and Study Area

Following is a description of the methods and study area used for the wetlands and coastal waters analysis in this Environmental Assessment (EA) (see **Appendix F** for details).

Existing literature related to the Port Modernization Program site and vicinity was reviewed, including the USFWS National Wetlands Inventory. In June 2010, site reconnaissance and a site survey were performed to determine the jurisdictional boundaries of the WOUS/Navigable WOUS, and to delineate wetlands within a study area that included the location of the two proposed storm water outfalls and the adjacent vessel berthing area (see **Figure 5.2.5-1** and Appendix C to **Appendix F** for a map of the study area).

Figure 5.2.5-1, Wetlands and Biological Resources Study Area



Source: Figure 2, Appendix F

The study area generally included the coastal waters along the southern boundary of the Terminal Yard and Expansion Area, and the uplands in the Expansion Area located south of the Gate 4 access road. The WOUS/navigable waters were measured using the mean high-water (MHW) and High Tide (HT) lines. The USACE regulates WOUS under Section 404 of the CWA up to HT; including adjacent wetlands (3.93 feet above Mean Lower Low Water [MLLW] in this case). The USACE also regulates navigable waters

under Section 10 of the Rivers and Harbors Act up to MHW (2.22 feet above MLLW in this case). Wetlands were identified based on procedures from the USACE *Wetlands Delineation Manual* (1987). In accordance with the manual, the presence of wetlands depends upon positive indicators of vegetation, hydrology, and soils.

5.2.5.2 Affected Environment

This section describes the existing wetlands and coastal waters on and in the vicinity of the Port Modernization Program site (see **Appendix F** for details). Existing storm water control facilities on site are also briefly described for reference.

Wetlands

The National Wetland Inventory Map does not show any wetlands on the Port Modernization Program site or in the study area, but does show wetlands in the vicinity of the study area. A dredge spoil island located approximately 100 feet south of the study area is depicted with estuarine and marine wetlands (see Appendix A to **Appendix F**).

Site reconnaissance of the study area indicated that upland portions of the study area have been constructed or augmented with coral boulders and fill material creating a 10 to 50-foot elevation increase above the water line. No riverine or wetland habitat was identified in the upland portions of the study area; wetlands were limited to coastal margins. The uplands portion of the Terminal Yard is highly developed, and no wetlands are expected to be located in this area.

Wetland areas were delineated in the in-water portion of the study area (see **Appendix F**), and the wetland boundaries were approved as jurisdictional (are protected by) the USACE, GEPA, and DAWR in September 2010 (see **Appendix K** for correspondence related to the wetland delineation).

Three separate mangrove (*Rhizophora mucronata*)-dominated wetlands (Wetlands A, B, and C) were identified in the study area (see **Figure 5.2.5-1** for an aerial photo that generally shows the wetlands in the study area, and Appendix C to **Appendix F** for surveys that more accurately represent the wetlands).

- *Wetland A* – this approximately 17,700-sq. ft. wetland is located in a small inlet along the Cabras Island coastline.
- *Wetland B* – this approximately 1,123-sq. ft. wetland is located along the coastline of Cabras Island.
- *Wetland C* – this approximately 11,355-sq. ft. wetland is located along a strand in Apra Harbor, approximately 100 feet south of the Cabras Island coastline.

Coastal Waters

The National Wetlands Inventory map shows estuarine and marine deep water in the coastal area surrounding Cabras Island, including in the study area (see Appendix A to **Appendix F**). A survey of the boundaries of the WOUS and Navigable WOUS was conducted for the study area, in accordance with the CWA definitions (see Appendix C to **Appendix F** for the survey map).

Storm Water Control Facilities

An existing storm water control system is present in the Terminal Yard; there are no existing storm water control facilities in the Expansion Area. Storm water control facilities in the Terminal Yard include eight outfalls to Apra Harbor. These outfalls currently discharge untreated storm water into Piti Channel and Apra Harbor (see **Section 5.2.2**, Surface Water, Storm Water, and Floodplains for details).

5.2.5.3 Environmental Consequences

This section describes potential environmental consequences to wetlands and coastal waters during construction and operation of the proposed Port Modernization Program under the Proposed Action and Alternatives.

Evaluation Criteria

Wetlands provide a number of important functions, including: water purification, flood control, shoreline stabilization, groundwater recharge, stream flow maintenance, and fish and wildlife habitat. Effects on wetlands are considered adverse if there would be a loss of wetland area or wetland function.

Proposed Action

The Proposed Action is not expected to result in significant direct or indirect impacts on wetlands on and in the vicinity of the site during construction and operation of the project.

Construction Effects

Construction activities for the Proposed Action would require grading to achieve suitable site topography, and installation of a permanent storm water control system, including two new storm water outfalls, in the Expansion Area. Minor trenching for installation of utilities would be required in the Terminal Yard.

Because there is no riverine or wetland habitat on the upland portion of the site, there is no potential for direct impacts to wetlands in this area during construction, and there would be no loss of wetland area. However, during grading operations in the Expansion Area and trenching in the Terminal Yard, there would be an increased potential for short-term erosion and sedimentation when disturbed soils would be exposed to storm water runoff and the associated potential to affect wetland function. Sediment, as well as other pollutants from construction equipment, could temporarily be discharged to Piti Channel/Apra Harbor, and associated wetlands (Wetlands A, B, and C) and coastal waters. With implementation of temporary storm water control management per GEPA, as well as applicable erosion, sedimentation, and pollutant control BMPs, no significant impacts on wetlands and their functions, and coastal waters would be expected (see **Section 5.2.2**, Surface Water, Storm Water, and Floodplains for details).

Operational Effects

Installation of the two new proposed storm water outfalls, would not directly impact wetlands or wetland-regulated areas, and there would be no loss of wetland area. As shown in Appendix C to **Appendix F**, neither of the proposed outfalls would be constructed within 30 feet of delineated wetlands, in compliance with GEPA policies; both outfalls would be at least 45 feet from the edge of the

nearest wetland. Construction of the outfalls would require the placement of fill material (rip-rap) in WOUS and work (to install the outfalls and rip-rap) in Navigable WOUS. The use of rip-rap to anchor and protect the storm water outfall structures would be required to maintain the outfalls' structural integrity. However, consistent with Section 404 of the CWA, the PAG would minimize impact to WOUS. The amount of rip-rap placed in WOUS would be the smallest amount necessary to maintain the outfalls' structural integrity. Based on preliminary designs, installation of the two outfalls would impact an area of approximately 1,530 square feet (combined) and require deposition of approximately 200 cubic yards (combined) of rip-rap material below the HT line in WOUS. The placement of additional concrete material below the HT line could also be required for construction of the concrete outfalls.

Storm water runoff generated from new impervious surfaces (i.e. container storage areas and roadways) primarily in the Expansion Area would consist of freshwater containing pollutants (i.e. oils and greases). Storm water would be discharged from the two new proposed outfalls into Piti Channel/Apra Harbor, and could affect water quality in the harbor, and associated wetlands (Wetlands A, B, and C) and coastal waters. The storm water discharge could also disturb sediments at the proposed outfall outlets, resulting in potential turbidity impacts on these water resources.

A permanent storm water control system would be installed and BMPs implemented in the Expansion Area, per GEPA requirements, that would reduce the potential for water quality and quantity impacts on Piti Channel/Apra Harbor and the associated wetland and coastal areas. The new storm water system would include oil/water separators to provide treatment to storm water prior to discharge into Piti Channel. The proposed outfalls from the Expansion Area would not discharge within 30 feet of wetlands or wetland-regulated areas. Rip-rap placed at the outlets of the outfalls would dissipate energy and reduce the potential to disturb sediment and cause turbidity. It is anticipated that turbidity and freshwater plumes from the proposed outfalls would dissipate, and the zone of initial dilution (ZID) would be confined by the existing tidal flat. Also, storm water runoff in the area of the proposed outfalls would be incorporated into the natural runoff and proceed westward, away from wetland areas, due to local tides and currents. Finally, the Port Modernization Program site represents a small portion of the watershed draining to Apra Harbor, and has as commensurate potential to impact water quality/wetlands/coastal waters in the harbor (see **Section 5.2.2**, Surface Water, Storm Water Management, and Floodplains, for details). As a result, storm water discharged from the proposed outfalls would not be expected to result in significant impacts to wetlands and their functions or coastal waters.

Under the Proposed Action, improvements would be made to the existing storm water control system in the Terminal Yard. Oil/water separators would be installed in the existing storm water system to provide treatment prior to discharge into Piti Channel/Apra Harbor. These improvements to the existing storm water outfalls would improve water quality discharged to the channel and harbor (and associated wetlands/coastal waters) relative to existing conditions.

Alternative 1

Under Alternative 1, no construction activities would take place in the Expansion Area. The grading activities and installation of a permanent storm water control system with associated outfalls assumed under the Proposed Action would not occur; therefore, the potential to impact wetlands and coastal waters during construction would not occur. Since there would be no new storm water outfalls installed in the Expansion Area under Alternative 1, there would be no new storm water discharge and its associated potential to impact wetlands and coastal waters.

As under the Proposed Action, the existing eight outfalls in the Terminal Yard would be fitted with oil/water separators, which would improve the quality of the storm water discharged to Piti Channel/Apra Harbor, and associated wetlands and coastal waters, as compared to the existing conditions.

No Action

As under Alternative 1, no construction activities would take place in the Expansion Area. The grading activities and installation of a permanent storm water control system with associated outfalls assumed under the Proposed Action would not occur; therefore, the potential to impact wetlands and coastal waters during construction would not occur. Since there would be no new storm water outfalls installed in the Expansion Area under this alternative, there would be no new storm water discharge and its associated potential to impact wetlands and coastal waters.

The eight existing outfalls in the Terminal Yard would continue to release untreated storm water to Piti Channel/Apra Harbor, which could impact water quality in wetlands and coastal waters. Improvements to water quality from additional storm water treatment facilities assumed under the Proposed Action and Alternative 1 would not be realized under the No Action Alternative.

5.2.5.4 Mitigation Measures

The following mitigation measures are proposed by the Proponent to address potential impacts to wetlands and coastal waters during construction and operation of the Proposed Action:

During Construction

- Temporary storm water management, and erosion, sedimentation, and pollution control measures would be implemented prior to construction activities, per GEPA requirements, which would minimize the potential for sediment and pollutants to be released to wetlands and coastal waters.
- Applicable BMPs would be employed during construction.
- Per Section 404 of the CWA, water quality would be monitored during construction of the proposed storm water pipes and outfalls. A Water Quality Plan would also be prepared and implemented during construction, in accordance with the local construction permits (Erosion Control and Clearing and Grading). Adaptive management would be based on the monitoring results to control any detected water quality impacts.
- Neither of the two new proposed storm water outfalls would be constructed directly in wetlands or within wetland-regulated areas (within 30 feet of wetlands, per GEPA regulations); the two outfalls would be at least 45 feet from the nearest wetland.

Following Construction

- A permanent storm water control system would be installed in the Expansion Area per GEPA requirements. Improvements would be made to the storm water control system in the Terminal Area. Together, these systems would minimize the potential for storm water impacts on wetlands and coastal waters.

- BMPs would be implemented to control erosion, sediment input, and storm water runoff.
- All of the existing storm water outfalls in the Terminal Yard, as well as the two proposed outfalls in the Expansion Area, would be fitted with oil/water separators.
- Neither of the two proposed outfalls would discharge to wetlands or wetland-regulated areas.
- Storm water would be directed to flow-dissipating rip-rap before discharge into Apra Harbor; this would minimize the potential to disrupt sediment and cause turbidity impacts to wetlands and coastal waters.
- The amount of rip-rap placed at the terminus of the two proposed outfalls would be minimized to the greatest extent possible to reduce impacts on WOUS.
- Storm water discharge from the outfalls would be monitored for compliance with NPDES Operating Permit discharge limits to protect water quality. Adaptive management would be based on the monitoring results to control any detected water quality impacts.

5.2.6 Terrestrial Resources (including Migratory Bird Treaty Act)

This section describes existing terrestrial resources on and in the vicinity of the Port Modernization Program site. Potential environmental consequences to these resources associated with construction and operation of the Port Modernization Program are also analyzed. The following section is based upon the *Terrestrial Flora and Fauna Survey* (2009) prepared by ARC Environmental Services (ARC), and the *Biological Resources Report* (2011) prepared by AMEC (see **Appendices E** and **G** to this Environmental Assessment (EA), respectively, for the full reports).

5.2.6.1 Introduction

Regulatory Framework

Federal and Guam requirements related to sensitive terrestrial resources include: U.S. Endangered Species Act (ESA), 16 U.S.C. §1531 *et seq.*; U.S. Migratory Bird Treaty Act of 1918, 16 U.S.C. §703 *et seq.*; Endangered Species Act of Guam, Guam Code Ann. Tit. 5, §63201 *et seq.*; and the Guam Comprehensive Wildlife Conservation Strategy. The USFWS and NOAA's NMFS administer the federal requirements; and the DAWR administers the local requirements listed above.

Key Definitions

The following key definitions apply to the descriptions and analysis in this section (also see **Appendices E** and **G**):

- *Terrestrial Resources* – vegetation (plant) and wildlife (animal) species and habitats that occur in terrestrial (land) environments.
- *Federally-Listed Threatened and Endangered Species and Species of Concern* – According to the ESA, some species (including plants, animals, and other organisms) and the ecosystems upon which they depend have become extinct, or in danger of or threatened with extinction “as a consequence of economic growth and development untempered by adequate concern and conservation.” ESA, 16 U.S.C. §1531(a)(1). A “*threatened species*” is any species which is likely to become endangered in the near future. An “*endangered species*” is a species which is in danger of becoming extinct, throughout all or a significant portion of its range. ESA, 16 U.S.C. §1532. A “*species of concern*” is an informal phrase used to refer to any species listed as endangered, threatened, or as a candidate for these listings.
- *Sensitive Biological Resources* – Include federally-listed species, proposed, and candidate species, and designated or proposed critical habitat; species of concern managed under Conservation Agreements or Management Plans; and, territorially-listed species.

Methods and Study Area

Two separate studies were conducted to describe and analyze the terrestrial resources on and in the vicinity of the site. Following are descriptions of the methods employed and study areas evaluated in those studies.

2009 Study

Aerial photographs were reviewed and a field reconnaissance was conducted in October 2009 to identify terrestrial vegetation and wildlife species and habitats for the *Terrestrial Flora and Fauna Study* (2009)(Appendix E). The study area consisted of the undeveloped portions of the Terminal Yard Expansion Area (see **Figure 5.2.6-1** for a map of the study area). Due to the extent of historical human-induced disturbance of the study area, a qualitative field method was used to identify plant and animal species, and habitats (see **Appendix E** for details on the methods used for this study).

Figure 5.2.6-1, Terrestrial Resources Study Area



Source: Appendix E

2011 Study

Subsequent to preparation of the 2009 study, more recent aerial photographs were reviewed and field reconnaissance was conducted in June 2010 to identify vegetation communities and wildlife species for the *Biological Resources Report* (2011) (Appendix G). The study area for the 2010 reconnaissance consisted of a limited portion of the 2009 study area described above, and included the location of the proposed storm water outfalls in the Port Expansion Area and the adjacent vessel berthing area to the west (see **Appendix G** for a map of the study area for the 2011 report and details on the methods used for this study).

In compliance with federal and Guam requirements, including the U.S. Fish and Wildlife Coordination Act (16 U.S.C. §661 *et seq.*), ESA, Migratory Bird Treaty Act, and Guam Comprehensive Wildlife Conservation Strategy, letters of inquiry were also sent to USFWS, NMFS, and DAWR requesting input on federal federally-listed species and species of concern potentially occurring on and around the site (see **Appendix G** for the letters of inquiry and agencies' responses regarding federally-listed species).

5.2.6.2 Affected Environment

This section describes the existing terrestrial resources, including vegetation communities, wildlife, and sensitive species on and in the vicinity of the Port Modernization Program site (more detail on sensitive species is provided in **Section 5.2.9**, Sensitive Species). In general, the site and vicinity have been highly disturbed by past human activities, including grading activities conducted by the U.S. Navy at the end of WWII, the development of the Port, and the recent use of the Terminal Expansion Area for scrap metal operations. As a result of this past disturbance, as well as the high percentage of non-native species on and near the site, the site is generally of low value to native plants and wildlife; the area surrounding the two proposed storm water outfalls is of low to moderate value to native plants and wildlife (see **Appendices E and G** for details).

Vegetation Communities

- The majority of the Port Modernization Program site (the Terminal Yard and most of the northern portion of the proposed Expansion Area) has been cleared and developed in Port facilities, and is devoid of vegetation. Vegetation is present in the eastern and southern portions of the Expansion Area, and offsite to the east in the undeveloped Expansion Area. During the 2009 field reconnaissance, the following vegetation communities were identified in the study area which consisted of the undeveloped portions of the Terminal Expansion Area (see **Figure 5.2.6-2** and **Appendix E** for details):
- *Edge Communities* – this plant community is found along Cabras Highway, Old Port Road, and the Terminal Yard fence line. It contains the highest species diversity and is characterized by an array of herbs, vines, grasses, and sedges, the majority of which have been introduced to Guam and are not native to the island. Dominant throughout this vegetation community, particularly along the Old Port Road, is woody liana (*Colubrina asiatica*). Between Old Port Road and the southern boundary of the study area a large mixed metal debris field was observed that was partially overgrown with *Mimosa diplotricha*. This plant was recently introduced to Guam and poses a potential threat to native and endemic vegetation. Focused eradication strategies are being developed to address this invasive plant species on Guam. The remnants of a nursery, including an assortment of cultivated ornamental plants, are located in the southwestern corner of the 2009 study area.
- *Interior Trees* – this plant community occupies the majority of the 2009 study area. The dominant tree in this area, tangantangan (*Leucaena leucocephala*), is supported by the limestone gravel and organic soil present in most of the area. A large proportion of this habitat consists of land modifications, such as rock piles, mixed scrap metal piles, and hills of debris that are vegetated by *L. leucocephala*, wildcane (*Saccharum spontaneum*), and a variety of introduced herbs, grasses, and sedges.
- *Clearings* – Small pocket areas are located between the interior trees that are dominated by grasses (*S. spontaneum*, pitted beardgrass (*Bothriochloa pertusa*), and Henry’s crabgrass (*Digitaria ciliaris*), native sedges (*Fimbristylis* spp.), and vines (beach morning glory [*Ipomoea pes-caprae*]). The dominant shrubs in this high light intensity area are the native *Pluchea indica* and *C. asiatica*. Also present in localized areas is the algae *Nostoc muscorum*.

Figure 5.2.6-2, Vegetation Communities



Source: Figure 2, Appendix E.

- **Anthropogenic Gully** – A man-made gully comprised of piled boulders is located along the north side of Old Port Road. The gully supports a patch of native nodding orchid (*Geodorum densiflorum*), as well as a large plot of ferns (*Nephrolepis hirsutula*) near Gate 4.
- **Shoreline Strand** – This plant community consists of a steep bank leading to a narrow strip of strand vegetation along the southern boundary of the 2009 study area. The community is dominated by mature native trees (i.e. binalo [*Thespesia populnea*], lalanyok [*Xylocarpus moluccensis*], and niyoron [*Cordia subcordata*]), and *Ficus* species, some rooting in small sand pockets and others growing from rocky banks. Many of the trees have indigenous ferns (i.e. *Asplenium polyodon*, *Davallia solida*, *Polypodium punctatum*, and *Pyrrrosia lanceolata*) growing within their canopies. Species diversity is lower in this habitat due to overlapping canopies, which limit the growth of other species.
- **Mangrove** – A narrow area located along the coastline is a mangrove (*Rhizophora mucronata*) plant community. A field delineation of mangrove wetlands in the vicinity of the proposed storm water outfalls and adjacent berthing area to the west was conducted in June 2010 in conjunction with the survey for the *Biological Resources Report* (see **Section 5.2.6**, Wetlands, and **Appendix F** for details).

During the 2010 field reconnaissance of the more limited study (an area that included the location of the proposed storm water outfalls and adjacent berthing area to the west), the following vegetation communities were identified (see **Appendix G** for a map of the 2010 study area):

- *Strand Forest* – A well developed, disturbed strand forest of non-native *L. leucocephala*, coconut palm (*Cocos nucifera*), and *T. populnea* grow along the Cabras island shoreline.
- *Mangrove* – Mangrove grow within tidal influence areas on the Cabras island shoreline, within a small inlet, and along an elevated strand approximately 100 feet south of the shoreline (see **Section 5.2.5**, Wetlands, and **Appendix F** for details on this community).
- *Coastline Plants* – including mikimiki (*Pemphis acidula*), sensitive plant (*Mimosa pudica*), and Indian camphor weed (*Pluchea indica*), grow along the shoreline.

Wildlife

As mentioned previously, the majority of the Port Modernization Program site (the Terminal Yard and most of the northern portion of the Expansion Area) has been cleared and developed in Port facilities, and is devoid of vegetation. As a result, the presence of terrestrial wildlife on the site is limited. Habitat for terrestrial wildlife occurs in the undeveloped portions of the Terminal Yard Expansion Area. Terrestrial wildlife observed during the 2009 field reconnaissance, and expected to occur on and in the vicinity of the site is described below (see **Appendix E** for details).

Crustaceans, mammals, reptiles, and amphibians that were observed in the 2009 study area were limited to: land crabs (*Cardisoma carnifex*), hermit crabs (*Coenobita* spp.), a Norway rat (*Rattus norvegicus*), marine toad (*Bufo marinus*), and curious skink (*Carlia fusca*).

Many insects were observed throughout the 2009 study area, including: centipedes, dragon flies, mosquitoes, solitary wasps, and spiders. In addition, termite mounds and trails on tree trunks were observed. Butterflies, such as *Euploea eunice*, *Hypolemnas bolina*, *Papilio plytes*, and *Catopsilia pomona*, were abundant. One moth (*Chilades pandava*) was observed.

A number of birds were observed or heard during field reconnaissance of the 2009 study area (see Migratory Birds section below).

Prior colonization of the area by giant African snail (*Achatina fulica*) and *Bradybaena pellucida* was evidenced by the many dead shells on the ground in the 2009 study area. One tree snail, *Drymaeus multilineatus*, an introduction from Florida, was seen on a *T. populnea* tree near the shoreline. Coconut crabs (*Birgus latro*), monitor lizards (*Varanus* spp.), and the brown tree snake (*Boiga irregularis*), while not recorded during the 2009 survey, are routinely found in similar habitats on Guam.

Sensitive Species

Based on agency correspondence for the 2011 *Biological Resources Report*, sea turtle species were of special interest, because of the shoreline present onsite, and the proximity to the harbor. Turtles, such as hawksbill turtle (*Eretmochelys imbricata*) – a federally endangered species, and green turtle (*Chelonia mydas*) – a federally threatened species, may be present on and around the site. No sea turtles were observed in the vicinity of the Port during any of the field reconnaissance, and neither turtle species is likely to nest onsite, because of the lack of sandy beaches along the shoreline. (see **Section 5.2.9**, Federally Threatened and Endangered Species, and **Appendix G** for details on sensitive species).

Migratory Birds

A number of birds were observed or heard during field reconnaissance of the 2009 study area, including whimbrel (*Numenius phaeopus*), yellow bittern (*Ixobrychus sinensis*), black drongo (*Dicrurus macrocerus*), Eurasian tree sparrow (*Passer montanus*), and Philippine turtle dove (*Streptopelia bitorquata*).

Based on agency correspondence for the 2011 *Biological Resources Report*, migratory birds were also of special interest. Migratory birds, such as: brown booby (*Sula leucogaster*), Pacific reef heron (*Egretta sacra*), yellow bittern (*I. sinensis*), and Marianas common moorhen (*Gallinula chloropus guami*) – a federally endangered species – may be present on and around the site. The Marianas common moorhen and brown booby are unlikely to forage or nest onsite due to the lack of appropriate habitat and protected nesting areas. The yellow bittern could seasonally forage and roost along the site shoreline and in the strand forest and mangrove habitats in the Terminal Expansion Area, and nest in the forested habitats in the Terminal Expansion Area. The Pacific heron is common in the Apra Harbor area and could forage along the shoreline and exposed tidal flats onsite, and nest in the treed habitats in the undeveloped portions of the Terminal Expansion Area (see **Section 5.2.9**, Federally Threatened and Endangered Species, and **Appendix G** for details on sensitive species).

5.2.6.3 Environmental Consequences

This section describes potential environmental consequences to terrestrial resources during construction and operation of the proposed Port Modernization Program under the Proposed Action and Alternatives.

Evaluation Criteria

The level of impact on terrestrial resources described in this section is based on (1) the importance (i.e. legal, commercial, recreational, ecological or scientific) of the resource, (2) the proportion of the resource that would be affected relative to its occurrence in the region, (3) the sensitivity of the resource to the proposed activity, and (4) the duration of ecological ramifications.

Effects on terrestrial resources are considered adverse if species or habitats of high concern are negatively affected. Effects are also considered adverse if disturbances cause reductions in population size or distribution of a species of high concern.

As a requirement under the ESA, federal agencies must provide documentation that ensures that agency actions, such as the proposed Port Modernization Program, do not adversely affect any federally-listed species or habitats. The ESA requires that all federal agencies avoid “taking” threatened and endangered species (which includes jeopardizing threatened or endangered species habitat). Section 7 of the ESA requires that federal agencies consult with the USFWS and/or NMFS to insure that federal actions do not jeopardize the continued existence of sensitive biological resources.

Proposed Action

The Proposed Action would not be expected to result in significant direct or indirect adverse impacts on terrestrial resources (vegetation communities or wildlife, including sensitive species) on and in the vicinity of the site during construction and operation of the project.

Construction Effects

Construction of the Proposed Action would require building demolition, debris removal, minor trenching, and construction throughout the Terminal Yard; and, clearing, grading, and construction to the north of Old Port Road, and to the south of the road to within about 50 feet of the shoreline, and immediately surrounding the storm water outfalls in the Expansion Area. These activities would generate short-term increases in activity levels, noise, and lighting, and temporary impacts to wildlife on and in the vicinity of the site. However, as mentioned previously, the Port Modernization Program site is largely already developed in an active Port, and largely devoid of vegetation and habitat for wildlife (the exceptions are the southern and eastern portions of the Expansion Area). Under the Proposed Action, vegetation would be cleared in the southern and eastern portions of the Expansion Area. Increased activity levels, noise, and light during construction could impact wildlife on and in the immediate vicinity of the site. Construction activities would have no impacts on the vegetation communities in the undeveloped Terminal Expansion Area to the east of the site, and minimal impacts on the wildlife in this area.

Operational Effects

The Terminal Yard currently consists of approximately 52 acres of developed area. The proposed Port Modernization Program would not eliminate any terrestrial habitat of concern in this area, as this area is of very low value to native plants and wildlife due to past disturbance. The proposed modernization would include expansion into approximately 19 acres in the Terminal Expansion Area. The southern portion of the proposed Expansion Area is presently in the following vegetation communities: interior tree, edge community, shoreline strand/strand forest, coastline plants, and mangrove; the eastern portion of the Expansion Area is interior tree community. Most of the Expansion Area is of low value to native plants and wildlife as a result of past disturbance, as well as the high percentage of non-native species in this area. The area immediately surrounding the proposed storm water outfalls is of low to moderate value to native plants and wildlife (see **Appendices E** and **G** for details). The majority of the existing vegetation communities in the Expansion Area would be eliminated with clearing and grading activities under the Proposed Action (vegetation in the areas within 50 feet of the shoreline, except for immediately surrounding the storm water outfalls, would be retained). The mangrove community and most of the shoreline strand/coastline plant communities along the Cabras island coastline would be preserved. Therefore, permanent elimination of vegetation in the Expansion Area with the proposed modernization would not be expected to result in significant impacts to native plants and wildlife.

With operation of the Port facilities under the Proposed Action, there would be a long-term increase in activity levels (related to increases in vessel and vehicular traffic), noise, and light at the Port relative to existing conditions (see **Chapter 4.0, Section 5.1.2**, Noise, and **Section 5.3.1**, Traffic for additional information). The increase in activity levels, noise, and light could impact wildlife on and in the vicinity of the site. However, the site currently is an active commercial port and activity levels, noise, and light onsite are already relatively high. Therefore, the incremental increase in these levels with the proposed modernization would not be expected to result in significant impacts on wildlife.

Sensitive Species

The Proposed Action would not be expected to result in significant direct or indirect impacts to sensitive plant and animal species during construction or operation of the project. No impacts to mangrove wetlands or their regulated buffers on and in the vicinity of the site would occur (see **Section 5.2.6**, Wetlands, and **Appendix F** for details). Significant impacts to sensitive terrestrial animal species would

not be anticipated, as no federally-listed species are expected to seasonally or permanently inhabit the site.

Migratory Birds

Construction activities for the storm water outfalls could disturb foraging and nesting birds, including yellow bittern (that forage and nest along the shoreline) and Pacific heron (that forage along the shoreline). Construction activities would be conducted in compliance with GEPA, and DAWR requirements to minimize potential disturbance from construction during bird migration periods, and direct impacts (i.e. for installation of the proposed storm water outfalls) would be avoided during active bird nesting. Engineering controls would be installed to minimize stray construction lighting from reaching adjacent habitat areas. Therefore, construction activities would not be expected to result in significant adverse effects on migratory birds.

Some habitat for other migratory bird species (i.e. yellow bittern and Pacific heron) to nest, forage and roost is present onsite (i.e. along the shoreline and in the forested areas onsite). This habitat would largely be preserved with the proposed modernization. A very limited amount of the habitat for these migratory birds would be eliminated in the Expansion Area for the proposed storm water outfalls, but would not be expected to significantly impact these species (see **Section 5.2.9**, Federally Threatened and Endangered Species, for details).

Alternative 1

Like the Proposed Action, Alternative 1 would not be expected to result in significant direct or indirect impacts on vegetation communities or wildlife, including sensitive species, on and in the vicinity of the site during construction and operation of the project. Under Alternative 1, reconfiguration and modernization of the Terminal Yard would occur, similar to under the Proposed Action. However, there would be no expansion of Port facilities into the Expansion Area, including installation of new storm water outfalls. Impacts to vegetation communities and wildlife would be less than with the Proposed Action, because no clearing, grading, and construction would occur in the Expansion Area. As a result, there would be no displacement of habitat, and no short-term and long-term increases in activity levels, noise, and light in the Expansion Area that could impact wildlife on and in the immediate vicinity of this area.

No Action

The No Action Alternative would not generate any new impacts to terrestrial resources. Under this alternative, reconfiguration, modernization, and expansion of the Terminal Yard, and the associated impacts on vegetation communities, wildlife, and sensitive species, would not occur. Repair and replacement of deteriorating facilities and utilities would take place as failures occurred over time. Facilities and utilities would be repaired or replaced within the existing footprint of the Terminal Yard.

5.2.6.4 Mitigation Measures

The following mitigation measures are proposed by the Proponent to address potential impacts to terrestrial resources during construction of the Proposed Action:

During Construction

- BMPs would be employed to minimize potential disturbance from construction during bird migration periods, and direct impacts (i.e. from installation of the proposed storm water outfalls) would be avoided during active bird nesting.
- The site would be surveyed for bird species of concern prior to vegetation clearing associated with construction of the storm water outfalls, to determine the status of migratory sea and shorebirds. If nests are located, clearing would not be completed until birds and nestlings leave on their own volition.
- Engineering controls (i.e. light focusing reflectors, deflective shrouds, and fence screens) would be installed to minimize stray light from construction activities from reaching adjacent habitat areas.

During Operation

- As possible, engineering controls (i.e. light focusing and shading features) would be installed to minimize stray light generated by permanent lighting from reaching adjacent habitat areas.

5.2.7 Benthic and Marine Resources

This section describes existing benthic and marine resources on and in the vicinity of the Port Modernization Program site. Potential environmental consequences to these resources associated with construction and operation of the Port Modernization Program are also analyzed. The following section is based upon the *Biological Resource Report* (2011) prepared by AMEC, and the *Marine Environmental Assessment* (2011) prepared by Marine Research Consultants, Inc. (see **Appendices G** and **I**, respectively for the full reports).

5.2.7.1 Introduction

Regulatory Framework

Various federal and local regulations related to the protection of benthic and marine resources would apply to the Port Modernization Program, as summarized below (see **Appendices G** and **I** for details).

Construction of the two new proposed storm water outfalls in the Expansion Area would require a USACE Rivers and Harbors Act of 1899 Section 10/404 Clean Water Act (CWA) permit (see **Section 5.2.6**, Wetlands and Coastal Waters for details). Approval of this permit would allow for the discharge of dredged or fill material (rip-rap at the proposed storm water outfall outlets) into coastal waters and work (to install the storm water outfalls and rip-rap) in these waters. A CWA Section 402 National Pollution Discharge Elimination System (NPDES) Permit administered by USEPA with authority delegated to GEPA would be required for the point source discharge of storm water from the site into surface waters (coastal waters, in this case). A CWA Section 401 water quality certification administered by USEPA with authority delegated to GEPA would also be required for storm water discharged from the site.

Federal and Guam requirements related to sensitive benthic and marine resources include: the U.S. Fish and Wildlife Coordination Act, ESA, Marine Mammal Protection Act, 16 U.S.C. §1361 et seq., Endangered Species Act of Guam and the Guam Comprehensive Wildlife Conservation Strategy. The USFWS and the NMFS) administer the federal requirements; and the DAWR administers the local requirements listed above.

A GEPA EPP would be required for clearing, grading, and marine-related construction work. EPPs include environmental protection measures to reduce, minimize, or eliminate impacts. EPPs may include erosion and sedimentation control, vegetation, wildlife, and coral/marine resource protection measures.

Key Definitions

The following key definitions apply to the descriptions and analysis in this section (see **Appendix G** and **I** for details):

- *Benthic Resources* – organisms and habitats that occur in the ecological region at the lowest level of a body of water, such as an ocean or a lake, including the sediment surface and some sub-surface layers.
- *Marine Resources* – organisms that live in the ocean or other marine or brackish bodies of water.

- *Threatened and Endangered (Federally-Listed) Species and Species of Concern* – according to the ESA, some species (including plants, animals, and other organisms) and the ecosystems upon which they depend have become extinct, or in danger of or threatened with extinction “as a consequence of economic growth and development untempered by adequate concern and conservation.” ESA, 16 U.S.C. §1531(a)(1). A “*threatened species*” is any species which is likely to become endangered in the near future. An “*endangered species*” is a species which is in danger of becoming extinct, throughout all or a significant portion of its range. ESA, 16 U.S.C. §1532. A “*species of concern*” is an informal phrase used to refer to any species listed as endangered, threatened, or as a candidate for these listings.
- *Sensitive Biological Resources* – Include federally-listed species, proposed, and candidate species, and designated or proposed critical habitat; species of concern managed under Conservation Agreements or Management Plans; and, territorially-listed species.

Methods and Study Area

Following is a description of the methods and study area used for the benthic and marine resources analysis in this EA (see **Appendix G** for details).

The benthic and marine survey for the *Marine Environmental Assessment* was conducted under a NMFS and USEPA-approved Work Plan (October 2010). GEPA and DAWR also had the opportunity to review and comment on the Work Plan. Letters of inquiry were sent to USFWS, NMFS, and DAWR requesting input on federally-listed species and species of concern potentially occurring on and around the site. The regulatory agencies were consulted regarding these species and available information regarding their likely presence, abundance and seasonality.

In January 2011, field reconnaissance of benthic habitat types and marine biota was conducted to characterize the existing benthic and marine biotic environment in the vicinity of the Port Modernization Program site. The study area extended from the locations of the two proposed storm water outfalls in the Expansion Area of the site, eastward through the Port’s main shipping channel, and southward across Piti Channel toward the southern shoreline of the channeled section of northeastern Apra Harbor. Thirteen (13) survey stations were evaluated in the study area; transects were established at each station (see **Figure 5.2.7-1**). A transect is a strip of ground along which ecological measurements, e.g. of the number of organisms, are made at regular intervals.

Figure 5.2.7-1, Benthic and Marine Resources Study Area



Source: Figure 1, Appendix I.

Eight (8) metrics were used to assess marine biota within the study area:

1. coral colony abundance;
2. coral colony size;
3. rugosity (rugosity is a measure of 3-dimensional structure which ignores the underlying biological component (e.g. coral, algae, etc.) of the structure);
4. algae abundance by species;
5. fish abundance and diversity by species;
6. mobile macro-invertebrate density by species (macro-invertebrates are invertebrates – animals without backbones – that are large enough to be seen without a microscope);
7. invasive species, and sightings of marine mammals and reptiles; and,
8. while not part of the scope of the study, evidence of infauna (Infauna are organisms that live in tubes or burrow beneath the surface of the sea floor) was noted (see **Appendix I** for details on the methods used for this study).

5.2.7.2 Affected Environment

This section describes the existing benthic and marine resources on and in the vicinity of the Port Modernization Program site.

Benthic Habitat

The following four habitat types and their associated biota were found during the 2011 marine surveys (see **Appendix I** for details):

- *Shallow Sand Flats* – This habitat is located in the area of discharge of the two new proposed storm water outfalls (Transects 1 and 4; see **Figure 5.2.7-1**). The habitat consists of very shallow flats covered with a combination of very fine-grained silty mud, calcium carbonate sand, and rubble fragments. At low tide, portions of these flats, particularly near the shoreline, are exposed to air. Natural tides and existing vessel wakes result in sediment re-suspension in this area.

The benthic habitat in this area is nearly devoid of biotic components (other than evidence of burrowing infauna). Coral and other epi-benthos were completely absent from these sand flats, and algae and fish were extremely rare. The absence of epifauna in this area is likely due to the absence of suitable hard-bottom substrate (epifauna are benthic organisms that live on the substrate [such as a hard sea floor] or on other organisms [i.e. barnacles, oysters, etc.]). The benthic algae that were identified were of a single species, *Padina sanctae-crusis*, and the reef fish consisted of predominantly gobies (Family Gobiidae).

- *Channel Sand Flats* – This habitat is located between Piti Channel and the northern shoreline of Dry Dock Island (Transects 2, 3, 5, 6, and 7; see **Figure 5.2.7-1**). This channel region occurs between two man-made rip-rap berms and Dry Dock Island, and consists of a predominantly muddy sand bottom with intermittent boulders and large rubble fragments.

The mud-sand bottom in this habitat is marked with numerous infaunal burrows. Scattered isolated lobed colonies of coral (predominantly *Porites* spp.) were observed on the floor of the channel sand flats; sections of these corals were devoid of living tissue. Several small clumps of seagrass (*Enhalus acoroides*), and an area of benthic algae (*P. sanctae-crusis*) were noted.

- *Coral Reef Flat and Slope* – This habitat is located between the shallow sand flats and the eastern end of the Port berths (Transects 8 and 9; see **Figure 5.2.7-1**). The reef flats and slope begin on the western boundary at a shipwreck where bottom topography consists of a narrow shelf approximately 100 feet wide, which terminates in a gently sloping bottom that extends to the floor of the main shipping channel. Bottom composition of the reef shelf zone consists of scattered algae-covered boulders and rubble fragments. Sandy sediment covered any non-living surface. Moving westward on the reef shelf, bottom composition and biotic structure changed significantly. Algae were absent, replaced by a bottom covered of very fine-grained mud.

In the reef flat to the west of the proposed storm water outfall rip-rap locations (Transect 8), corals were sparse, but occurred throughout the area. Many of the corals exhibited the effects of sediment deposition. In the reef flat and slope to the channel floor (Transect 9) there was abundant coral colonization of a variety of lobate and branching species dominated by large

colonies of *Porites rus*. Corals in this location showed the least effect of sediment of all the transect locations. The most abundant fish, *Apogon* spp., were observed on the reef shelf.

- *Deep Channel Floor* – This habitat is located where the western end of the reef shelf ends at the Port’s wharves (Transects 10-13; see **Figure 5.2.7-1**). The floor of the deep (approximately 35-45 feet) main shipping channel between these wharves and the northern shoreline of Dry Dock Island consists of a bed of very fine-grained mud.

No coral, algae, or macro-invertebrates were observed in this habitat. Numerous infauna burrow holes were noted.

(See **Appendix G** for the complete assessment of the eight (8) metrics that were used to assess marine biota within the study area.)

In conclusion:

- All four habitats were characterized by near complete cover of soft sediments.
- None of the coral communities observed in the study area are unique or rare to Apra Harbor.
- Algae occurred most abundantly in areas with boulder bottoms (i.e. in the shallow sand flats).
- Macro-benthic invertebrates other than corals were essentially absent from the study area.
- Invasive species were not observed in the study area.
- The shallow sand flats, where the new storm water outfalls are proposed to be located, is not presently considered a sensitive benthic habitat.

Marine Mammals

A number of marine mammals occur in the seas around Guam, including whales, dolphins and dugong (*Dugong dugong*). These are primarily pelagic and off-shore species, and are unlikely to occur within Apra Harbor (pelagic means relating to, living, or occurring in the waters of the ocean or the open sea, as opposed to near the shore). Spinner dolphin (*Stenella longirostris*) occurs in lagoons and sheltered inlets, often with daily movement into the open ocean, with occasional sightings within Apra Harbor. Dugong can occur in bays and harbors, but is not currently known on Guam, with only one historical sighting.

Sensitive Species

While endangered or protected marine species (primarily sea turtles, such as hawksbill turtle [*Eretmochelys imbricate*] and green turtle [*Chelonia mydas*]) are commonly observed throughout Apra Harbor, none were observed during the site reconnaissance, including at the location where the two new storm water outfalls would discharge (see **Section 5.2.9**, Sensitive Species, for details on sensitive species).

5.2.7.3 Environmental Consequences

This section describes potential environmental consequences to benthic and marine resources during construction and operation of the proposed Port Modernization Program under the Proposed Action and Alternatives.

Evaluation Criteria

The level of impact on benthic and marine resources described in this section is based on: 1) the importance (i.e. legal, commercial, recreational, ecological or scientific) of the resource, 2) the proportion of the resource that would be affected relative to its occurrence in the region, 3) the sensitivity of the resource to the proposed activity, and 4) the duration of ecological ramifications.

Effects on benthic and marine resources are considered adverse if species or habitats of high concern are negatively affected. Effects are also considered adverse if disturbances cause reductions in population size or distribution of a species of high concern.

As a requirement under the ESA, federal agencies must provide documentation that ensures that agency actions, such as the proposed Port Modernization Program, do not adversely affect the existence of any benthic or marine federally-listed species or habitats. The ESA requires that all federal agencies avoid “taking” threatened and endangered species (which includes jeopardizing threatened or endangered species habitat). Section 7 of the ESA requires that federal agencies consult with the USFWS and/or NFMS to insure that federal actions do not jeopardize the continued existence of sensitive biological resources.

Proposed Action

The Proposed Action would not be expected to result in significant direct or indirect adverse impacts on benthic and marine resources (including sensitive species) on and in the vicinity of the site during construction and operation of the project.

Construction Effects

Construction activities for the Proposed Action would require grading to achieve suitable site topography and installation of a permanent storm water control system, including two new storm water outfalls, in the Expansion Area. Minor trenching for installation of utilities would be required in the Terminal Yard. During grading operations in the Expansion Area and trenching in the Terminal Yard, there would be an increased potential for short-term erosion and sedimentation when disturbed soils would be exposed to storm water runoff. Sediment, as well as other pollutants from construction equipment, could temporarily be discharged to Piti Channel/Apra Harbor, and could impact benthic and marine resources. With implementation of temporary storm water control, as well as erosion, sedimentation and pollutant control BMPs required by GEPA, no significant impacts on benthic and marine resources would be expected during construction (see **Section 5.2.2**, Surface, Storm Water, and Floodplains, for details).

During construction, removal of materials (including debris) currently existing in waters in or adjacent to the project impact footprint may be necessary. Removal of materials (including debris) is regulated by Section 404 of the CWA and Section 10 of the Rivers and Harbors Act. During the 404/10 permit process, the USACE will consult with federal and territorial environmental regulatory agencies, including NMFS, to solicit comments on the proposed debris removal to ensure avoidance/minimization of impact to any organisms, such as corals, associated with the debris.

Operational Effects

Storm water runoff generated from new impervious surfaces primarily in the Expansion Area would consist of freshwater containing pollutants. Efforts to minimize the impervious surfaces to be installed largely in the 19-acre Expansion Area are currently incorporated into the Proposed Action (see **Section 5.2.2**, Surface Water, Storm Water and Floodplains for details). Storm water would be discharged from the two new proposed storm water outfalls to Piti Channel/Apra Harbor and could affect water quality in the harbor, and in turn benthic and marine resources. Impacts to WOUS are discussed in **Section 5.2.5**, Wetlands and Coastal Waters. Impacts associated with implementing the Proposed Action would require a USACE Permit(s) in accordance with the Rivers and Harbors Act, Section 10,; Section 404 of the CWA; and Section 103 of the Marine Protection, Research, and Sanctuaries Act, 16 U.S.C. §1431 et seq. The proposed storm water outfalls would impact sand flats containing unconsolidated sediment (sand to very fine-grained silty mud) and limestone rubble. Actions to offset the permanent loss of unconsolidated sediment would be addressed during the USACE Permit process.

A permanent storm water control system would be installed in the Expansion Area, per GEPA requirements, that would reduce the potential for water quality and quantity impacts on PitiChannel/Apra Harbor, and on benthic and marine resources. The new storm water control system would include oil/water separators to provide treatment of storm water prior to discharge into Piti Channel. BMPs would also be implemented to control land-side erosion, sediment input and storm water runoff to the marine environment. Rip-rap would be placed at the outlets of the outfalls to dissipate energy and reduce the potential to disturb sediment and cause turbidity. The proposed storm water outfalls would be operated in compliance with a NPDES Permit, including associated periodic monitoring requirements. As a result, operation of the permanent storm water control system in the Expansion Area would not be expected to significantly impact water quality, and benthic and marine resources (see **Section 5.2.2**, Surface Water, Storm Water, and Floodplains for details).

Installation of the proposed storm water outfalls would require the placement of fill material (rip-rap) in the shallow sand flats, eliminating some soft-bottom benthic habitat in this area. The use of rip-rap to anchor and protect the storm water outfall structures would be required to maintain the outfalls' structural integrity. However, consistent with Section 404 of the CWA, the PAG would minimize impacts to the WOUS (which include benthic marine habitat). The amount of rip-rap placed in this area would be the smallest amount necessary to maintain the outfalls' structural integrity. Based on preliminary designs, rip-rap would be placed directly on the shore, and would extend approximately 10 to 15 feet into the shallow sand flats and coral rubble along the shoreline. The rip-rap would impact an area of approximately 1,530 square feet (combined) and require deposition of approximately 200 cubic yards (combined) of rip-rap material into this benthic habitat. The installation of rip-rap into the marine environment would present virgin hard-bottom substrate available for the recruitment and colonization of benthic epifauna. The Proposed Action would not result in the permanent loss of benthic marine habitat.

The benthic habitat and marine biota survey results found that the sand flats where the energy dissipation rip-rap would be installed, are essentially barren of epifauna due to a combination of factors, most importantly, the absence of solid surfaces for settlement (the area is covered in very fine-grained mud). The exposure of the area to air during low tides, and constant repeated re-suspension of fine-grained sediment from vessel traffic and wave action also results in less than favorable reef conditions for epifauna. Benthic and marine resources also would not be expected to be significantly impacted by the elimination of a minor amount of shallow sand flats habitat.

Under the Proposed Action, improvements would be made to the existing storm water control system in the Terminal Yard. Oil/water separators would be installed in the existing storm water system to provide treatment prior to discharge into Piti Channel/Apra Harbor. These improvements to the existing storm water outfalls would improve the quality of storm water discharged to the channel and harbor, which could reduce any current impacts on benthic and marine resources from this discharge.

With operation of the Port facilities under the Proposed Action, there would be a long-term increase in vessel activity in the harbor relative to existing conditions (see **Chapter 4.0** for additional information). This increased vessel activity would generate wakes and disturb sediment at the bottom of Apra Harbor. The increase in vessel activity could impact marine and benthic resources in the vicinity of the site. However, marine and benthic resources in the harbor are already limited and the site currently is an active port and vessel levels are presently relatively high. Therefore, the incremental increase in these levels with the proposed modernization would not be expected to result in significant impacts on marine and benthic resources.

Sensitive Species

The Proposed Action would not be expected to result in significant direct or indirect impacts to sensitive benthic and marine species during construction and operation of the project, as such species are unlikely to reside or frequent the marine environment immediately adjacent to the site (see **Section 5.2.9**, Federally Threatened and Endangered Species, for details).

Coral Reef Flat and Slope

Coral communities that presently exist on the reef shelf and slope to the west of the proposed storm water outfalls have developed under the influence of past Port activities, as well as past variability of marine water chemistry associated with wet and dry weather conditions (see **Section 5.2.2**, Surface Water, Storm Water, and Floodplains, for details on water quality in the harbor). Therefore, it is unlikely that coral would be significantly impacted by operations of the outfalls, particularly with installation of the energy dissipating rip-rap and water quality treatment facilities.

Alternative 1

Like the Proposed Action, Alternative 1 would not be expected to result in significant direct or indirect impacts on benthic and marine species, including sensitive species, on and in the vicinity of the site during construction and operation of the project. Under Alternative 1, no construction activities would take place in the Expansion Area. The grading activities and installation of a permanent storm water control system with associated outfalls assumed under the Proposed Action would not occur; therefore, the potential to impact benthic and marine resources during construction would not occur. Since there would be no new storm water outfalls installed in the Expansion Area under Alternative 1, there would be no elimination of benthic habitat (due to the placement of rip-rap), and no new storm water discharge and its associated potential to impact benthic and marine resources.

As under the Proposed Action, the existing eight outfalls in the Terminal Yard would be fitted with oil/water separators, which would improve the quality of storm water discharged to Piti Channel/Apra Harbor, and reduce potential impacts on benthic and marine resources, as compared to existing conditions.

No Action

The No Action Alternative would not generate any new impacts to benthic and marine resources, relative to existing conditions. Under this alternative, no construction activities would take place in the Expansion Area. The grading activities and installation of a permanent storm water control system with associated outfalls assumed under the Proposed Action would not occur; therefore, the potential to impact benthic and marine resources during construction would not occur. Since there would be no new storm water outfalls installed in the Expansion Area under this alternative, there would be no elimination of benthic habitat (due to the placement of rip-rap), and no new storm water discharge and its associated potential to impact benthic and marine resources.

The eight existing outfalls in the Terminal Yard would continue to release untreated storm water to Piti Channel/Apra Harbor, which could impact water quality and benthic and marine resources. Improvements to water quality from additional storm water treatment facilities assumed under the Proposed Action and Alternative 1 would not be realized under the No Action Alternative.

5.2.7.4 Mitigation Measures

The following mitigation measures are proposed by the Proponent to address potential impacts to benthic and marine resources during construction and operation of the Proposed Action:

During Construction

- Temporary storm water management, and erosion, sedimentation, and pollution control measures would be implemented prior to construction activities, per GEPA and USFWS requirements (i.e. via a Guam EPP and USFWS BMPs), which would minimize the potential for sediment and pollutants to impact benthic and marine resources.
- Per Section 404 of the CWA, water quality would be monitored during construction of the proposed storm water pipes and outfalls. A Water Quality Monitoring Plan would also be prepared and implemented during construction, in accordance with the local construction permits (Erosion Control and Clearing and Grading). Adaptive management would be based on the monitoring results to control any detected water quality impacts.
- Filling in the marine environment for the proposed storm water outfalls would be scheduled to avoid coral spawning and recruitment periods and sea turtle nesting and hatching periods.

Following Construction

- A permanent storm water control system would be installed in the Expansion Area per USEPA requirements. Improvements would be made to the storm water control system in the Terminal Area. Together, these systems would minimize the potential for storm water impacts on benthic and marine resources.
- All of the existing storm water outfalls in the Terminal Yard, as well as the two proposed outfalls in the Expansion Area, would be fitted with oil/water separators.

- Storm water would be directed to flow-dissipating rip-rap before discharge into Apra Harbor; this would minimize the potential to disrupt sediment and cause turbidity impacts on benthic and marine resources.
- The amount of rip-rap placed at the terminus of the two proposed outfalls would be the smallest amount necessary to maintain the outfalls' structural integrity and would reduce the loss of soft-bottom benthic habitat. The rip-rap would provide hard-bottom habitat, however.
- BMPs would be implemented to control erosion, sediment input, and storm water runoff to the marine environment.
- Storm water discharge from the outfalls would be monitored for compliance with NPDES Operating Permit discharge limits to protect water quality. Adaptive management would be based on the monitoring results to control any detected water quality impacts.
- Actions to offset the permanent loss of unconsolidated sediment would be addressed during the USACE Permit process.

5.2.8 Essential Fish Habitat

This section describes existing essential fish habitat (EFH) in the vicinity of the Port Modernization Program site. Potential environmental consequences to this habitat associated with construction and operation of the Port Modernization Program are also analyzed. The following section is based upon the *Essential Fish Habitat Assessment* (2011) prepared by AMEC (see **Appendix H** to this Environmental Assessment (EA) for the full report).

5.2.8.1 Introduction

Regulatory Framework

Various federal and local regulations related to the protection of EFH would apply to the Port Modernization Program, as summarized below (see **Appendix H** for details).

The 1996 Sustainable Fisheries Act (P. L. 104-297) amendments to the Magnuson-Stevens Fishery Management and Conservation Act (MSFMCA), 16 U.S.C. §1801 et seq., is the primary federal law governing marine fisheries management in the U.S. Regional Fishery Management Councils develop and implement fishery management plans to restore depleted stock, and manage healthy stock, in accordance with this Act. Within the Guam area, the Western Pacific Regional Fishery Management Council manages major fisheries. EFH consultation is required by the Act on all activities, or proposed activities, authorized, funded, or undertaken by the agency, that may adversely affect EFH; the proposed Port Modernization Program is such an activity. 16 U.S.C. §1855(b); 50 CFR 600.905-930.

Construction of the two new proposed storm water outfalls in the Expansion Area would require a USACE Rivers and Harbors Act of 1899 Section 10/404 Clean Water Act (CWA) permit. Approval of this permit would allow for the discharge of dredged or fill material (rip-rap at the proposed storm water outfall outlets) into coastal waters and work (to install the storm water outfalls and rip-rap) in these waters. A CWA Section 402 National Pollution Discharge Elimination System (NPDES) permit administered by the USEPA with authority delegated to GEPA would be required for the point-source discharge of storm water from the site into surface waters (coastal waters, in this case). A CWA Section 401 water quality certification administered by USEPA with authority delegated to GEPA would also be required for storm water discharged from the site. Implementation of these permit/certification requirements would help maintain acceptable water quality in Apra Harbor, which supports EFH.

A GEPA EPP would be required for clearing, grading, and marine-related construction work. EPPs include environmental protection measures to reduce, minimize, or eliminate impacts. EPPs may include erosion and sedimentation control, vegetation, wildlife, and coral/marine resource protection measures that would help minimize impacts on EFH.

Key Definitions

The following key definitions apply to the descriptions and analysis in this section (see **Appendix H** for details):

- *Essential Fish Habitat (EFH)* – those waters and substrates necessary to support a sustainable fishery and managed species population for a full life cycle (spawning, breeding, feeding, or growth to maturity). These waters include aquatic areas and their associated physical, chemical, and biological properties used by fish, and may include areas historically used by fish.

- *Habitat Areas of Particular Concern (HAPC)* – are discrete subsets of EFH that provide extremely important ecological functions or are especially vulnerable to degradation. Regional Fishery Management Councils (in this case, the Western Pacific Regional Fishery Management Council) may designate specific habitat areas as an HAPC. The HAPC designation does not confer additional protection or restrictions upon an area, but can help prioritize conservation efforts.

Methods and Study Area

Following is a description of the methods and study area used for the EFH analysis in this EA (see **Appendix H** for details).

The *Essential Fish Habitat Assessment* was prepared based upon a review of existing literature, site-specific studies (including the *Marine Environmental Assessment* (2011) (see **Appendix I** to this EA), maps, and diver and hydrographic surveys of the site vicinity (see **Appendix J** to this EA). In June 2010, limited site-specific observations were made of the EFH in the site vicinity during the wetland survey prepared for this EA. The study area for the observations of the EFH consisted of the location of the two proposed storm water outfalls in the Expansion Area, and the adjacent berthing area to the west, because this is the area containing EFH with the greatest potential to be impacted by the proposed Port Modernization Program (see Figure 1 in **Appendix H** for a map of the study area, and **Appendix H** and for details on the methodology used for the study).

5.2.8.2 Affected Environment

This section describes the existing EFH in the vicinity of the Port Modernization Program site.

Existing conditions in the vicinity of the two proposed storm water outfalls in the Expansion Area include a pronounced coral rubble tidal flat emanating from the shoreline, and three small strands of mangrove to the east. Mangrove swamps and coral reefs were identified as important fish nurseries and adult habitat throughout the tropical Pacific. However, these habitats vary significantly within the outer and inner confines of Apra Harbor (e.g. coral is largely absent in the inner harbor). Following are the Western Pacific Regional Fishery Management Council’s Fishery Ecosystem Plan (FEP)-designated EFH for Apra Harbor:

- *Mangrove (Ma)* (mangrove are included in the FMP);
- *Lagoon (La)*;
- *Estuarine (Es)*;
- *Coral Reef/Hard Substrate (Cr/Hs)*; and,
- *Patch Reefs (Pr)*.

These designated EFH are further divided into more discrete sensitive habitat types - water column, mangrove, and soft-bottom - located in the area of the proposed storm water outfalls, as described below.

- *Water Column* – the water column is the basic habitat and the medium through which all of the other fish habitats are connected. Water quality in this habitat at the location of the proposed storm water outfalls is categorized by GEPA as “M-3 Fair” (the lowest category on a scale of M-3 Excellent, M-2 Good, and M-3 Fair; GEPA Water Quality Standards, 5102(a)(1-3)). This water category is intended for general, commercial, and industrial use. The Piti Power Station, located

approximately 0.5 mile to the east of the site, produces a thermal discharge into Piti Channel that increases the overall ambient water temperature in the vicinity of the Port Modernization Program site. The site currently discharges untreated storm water to Apra Harbor through eight outfalls in the Terminal Yard (see **Appendix H** for details).

- *Mangrove* – mangrove habitat was identified to the east of the proposed outfalls. This habitat is subject to daily tidal changes, causing the mangrove to be partially to completely exposed at low-tide. Mangrove trees were determined to provide nursery habitat for juvenile fish and invertebrates. Depending on factors such as hydrologic regime and nutrient supply, this habitat is considered very productive and an important source of organic matter for estuarine areas.
- *Soft-bottom* – the dominant substrate at the location of the proposed outfalls is comprised of coral rubble and sand. Sediment quality in this area is considered fair, in keeping with the use of the harbor as a commercial port.

The FEP lists Jade Shoals in the site vicinity as HAPC, a subset of EFH. These shoals are located approximately one mile from the project site in Outer Apra Harbor (see **Figure 5.2.8-1** for a depiction of the Jade Shoals in the outer harbor).

Figure 5.2.8-1, Location of Jade Shoals (HAPC)



Source: EA Engineering, Science, and Technology and GoogleEarth, 2012.

Several marine species were observed during the 2010 survey, primarily in the vicinity of the foundered ships approximately 600 feet west of the proposed outfalls. Coral and other epi-benthos were completely absent, and algae and fish species were extremely rare in the sand flats where the outfalls are proposed to be located. Fish species identified near the foundered ships included: blacktip grouper (*Epinephelus fasciatus*), snapper (*Lutjanus* spp.), mullet (Family Mugilidae), surgeonfish (*Acanthurus* spp.), and trigger fish (Family Balistadae). Several crab species (i.e. *Cardisoma carnifex* and *Carcinus maenas*) were found along the entire shoreline, and mudskippers (*Periophthalmus barbarous*) were observed where there was adequate nearshore shelter, such as within the mangrove roots to the east of

the proposed outfalls. A peppered moray eel (*Siderea picta*) was observed in the shallow sand flats (see **Appendix H** for details).

EFH elements, including water quality, sediment quality, mangroves, and benthic and marine resources, are further discussed in **Section 5.2.2**, Surface Water, Storm water, and Floodplains; **Section 5.2.4**, Sediment Quality; **Section 5.2.5**, Wetlands and Coastal Waters, and **Section 5.2.7**, Benthic and Marine Resources, of this EA.

5.2.8.3 Environmental Consequences

This section describes potential environmental consequences to EFH during construction and operation of the proposed Port Modernization Program under the Proposed Action and Alternatives.

Evaluation Criteria

The EFH Assessment was prepared pursuant to 50 CFR 600.905 - 930 Essential Fish Habitat coordination and consultation procedures. According to these procedures, an “adverse effect” on EFH is defined as any impact that reduces the quality and/or quantity of EFH, including direct or indirect physical, chemical, or biological alterations of the waters or substrate, and loss of, or injury to, benthic organisms, prey species, and their habitat, and other ecosystem components, if such modifications reduce the quality and/or quantity of EFH.

Designated Fishery Ecosystem Plan EFH in Apra Harbor includes Mangrove (Ma), Lagoon (La), Estuarine (Es), Coral/Reef/Hard Substrate (Cr/Hs), and Patch Reefs (Pr). These EFH were further divided into more discrete sensitive habitat types - water column, mangrove, and soft-bottom - that apply to the project vicinity. The FEP lists Jade Shoals in the site vicinity as HAPC. Potential impacts of the Port Modernization Program on these sensitive habitat types and HAPC are evaluated in this the *Essential Fish Habitat Assessment* (see **Appendix H** for details).

Proposed Action

The Proposed Action would not be expected to result in significant direct or indirect impacts on EFH in the vicinity of the site during construction and operation of the project.

Construction Effects

Construction activities for the Proposed Action would require grading to achieve suitable site topography and installation of a permanent storm water control system, including two new storm water outfalls, in the Expansion Area. Minor trenching for installation of utilities would be required in the Terminal Yard. During grading operations in the Expansion Area and trenching in the Terminal Yard, there would be an increased potential for short-term erosion and sedimentation when disturbed soils would be exposed to storm water runoff. Sediment, as well as other pollutants from construction equipment, could temporarily be discharged to Piti Channel/Apra Harbor, and could impact EFH.

The specific effects of construction activities on the sensitive habitat at the location of the proposed outfalls would include:

- *Water Column and Mangrove* – the water column and mangrove habitats could be intermittently and temporarily impacted by water circulation and turbidity from storm water

discharge during construction of the project. However, these impacts would be minor compared to the overall watershed contribution to Apra Harbor. Also, natural tides and currents would transport potential pollutants away from the mangrove habitat. With implementation of temporary storm water management, and erosion, sedimentation, and pollution control measures, per GEPA, and implementation of BMPs recommended by USFWS and/or NMFS to minimize turbidity and other pollutants, no significant impacts on the water column and mangrove habitats would be expected during construction.

- *Soft-bottom* – installation of the rip-rap at the outlet of the proposed outfalls could temporarily disturb soft-bottom habitat. This would be a short-term impact that would be minimized to the extent possible, and no significant impacts on this habitat would be expected during construction.

Construction of the storm water outfalls would not be expected to result in significant impacts on EFH or HAPC (Jade Shoals), a subset of EFH, due to the distance of the shoals from the site.

In conclusion, based upon the existing site conditions, the proposed location of the two outfalls in relation to sensitive habitat and HAPC (Jade Shoals), and the low abundance of species observed within the potential area of impact (the 2010 study area), adverse impacts to EFH are expected to be temporary and minimal. With implementation of temporary storm water control required by GEPA, as well as erosion, sedimentation and pollutant control BMPs recommended by USFWS, no significant impacts on EFH would be expected during construction (see also **Section 5.2.2**, Surface Water, Storm Water, and Floodplains, for details).

Operational Effects

Under the Proposed Action, storm water runoff generated from new impervious surfaces, primarily in the Expansion Area, would consist of freshwater containing pollutants. Storm water would be discharged from the two new proposed storm water outfalls to Piti Channel/Apra Harbor and could affect water quality in the harbor, and in turn EFH.

A permanent storm water control system would be installed in the Expansion Area, per GEPA requirements, that would reduce the potential for water quality and quantity impacts on Piti Channel/Apra Harbor, and on EFH. The new storm water control system would include oil/water separators to provide treatment of storm water prior to discharge into Piti Channel. BMPs would also be implemented to control land-side erosion, sediment input and storm water runoff to the marine environment. Rip-rap would be placed at the outlets of the outfalls to dissipate energy and reduce the potential to disturb sediment and cause turbidity. The proposed storm water outfalls would be operated in compliance with a NPDES Operating Permit, including associated periodic monitoring requirements. As a result, operation of the permanent storm water control system in the Expansion Area would not be expected to significantly impact water quality, and EFH (see **Section 5.2.2**, Surface Water, Storm Water, and Floodplains, for details).

The existing storm water outfalls would be fitted with oil/water separators, which would improve water quality relative to existing conditions; this could result in positive impacts to EFH.

The specific effects of project operation on sensitive habitat at the location of the proposed storm water outfalls would include:

- *Water Column* – Operation of the proposed outfalls would intermittently release fresh storm water containing pollutants that could affect water quality in the water column habitat. However, with installation of a permanent storm water control system per GEPA requirements, significant water quality impacts on the water column would not be expected (see **Section 5.2.2**, Surface Water, Storm Water, and Floodplains, for details).
- *Mangrove* – No direct impacts to mangrove habitat would result from operation of the proposed project, including from installation of rip-rap at the two new proposed storm water outfalls. The outfalls would be located at least 30 feet from the mangroves on and in the vicinity of the site (Wetlands A, B, and C). Operation of the proposed outfalls would intermittently release fresh storm water containing pollutants that could affect the mangrove habitat. However, with installation of a permanent storm water control system per GEPA requirements, significant water quality impacts on mangrove habitat would not be expected (see **Section 5.2.5**, Wetlands and Coastal Waters, and **Appendix F** for details).
- *Soft-bottom* – Direct impacts to soft-bottom habitat would occur with the installation of rip-rap at the two proposed outfalls. The rip-rap would stabilize the outfalls and protect the shoreline from erosion by dissipating water energy. The amount of rip-rap placed in this area would be minimized to the greatest extent possible and installed per USACE permit requirements. Based on preliminary designs, installation of the two outfalls would require the placement of approximately 200 cubic yards (CY) (combined) of rip-rap material, and would eliminate approximately 1,530 square feet (combined) of soft-bottom habitat below the high tide line (HTL), replacing this habitat with hard structure. The elimination of soft-bottom habitat could be considered an adverse impact, because this is foraging habitat for benthic finfish. However, the new rip-rap bottom would represent a structure that is expected to increase the immediate species diversity for species that use hard-bottom habitat (i.e. coral, barnacles, and oysters). Therefore, significant impacts to soft-bottom habitat would not be expected.

Operation of the storm water outfalls would not be expected to result in significant impacts on HAPC (Jade Shoals), a subset of EFH, due to the distance of the shoals from the site.

Alternative 1

Similar to the Proposed Action, Alternative 1 would not be expected to result in significant direct or indirect impacts on EFH in the vicinity of the site during construction and operation of the project. Under Alternative 1, reconfiguration and modernization of the Terminal Yard would occur, similar to under the Proposed Action. However, there would be no expansion of Port facilities into the Expansion Area, including installation of new storm water outfalls. Impacts to EFH would be less than with the Proposed Action, because no clearing, grading, and construction, and their associated potential to impact water quality and EFH, would occur in the Expansion Area. The existing storm water outfalls would be fitted with oil/water separators, which would improve water quality relative to existing conditions; this could result in positive impacts to EFH.

No Action

The No Action Alternative would not generate any new impacts to EFH. Under this alternative, reconfiguration, modernization, and expansion of the Terminal Yard, and the associated impacts on EFH, would not occur. Repair and replacement of deteriorating facilities and utilities at the Port would take

place as failures occurred over time. Facilities and utilities would be repaired or replaced within the existing footprint of the Terminal Yard. The existing storm water outfalls would continue to discharge untreated storm water to Apra Harbor, which could impact EFH.

5.2.8.4 Mitigation Measures

The following mitigation measures are proposed by the Proponent to address potential impacts to EFH during construction and operation of the Proposed Action:

During Construction

- Temporary storm water management, and erosion, sedimentation, and pollution control measures would be implemented prior to construction activities, per GEPA requirements (i.e. via a Guam EPP and USFWS BMPs), which would minimize the potential for sediment and pollutants to impact EFH.
- BMPs recommended by USFWS would be employed during construction.
- Per Section 404 of the CWA, water quality would be monitored during construction of the proposed storm water pipes and outfalls. A Water Quality Monitoring Plan would also be prepared and implemented during construction, in accordance with the local construction permits (Erosion Control and Clearing and Grading). Adaptive management would be based on the monitoring results to control any detected water quality impacts.

Following Construction

- A permanent storm water control system would be installed in the Expansion Area, per GEPA requirements. Improvements would be made to the storm water control system in the Terminal Area. Together, these systems would minimize the potential for storm water impacts on EFH.
- BMPs would be implemented to control erosion, sediment input, and storm water runoff to the marine environment
- All of the existing storm water outfalls in the Terminal Yard, as well as the two proposed outfalls in the Expansion Area, would be fitted with oil/water separators.
- Storm water would be directed to flow-dissipating rip-rap before discharge into Apra Harbor; this would minimize the potential to disrupt sediment and cause turbidity impacts on EFH.
- The amount of rip-rap placed at the terminus of the two proposed outfalls would be the smallest amount possible to maintain the outfalls' structural integrity and would reduce the loss of soft bottom habitat. Actions to offset the permanent loss of unconsolidated sediment would be addressed during the USACE Permit process. The rip-rap would provide hard-bottom habitat, however.
- Storm water discharge from the outfalls would be monitored for compliance with NPDES Operating Permit discharge limits to protect water quality. Adaptive management would be based on the monitoring results to control any detected water quality impacts.

5.2.9 Federally Threatened and Endangered Species

This section describes existing federally threatened and endangered species on and in the vicinity of the Port Modernization Program site. Potential environmental consequences to these species associated with construction and operation of the Port Modernization Program are also analyzed. The following section is based upon the *Terrestrial Flora and Fauna Survey* (2009) prepared by ARC Environmental Services; *Biological Resources Report* (2011) prepared by AMEC. (see **Appendices E and G**).

5.2.9.1 Introduction

Regulatory Framework

Federally threatened and endangered species are regulated by the ESA. The USFWS and the NMFS administer this federal requirement.

Key Definitions

The following key definition applies to the descriptions and analysis in this section (also see **Appendix G**):

- *Threatened and Endangered (Federally-Listed) Species and Species of Concern* – According to the ESA, species (including plants, animals, and other organisms) and the ecosystems upon which they depend have become extinct, or in danger of or threatened with extinction “as a consequence of economic growth and development untempered by adequate concern and conservation.” ESA, 16 U.S.C. §1531(a)(1). A “*threatened species*” is any species which is likely to become endangered in the near future. An “*endangered species*” is a species which is in danger of becoming extinct, throughout all or a significant portion of its range. ESA, 16 U.S.C. §1532. A “*species of concern*” is an informal phrase used to refer to any species listed as endangered, threatened, or as a candidate for these listings.

Methods and Study Area

To assist with compliance with the ESA, letters of inquiry were sent to the USFWS and NMFS requesting those agencies identify federally-listed species and species of concern, including federally threatened and endangered species, and or critical habitats on and in the vicinity of the Port Modernization Program site (see **Appendix G** to this EA for the letters of inquiry and agencies’ responses regarding federally-listed species).

In addition to the letters of inquiry, field surveys were conducted in October 2009 to prepare the *Terrestrial Flora and Fauna Study*, in June 2010 to prepare the *Biological Resources Report*; and, in December 2010 and January 2011 to prepare the *Essential Fish Habitat Assessment and Marine Environment Assessment* (see **Appendices E, G, H, and I** for details). These surveys included references to federally threatened and endangered species, as appropriate.

5.2.9.2 Affected Environment

This section describes the federally threatened and endangered species that were observed and are expected to occur on and in the vicinity of the Port Modernization Program site (see **Appendices E, G, and K** for details).

Based on the agencies' responses to the letters of inquiry regarding federally threatened and endangered species, as well as follow-up communication, the federally threatened and endangered species on and in the vicinity of the site are: the green turtle (*Chelonia mydas*) – a federally threatened species; hawksbill turtle (*Eretmochelys imbricata*) – a federally endangered species; and Marianas common moorhen (*Gallinula chloropus guami*) – a federally endangered species. The anticipated prevalence of these species on and near the site is summarized below.

- *Sea Turtles* (green turtle and hawksbill turtle) – Due to lack of habitat, there is a low likelihood of either of the sea turtles (*C. mydas* and *E. imbricata*) nesting or foraging onsite, particularly in the location of the two new proposed outfalls in the Expansion Area. Aerial turtle survey information obtained from 1992 to 2009 by DAWR indicated that the nearest record of nesting is at the Sea Plane Ramp located approximately 4,000 feet west of the site. Neither turtle species is likely to nest onsite, because of the lack of sandy beaches along the shoreline. No sea turtles were observed in the vicinity of the site during either the June 2010 biological survey or the December 2010 and January 2011 marine surveys for this EA.
- *Marianas Common Moorhen* – The Marianas common moorhen (*G. chloropus guami*) is unlikely to forage or nest onsite due to the lack of appropriate habitat and protected nesting areas. The Marianas common moorhen was not observed during the June 2010 field survey.

5.2.9.3 Environmental Consequences

This section describes potential environmental consequences to federally threatened and endangered species during construction and operation of the proposed Port Modernization Program under the Proposed Action and Alternatives.

Evaluation Criteria

As a requirement under the Endangered Species Act (ESA), federal agencies must provide documentation that ensures that agency actions, such as the proposed Port Modernization Program, do not adversely affect the existence of any federally-listed species. The ESA requires that all federal agencies avoid “taking” federally-listed species (which includes jeopardizing threatened or endangered species habitat). Section 7 of the ESA requires that federal agencies consult with the USFWS and/or NMFS to insure that federal actions do not jeopardize the continued existence of sensitive biological resources. Informal consultation under Section 7 was initiated with USFWS and NMFS on August 22, 2012. Correspondence from USFWS and NMFS was subsequently received (**Appendix K**) and was incorporated as appropriate into this Environmental Assessment.

Proposed Action

The Proposed Action would not be expected to result in significant direct or indirect impacts to federally threatened and endangered species during construction or operation of the project.

Construction Effects

Significant impacts to federally threatened and endangered species (i.e. the hawksbill turtle- *E. imbricata*, green turtle - *C. mydas*, and Marianas common moorhen - *G. chloropus guami*) would not be expected during construction activities for the proposed Port Modernization Program, as there is little likelihood that these species seasonally or permanently inhabit the site.

However, to minimize the potential to impact federally threatened and endangered species (if any), construction activities would be conducted in compliance with GEPA and DAWR requirements to minimize potential disturbance from construction during bird migration periods, and direct impacts (i.e. for installation of the proposed storm water outfalls) would be avoided during active bird nesting. Engineering controls would be installed to minimize stray construction lighting from reaching adjacent habitat areas. Therefore, construction activities would not be expected to result in significant adverse effects on federally threatened and endangered species.

Operational Effects

Significant impacts to federally threatened and endangered species would not be expected during operation of the Port Modernization Program, as none of these species are expected to seasonally or permanently inhabit the site.

With operation of the Port facilities under the Proposed Action, there would be a long-term increase in activity levels (related to increases in vessel and vehicular traffic), noise, and light at the Port relative to existing conditions (see **Chapter 4.0, Section 5.1.2**, Noise, and **Section 5.3.1**, Traffic for additional information). The increase in activity levels, noise, and light could impact federally threatened and endangered species (if any) on and in the vicinity of the site. However, the site currently is an active commercial port and activity levels, noise, and light onsite are already relatively high. Therefore, the incremental increase in these levels with the Proposed Action would not be expected to result in significant impacts on federally threatened and endangered species.

Alternative 1

Like the Proposed Action, Alternative 1 would not be expected to result in significant direct or indirect impacts on federally threatened and endangered species on and in the vicinity of the site during construction and operation of the project. Under Alternative 1, reconfiguration and modernization of the Terminal Yard would occur, similar to under the Proposed Action. However, there would be no expansion of Port facilities into the Expansion Area, including installation of new storm water outfalls. As a result, there would be no displacement of habitat, and no short-term and long-term increases in activity levels, noise, and light in the Expansion Area that could impact federally threatened and endangered species (if any) on and in the immediate vicinity of this area.

No Action

The No Action Alternative would not generate any new impacts to federally threatened and endangered species. Under this alternative, reconfiguration, modernization, and expansion of the Terminal Yard, and any potential associated impacts on federally threatened and endangered species would not occur. Repair and replacement of deteriorating facilities and utilities at the Port would take place as failures occurred over time. Facilities and utilities would be repaired or replaced within the existing footprint of the Terminal Yard.

5.2.9.4 Mitigation Measures

The following mitigation measures are proposed by the Proponent to address potential impacts to federally threatened and endangered species during construction of the Proposed Action:

During Construction

- Applicable BMPs to minimize potential disturbance from construction during bird migration periods, and direct impacts (i.e. for installation of the proposed storm water outfalls) would be avoided during active bird nesting.
- The site would be surveyed for bird species of concern prior to vegetation clearing associated with construction of the storm water outfalls, to determine the status of migratory sea and shorebirds. If nests are located, clearing would not be completed until birds and nestlings leave on their own volition.
- Engineering controls (i.e. light focusing reflectors, deflective shrouds, and fence screens) would be installed to minimize stray light from construction activities from reaching adjacent habitat areas.

During Operation

- As possible, engineering controls (i.e. light focusing and shading features) would be installed to minimize stray light generated by permanent lighting from reaching adjacent habitat areas.

5.3 Human Resources

5.3.1 Traffic

This section describes existing traffic conditions on and in the vicinity of the Port Modernization Program site. Potential environmental consequences to existing traffic conditions associated with construction and operation of the proposed Port Modernization Program are analyzed.

5.3.1.1 Introduction

Regulatory Framework

On December 19, 2008, the Guam Department of Public Works issued the *2030 Guam Transportation Plan* which is intended to present a comprehensive strategy to improve transportation infrastructure throughout Guam. The *Guam Transportation Plan* outlines Guam’s forecasted roadway, bicycle, pedestrian and transit facility needs through 2030 based on forecasted population growth and the Military Relocation Program. The *Guam Transportation Plan* also outlines proposed projects required to meet forecasted needs and defines level of service standards and volume/capacity ratios.

Key Definitions

The following key definitions apply to the descriptions and analysis in this section:

- *Volume/Capacity Ratio* – Traffic congestion is a condition on road networks that occurs as vehicle use increases, and is characterized by slower speeds, longer trip times, and increased vehicular queuing. Traffic congestion is measured by dividing the number of cars on the road (i.e., volume) by the number of cars the road was designed to carry (i.e., capacity). A volume to capacity (v/c) ratio greater than 1 indicates that the roads are carrying more vehicles than they were designed to handle and that the roads are congested; a v/c ratio of less than 1 indicates that roads are not congested.
- *Level of Service* – Intersection operations can be measured to assess the Level of Service (LOS) experienced by drivers. The LOS describes the quality of traffic operations conditions, ranging from A to F and is measured as the duration of delay that a driver experiences at a given intersection. LOS A represents free-flow movement of traffic and minimal delays to motorists. LOS F generally indicates severely congested conditions with excessive delays to motorists. Intermediate grades of B, C, D, and E reflect incremental increases in congestion. **Table 5.3.1-1**, provides the delay thresholds for signalized intersections.

Table 5.3.1-1, Delay Thresholds for Level of Service

LOS	Signalized Intersection (seconds per vehicle)
A	0.00-10.0
B	10.1-20.0
C	20.1- 35.0
D	35.1-55.0
E	55.1-80.0
F	Greater than 80.0 seconds

Source: Transportation Research Board, *Highway Capacity Manual, 2000*, as referenced in *2030 Guam Transportation Plan*, Guam Dept. of Public Works, 2008.

Methods and Study Area

Following is a description of the methods used for the traffic analysis in this EA.

The vehicular traffic associated with the Proposed Action is directly related to the number of marine vessels processed at the facility. The Port, in collaboration with the Joint Guam Program Office, has forecasted marine vessel operations data through 2027 that includes both vessel trips associated with projected Port commercial growth and vessel trips associated with the Guam Military Relocation Program, as described in **Section 3.3.2**, Forecasted Operations.

As described in **Section 2.2.2**, in September 2010 the *Guam and Commonwealth of the Northern Marianas Islands (CNMI) Military Relocation: Relocating Marines from Okinawa, Visiting Aircraft Carrier Berthing, and Army Air and Missile Defense Task Force Record of Decision (ROD)* was issued by the Joint Guam Program Office. This ROD (and the supporting EIS provided analysis of potential impacts that would result from the proposed military relocation from Okinawa, Japan, to the island of Guam (Guam Military Relocation Program). The Guam Military Relocation Program EIS (which considered vehicular trips associated with all forecasted marine vessel trips through 2027, including both vessel trips associated with projected Port commercial growth and vessel trips associated with the Guam Military Relocation Program) included a comprehensive traffic analysis for roadways on Guam, including the Apra Harbor region where the Port is located. Data from this recent traffic analysis was used as a baseline and as a basis of comparison to determine the potential for impacts associated with the Port Modernization Program, including:

- Data from the *Guam Military Relocation EIS* regarding existing (2008) congestion on Route 11 and Route 1 and operations at the intersection of Route 11/Route 1 (Joint Guam Program Office, 2010a, Volume 6, Section 4)
- Data from the *Guam Military Relocation EIS* regarding environmental consequences associated with Guam Military Relocation Program construction and operation and general background growth (Joint Guam Program Office, 2010a, Volume 6, Section 4). The traffic analysis of environmental consequences in the Guam Military Relocation EIS included assumptions relevant to the Port Modernization Program, as described in detail in **Section 5.3.1.3**.
- A qualitative discussion of construction-related traffic impacts associated with the Port Modernization Program as compared to the project peak traffic associated with the Guam Military Relocation Program (Joint Guam Program Office, 2010a, Volume 6, Section 4).

5.3.1.2 Affected Environment

This section describes the existing traffic conditions on and in the vicinity of the Port Modernization Program site.

Key roadways serving the Port include Route 11 and Route 1 (see **Figure 5.3.1-1**). Route 1, also known as Marine Corps Drive, is a major arterial roadway and extends approximately 22 miles from Andersen Air Force Base in Yigo on the northeastern corner of the island down to Naval Base Guam in Santa Rita, located in the central western area of the island. There is a combination of raised and flush median, shoulders, no curb and gutter and no sidewalks.

Figure 5.3.1-1, Roadways in the Vicinity of the Port Modernization Program Site

Source: EA, GoogleEarth, 2012.

Route 11 serves as the entrance the Port and has a posted speed limit of 15 miles per hour. Route 11 is 2.9 miles-long and is classified as a minor arterial. The road has two lanes with no median, and intermittent shoulders, curb and gutter and sidewalks. The lanes are generally 12 feet wide.

Route 11 is fed directly from Route 1. The intersection of Route 1 and Route 11 is a “T” intersection controlled by a traffic signal.

Traffic Volumes

As of 2008, approximately 9,100 vehicles per day (VPD) traveled on Route 11 and the v/c ratio was 0.00-0.80 in both the AM and PM peak hours, which are considered to be, not congested (Joint Guam Program Office, 2010a).

As of 2008, traffic volumes on Route 1 ranged from 19,000 to 30,000 VPD. The traffic was noted to decrease into the entrance of Naval Base Guam, which is at the Route 1/2A intersection south of the Port Modernization Program site. The v/c ratio was 0.00-0.80 in both the AM and PM peak hours, which are considered to be, not congested (Joint Guam Program Office, 2010a).

Intersection Operations

As of 2008, the intersection of Route 11/Route 1 was operating at LOS B (14.5 second/vehicle delay) in the morning peak hour and LOS B (22.2 second delay) in the afternoon peak hour (Joint Guam Program Office, 2010a). The LOS for this intersection, based on 2008 traffic volumes, is considered acceptable.

Port of Guam Traffic

Vehicles enter and exit the Port from unsignalized intersections off of Route 11. Vehicles entering and exiting the Port are generally controlled at a single check point gate with three entrance lanes and one exit lane. Based on information provided by Port operations staff (PAG, 2008), processing times at the gate for entering vehicles typically ranges from three to five minutes. Outbound processing times are relatively low at typically one minute.

Turnaround times within the Terminal Yard Area include initial processing time, locating of cargo units, physical lifts, and exit processing. These internal turnaround times range from 15 to 30 minutes and average approximately 20 to 22 minutes (PAG, 2008).

Approximately 150 trucks enter and exit the Port on a weekday (PAG, 2008). The origins and destinations of truck trips are generally to and from Route 1, and to and from the northern parts of the Guam, including Anderson Air Force Base. Port staff estimates that 85 to 90 percent of all cargo entering or leaving the Port is directed to and from the northern parts of Guam (PAG, 2008).

5.3.1.3 Environmental Consequences

This section describes potential environmental consequences to traffic conditions during construction and operation of the proposed Port Modernization Program under the Proposed Action and Alternatives. Traffic generated from construction and operational activities associated with the Proposed Action and Alternatives would not be anticipated to trigger significant traffic impacts.

Evaluation Criteria

The *2030 Guam Transportation Plan* (Guam Department of Public Works, 2008), indicates that “All intersections and roadway segments should operate at LOS E during peak periods.” For purposes of this EA analysis, any intersection LOS less than E is considered a significant impact.

For purposes of this Environmental Assessment (EA) analysis, any roadway that is currently uncongested (v/c ratio less than 1) that would become congested (v/c ratio greater than 1) with the Proposed Action is considered a significant impact.

Proposed Action

As stated previously, the vehicular traffic generated from the Proposed Action is directly related to the number of marine vessels processed at the Port. The *Guam Military Relocation EIS* traffic analysis included assumed vehicular traffic associated with the Port’s forecasted vessel traffic including both Guam Military Relocation Program-related vessels and well as other commercial vessel traffic forecasts provided by the Port.

Since the construction materials for the Guam Military Relocation and the associated growth in goods would arrive in Guam via the port prior to distribution throughout the island, data from the *Guam Military Relocation EIS* traffic analysis are relevant to construction traffic impacts of the Port Modernization Program including:

- Construction materials for development of the Guam Military Relocation Program would arrive at the Port of Guam via marine vessels during the buildup period (2012-2016). After arrival at

the Port of Guam via marine vessels, construction materials would be conveyed via truck to construction sites in different areas of the island. The traffic analysis included assumptions for Guam Military Relocation Program construction traffic from the Port site on Route 11 to other areas of the island where the Guam Military Relocation Program construction activities would occur (Joint Guam Program Office, 2010a, Volume 6, Section 4).

- The increases in population associated with Guam Military Relocation Program and anticipated general population growth would increase the amount of goods imported to the island (i.e., household goods, cars) during and subsequent to the buildup period (2012-2016). The goods would be imported to the island via marine vessel at the Port of Guam and transported to other parts of the island via truck. The Guam Military Relocation Program EIS traffic analysis included assumptions for traffic from assumed vessel traffic associated with imports of goods to the island (Joint Guam Program Office, 2010a, Volume 6, Section 4).
- The Guam Military Relocation Program EIS traffic analysis included assumptions for general traffic conditions based on projected increases in population (Joint Guam Program Office, 2010a, Volume 6, Section 4).
- The Guam Military Relocation Program EIS traffic analysis includes all known roadway improvement projects included in the *2030 Guam Transportation Plan (2008)* (Joint Guam Program Office, 2010a, Volume 6, Section 4).
- The Guam Military Relocation Program EIS traffic analysis includes all identified roadway improvement mitigation projects associated with the Guam Military Relocation Program. Improvements to Route 11 include repaving and strengthening measures (Joint Guam Program Office, 2010a, Volume 6, Section 4).

The *Guam Military Relocation EIS* assumed the peak vehicular traffic would occur in 2014, after completion of the Port Modernization Program project.

Construction Effects

Under the Proposed Action, vehicular traffic would be generated by construction activities on the Port Modernization Program site including construction worker commuter trips and truck hauling associated with grading/waste disposal. Approximately 145,000 CY of grading would occur in the Expansion Area. Material not reused onsite would be transported to a temporary soil stockpile area north of the Expansion Area, north of Route 11. Trucks would cross Route 11 directly from the Expansion Area to the stockpile site. Vehicle trips could also be generated from transportation of construction materials to the site; although, the majority of construction materials would be anticipated to arrive directly to the site via marine vessel. Construction traffic associated with the Port Modernization Program would occur prior to the Guam Military Relocation Program peak year (2014), as the Port Modernization Program improvements would be necessary to achieve projected peak marine vessel traffic in 2014.

The Guam Military Relocation Program EIS Alternatives 1 and 2 traffic in 2014 presents a “worst-case scenario” for the projected peak vessel and vehicular activity at the Port. Construction traffic generated by the Port Modernization Program Proposed Action would not be anticipated to be greater than the peak Guam Military Relocation Program in 2014, as summarized below.

Table 5.3.1-2, shows the assumptions for traffic congestion on Route 11 and Route 1 under Alternatives 1 and 2 of the Guam Military Relocation EIS in terms of VPD and v/c ratios. Under the Guam Military Relocation EIS Alternatives 1 and 2, the number of vehicles on Route 11 would increase to 14,000 VPD in 2014 and would level off to approximately 8,900 VPD in 2030. As indicated in **Table 5.3.1-2**, the peak trips associated with the military relocation in 2014 (anticipated peak year of traffic generation) were not anticipated to exceed the Guam Transportation Plan’s v/c standard of 1; thus the lower number of vehicle trips associated with construction would not be anticipated to exceed the v/c standard or result in significant impacts.

Table 5.3.1-2, Assumptions for Traffic Congestion on Route 11 and Route 1 under Alternatives 1 and 2 of the Guam Military Relocation EIS

Roadway	Existing	Alt 1 and Alt 2	
	2008	2014	2030
Route 11	9,100 VPD	14,000 VPD	8,900 VPD
	0.00-0.80 v/c ratio (not congested)	0.00-0.90 v/c ratio (not congested)	0.00-0.90 v/c ratio (not congested)
Route 1	19,000-30,000 VPD	23,000-47,000 VPD	24,000-56,000 VPD
	0.00-0.80 v/c ratio (not congested)	<1.0 v/c ratio (not congested)	<1.0 v/c ratio (not congested)

Source: Joint Guam Program Office, 2010a.

Table 5.3.1-3, shows the assumptions for traffic congestion on Route 11 under Alternatives 1 and 2 of the Guam Military Relocation EIS in terms of VPD and v/c ratios. As indicated in the table, the peak trips associated with the military relocation in 2014 were not anticipated to degrade LOS below the Guam Transportation Plan’s LOS standard of E; thus, the lower number of vehicle trips associated with construction would not be anticipated to degrade LOS below the standard or result in significant impacts.

Table 5.3.1-3, Assumptions for Operations at the Intersection of Route 11/Route 1 under Alternatives 1 and 2 of the Guam Military Relocation EIS

	Existing		Alt 1/2			
	2008	Delay	2014	Delay	2030	Delay
LOS (am peak hour)	B	14.5	C	25.4	C	20.7
LOS (pm peak hour)	C	22.2	E	67.1	D	43.5

Source: Joint Guam Program Office, 2010a.

Vehicular traffic generated by Port Modernization Program construction activities would not be anticipated to be greater than the Guam Military Relocation Program peak in 2014; therefore, Port Modernization Program construction traffic would not be anticipated to result in unacceptable LOS F conditions at the intersection of Route 1/11 or v/c conditions greater than 1 on Route 11 or Route 1.

Operational Effects

Under the Proposed Action, after construction of the Proposed Action, operations of the Port would increase substantially over current conditions in the short-term (2014) due to the traffic associated with the Guam Military Relocation Program and decline until 2016 when it would level out. Peak Port

operations traffic in 2014 would not be anticipated to exceed the Guam Transportation Plan's LOS E Standard at the intersection of Route 1/11 or exceed the Guam Transportation Plan's v/c standard of 1 on Route 11 or Route 1, as shown on **Tables 5.3.1-2** and **Table 5.3.1-3**.

Marine vessel trips and the associated vehicular traffic generated by Port operational activities after completion of the Port Modernization Program and Guam Military Relocation Program would be less than the Guam Military Relocation Program peak in 2014; therefore, Port operational traffic would not be anticipated to create LOS F conditions at the intersection of Route 1/11 or v/c conditions greater than 1 on Route 11.

Under the Proposed Action, onsite Port operations would be reconfigured to maximize efficiency and a new terminal gate complex would be constructed to improve traffic queuing. Traffic operations internal to the Port Modernization Program site would improve with new lift equipment, security screening, and new gate system improvements collectively in place. Current processing times would likely decrease, resulting in less queuing activity at entrance and exit gates and lower overall turnaround times as compared to the existing conditions.

Alternative 1

Construction and operational environmental consequences related to traffic under with Alternative 1 would generally be similar to those described for the Proposed Action. Port operational traffic would not be anticipated to exceed the Guam Transportation Plan's LOS E standard at the intersection of Route 1/11 or exceed the Guam Transportation Plan's v/c standard of 1 on Route 11 or Route 1.

Under Alternative 1, Port operations would not be reconfigured and a new terminal gate complex would not be constructed; therefore, improvements to traffic queuing on the site realized under the Proposed Action would not occur under Alternative 1.

No Action

Under the No Action Alternative, traffic conditions would be similar to existing conditions and no new traffic environmental consequences would be anticipated. Considering that the cargo handling capacity at the Port would not increase, the Military Relocation Program would be anticipated to implement an adaptive program management (APM), to slow the construction pace and the movement of military construction material through the Port. Although the volume of peak hour traffic would not be anticipated to substantially exceed existing levels, the length of time that peak traffic levels occur could increase over current conditions.

Onsite improvements to traffic queuing realized under the Proposed Action would not occur.

5.3.1.4 Mitigation Measures

The following mitigation measures are proposed by the Proponent to address potential traffic impacts to during construction of the Proposed Action:

During Construction

- The Port could implement a construction traffic plan for workers, truck deliveries, and construction traffic from the Expansion Area to the soil stockpile site north of Route 11 in order

to minimize disruption to traffic flow for existing tenants of the port. This plan could consider the need for special signage, flaggers and parking for construction workers.

5.3.2 Cultural, Historic and Section 4(f) Resources

This section describes existing cultural, historic, and Section 4(f) resources on and in the vicinity of the Ports Modernization Program site. Potential environmental consequences to these resources associated with construction and operation of the Port Modernization Program are also analyzed.

5.3.2.1 Introduction

Regulatory Framework

Various federal and local regulations related to cultural and historic resources would apply to the Port Modernization Program, as summarized below.

Archaeological and architectural resources determined to be significant under cultural resource legislation, such as the National Historic Preservation Act (NHPA) (16 U.S.C. §470 et seq.) and the Archaeological Resources Protection Act (ARPA) (16 U.S.C. §470aa), are subject to protection or consideration by a federal agency. Other laws and Executive Orders (E.O.) may also apply, such as: the Historic Sites Act of 1935 (16 U.S.C. §§461-467); Archeological and Historic Preservation Act of 1974 (16 U.S.C. §§469-469c); Abandoned Shipwreck Act of 1987 (43 U.S.C. §§2101-2106); E.O. No. 11593 Protection and Enhancement of the Cultural Environment (1971); and E.O. No. 13287 Preserve America (2003). Additional regulations include Curation of Federally-Owned and Administered Archeological Collections (36 CFR Part 79), Preservation of American Antiquities (43 CFR Part 3), and National Historic Landmarks Program (36 CFR Part 65).

Section 106 of the NHPA requires federal agencies to consider the effects of their actions on historic properties. The implementing regulations for Section 106 (36 CFR Part 800) specify a consultation process to assist in satisfying this requirement, while Section 110 of the NHPA includes responsibilities for stewardship.

Section 4(f) of the Department of Transportation Act of 1966 (P.L. 89-670 recodified at 49 U.S.C. § 303) also offers protection to historic properties that are eligible for or listed on the NRHP. The DOT, which includes MarAd, may not permit the use of historic properties unless it has been determined through evaluation that no prudent and feasible alternative to the use exists or unless it has been determined that the impact is considered *de minimis*, meaning trivial. D may consider use of a historic Section 4(f) property *de minimis* if Section 106 consultation with the State Historic Preservation Office (SHPO) results in a finding of No Adverse Effect or No Historic Properties Affected.

The laws and regulations related to the management and preservation of cultural resources on Guam falls under Real Property Law, Historical Objects and Sites (21 Guam Code Ann. tit. 21 §76101 et seq.), which sets out public policy to implement a comprehensive program of historic preservation and authority for preservation review of all government permits or licenses and provides authority to stop projects in violation of preservation requirements. Guam E.O. 89-9, which requires consideration of historic preservation for any action needing an approval of the Territorial Land Use Commission (now known as the Guam Land Use Commission); and Guam E.O. 89-24, which establishes policies for the disposition of archaeologically recovered human remains. The *Comprehensive Historic Preservation Plan for Guam* (Belt Collins 2007) and *Guidelines for Archaeological Burials* (Parks and Recreation n.d.) further define specific procedures and consultation requirements. These laws pertain to non-federal lands on Guam. Federal agencies are required to comply with federal laws, which supersede local laws. NHPA

requirements are met on all federal lands and lands managed by federal agencies, while ARPA only applies to federally owned lands. Procedures for reburial and repatriation of human remains have been developed through consultation with the Guam SHPO and adopted as standard operating procedures in Integrated Cultural Resources Management Plans (ICRMPs).

Key Definitions

The following key definitions apply to the descriptions and analyses in this section:

- *Cultural Resources* – cultural resources are defined as any district, site, building, structure, or object considered to be important to a culture, subculture, or community for scientific, traditional, religious, or any other reason. Cultural resources include pre-Contact (before European contact) and post-Contact archaeological resources, architectural resources, and traditional cultural properties. The cultural resources discussed in this section include those that meet the specific criteria of the NHPA and its associated regulations.
- *Historic Resources* – historic properties include sites and structures that usually must be at least 50 years old to be eligible for listing on National Park Service’s National Register of Historic Places (NRHP). In order to be considered a historic property under the NHPA, a resource must meet the criteria in 36 CFR 60.4 (defined below).
- *NHPA Criteria* – for the purposes of the NHPA, significant cultural and historic resources are those that are listed or eligible for listing on the NRHP. The criteria for significance are contained in federal regulation 36 CFR 60.4 and include cultural and historic resources that:
 - A. Are associated with events that have made a significant contribution to the broad pattern of history, or
 - B. Are associated with the lives of persons significant in the past, or
 - C. Embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic value or represent a significant and distinguishable entity whose components may lack individual distinction, or
 - D. Have yielded, or may be likely to yield information important in prehistory or history.

According to National Register Bulletin, *How to Apply the National Register Criteria for Evaluation* (National Park Service [NPS] 2002), a cultural or historic resource must meet at least one of the NRHP significance criteria (A, B, C, or D) and must also retain integrity in order to be listed on or determined eligible for listing on the NRHP.

- *4(f) Resources* – Section 4(f) offers protection to historic properties that are eligible for or listed on the NRHP.

Methods and Study Area

The Area of Potential Effect (APE) for the Proposed Action includes the Port of Guam site plus a 30-foot buffer around the site. A number of resources were reviewed to identify historic properties within the APE, including:

- GIS files of historic site locations on Guam;

- *Jose D. Leon Guerrero Commercial Port of Guam Master Plan Update 2007 Report*; and
- *Cultural Resources, Chapter 12 of Volume 2 of the Guam and CNMI Military Relocation Final EIS* (July 2010).

Section 106 consultation was initiated with the Guam Historic Preservation Office (GHPO) on October 22, 2009.

5.3.2.2 Affected Environment

This section describes the existing cultural, historic and Section 4(f) resources on and in the vicinity of the Port Modernization Program site.

The Port of Guam was constructed starting in 1966, with a peak of construction activity between 1967 and 1969. The existing structures are generally one- to two-story buildings, primarily constructed of reinforced concrete. There are relatively few unmodified buildings onsite; these include: the Port Administration Building (1967-1968), Control Tower (1968-1969), and the Port Police Station (post 1970). There have been several expansion projects since the initial Port construction, which have impacted the buildings and structures at the Port. None of the buildings or structures on site are currently listed in the National Register of Historic Places. As mentioned previously, historic properties usually must be at least 50 years old to be eligible for listing in the NRHP. Since all of the Port buildings were constructed after 1966, they are considered out-of-period (built after 1962 and less than 50 years old), and are not historic properties as defined in 36 CFR Part 800.

Thirty-one known locations of shipwreck sites and submerged objects are located in Outer Apra Harbor, including two ships listed on the NRHP. These resources are located outside the boundaries of the APE.

Section 106 consultation was initiated with the Guam Historic Preservation Office (GHPO) on October 22, 2009. GHPO's documentation, including a GIS database of historic properties on the island, does not indicate any known historic properties within the Proposed Action's APE (see **Appendix L** for consultation letter).

Archaeological sites are located in open space areas around the Marianas Yacht Club (See **Figure 3-2**). These areas are outside of the Proposed Action's APE.

There are no Section 4(f) resources (resources that are eligible or listed on the NRHP) in the APE of the Proposed Action.

5.3.2.3 Environmental Consequences

This section describes potential environmental consequences to cultural, historic and Section 4(f) resources during construction and operation of the proposed Port Modernization Program under the Proposed Action and Alternatives.

Evaluation Criteria

A historic property is a property that is eligible for or listed on the NRHP. For cultural resources found eligible to the NRHP, a significant adverse impact is one that disturbs the integrity of a historic property. If a project disturbs intrinsic characteristics that make the property eligible for or listed on the NRHP (other than its integrity), then it is also considered to have a significant adverse impact.

Proposed Action

The Proposed Action would not be expected to result in significant impacts on cultural, historic or Section 4(f) resources on and in the vicinity of the site during construction and operation of the project.

Construction and Operational Effects

Several buildings will be demolished or modified under the Proposed Action (see **Section 4.2.2**). None of these buildings are currently listed or eligible to be listed on the NRHP. No cultural resources have been identified within the APE.

A letter requesting review of the Proposed Action under Section 106 of the National Historic Preservation Act was sent to the GHPO on December 15, 2010. The GHPO concurred with the determination of “No Historic Property Affected” in a January 19, 2011 letter to the Port. The GHPO requested that the Port provide the services of an archaeologist if there is an inadvertent discovery of cultural resources. Documentation of consultation with the GHPO is included in **Appendix L**. Therefore, no impacts on cultural or historic resources would be anticipated. It is possible that cultural resources could be discovered during clearing and grading activities for the Proposed Action. Should this occur, the Port of Guam would engage the services of an archaeologist.

Storm water outfall dissipation pads/rip-rap would extend about 10 to 15 feet from the shoreline. There are no shipwrecks in this area. Therefore, no impacts to shipwrecks would be anticipated under the Proposed Action.

The Proposed Action would take place on Port property only and there are no Section 4(f) resources in the area of the Proposed Action. Therefore, the Proposed Action would not have an impact on Section 4(f) resources.

Alternative 1

Under Alternative 1, a few buildings will be demolished or modified in the Terminal Yard (see **Section 4.3.2**). None of these buildings are currently listed or eligible to be listed on the NRHP. No construction activities would take place in the Expansion Area, which is within the APE. As noted above, the APE does not contain any cultural, historic, or Section 4(f) resources. Therefore, the potential to impact these resources during construction or operation would not occur.

No Action

Under the No Action Alternative, the Port would remain in its current configuration, and current operations would continue. As noted under the Proposed Action and Alternative 1, no known cultural, historic or Section 4(f) resources exist within the APE. Therefore, the No Action Alternative would not affect cultural, historic, or Section 4(f) resources.

5.3.2.4 Mitigation Measures

The following mitigation measures are proposed by the Proponent to address potential impacts to cultural, historic, or Section 4(f) resources during construction of the Proposed Action:

During Construction

If an inadvertent discovery of historic properties occurs, the Port Authority of Guam (PAG) would engage the services of an archaeologist.

5.3.3 Land Use and Coastal Zone Consistency

This section describes existing land uses on and in the vicinity of the Port Modernization Program site. Potential environmental consequences to land uses associated with construction and operation of the Port Modernization Program and consistency with applicable land use policies, including the Port of Guam Master Plan and the Guam Coastal Management Program, are also analyzed.

5.3.3.1 Introduction

Regulatory Framework

Guam regulations regarding land use that would apply to the Port Modernization Program are described in this section.

- The *Territory of Guam Master Plan* was prepared for the Territorial Planning Commission in 1966 and is the adopted land use plan for Guam. Although this plan is the official land use plan, it has limited utility when describing existing land use and describing trends for future development.
- Other more recent Guam government land use plans were not adopted or are longer valid. The *Guam Comprehensive Development Plan* was adopted in 1977, and was valid for a planning period up to the year 2000. The I Tano'-ta (The Land Use Plan for Guam) drafted in 1994 was not adopted.
- The *Guam Coastal Management Program* (GCMP) implements the Coastal Zone Management Program for Guam. The Port Modernization Program must be deemed consistent with the Coastal Management Program by the Bureau of Statistics and Plans.
- The Port Master Plan (*Jose D. Leon Guerrero Commercial Cargo Port Master Plan Update*) was published in 2008. The Master Plan notes physical deficiencies at the Port that the proposed Port Modernization Program attempts to address.

Key Definitions

The following key definitions apply to the descriptions and analysis in this section:

- The GCMP guides the use, protection, and development of land and ocean resources within Guam's coastal zone. The "coastal zone" of Guam includes all non-federal property on the island, including offshore islands and the submerged lands and waters extending seaward to a distance of three (3) nautical miles.

Methods and Study Area

For purposes of this EA analysis, a review of applicable literature was performed, including the Port of Guam Master Plan, the Guam Coastal Management Program, and a discussion of existing and proposed land uses on the Port Modernization Program site associated with the Proposed Action and Alternatives is provided.

The Proposed Action (i.e., Port Modernization Program site) is bordered on the north by Route 11, on the south by Apra Harbor, on the east by an undeveloped area set aside for future expansion, and on

the west by marine industrial facilities. Guam's coastal zone includes all non-federal property on the island, including offshore islands and the submerged lands and waters extending seaward to a distance of 3 nautical miles are included in the coastal zone (BSP, 2011a). Therefore, the land use and coastal zone consistency assessment study area includes the Port and its surrounding areas on Cabras Island (**Figure 3-2**).

5.3.3.2 Affected Environment

Existing Land Uses

Port Modernization Program Site

The Port Modernization Program site consists of an approximately 72-acre area that is mostly occupied by the Port's Terminal Yard. The Terminal Yard is primarily used to support cargo operations at the Berths F-4, F-5, and F-6.

The Port Modernization Program site primarily consists of:

- Open, concrete-paved and gravel surface space that is currently used for storing cargo containers and general cargo. In paved areas, cargo containers are typically stacked in blocks that are five or six containers wide and two or three containers high.
- Partially used and vacant land located in the eastern and northeastern portions of the site. Most of this area has been reserved for future expansion of the Terminal Yard. The Unitek Waste Transfer Facility is located in this area.
- Buildings, primarily located in the western portion of the site, including the Port Administration Building, which serves as the PAG's headquarters and also provides office space for several private shipping companies; the Horizon Lines Building, which provides office space for private shipping companies; the Container Freight Station, which is used by the shipping companies as a repair facility and maintenance shop; the Equipment Maintenance and Repair (EQMR) Building, which is used by the Port's maintenance and repair staff; and Warehouses No. 1 and No. 2, which include storage space for commercial fishing and shipping tenants as well as office space for Port personnel. In addition, there is a welding shed, Port Police Station, control tower, gas station (which is no longer in use), sewer pump house, and four electrical load center buildings on the site. See **Figure 3-4** for existing building locations.

Surrounding Land Uses

Land uses surrounding the Port Modernization Program site include a mix of industrial facilities, commercial water-dependent uses, vacant land, and recreational uses (see **Figure 3-2** for general locations of these facilities).

East of the Port Modernization Program site, on the north side of Route 11, is a large vacant parcel designated as Cabras Island Industrial Park. Cabras Island Park is identified by the Port as a potential area for Port-related industrial use in the future.

Further to the east of the Port Modernization Program site, on the south side of Route 11 at the eastern end of Cabras Island and across Piti Channel near the intersection of Route 11 and Route 1, are the Guam Power Authority (GPA) Power Plants comprised of the Cabras Island Power Plant and the Piti

Power Plant. Oil reserve tanks owned by the Tri-Star Company are located adjacent to the Piti Island Power Plant.

Immediately west of the Terminal Yard portion of the site is the Port's Marine Industrial Terminal and includes an oil tank farm. Further to the west is the Glass Breakwater, which includes a seaplane ramp, a fueling pier, and recreational facilities including a dinner cruise and a family beach.

Route 11 is located immediately to the north of the Port Modernization Program site and the Philippine Sea lies to the north of Route 11. The Piti Channel Apra Harbor is located to the south of the Port Modernization Program site.

Port Authority of Guam Port Master Plan

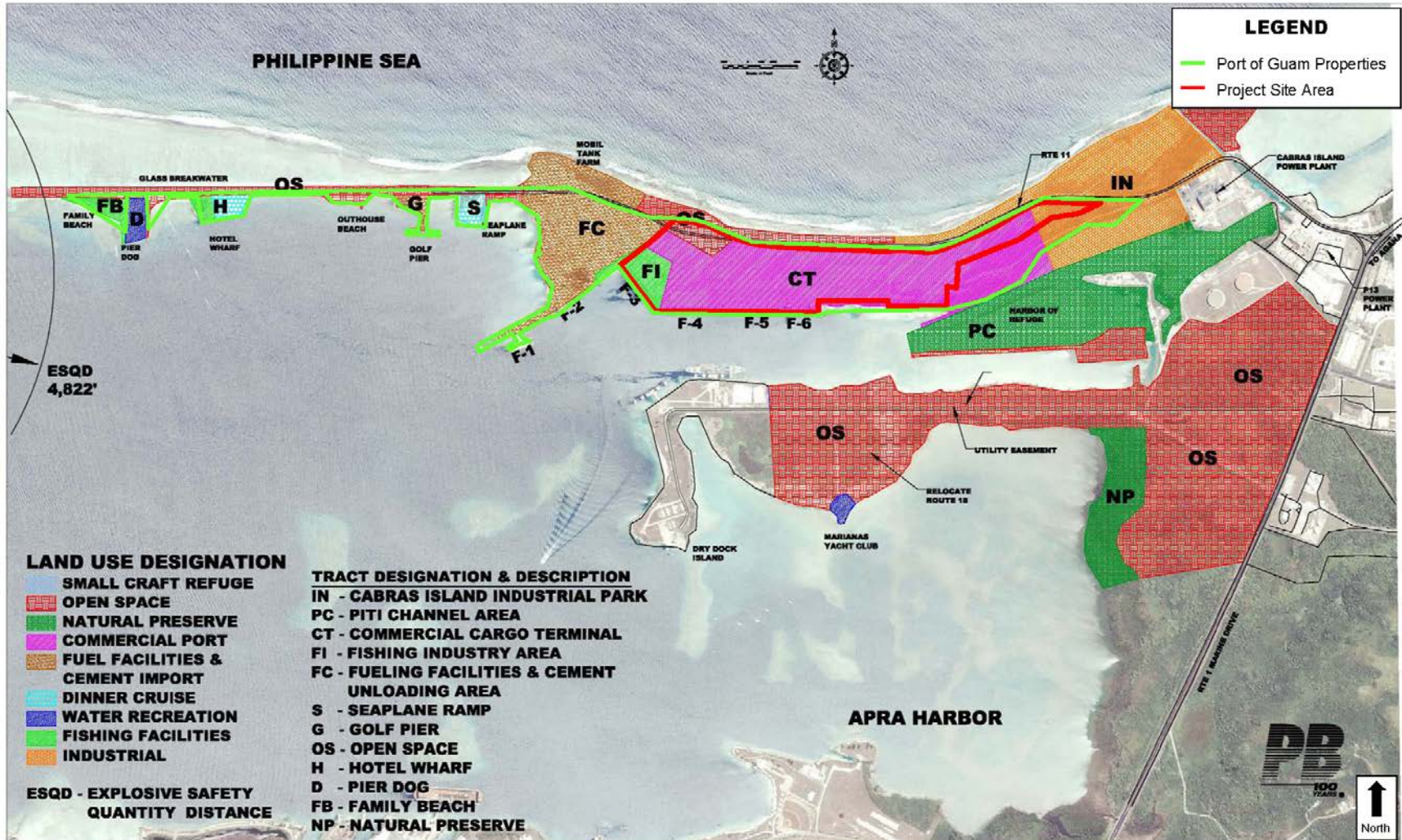
The land uses within the Port are established by the Port Master Plan (PAG, 2008) which serves as the Port's comprehensive land use plan. The current land use designations for the Port and surrounding area were established by the 1999 Master Plan, which was adopted by the legislature in 2000, and are shown in **Figure 5.3.3-1**. The current land use designations reflect the existing land uses in these areas. An update of the Port Master Plan, the *Commercial Port Master Plan Update 2007 Report*, was completed in April 2008 and received legislative approval in September 2009. The updated Port Master Plan retains the current land use designation at the Port. The recommendations and updates in the Master Plan address future improvements, modernization, reconfiguration and expansion based on typical commercial growth at the Port, as well as the impending military relocation from Okinawa, Japan to Guam.

The Port Master Plan includes the following designations within the Port Modernization Program site:

- *Commercial Port* – This area consists of the existing Terminal Yard and the Expansion Area located to the east of the terminal. It includes the area currently occupied by the Port Administration Building and associated small buildings located outside the Terminal Yard fenced area.
- *Fishing Facilities* – This area designated as “Fishing Facilities” includes the segment of land currently occupied by the Port's Warehouse #1, the Equipment Maintenance and Repair Building and adjacent tank area. It is currently located within the Terminal Yard fence and is contiguous with the terminal. A part but not all of this area is leased and occupied by the CASAMAR purse seiner fishing repair facility.
- *Open Space* – A small portion within the Port Modernization Program site designated as “Open Space” includes the area nestled *between* the Terminal Yard and the seawall to the north.
- *Industrial* – The eastern end of the Port Modernization Program site is designated as “Industrial” south of Route 11. The Unitek oil waste recycling facility is located in this area.

The Port Master Plan includes the following land use designations for land immediately adjacent to the Port Modernization Program site:

Figure 5.3.3-1, Port Master Plan Commercial Port and Vicinity Land Use Designations



Source: Port Authority of Guam, 2008.

- *Industrial* – East of the Port Modernization Program site, this segment of land adjacent to and north of Route 11 has been designated for “Industrial” use. The proposed Cabras Island Industrial Park is slated to be located in this area.
- *Fuel Facilities and Cement Import* – West of the Port Modernization Program site, the various tenant facilities located within this designation including the Mobil Tank Farm, Pier F-1, the Cement Unloading dock and the CASAMAR upland and building areas
- *Natural Preserve* – This designation to the south of the Port Modernization Program site consists of Piti Channel that flows from the Philippine Sea under the Route 11 Bridge past the Harbor of Refuge for small craft and into Apra Harbor via the Cabras Island Navigation Channel and Port Slips.

Land use designations at Glass Breakwater include *Open Space* (along the length of the breakwater), *Small Craft Refuge* (Seaplane Ramp), *Fuel Facilities and Cement Import* (Golf Pier), *Dinner Cruise* (Hotel Wharf), *Water Recreation* (Family Beach/Dog Leg Pier), and *Fishing Facilities* (Hotel Wharf and Family Beach). See **Figure 5.3.3-1** for these locations.

Coastal Zone Management Program

The GCMP, administered by the Guam Bureau of Statistics and Plans (GBSP), includes enforceable policies that serve to maintain and preserve coastal resources in Guam. The Proposed Action involves a federal undertaking within Guam’s designated coastal zone, and would require that a coastal zone consistency determination (CCD) assessment be submitted to GBSP. An assessment of the consistency of the Proposed Action with the GCMP policies is presented below under **Section 5.3.3.3**.

5.3.3.3 Environmental Consequences

This section describes potential environmental consequences to land use during construction and operation of the proposed Port Modernization Program under the Proposed Action and Alternatives. No significant environmental consequences to land use from construction and operations of the Proposed Action and Alternatives would be anticipated.

Evaluation Criteria

Impacts associated with land use would be adverse if an incompatible land use was located adjacent to an existing use. For this Proposed Action, the proposed land uses and associated locations respective to existing adjacent land uses were evaluated.

Proposed Action

Land Use

Construction Effects – Construction would occur in phases with the initial stage including demolition of Warehouse No. 2 and expansion of the break-bulk facilities in the western portion of the site. Subsequent stages would proceed from east to west. Development of the 11-acre Expansion Area portion of the site would allow the Port to phase and stage construction activities associated with the Proposed Action with minimal disruption to ongoing operations. See **Section 4.2.2** for a full list of the structures to be demolished under the Proposed Action. Existing uses housed in the facilities would be

temporarily relocated prior to demolition activities. No existing uses are assumed to be permanently displaced as a result of redevelopment activities. The Unitek waste oil recycling facility in the Expansion Area would be demolished consistent with applicable regulations and would likely relocate elsewhere on the island.

Operational Effects – The Proposed Action involves expansion of the existing Terminal Yard and reconfiguring and upgrading various facilities within the Port’s existing property to improve the efficiency of Port operations. Land acquisition or the displacement of any existing land uses, with the exception of the Unitek waste oil recycling facility in the Expansion Area, would not be necessary. Within the existing Terminal Yard, there would be no change in land use on the site and it would continue to be used as a commercial port facility.

Within the Expansion Area, 19 acres of the undeveloped 39 acres is proposed to be redeveloped as part of the Proposed Action. As noted above, the Unitek facility would be relocated and the area would be regraded to accommodate container storage and terminal operations, with the addition of a new Load Center to address power requirements, a new Terminal Gate and Gate Administration Building, and parking facilities.

The Proposed Action would not increase cargo volumes over the projected peak analyzed in the *Guam Military Relocation EIS* (see **Section 3.3.2**). The Proposed Action would slightly increase cargo volumes over historic peak levels, but due to the increased efficiency within the Terminal Yard, it would not significantly affect the intensity of land use at the Port. Therefore, it would not induce any new development or changes in land use on sites in the surrounding area.

The Proposed Action would not be anticipated to restrict or disrupt access to recreation areas or commercial activities at Glass Breakwater either during construction or operation.

As part of the Proposed Action, the support space in Warehouse No. 1 for current commercial fishing tenants would be relocated to Warehouse No. 2. This would result in a minor, short-term disruption to these tenants, but it would not be expected to significantly impact their operations. The relocation would locate the support space for the fishing tenants closer to the main commercial fishing operations at Berth F-3. The relocation also would separate the commercial fishing tenants from the main cargo operations at the Container Terminal, which is intended to improve the efficiency of Port operations.

With implementation of the Proposed Action, the general character of the Terminal Yard portion of the site would be similar to existing conditions. The Terminal Yard would continue to be developed with Port operations and equipment, as shown on Figure 4-1. The addition of cargo container storage in the proposed 19-acre Expansion Area portion of the site would represent a continuation of the character of the existing Terminal Yard.

Port Master Plan Consistency

The Proposed Action is intended to achieve goals and direction provided by the Port Master Plan. The Proposed Action would modernize, improve, and reconfigure the Port’s existing 52-acre Terminal Yard and develop a 19-acre Expansion Area with new cargo storage facilities in order to increase cargo-handling capacity and operating efficiency. Extension of the Terminal Yard to the Expansion Area would increase operational capacity of the entire Port facility in the long-term, as well as allow for construction activities to be phased and staged with minimal disruption to existing Port operations.

The Proposed Action would also construct a new Break-bulk Terminal area in the western portion of the Terminal Yard (west of Berths F-4 to F-6) that would consolidate break-bulk activities currently occurring in various locations across the Terminal Yard. The Proposed Action would also create a Non-Port Operations Area to the west of the proposed new Break-bulk Terminal to isolate these activities from the remainder of the Port to improve efficiency and security. See **Figure 4-1** for the locations of these two areas.

The Proposed Action is intended to implement the Master Plan recommendations regarding Port modernization and future improvements and therefore, would not conflict with public land use policies governing the area. The expansion of Terminal Yard, the new Break-bulk Terminal, and the isolation of non-Port operations separate from cargo terminal operations are specific recommendations in the 2008 Port Master Plan. The Proposed Action also complies with the Port's Commercial Port and Fishing Facilities land use designations for the site.

Coastal Zone Consistency

The Proposed Action would be constructed and operated in compliance with GEPA and USACE permits, and therefore, would minimize impacts to development and resources as outlined in the policies of the GCMP. A coastal zone consistency determination (CCD) assessment will be submitted to the GBSP during this planning phase, prior to the permitting process. An assessment of the consistency of the Proposed Action with the GCMP policies is presented below.

Development Policies (DP)

DP 1. Shore Area Development

Intent: To ensure environmental and aesthetic compatibility of shore area land uses.

Policy: Only those uses shall be located within the Seashore Reserve which:

- enhance, are compatible with or do not generally detract from the surrounding coastal area's aesthetic and environmental quality and beach accessibility; or
- can demonstrate dependence on such a location and the lack of feasible alternative sites.

Discussion: The land uses within the existing Terminal Yard would not change under the Proposed Action. Section 5.3 of the 2008 Port Master Plan outlines the dependence on the existing location and the lack of feasible alternative sites. The Master Plan indicates that there is no readily available land for a new "green-fields" port of this nature, and considerable assets, albeit outdated, are available at the current location to facilitate modernizing the Terminal Yard in place more quickly and economically.

DP 2. Urban Development

Intent: To cluster high impact uses such that coherent community design, function, infrastructure support and environmental compatibility are assured.

Policy: Commercial, multi-family, industrial and resort-hotel zone uses and uses requiring high levels of support facilities shall be concentrated within appropriate zone as outlined on the Guam Zoning Code.

Discussion: The Proposed Action is located on Port property that is designated in the Port Master Plan as *Commercial Port*. The existing Terminal Yard has historically functioned as a commercial

port and will continue to do so. The Expansion Area is also designated *Commercial Port* and is an extension of these functions to increase the efficiency of Port operations.

The infrastructure, including transportation and utilities, is sufficient to handle demand resulting from the Proposed Action. Marine vessel trips and the associated vehicular traffic generated by Port operational activities after completion of the Port Modernization Program and Guam Military Relocation Program would be less than the Guam Military Relocation Program peak in 2014; therefore, Port operational traffic would not be anticipated to create LOS F conditions at the intersection of Route 1/11 or volume to capacity ratio (v/c) conditions greater than 1 on Route 11. Under the Proposed Action, onsite Port operations would be reconfigured to maximize efficiency and a new terminal gate complex would be constructed to improve traffic queuing. Traffic operations internal to the Port Modernization Program site would improve with new lift equipment, security screening, and new gate system improvements collectively in place. Current processing times would likely decrease, resulting in less queuing activity at entrance and exit gates and lower overall turnaround times as compared to the existing conditions.

The Proposed Action would improve the water supply system at the Port by replacing aging infrastructure and re-routing supply lines. Fire protection system improvements under the Proposed Action would include the installation of new fire mains connected to the relocated main north of the secured Terminal Yard in the Route 11 right-of-way. Fire-fighting water pressure would be improved to meet code requirements through installation of storage tanks and pumps. The Proposed Action would expand lighting and back-up power capability, add a new Load Center (LC)/upgrade other LCs, and potentially remove overhead power lines and replace them with underground lines.

DP 3. Rural Development

Intent: To provide a development pattern compatible with environmental and infrastructure support suitability and which can permit traditional lifestyle patterns to continue to the extent practicable.

Policy: Rural districts shall be designated in which only low density residential and agricultural uses will be acceptable. Minimum lot size for these uses should be one-half acre until adequate infrastructure including functional sewerage is provided.

Discussion: The Proposed Action is located on existing Port property that is currently and historically has been operated as an industrial use. The site does not include rural district designations, and therefore, Policy DP 3 does not apply to the Proposed Action.

DP 4. Major Facility Siting

Intent: To include the national interest in analyzing the siting proposals for major utilities, fuel and transport facilities.

Policy: In evaluating the consistency of proposed major facilities with the goals, policies, and standards of the Comprehensive Development and Coastal Management Plans, Guam shall recognize the national interest in the siting of such facilities, including those associated with electric power production and transmission, petroleum refining and transmission, port and air installations, solid waste disposal, sewage treatment, and major reservoir sites.

Discussion: The Proposed Action includes the replacement or renovation of aging facilities to increase the efficiency of Port operations. An efficient and expanded Terminal Yard would serve the national interest, as the increased capacity and efficiency would be required to support the Guam Military Relocation Program that will relocate military personnel from Okinawa to Guam.

DP 5. Hazardous Areas

Intent: Development in hazardous areas will be governed by the degree of hazard and the land use regulations.

Policy: Identified hazardous lands, including floodplains, erosion-prone areas, air installations' crash and sound zones and major fault lines shall be developed only to the extent that such development does not pose unreasonable risks to the health, safety or welfare of the people of Guam, and complies with the land use regulations.

Discussion: The Port Modernization Program site is primarily located within FEMA Flood Zone A (the 100-year floodway fringe, and considered Special Flood Hazard Areas). The central portion of the upland areas of the site in the Terminal Yard and Expansion Area are located in Zone X (outside the 100-year floodplain, and considered areas of minimal flood hazard). The Port Modernization Program Site is not located in a designated floodway, which greatly reduces the potential for flood rise impacts. The Proposed Action would place new structures within the floodplain and expand into the adjacent floodway fringe, potentially eliminating some of the flood storage capacity in these areas. Development would occur in accordance with federal and Guam flood management regulations.

The site is not within an erosion-prone area, along a major fault line, or air installation' crash and sound zones.

Implementation of appropriate abatement, demolition and cleanup actions during construction of the Proposed Action would be conducted as part of the phased redevelopment of the site in order to address potential environmental health and hazardous materials issues. These activities are proposed to be performed in compliance with applicable Federal and Guam regulations and existing agreements.

DP 6. Housing

Intent: To promote efficient community design placed where the resources can support it.

Policy: The government shall encourage efficient design of residential areas, restrict such development in areas highly susceptible to natural and manmade hazards, and recognize the limitations of the island's resources to support historical patterns of residential development.

Discussion: The Proposed Action does not include residential uses. Policy DP 6 does not apply to the Proposed Action.

DP 7. Transportation

Intent: To provide transportation systems while protecting potentially impacted resources.

Policy: Guam shall develop an efficient and safe transportation system, while limiting adverse environmental impacts on primary aquifers, beaches, estuaries, coral reefs and other coastal resources.

Discussion: The vehicular traffic generated from the Proposed Action is directly related to the number of marine vessels processed at the Port. Marine vessel trips and the associated vehicular traffic generated by Port operational activities after completion of the Port Modernization Program and Guam Military Relocation Program would be less than the Guam Military Relocation Program peak in 2014; therefore, Port operational traffic on Route 11 or at the intersection of Route 1/11 would not be anticipated to exceed the standards established by the Guam Transportation Plan (i.e., LOS F or v/c conditions greater than 1, respectively).

Under the Proposed Action, onsite Port operations would be reconfigured to maximize efficiency and a new terminal gate complex would be constructed to improve traffic queuing. Traffic operations internal to the Port Modernization Program site would improve with new lift equipment, security screening, and new gate system improvements collectively in place. Current processing times would likely decrease, resulting in less queuing activity at entrance and exit gates and lower overall turnaround times as compared to the existing conditions.

DP 8. Erosion and Siltation

Intent: To control development where erosion and siltation damage is likely to occur.

Policy: Development shall be limited in areas of 15 percent or greater slope by requiring strict compliance with erosion, sedimentation, and land use regulations, as well as other related land use guidelines for such areas.

Discussion: The majority of the Port Modernization Program site is level, particularly at the Terminal Yard. Construction activities for the Proposed Action would require grading to achieve suitable site topography and installation of a permanent storm water control system, including two new storm water outfalls, in the Expansion Area. Temporary storm water control as required by GEPA, as well as applicable erosion, sedimentation and pollutant control BMPs would be implemented during construction.

Storm water from the Port Modernization Program site is currently not treated before discharge to Piti Channel/Apra Harbor. The Proposed Action would include measures to control increased storm water volumes and to provide storm water quality treatment before discharge to Apra Harbor.

Resources Policies (RP)

RP 1. Air Quality

Intent: To control activities to insure good air quality.

Policy: All activities and uses shall comply with all local air pollution regulations and all appropriate Federal air quality standards in order to ensure the maintenance of Guam's relatively high air quality.

Discussion: Given that the Proposed Action represents a continuation and modernization of existing Port uses, and proposed improvements are intended (in part) to improve existing queuing conditions (and associated idling truck emissions) and inefficient equipment, proposed modernization of Port operations would not cause or exacerbate an exceedance of a National Ambient Air Quality Standards (NAAQS). Therefore, project-generated emissions would be less than the General Conformity significance thresholds. As such, the Proposed Action would comply with the USEPA General Conformity Rule.

RP 2. Water Quality

Intent: To control activities that may degrade Guam's drinking, recreational, and ecologically sensitive waters.

Policy: Safe drinking water shall be assured and aquatic recreation sites shall be protected through the regulation of uses and discharges that pose a pollution threat to Guam's waters, particularly in estuaries, reef and aquifer areas.

Discussion: The new storm water management system would be designed to accommodate increased storm water volume and would provide water quality treatment prior to discharge. The Proposed Action would result in beneficial effects on water quality, as compared to existing conditions, with the addition of oil/water separators to existing and proposed outfalls. A NPDES Operating Permit would be obtained from GEPA for the two new outfalls in the Expansion Area. The outfalls would be operated in compliance with this permit, including periodic water quality monitoring requirements, ensuring that water quality is protected during operation of the outfalls.

RP 3. Fragile Areas

Intent: To protect significant cultural areas, and natural marine and terrestrial wildlife and plant habitats.

Policy: Development in the following types of fragile areas including Guam's Marine Protected Areas (MPA) shall be regulated to protect their unique character.

- historical and archeological sites
- wildlife habitats
- pristine marine and terrestrial communities
- limestone forests
- mangrove stands and other wetlands
- coral reefs

Discussion: The Proposed Action would not be expected to result in significant direct or indirect impacts on terrestrial resources (vegetation communities or wildlife) or benthic and marine resources, including sensitive species, on and in the vicinity of the site during construction and operation of the project.

The increase in activity levels, noise, and light has the potential to impact wildlife on and in the vicinity of the site. However, the site currently is an active port and activity levels, noise, and light onsite are already relatively high. Therefore, the incremental increase in these levels with the proposed modernization would not be expected to result in significant impacts on wildlife.

The southern portion of the proposed Expansion Area is presently in the following vegetation communities: interior tree, edge community, shoreline strand/strand forest, coastline plants, and mangrove; the eastern portion of the Expansion Area is interior tree community. Most of the Expansion Area is of low value to native plants and wildlife as a result of past disturbance, as well as the high percentage of non-native species in this area. The area immediately surrounding the proposed storm water outfalls is of low to moderate value to native plants and wildlife (see **Appendices E and G** for details). The majority of the existing vegetation communities in the Expansion Area would be eliminated with clearing and grading activities under the Proposed Action (vegetation in the areas within 50 feet of the shoreline, except for immediately surrounding the

storm water outfalls, would be retained). The mangrove community and most of the shoreline strand/coastline plant communities along the Cabras island coastline would be preserved. Therefore, permanent elimination of vegetation in the Expansion Area with the proposed modernization would not be expected to result in significant impacts to native plants and wildlife. BMPs would be employed to minimize potential disturbance from construction during bird migration periods, and direct impacts (i.e. from installation of the proposed storm water outfalls) would be avoided during active bird nesting.

See the consistency assessment for Policy RP 4 below for the protection of benthic and marine resources.

The Proposed Action would not be expected to result in significant impacts on cultural, historic or Section 4(f) resources on and in the vicinity of the site during construction and operation of the project. The Guam Historic Preservation Officer concurred with the determination of “No Historic Property Affected” in a January 19, 2011 letter to the Port. If an inadvertent discovery of historic properties occurs during construction, the PAG would engage the services of an archaeologist.

RP 4. Living Marine Resources

Intent: To protect marine resources in Guam's waters.

Policy: All living resources within the waters of Guam, particularly fish, shall be protected from over harvesting and, in the case of corals, sea turtles and marine mammals, from any taking whatsoever.

Discussion: Under the Proposed Action, storm water would be discharged from the two new proposed storm water outfalls to Piti Channel/Apra Harbor and could affect water quality in the harbor, and in turn EFH. A permanent storm water control system would be installed in the Expansion Area, per GEPA requirements, that would reduce the potential for water quality and quantity impacts on Piti Channel/ Apra Harbor, and on EFH.

Direct impacts to soft-bottom habitat would occur with the installation of rip-rap at the two proposed outfalls. The rip-rap would stabilize the outfalls and protect the shoreline from erosion by dissipating water energy. The amount of rip-rap placed in this area would be minimized to the greatest extent possible. The elimination of soft-bottom habitat could be considered an adverse impact, because this is foraging habitat for benthic finfish. However, the new rip-rap bottom would represent a structure that is expected to increase the immediate species diversity for species that use hard-bottom habitat (i.e. coral, barnacles, and oysters).

No direct impacts to mangrove habitat would result from operation of the proposed project, including from installation of rip-rap at the two new proposed storm water outfalls. The outfalls would be located at least 30 feet from the mangroves on and in the vicinity of the site. Operation of the proposed outfalls would intermittently release fresh storm water containing pollutants that could affect the mangrove habitat. However, with installation of a permanent storm water control system per GEPA requirements, significant water quality impacts on mangrove habitat would not be expected.

In addition, water quality improvements would be made to the existing storm water control system in the Terminal Yard which would improve the quality of water discharged to the channel and harbor relative to existing conditions.

RP 5. Visual Quality

Intent: To protect the quality of Guam's natural scenic beauty

Policy: Preservation and enhancement of, and respect for the island's scenic resources shall be encouraged through increased enforcement of and compliance with sign, litter, zoning, subdivision, building and related land-use laws. Visually objectionable uses shall be located to the maximum extent practicable so as not to degrade significant views from scenic overlooks, highways and trails.

Discussion: The Proposed Action would require demolition, expansion, and refurbishment of existing buildings and construction of new buildings. The Port's Terminal Yard would continue to operate as it does today and its overall visual character and quality would not change substantially. Its industrial waterfront would be typical in appearance of most active commercial port facilities in terms of its site arrangement and physical features. The yard and gantry cranes would continue to be the tallest and most visibly prominent feature of the Port Modernization Program site. The new and refurbished structures, such as buildings and cargo containers, would have a similar profile to what currently exists. These elements would continue to be visible from nearby viewing points such as the village of Piti, but would not be visually prominent from more distant views toward the Port.

RP6. Recreation Areas

Intent: To encourage environmentally compatible recreational development.

Policy: The Government of Guam shall encourage development of varied types of recreational facilities located and maintained so as to be compatible with the surrounding environment and land uses, adequately serve community centers and urban areas and protect beaches and such passive recreational areas as wildlife, marine conservation and marine protected areas, scenic overlooks, parks, and historical sites. Developments, activities and uses shall comply with the Guam Recreational Water Use Management Plan (RWUMP).

Discussion: The Proposed Action includes the modernization of a commercial port, which by its nature, does not include recreational facilities. Access to the recreational facilities located west of the Terminal Yard at the Glass Breakwater would not be restricted or disrupted during construction or operation of the Proposed Action.

RP 7. Public Access

Intent: To ensure the right of public access.

Policy: The public's right of unrestricted access shall be ensured to all non-federally owned beach areas and all Guam recreation areas, parks, scenic overlooks, designated conservation areas and their public lands. Agreements shall be encouraged with the owners of private and federal property for the provision of releasable access to and use of resources of public nature located on such land.

Discussion: Access to the recreational facilities located west of the Terminal Yard at the Glass Breakwater would not be restricted or disrupted during construction or operation of the Proposed Action.

RP 8. Agricultural Lands

Intent: To stop urban types of development on agricultural land.

Policy: Critical agricultural land shall be preserved and maintained for agricultural use.

Discussion: The Proposed Action is not located on or proximate to critical agricultural land. Policy RP 8 does not apply to the Proposed Action.

Alternative 1

As under the Proposed Action, Alternative 1 would not be anticipated to result in significant direct or indirect impacts on land use on and in the vicinity of the site during construction and operation. Under Alternative 1, reconfiguration and modernization of the existing Terminal Yard would occur, similar to under the Proposed Action. However, there would be no expansion of Port facilities into the Expansion Area. Potential impacts to land use would be less than with the Proposed Action, because no clearing, grading, and construction would occur in the Expansion Area, the Unitek facility would not be displaced, and the current undeveloped land in the Expansion Area would remain vacant. Alternative 1 would be consistent with the GCMP policies as discussed above.

No Action

Under the No Action Alternative, no change from current land use in the Port area would occur. The Port would remain in its current configuration, storm water improvements would not be implemented and current operations would continue; the No Action Alternative would not achieve the Port of Guam Master Plan's recommendation to upgrade and modernize the existing facilities and operations. Therefore, the No Action Alternative would not impact land use or require consistency with Guam coastal zone policies.

5.3.3.4 Mitigation Measures

No significant environmental consequences to land use during construction and operation of the Proposed Action have been identified. Therefore, no mitigation measures are proposed by the Proponent.

5.3.4 Visual Resources and Light and Glare

This section describes existing visual resources and light/glare conditions on and in the vicinity of the Port Modernization Program site. Potential environmental consequences to visual resources and from light/glare associated with construction and operation of the Port Modernization Program are also analyzed.

5.3.4.1 Introduction

Regulatory Framework

The PAG Master Plan does not contain any development regulations or policies related to aesthetics and visual resources in the Commercial Port area, including view protection. The Guam Coastal Management Program (GCMP) does include a visual quality policy that protects the quality of Guam's scenic resources. Policy RP 5 states:

Preservation and enhancement of, and respect for the island's scenic resources shall be encouraged through increased enforcement of and compliance with sign, litter, zoning, subdivision, building and related land-use laws. Visually objectionable uses shall be located to the maximum extent practicable so as not to degrade significant views from scenic overlooks, highways and trails.

Key Definitions

The following key definitions apply to the descriptions and analysis in this section:

- *Visual Resources* – consist of the various elements of the landscape that contribute to the visual character of a place. These elements include natural and man-made features that give a landscape its visual aesthetic qualities, such as landforms, vegetation, water surfaces, and cultural modifications, as well as vistas and viewsheds.
- *Visual Character* – The elements of form line, texture, and color of a visual resource, combined with the visual resource's characteristics of dominance, scale, diversity and continuity. Both natural and man-made features compose the character of an area or view.
- *Dominant Landscape Feature* – e.g. a tall water tower in a landscape otherwise composed of low vegetation and one or two story buildings.
- *Light* – visible light or electromagnetic radiation that is visible to the human eye, and is responsible for the sense of sight.
- *Glare* – to shine with a harsh, uncomfortably brilliant light.

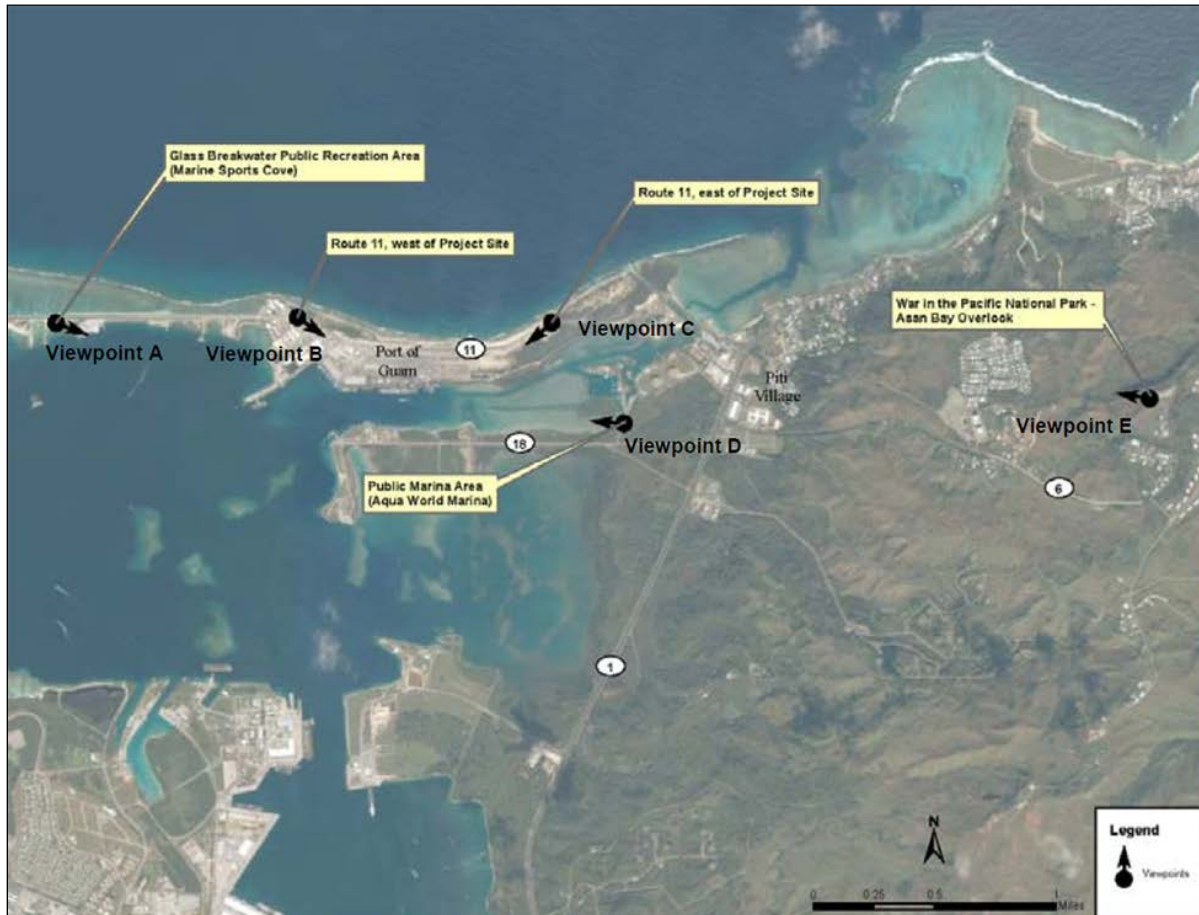
Methods and Study Area

The analysis of potential impacts to visual resources on and in the vicinity of the site from the proposed Port Modernization Program is based on the short-term (construction) effects, and the long-term (operational) effects – i.e. after construction has occurred and all buildings, facilities, and structures are in place.

In 2010, five (5) viewpoints were selected and photographed by Parsons Brinckerhoff for the visual analysis in this EA. These viewpoints include key roadways, recreational areas, and other public viewpoints deemed representative of the area (see **Figure 5.3.4-1** for the Visual Resources Photo Key Map). The selected viewpoints are from the following locations:

- *Viewpoint A* — Glass Breakwater Public Recreation Area, west of the site.
- *Viewpoint B* — Route 11, west of the site.
- *Viewpoint C* — Route 11, east of the site.
- *Viewpoint D* — Public marina area (Aqua World Marina), southeast of the site.
- *Viewpoint E* — War in the Pacific National Park, Asan Bay Overlook, east of the site.

Figure 5.3.4-1, Visual Resources Photo Key Map



Source: Parsons Brinckerhoff, 2011

5.3.4.2 Affected Environment

Visual Setting

Site Vicinity

Apra Harbor is a large natural harbor formed by Cabras Island and a long breakwater to the north and Orote Peninsula to the south. The Harbor’s main developed features are the Port on its northern side and a U.S. Navy Base at its southern end. The Port and Navy Base, as well as other wharf and pier

facilities along the Harbor's shoreline and the presence of large commercial and Navy vessels in the waterway, give Apra Harbor an overall maritime industrial visual character. Within the context of Apra Harbor, the Port has a significant presence as it is one of the largest land uses and generators of activity in the Harbor's environs.

Cabras Island extends seaward from the western shoreline of the mainland and forms the northern boundary of Apra Harbor. The visual character of Cabras Island is predominantly industrial and includes a mix of industrial facilities, pier structures, and vacant land. The majority of the island is occupied by the Port and also contains the Piti and Cabras power plants at its eastern end. A portion of Cabras Island between the Port and the power plants is undeveloped with a natural vegetated shoreline. The vegetated undeveloped area between the Port and the power plants provides a visual break to the otherwise industrial visual character of the area.

The village of Piti is located east of Cabras Island, approximately ¼-mile from the Port. The village is a small residential area with curved two-lane roads and a scattering of homes, many of which date back to the decade after World War II. The coastline in Piti is lined by two beach parks: Tepungan Beach Park, located northeast of Cabras Island along Route 1, and the Pedro Santos Memorial Park, located northwest of the intersection of Route 1 and 11.

The area to the west of the Port consists of the Glass Breakwater, which is a narrow breakwater extending from the western end of Cabras Island with several pier and wharf structures on the eastern portion of its harbor side. The breakwater both physically and visually defines the northern boundary of Apra Harbor.

The Port is reflective of an industrial waterfront and is typical in appearance of most active commercial port facilities in terms of its site arrangement and physical features. Its main visual features consist of container cranes along the ship berths and in the upland container yard, container ships, and other vessels at the berths, an expansive container yard occupied by stacked cargo containers, several warehouse-like buildings located throughout the site, and a large tank farm occupied by petroleum storage tanks and a cement silo.

The topography of the Port area is flat and at a low elevation of just above sea level. There is minimal landscaping and few trees within the Port.

The Port is generally separated into two functional areas: the Terminal Yard and the Marine Industrial Terminal (see **Figure 3-2**). The Terminal Yard is part of the proposed Port Modernization Program site, and is described below.

The Marine Industrial Terminal is adjacent to the Terminal Yard in the western portion of the Port. The upland portion of the Marine Industrial Terminal is mostly occupied by petroleum storage tanks. The area also contains open parking areas, a warehouse and several smaller sheds, and a cement silo. The cement silo is a tall, cylindrical, concrete structure located near the ship berths at the waterfront, and is the most visually prominent feature in the Marine Industrial Terminal area due to its height.

Port Modernization Program Site

The visual character of the Port Modernization Program site is similar to the overall industrial character of the Port. As noted above, the site currently contains the Port's existing container yard and mainly consists of a large, concrete-paved open area used for storing shipping containers and general cargo.

Cargo containers are typically stacked throughout the yard in blocks that are five or six containers wide and two or three high. There also are several cranes and other cargo-handling equipment located throughout the container yard.

The Port Modernization Program site also contains two warehouses and several other port-related buildings, most of which are concentrated in the western portion of the site. The buildings are all low-rise structures ranging from one to two stories (approximately 18 to 28 feet in height) and constructed of reinforced concrete. Most of the buildings are painted white with an aqua-blue trim.

The Port's truck entrance and exit gate is located toward the northeastern corner of the Port Modernization Program site. It consists of an approximately 19-foot-tall concrete structure with four bays.

An area of vacant land in the northeastern portion of the Port Modernization Program site, the Expansion Area, has been set aside for future expansion of the container yard. This area consists of hard-packed earth and limited amounts of vegetation, and is currently used by the Port for storing empty cargo containers.

The yard cranes are the tallest and most visually-prominent feature of the Port Modernization Program site. The other structures within the site, such as buildings and cargo containers, have a generally low profile and are visible from nearby viewing points, but are not as visually prominent from more distant views toward the Port.

Existing Light and Glare Conditions

Existing sources of light and glare at the Port mainly consist of illumination of the ship berths and container yard to allow for nighttime operations. Most lighting sources at the Port are within the site, where the existing container yard is illuminated by pole-mounted flood lights with 1,000 watt metal halide lamps. There are thirty, 50-foot high poles and ten, 80-foot high poles installed throughout the site; the number and configuration of the flood lights on each pole are different to suit the location. In addition, lower intensity lighting is used for exterior building lighting and security purposes throughout the facility. Vessels in the harbor and vehicles on the site and vicinity roadways are also contribute to light and glare.

Existing lighting levels at the Port, and in particular within the Port Modernization Program site, are much higher than lighting levels in the surrounding area. In the surrounding area, more limited lighting is provided at the pier facilities along the Glass Breakwater and very little lighting is provided in the undeveloped areas to the east of the Port.

Views and Visual Quality

The Port Modernization Program site is mostly viewed from within the context of the Port of Guam (Port), particularly from nearby viewpoints to the east and west. Apra Harbor and Cabras Island contribute to the site's visual setting. Limited views of the site are possible at a distance (i.e. higher elevations in Piti Village and Asan Bay Overlook)

This section describes views toward the Port Modernization Program site from five (5) key roadways, recreational areas, and other public viewpoints deemed representative of the area. The visual quality from each viewpoint is described in terms of the visual characteristics and value of the visual experience

to the public. Photographs depicting the existing views from each viewpoint are provided below, and the location of each respective viewpoint is shown on **Figure 5.3.4-1**.

Viewpoint A: Glass Breakwater Public Recreation Area (Marine Sports Cove)

This viewpoint (see **Figure 5.3.4-2**) is located to the west of the site, looking southeast along the Harbor side of the Glass Breakwater in the area between Dog Leg Pier and Hotel Wharf. The area, which is known as Marine Sports Cove, consists of a cove with a sand beach and is mostly used for recreational water activities, such as swimming, kayaking, Jet Ski rentals, and SCUBA diving lessons.

The existing view, looking southeast from the shoreline toward the site, includes the water area and shoreline of the cove in the foreground with the Hotel Wharf extending seaward, and the hillsides of the mainland visible in the background.

Because of the sea-level elevation of this area, most of the Port is obstructed from view by the Hotel Wharf structure and shoreline in the foreground. However, some of the taller features of the Port, including the cement silo, cargo cranes, and upper portions of cargo ships at the berths, are all visible from this location in the background.

The primary viewer groups from this viewpoint consist of tourists and local residents engaging in the available recreational activities. However, given the existing industrial character of the area, it is not expected that these recreational users visit the area so much for its scenic quality, but rather because the protected Harbor-side location provides good conditions for the recreational activities noted above. Therefore, the views toward the site of the Proposed Action from this area are considered to be of moderate sensitivity to the public.

Viewpoint B: Route 11, West of the Site

This viewpoint (see **Figure 5.3.4-3**) is located on Route 11 near the fuel storage tanks and is near the western end of the site. The existing view looking southeast toward the site is primarily of Route 11 in the foreground. The perimeter of the upland areas of the Port, including the perimeter fence and pole-mounted utility lines that run along the property line, backed by open parking areas and trucks, several Port buildings, and the upper portions of the container cranes, are visible in the mid-ground. The hillsides of the mainland are visible in the background. The character of the view is mostly that of an active Port environment.

Figure 5.3.4-2, Glass Breakwater Public Recreation Area (Marine Sports Cove)



Source: Parsons Brinckerhoff, 2011.

Figure 5.3.4-3, Route 11, West of the Project Site



Source: Parsons Brinckerhoff, 2011.

The main viewer group from this viewpoint consists of motorists traveling east on Route 11, mostly from the Port, but also from the recreational areas on the breakwater. These viewers' exposure to the views toward the site is brief as they drive through the area. Because of the industrial character and brief exposure of this view, it is not considered to be highly valued by the viewer groups in this area and their sensitivity is low.

Viewpoint C: Route 11, East of the Site

This viewpoint (see **Figure 5.3.4-4**) is located at the vehicle pull-off area on Route 11 to the east of the Port. The existing view looking west toward the Port Modernization Program site is industrial in character. Route 11 and the pull-off are visible in the foreground. Port features, including stacked cargo containers, container cranes, perimeter fence, main truck entrance and exit gate, and the cement silo can be seen in the background. Open views of the water and Dry Dock Island are available to the north in the periphery of the viewshed, but the Harbor-side water features of the Port to the south cannot be seen.

Figure 5.3.4-4, Route 11, East of the Project Site



Source: Parsons Brinckerhoff, 2011.

The main viewer group consists of motorists traveling west on Route 11, mostly truck drivers and Port employees, and their sensitivity to this view is considered low. Other viewers include tourists and local residents traveling to the recreational areas on Glass Breakwater, and it is not expected that these views of the Port environment are highly valued by these viewers as they pass by the area.

Viewpoint D: Public Marina Area (Aqua World Marina)

This viewpoint (see **Figure 5.3.4-5**) is located at the Aqua World Marina, which is a public marina located on the shoreline of inner Apra Harbor southeast of the Port Modernization Program site. The existing view west toward the site is mostly of the Harbor of Refuge in the fore and mid-ground, which is a small, natural harbor characterized by calm water surrounded by undeveloped, vegetated shoreline. Due to the low elevation of this viewpoint, the Port is mostly obscured by the surrounding vegetation and is not very visible. However, the cargo cranes at the Terminal Yard are visible in the background, and the wharf structures and two large fuel storage tanks associated with the ship fueling facility in the Marine Industrial Terminal are visible farther away in the background. These Port features add an industrial element to the otherwise natural setting of this viewshed.

Figure 5.3.4-5, Public Marina Area (Aqua World Marina)



Source: Parsons Brinckerhoff, 2011.

The main viewer group from this viewpoint consists of recreational boaters, including local boat owners and tourists, departing on commercially operated diving, fishing, and other boating excursions from the

marina. Given the recreational use of this area and natural quality of the viewshed, it is assumed that views from this area are valued by the public and their sensitivity is high.

Viewpoint E: War in the Pacific National Park, Asan Bay Overlook

This viewpoint (see **Figure 5.3.4-6**) is approximately 2.75 miles inland to the east of the Port Modernization Program site at the War in the Pacific National Park. The viewpoint is a designated scenic overlook due to its high elevation on Nimitz Hill, which provides expansive, unobstructed views of Apra Harbor and Asan Bay to the west. The views are of a high visual quality, as the location provides panoramic views of the Harbor and open waters beyond, with areas of vegetated hillside and low-scale residential development in the fore and mid-ground. Due to the high elevation of this viewpoint, the entire Port facility is visible and all of its main features can be seen. However, because of the wide expanse of the views from this location and its distance from the site, the Port and surrounding industrial areas, while a prominent visual feature, are not the main focal point of the viewshed.

Figure 5.3.4-6, War in the Pacific National Park, Asan Bay Overlook



Source: Parsons Brinckerhoff, 2010.

The primary viewer group from this viewpoint is tourists visiting the park for its historic WW II exhibits, and to enjoy the views; therefore, this viewshed is considered to be highly valued. In addition, given its designation as a scenic overlook, the sensitivity of the views from this location is high.

5.3.4.3 Environmental Consequences

This section describes potential impacts to visual resources and from light and glare during construction and operation of the proposed Port Modernization Program under the Proposed Action and Alternatives. Construction-related activities related to the Port Modernization Program would be relatively minimal in their impacts (i.e. earth-moving equipment clearing vegetation and constructing facilities, and their associated light and glare). No significant environmental consequences to visual resources or from light and glare during operation of the Proposed Action would be anticipated, as the overall visual character and quality would not change substantially and would represent a continuation of current Port conditions.

Evaluation Criteria

A perceived change in visual character depends on public expectations and interest in the resource and changes to the quality of the resource. For the purpose of this EA, the Proposed Action and alternatives would cause a significant impact to visual resources if they:

- Would substantially alter the views or scenic quality associated with particularly significant and/or publicly recognized vistas, viewsheds, overlooks, or features;

- Would substantially affect sensitive receptors – i.e. viewers with particular sensitivity (or intolerance) to a changed view (e.g. a hillside neighborhood with views of a relatively undisturbed, naturally-appearing landscape); and/or,
- Would substantially change the light and glare, within a given area.

Proposed Action

Construction Effects

Temporary visual impacts would include the presence of construction equipment, cranes, materials, and staging areas in a specific construction zone. Construction equipment and activities would appear small in scale and limited in distribution compared to the panorama of the outer harbor and the open ocean. Construction activities, even if noticed, would not appear incongruous to normal daytime Port activities.

New temporary sources of light would be introduced to the site if non-daylight construction is necessary. These lighting sources would be associated with infrastructure and building construction, trucks and other equipment, and would not be expected to disrupt normal activities or result in significant light and glare impacts (see **Section 5.2.6**, Terrestrial Resources, and **Section 5.2.9**, Sensitive Species for a discussion of potential light impacts on those resources).

Operational Effects

The Proposed Action would require demolition, expansion, and refurbishment of existing buildings and construction of new buildings (see **Chapter 4** for details). The Port's Terminal Yard would continue to operate as it does today and its overall visual character and quality would not change substantially. Its industrial waterfront would be typical in appearance of most active commercial port facilities in terms of its site arrangement and physical features. The yard and gantry cranes would continue to be the tallest and most visibly prominent feature of the Port Modernization Program site. The new and refurbished structures, such as buildings and cargo containers, would have a similar profile to what currently exists. These elements would continue to be visible from nearby viewing points such as the village of Piti, but would not be visually prominent from more distant views toward the Port. Most residences and views from Piti and Viewpoints A through E discussed above, are oriented along the shoreline and out across open water. These panoramic views take in a wider, more expansive landscape and are less sensitive to changes in view composition.

For the container area, high mast lighting equipped with 1,000-watt high-pressure sodium¹⁵ (HPS) lamps would be mounted on masts 35 meters in height. The new high-mast lighting would increase lighting levels at the site. The increase in surface illumination would make the Terminal Yard visible from a greater distance during evening hours, especially in areas such as the public marina and Asan Bay overlook (Viewpoint E). However, no light sensitive land uses, such as hotels and residences, are near the Port Modernization Program site (the closest residences are within the village of Piti) and existing lighting levels at the Port, and in particular within the Port Modernization Program site, are already much higher than lighting levels in the surrounding area.

The degree of increased illumination onsite that would be visible to surrounding areas would vary depending on weather conditions. Other variables that could affect ambient light levels include no-moon versus full-moon conditions and cloud cover. During yard operation periods, the lighting level would be higher than at non-operating periods when lighting levels would be reduced to the minimum

required for security purposes. Non-operating periods would reduce light and glare effects. The incremental increase in light intensity on the site is not expected to disrupt normal activities or result in significant light and glare impacts to the surrounding areas where it would be visible.

Alternative 1

Like the Proposed Action, Alternative 1 would not be expected to result in significant impacts on visual resources or from light and glare during construction and operation of the project. The Expansion Area would not be developed under Alternative 1; therefore, there would be no impacts to visual impacts and from light and glare in this area.

No Action

The No Action Alternative would not generate new impacts to visual resources or from light and glare. Under this alternative, reconfiguration, modernization, and expansion of the Terminal Yard, and the associated potential for impact on visual resources and from light and glare would not occur. Repair and replacement of deteriorating facilities and utilities at the Port would take place as failures occur over time. Facilities and utilities would be repaired or replaced within the existing footprint of the Terminal Yard.

5.3.4.4 Mitigation Measures

No significant environmental consequences to visual resources or from light and glare during construction and operation of the Proposed Action have been identified. Therefore, no mitigation measures are proposed by the Proponent. See **Section 5.2.6**, Terrestrial Resources, and **Section 5.2.9**, Sensitive Species for mitigation related to construction lighting on those resources.

5.3.5 Socioeconomic Resources and Environmental Justice

This section describes existing socioeconomic resources in the vicinity of the Port Modernization Program site. Potential environmental consequences to socioeconomic resources and environmental justice associated with construction and operation of the Port Modernization Program are also analyzed.

5.3.5.1 Introduction

Regulatory Framework

Federal and Guam regulations regarding socioeconomic resources and environmental justice that would apply to the Port Modernization Program are described in this section.

- Under Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (59 Fed. Reg. 7629 (1994)), certain federal agencies, including MarAd, are required to consider how federal projects, or federally-funded projects, may have disproportionately high and adverse human health or environmental effects on minority and/or low-income populations (as defined below).

Key Definitions

The following key definitions apply to the descriptions and analysis in this section:

- *Socioeconomic Resources* – includes population size and demographics; employment and income; and economic activity.
- *Low Income Population* – any readily identifiable group of low income persons who live in geographic proximity and, if circumstances warrant, geographically dispersed/transient persons (such as migrant workers or Native Americans) who will be similarly affected by the proposed policy or activity.
- *Minority Population* – the minority population percentage of the affected area is greater than the minority population percentage in the general population or other appropriate unit of geographic analysis.
- *Disproportionately High and Adverse Effect* – an adverse effect is predominantly borne by a minority population and/or a low income population and the effect that will be suffered by the minority population and/or low income population is appreciably more severe or greater in magnitude than that borne by the rest of the population.

Methods and Study Area

The nearest residential community to the Port Modernization Program site is the village of Piti, which is approximately one-half mile to the east of the Port and consists of approximately 7 square miles in land area. While the village center is located east of Highway 1, the Port is technically located within Piti, but geographically removed from the main areas of the village due to its location out on Cabras Island. However, because of the relatively small size of the island of Guam, the potential for socioeconomic resource impacts associated with the Proposed Action and Alternatives are discussed for both Piti and the island as a whole.

For purposes of this EA analysis, a review of applicable literature and data was performed, and a discussion of existing socioeconomic resources and proposed impacts associated with the Proposed Action and Alternatives is provided.

5.3.5.2 Affected Environment

Socioeconomic Resources

The demand for Port facilities and services are driven by economic activity (*Master Plan Update*, PAG 2008). The primary economic sectors on Guam are tourism and the DoD. In addition, cargo activity also is driven by the local population base, construction (supporting both civilian and military) and trans-shipment to neighboring islands.

According to the U.S. Census, the population of Guam as a whole was 159,358 in the year 2010. Guam's population has grown at an annual rate of 0.3 percent per year in the decade between 2000 and 2010. The population grew relatively fast between 1990 and 2000 (1.6 percent per year), but has slowed during the past decade.

The Port Modernization Program site and the immediate vicinity contain no residential uses or residential population.

The nearest residential community to the Port Modernization Program site is the village of Piti, which is located along the western shoreline of Guam approximately one-half mile to the east of the Port. Piti, which contains approximately seven square miles in land area, is primarily a residential community of single-family homes with supporting commercial uses and community facilities, including a grocery, gas station, church, and public school. The Piti Power Plant, Cabras Island Power Plant, and the Port also are located within Piti, although the Port is geographically removed from the main areas of the village due to its location out on Cabras Island. Population data for Piti from the U.S. Census Bureau's 2010 Census is presented in **Table 5.3.5-1** below, in comparison to the other villages on the island and to Guam overall. Northern Guam and portions of Central Guam increased in population during the last decade, while other villages in Central Guam, including Piti, as well as Southern Guam, decreased in population during the same time period. The village of Piti decreased in population by 12.7 percent between 2000 and 2010.

Table 5.3.5-1, Population of Guam and Villages, 2000 and 2010

	2010	2000	% Increase/ Decrease
Total	159,358	154,805	2.9
North	85,167	80,466	5.8
Dededo	44,943	42,980	4.6
Tamuning	19,685	18,012	9.3
Yigo	20,539	19,474	5.5
Central	48,755	45,382	7.4
Agaña Heights	3,808	3,940	-3.4
Asan-Maina	2,137	2,090	2.2
Barrigada	8,875	8,652	2.6
Chalan-Pago-Ordot	6,822	5,923	15.2
Hågatña (Agaña)	1,051	1,100	-4.5
Mangilao	15,191	13,313	14.1
Mongmong-Toto-Maite	6,825	5,845	16.8

Piti	1,454	1,666	-12.7
Sinajana	5,592	2,853	-9.1
South	25,436	28,957	-12.2
Agat	4,917	5,656	-13.1
Inarajan	2,273	3,052	-25.5
Merizo	1,850	2,163	-14.5
Santa Rita	6,084	7,500	-18.9
Talofoto	3,050	3,215	-5.1
Umatac	782	887	-11.8
Yona	6,480	6,484	-0.1

Source: Bureau of Statistics and Plans, Statistical Yearbook, 2010.

The Census Demographic Profile for Guam, which includes selected demographic, social, economic and housing characteristics for Guam and its villages, was not available at the time of publication of this EA. Therefore this detailed information from the 2010 Census is not available at this time. Demographic information from the 2000 Census is presented below and is not anticipated to have changed significantly between 2000 and 2010.

According to the U.S. Census, Piti had a population of 1,666 in 2000. The majority of the population (53.7 percent) was comprised of peoples of Pacific Islander ethnicity, of which 50.5 percent were of Chamorro ancestry (see **Table 5.3.5-2**). Other races and ethnic groups in Piti consist of 12.1 percent Asian, 16.3 percent White, 0.7 percent Black or African American, and 1.2 percent of the population identifies themselves as some other group or ethnicity. In addition, approximately 15.9 percent of the population of Piti identifies themselves as two or more races or ethnic groups. Comparatively, Guam's population as a whole, as of 2000, was 44.6 percent Pacific Islander (of which 37 percent were of Chamorro descent), 32.5 percent Asian, 6.8 percent White, 1.0 percent Black or African American, 1.2 percent of the population identified themselves as some other group or ethnicity, and 13.9 percent of the population identified themselves as two or more races or ethnic groups.

Table 5.3.5-2, Ethnicity of Piti and Guam, 2000

Ethnicity	Piti	Guam
	% of Population	% of Population
Pacific Islander	53.7	44.6
Asian	12.1	32.5
White	16.3	6.8
Black/African-American	0.7	1.0
Other	1.2	1.2
Two or more races	15.9	13.9

Source: U.S. Census Bureau, 2000.

The median age of the population in Piti in 2000 was 30.3 years of age, compared to 27.4 years of age for the island of Guam. As of 2000, there were 474 households in Piti with a median household income of \$54,167, compared to a median household income of \$39,317 for Guam overall. Approximately 13.1 percent of families and 16 percent of individuals were living below the poverty level; whereas, for Guam, approximately 20 percent of families and 23 percent of individuals were living below the poverty level.

There were 576 housing units in Piti as of 2000, with a vacancy rate of approximately 17.7 percent. Of the occupied housing units, approximately 56.8 percent were owner-occupied and 43.2 percent were

renter-occupied. For Guam, the vacancy rate was approximately 18.7 percent, and approximately 48.4 percent of housing units were owner-occupied and 51.6 percent were renter-occupied.

In summary, Piti is fairly similar to Guam as a whole in terms of its ethnic composition, in that much of the population is comprised of people of Pacific Island descent, including a large proportion of indigenous Chamorro population. However, Piti has a much smaller Asian population compared to Guam overall and a larger proportion of White population. The median family income in Piti is substantially higher than in Guam overall, and a significantly smaller percentage of its population is below the poverty level. As of 2000, the vacancy rate of housing units in Piti was slightly less than that of Guam overall and a higher proportion of the housing units in Piti were owner-occupied.

Guam Military Relocation Program

Military populations can affect the composition and growth of villages on Guam. The northern villages cover military-owned land and have high proportions of military and military dependent residents relative to other villages, and have experienced positive population growth over the past decade, albeit slower growth than the previous decade. Guam's active duty military population has remained constant at about 6,200 over the past ten years, with a slight dip from 2000 through 2003.

Based on information provided by the DoD, Guam's military population (including active duty personnel and their dependents) stood at approximately 14,110 persons in 2007. This includes 6,420 active duty personnel (4,350 in the US Navy, 1,930 in the US Air Force, and 140 in the USCG) and 7,690 dependents (5,230 with the US Navy, 2,280 with the US Air Force, and 140 with the USCG).

As a result of redefining the United States (U.S.) defense posture in the Pacific region and the U.S. alliance with Japan, a portion of U.S. Marine Corps forces currently located in Okinawa, Japan will be relocated to Guam as part of the DoD's *Guam and Commonwealth of the Northern Marianas Islands (CNMI) Military Relocation Program* (Guam Military Relocation Program) (Joint Guam Program Office, July 2010a). Approximately 8,600 Marines and their 9,000 dependents will be relocated from Okinawa to Guam. Approximately 600 Army personnel and their 900 dependents will also be relocated to Guam to establish and operate an Army Air and Missile Defense Task Force.

Economic Activity

Demand for port facilities and services are a derived demand, meaning that it is driven by economic activity. The primary economic sectors on Guam are tourism and the DoD. In addition, cargo activity is also driven by the local population base, construction (supporting both civilian and military) and transshipment to neighboring islands.

The civilian economy generated approximately \$4.6 billion in sales in 2002, according to the most recent census for which this data is available. Local residents accounted for 38.8 percent of sales followed by visiting tourists (27.5 percent), businesses and non-military government agencies (17.5 percent), retailers/wholesalers (12.3 percent) and construction firms (3.7 percent).

In 2002, the military spent \$532 million in Guam, including \$282 million on construction projects and \$250 million on payroll (\$194 million for military personnel and \$56 million on civilian personnel). Military expenditures, which are not included in the Census estimates, amounted to 11.6 percent of sales in the civilian economy.

According to statistics from the Government of Guam, imports have increased from \$503 million in 2004 to \$583 million in 2007. This data includes items intended for resale in Guam and excludes the military, government, promotional and personal items. It also excludes imports of petroleum products. Most of Guam's imports consist of consumer goods (particularly food, beverages and apparel), motor vehicles and parts and construction materials.

Guam exports totaled \$53.0 million in 2006 and were estimated to be approximately \$63.2 million in 2007. Exports (with the same caveats on excluded products as for imports) primarily consist of transportation products and food and beverages produced in Guam and/or trans-shipped from Guam to the US and foreign countries.

Employment

The civilian employment base in Guam was approximately 58,700 in 2006. This was up slightly from the prior years. However, it is significantly lower than the employment levels of the mid to late 1990s, when employment averaged around 65,000 persons.

As noted above, there are currently 6,420 active duty personnel, which is equal to around 11 percent of the civilian employment base. Including civilian and military employees, there were 65,159 employed persons in Guam in 2006, down from a peak of 80,809 employed persons in 1992. Like much of the rest of the U.S., Guam's employment base has become more oriented toward retail trade and services (including accommodations and business services). Between 1990 and 2000, retail grew at 1.4 percent per year, services at 2.9 percent per year and transportation at 2.1 percent per year. During this time period, there was a loss of jobs in construction, federal government agencies (non-DoD) and to a lesser extent in manufacturing.

5.3.5.3 Environmental Consequences

This section describes potential environmental consequences to socioeconomic resources and environmental justice during construction and operation of the proposed Port Modernization Program under the Proposed Action and Alternatives. No significant environmental consequences to socioeconomic resources or environmental justice from construction and operation of the Proposed Action and Alternatives would be anticipated.

Evaluation Criteria

Impact significance determinations vary among different types of socioeconomic resource impacts, because what might be "beneficial" (or good) to one entity could be "mixed" to another and "adverse" (or bad) to yet another, and related socioeconomic resource topics often are like two sides of the same coin, one "beneficial" (such as increased job opportunities) and the other mixed or "adverse" (such as social stress from immigrant workers attracted by new jobs).

In evaluating environmental justice, according to Executive Order 12898, a disproportionately high and adverse effect is an adverse effect predominantly borne by a minority population and/or a low income population and the effect that will be suffered by the minority population and/or low income population is appreciably more severe or greater in magnitude than that borne by the rest of the population.

Proposed Action

Socioeconomic Resources

Construction Effects – Because the site does not contain any residential population, construction activities under the Proposed Action would not be anticipated to displace or directly impact any population group.

In terms of the local economy and added revenue related to construction, spending on construction materials and labor would be anticipated to result in beneficial economic effects to the construction industry, and other sectors (engineering, architecture, etc.) on Guam. For example, fill and paving materials and building products would be supplied by companies and shipping and trucking firms would aid in delivery of construction materials. In addition, the Proposed Action would be anticipated to generate construction jobs and economic stimulus. Jobs also could be created by additional spending generated by construction worker earnings. The Proposed Action would likely have a beneficial impact on Piti and the overall economy of Guam.

Operational Effects – The Proposed Action would include reconfiguration of the Port area to create a more streamlined and efficient process. It would likely improve socioeconomic conditions through providing greater capacity and quicker transport of consumer goods and materials. To accommodate the quicker and more efficient transport of materials, there could be a slight increase in demand for long-term jobs. The potential increase would depend on overall economic conditions, which includes the demand for goods and materials. If the demand for long-term jobs occurs, the demand for housing could increase and personal incomes in Guam could benefit.

Environmental Justice

Because the Port Modernization Program site does not contain any residential population, the Proposed Action would not be anticipated to displace or directly impact any population group. The island of Guam is unique in that a majority of the population on Guam meets the criteria for being an Asian Pacific minority group in the context of the overall US population. As a result, where the EA identifies impacts for a particular resource, there would be a corresponding, island-wide adverse effect to minority populations on Guam, compared to the U.S. population. However, due to the requirement that the Proposed Action be located on Guam, the evaluation of environmental justice would be on whether there are disproportionate adverse effects within the context of alternatives for facility location on Guam. It is considered extremely unlikely for there to be a disproportionate effect from an identified adverse impact based solely on the impact affecting a minority population. For example, any increases in traffic associated with construction and operation of the Proposed Action would not be anticipated to affect one population group over the others, and significant environmental justice impacts would not be anticipated.

Alternative 1

Redevelopment with Alternative 1 would include systematic and coordinated replacement and/or repair of deteriorated or inefficient facilities and equipment within the Port's existing 52-acre Terminal Yard, but the proposed development of 19-acres of the Expansion Area to the east of the Terminal Yard would not occur. Under Alternative 1, the Port's cargo-handling capacity and operating efficiency would be improved as compared to existing conditions and would create sufficient capacity to meet peak

demand, but without the new terminal gates and parking facilities in the expansion area, longer waiting times for vessel berths and longer truck queuing lines could result, as compared to the Proposed Action.

Without the development of the 19-acres of Expansion Area, the Port would have less flexibility to phase and stage construction activities resulting in more disruptions to Port operations as compared to the Proposed Action. It is assumed that under Alternative 1, the Port could extend work hours to run 24-hour shifts during the peak demand period.

While Alternative 1 would increase the capacity of the Port Terminal Yard and increase efficiency to a degree, it would not be anticipated to provide the economic benefits as anticipated under the Proposed Action.

As under the Proposed Action, construction and operations activities under Alternative 1 would not be anticipated to affect one population group more than the others, and significant environmental justice impacts would not be anticipated.

No Action

Under the No Action Alternative, reconfiguration and reconstruction of the Port would not occur and the income related to construction of the Proposed Action would not be generated into the economy. Congested traffic patterns within the Port would remain as is. Therefore, the No Action Alternative would not have a beneficial impact on socioeconomic resources, particularly economic activity.

5.3.5.4 Mitigation Measures

No significant environmental consequences to socioeconomic resources and environmental justice during construction and operation of the Proposed Action have been identified. Therefore, no mitigation measures are proposed or required.

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6.0 CUMULATIVE EFFECTS, IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

6.1 Cumulative Effects

The assessment of cumulative effects is required for NEPA documentation by the Council of CEQ regulations (40 CFR 1508.7). Cumulative effects on environmental resources result from incremental effects of projects, when combined with other applicable past, present, and reasonably foreseeable future projects in the area. Cumulative effects can result from individually minor, but collectively substantial, actions undertaken over a period of time by various agencies (federal and territorial) or individuals. Informed decision-making is served by consideration of cumulative effects resulting from projects that are proposed, under construction, recently complete, or anticipated to be implemented in the foreseeable future.

6.1.1 Scope and Assessment of Cumulative Effects

Reasonably foreseeable actions include projects that have occurred recently or are likely to occur concurrently or shortly following implementation of the proposed Port Modernization Program. The assessment of cumulative effects in this Environmental Assessment (EA) is limited to reasonably foreseeable actions in the Marianas Islands region.

As indicated in **Section 2.2.2**, Relevant Prior and Ongoing Environmental Review of this EA, environmental review under NEPA has been accomplished for several prior and ongoing actions that pertain to the Port Modernization Program. The *Guam and Commonwealth of the Northern Mariana Islands (CNMI) Military Relocation; Relocating Marines from Okinawa, Visiting Aircraft Carrier Berthing, and Army Air and Missile Defense Task Force Environmental Impact Statement (EIS)* (July 2010) - also known as the "Guam Military Relocation EIS" - was prepared on such a prior action. The Guam Military Relocation EIS included analysis of the cumulative effects of the military relocation together with the proposed Port Modernization Program and other reasonably foreseeable actions. Where appropriate, the analysis from the Guam Military Relocation EIS has been referenced in this document.

Following are brief descriptions of the reasonably foreseeable actions identified for analysis of cumulative effects in this EA, followed by a summary of potential or known environmental consequences associated with these actions together with the Port Modernization Program Proposed Action.

Reasonably Foreseeable Actions

Live-Fire Training Range Complex

This project would consist of the construction and operation of a live-fire training range complex that would allow for simultaneous use of all firing ranges to support training and operations on Guam for the relocated Marines from Okinawa, Japan. The live-fire training range complex would consist of Known Distance (KD) rifle range, KD pistol range, Modified Record of Fire Range, nonstandard small arms range, Multipurpose Machine Gun range, and a hand grenade range. The project also includes associated roadways and supporting infrastructure.

The Department of Navy (DoN) has preliminarily identified five alternatives for the range complex: two are adjacent to Route 15 in northeastern Guam (approximately 12 miles northeast of the Port Modernization Program site), and three are located at or immediately adjacent to the Naval Magazine (NAVMAG), also known as the Naval Munitions Site located in the south-central portion of the island (approximately 7 miles south of the Port Modernization Program site).

A NEPA Supplemental Environmental Impact Statement (SEIS) is being prepared by DoN on the Live-Fire Training Range Complex. The SEIS will supplement the Guam Military Relocation EIS .

Carrier Vessel Nuclear (CVN)

This project would include construction and operation of an approximately 1,325-foot long, deep draft wharf that would support a transient nuclear powered aircraft carrier. Over 5,600 military personnel would be required to maintain daily operations in the carrier (the largest ship in the DoN's fleet). The carrier would have up to 63 “visit days” to the wharf each year. No carrier maintenance or refueling of the ship’s nuclear reactors would be done in Guam. The proposed wharf would be part of the military’s plan to expand naval waterfront facilities, build expeditionary training ranges on the island of Tinian, and house a military force, including up to 8,600 Marines who would shift to Guam from Okinawa.

The DoN identified Point Polaris at Naval Base Guam in Apra Harbor, to the south of the Port Modernization Program site, as the proposed location for the deep draft wharf/CVN.

A SEIS is being prepared on the *Carrier Vessel Nuclear* project by the DoN. The SEIS will supplement the Guam Military Relocation EIS .

Guam and CNMI Divert Activities and Exercises

The U.S. Air Force proposes to expand one of its existing airfields in the Mariana Islands region. The expansion would include the construction of facilities and infrastructure to support one aircraft squadron and its approximately 500 support personnel for periodic exercises and humanitarian assistance. The following aircraft support capabilities would be required at the proposed airfield:

- A 10,000-foot-long runway, a fuel storage and fuel distribution system, 12 parking aprons, temporary munitions storage facility, hazardous cargo pad, and a 6,000-square-foot maintenance and storage facility (specific facilities would vary by location).
- Divert unscheduled landings if other locations in the western Pacific, such as Anderson Air Force Base, are unavailable for landing.
- Joint military exercises, including general flight and tanker operations.
- Humanitarian airlift staging in the event of unplanned emergency or disaster.
- Billeting for up to 500 temporary personnel.

The following airports and airfields are being considered as alternative locations for Guam and CNMI Divert Activities and Exercises: Saipan International Airport, Tinian International Airport, and Rota International Airport. None of these alternative locations are location on the island of Guam.

An EIS is being prepared by the U.S. Air Force on the Guam and CNMI Divert Activities and Exercises.

Guam Transportation Improvement Projects

The Guam Department of Public Works (GDPW) prepares the Territorial Transportation Improvement Program (TTIP), in accordance with the requirements of the Safe Accountable Flexible Efficient Transportation Equity Act (SAFETEA). The TTIP provides a near-term improvement program that identifies GDPW's priorities for the expenditure of federal funds for a 4-year period. This program is a subset of the long-range Guam Transportation Program (GTP).

On-going transportation improvement projects from the most recent (2009) TTIP include:

- *North Guam (Route 1) Signalization*
- *Masso River Bridge Embankment Restoration*
- *Route 25 (Alageta Road) Reconstruction & Widening*
- *Route 11 Shore Protection/Improvements/Screening Station Construction*
- *Route 15 Embankment Restoration*
- *Route 2 Culverts and Slide Repair*
- *Route 16/GMP Post Office/Army National Traffic Signal Upgrade*
- *Route 8/10/16 Tri Intersection Improvements*
- *Route 4 Resurfacing (McDonalds to Route 10)*
- *Route 4 Resurfacing & Widening (Ylig Bridge to Pago Bay)*
- *Route 17 Rehabilitation & Widening*
- *Ylig Bridge Replacement*
- *Island-wide and School Zone Signs*
- *Route 7A Resurfacing*
- *Route 6A Murray Road, Maina-Nimitz Hill Embankment Restoration*
- *Route 4 Bridges over the Talofofo & Togcha Rivers Rehabilitation*
- *Route 1/8 Intersection Improvements & Agaña Bridge Replacement*

Future projects from the most recent TTIP include:

- *Taleyfack Bridge Restoration*

The projects identified in the TTIP were assumed as pipeline projects in the Guam Military Relocation EIS transportation analysis. A cumulative analysis of transportation effects was provided in the Guam Military Relocation EIS that included the military build-up, together with the proposed Port Modernization Program and other reasonably foreseeable actions (see **Section 5.3.1**, Traffic, of this EA for details).

Cumulative Impacts of Reasonably Foreseeable Actions and the Proposed Action

- *Air Quality* – Cumulatively, no significant short-term or long-term effects on air quality would be expected with construction and operation of the three reasonably foreseeable actions together with the Proposed Action. Air emissions from construction activities for these actions would be short-term in nature and may or may not occur simultaneously. Only the Proposed Action and the preferred location for the CVN project would occur within relatively close proximity to one another (approximately 1.5 miles); the other foreseeable actions would occur from up to 12 miles from the Port Modernization Program site. Construction activities for all of the actions would be conducted consistent with BMPs related to construction equipment emissions and

fugitive dust, and no significant impacts would be expected. Operational activities associated with the Proposed Action (i.e. additional vessel and vehicular traffic) are not anticipated to result in significant air quality impacts; the three reasonably foreseeable actions could result in some changes or increases in traffic that could result in air quality impacts; however, no significant impacts on air quality would be expected.

- *Noise* – Cumulatively, no significant short-term or long-term noise effects would be expected with construction and operation of the three reasonably foreseeable actions together with the Proposed Action. Noise from construction activities for these actions would be intermittent in nature and may or may not occur simultaneously. Only the Proposed Action and the preferred location of the CVN project would occur in relatively close proximity to one another. Operational activities associated with the Proposed Action are not anticipated to result in significant noise impacts, particularly since the proposal would represent the expansion of an existing commercial port that already produces considerable noise. The three foreseeable actions could result in some changes or increases in traffic or other operations that could result in noise impacts; however, no significant noise effects would be expected.
- *Hazardous Materials and Waste* – Cumulatively, no significant short-term or long-term effects on hazardous materials and waste would be expected with construction and operation of the three reasonably foreseeable actions together with the Proposed Action. While these actions could result in localized disturbance of contaminants, the active construction sites for the three projects and the Proposed Action would be removed from each other spatially. Hazardous materials and wastes at all of these sites would be handled in accordance with applicable laws and regulations. Therefore, impacts on hazardous materials and wastes from these actions, individually and collectively, would not be expected to be significant.
- *Safety and Security* – Cumulatively, no significant short-term or long-term effects on safety and security would be expected with construction and operation of the three reasonably foreseeable actions together with the Proposed Action. Some short-term minor adverse effects on safety of construction workers would be expected with the Proposed Action and three foreseeable actions. Long-term beneficial effects on safety and security would result from the proposed Port Modernization Program (i.e. due to improvements to the site access points, lighting, and perimeter fencing). It is assumed that operational safety and security would be taken into account for the other foreseeable actions as well.
- *Utilities and Public Services* – Cumulatively, no significant short-term or long-term adverse effects on utilities and public services would be anticipated with construction and operation of the three reasonably foreseeable actions together with the Proposed Action. Sufficient supply, capacity, and facilities/staff exist to meet the demands for utilities and public services from these actions. Therefore, impacts to utilities and public services, individually and collectively, would not be anticipated to be significant.
- *Geology and Soils* – Cumulatively, no significant short-term or long-term effects on geological resources would be expected with construction and operation of the three foreseeable actions together with the Proposed Action. While these projects would result in soil disturbance and potential soil erosion (short-term minor adverse effects) during construction, only the preferred location of the CVN draft wharf and the Proposed Action would occur within relatively close

proximity to each other and both would require work in and near Apra Harbor. Construction of all of these actions would proceed in accordance with applicable regulations and BMPs. Therefore, impacts to geological resources from these actions, individually and collectively would not be expected to be significant.

- *Surface Water, Storm Water, and Floodplains* – Cumulatively, no significant short-term or long-term effects on water resources would be expected with construction and operation of the three reasonably foreseeable actions together with the Proposed Action. These actions would result in the creation of impervious surfaces that could result in adverse effects on storm water resources associated with increased storm water volume; however, only the preferred location of the CVN deep draft wharf and the Proposed Action would occur within relatively close proximity to each other and both would require work in and near Apra Harbor (the CVN wharf would require dredging and other construction activity in the harbor, which could impact water quality in the harbor). All work associated with the Proposed Action and the other foreseeable actions would comply with applicable regulations, including installation and operation of temporary and permanent storm water control facilities, and implementation of BMPs. Therefore, impacts to water resources from these actions, individually and collectively, would not be anticipated to be significant.
- *Groundwater* – Cumulatively, no significant short-term or long-term adverse effects on regional groundwater resources would be anticipated with construction and operation of the three reasonably foreseeable actions together with the Proposed Action. Any impacts to groundwater resources from these actions would be anticipated to be localized near each respective site. All work associated with the Proposed Action and the other foreseeable actions would comply with applicable regulations, including installation and operation of temporary and permanent storm water control facilities, and implementation of BMPs. Therefore, impacts to groundwater resources from these actions, individually and collectively, would not be anticipated to be significant.
- *Sediment Quality* – Cumulatively, no significant short-term or long-term adverse effects on sediment quality would be anticipated with construction and operation of the three reasonably foreseeable actions together with the Proposed Action. The preferred location of the CVN deep draft wharf and the Proposed Action would occur within relatively close proximity to each other and both would require work in and near Apra Harbor (the CVN wharf would require dredging and other construction activity in the harbor, which could impact sediment quality in the harbor). All work associated with the Proposed Action and the other foreseeable actions would comply with applicable regulations, including installation and operation of temporary and permanent storm water control facilities, and implementation of BMPs. Therefore, impacts to sediment quality from these actions, individually and collectively, would not be anticipated to be significant.
- *Wetlands* – Cumulatively, no significant short-term or long-term adverse effects on wetlands would be anticipated during construction and operation of the three reasonably foreseeable actions together with the Proposed Action. Construction/operation of the Proposed Action would not directly impact any wetlands or wetland-regulated areas, and there would be no loss of wetland area. All work associated with the Proposed Action and the other foreseeable actions would comply with applicable wetland regulations, including installation and operation

of temporary and permanent storm water control facilities, and implementation of BMPs. Therefore, impacts to wetlands from these actions, individually and collectively, would not be anticipated to be significant.

- *Terrestrial Resources* – Cumulatively, no significant short-term or long-term adverse effects on terrestrial resources would be anticipated with construction and operation of the three reasonably foreseeable actions together with the Proposed Action. Some habitat for terrestrial resources would be eliminated in the Terminal Yard Expansion Area with the Proposed Action; however, this habitat is generally considered of low value. The area to be cleared of vegetation is not expected to provide habitat for any threatened and endangered species. All work associated with the Proposed Action and the other foreseeable actions would comply with applicable regulations. Therefore, impacts to terrestrial resources from these actions, individually and collectively, would not be anticipated to be significant.
- *Benthic and Marine Resources* – Cumulatively, no significant short-term or long-term adverse effects on benthic and marine resources would be anticipated with construction and operation of the three reasonably foreseeable actions together with the Proposed Action. A minor amount of soft-bottom benthic habitat in Apra Harbor would be eliminated at the discharge points for the proposed storm water outfalls with the Proposed Action. However, rip-rap that would be installed would present new virgin hard-bottom substrate for benthic epifauna. Other impacts of the Proposed Action on benthic and marine resources would be typical of a commercial port and similar to what currently occurs. The Proposed Action would occur in relatively close proximity to the preferred location for the CVN deep draft wharf, and both would require work in Apra Harbor (the CVN wharf would require dredging and other construction activity in the harbor, which could impact benthic and marine resources). All work associated with the Proposed Action and the other foreseeable actions would comply with applicable regulations, including installation and operation of temporary and permanent storm water control facilities, and implementation of BMPs. Therefore, impacts to benthic and marine resources from these actions, individually and collectively, would not be anticipated to be significant.
- *Essential Fish Habitat (EFH)* – Cumulatively, no significant short-term or long-term adverse effects on EFH and HAPC (Jade Shoals) would be anticipated with construction and operation of the three reasonably foreseeable actions together with the Proposed Action. A minor amount of soft bottom habitat in Apra Harbor would be eliminated at the discharge points for the proposed storm water outfalls with the Proposed Action; however, new hard bottom habitat would be created in these locations. The Proposed Action would occur in relatively close proximity to the preferred location for the CVN deep draft wharf and both would require work in and near Apra Harbor (the CVN wharf would require dredging and other construction activity in the harbor, which could impact EFH). All work associated with the Proposed Action and the other foreseeable actions would comply with applicable regulations, including installation and operation of temporary and permanent storm water control facilities, and implementation of BMPs. Therefore, impacts to EFH from these actions, individually and collectively, would not be anticipated to be significant.
- *Sensitive Species* – Cumulatively, no significant short-term or long-term adverse effects on sensitive species would be anticipated with construction and operation of the three reasonably

foreseeable actions together with the Proposed Action. A limited amount of the habitat for migratory birds that are not threatened or endangered (i.e. yellow bittern and Pacific heron) would be eliminated in the Expansion Area for the proposed storm water outfalls, but would not be expected to significantly impact these species. All work associated with the Proposed Action and the other foreseeable actions would comply with applicable regulations. Thus, impacts to sensitive species, individually and collectively, would not be anticipated to be significant.

- *Traffic* – Cumulatively, no significant short-term or long term adverse effects on traffic would be anticipated with construction and operation of the three reasonably foreseeable actions together with the Proposed Action. During construction of these projects, there could be cumulative short-term, intermittent impacts on traffic if these projects occur simultaneously. However, only the CVN project and the Proposed Action would occur within relatively close proximity to each other. Operational activities associated with the Proposed Action are not anticipated to result in long-term traffic impacts; the three reasonably foreseeable actions could result in changes or increases in traffic levels or traffic patterns that could result in impacts; however, these impacts are not expected to be significant.
- *Cultural, Historic, and Section 4(f) Resources* – Cumulatively, no significant short-term or long-term adverse effects on cultural, historic, and Section 4(f) resources would be anticipated with construction and operation of the three reasonably foreseeable actions together with the Proposed Action. There are no known historic properties within the Proposed Action’s Area of Potential Effect (APE). The preferred location for the CVN deep draft wharf at Polaris Point also would not be expected to impact any cultural, historic, or Section 4(f) resources. None of the submerged cultural resources (shipwrecks) in Apra Harbor are located adjacent to Polaris Point or within the area of the proposed turning basin or entrance channel. Because none of these resources are within the Polaris Point APE, dredging and construction for the CVN would not result in direct adverse impact on submerged resources. It is not known if cultural, historic, or Section 4(f) resources are located within the APE of the other foreseeable actions. However, as necessary, these projects would undergo Section 106 consultation, similar to the Proposed Action. For all of these actions, it is assumed that if an inadvertent discovery of historic properties occurs, appropriate measures would be taken to preserve and protect these resources and no significant impacts would be expected.
- *Land Use and Coastal Zone Consistency* – Cumulatively, no significant short-term or long-term adverse effects on land use would be anticipated with construction and operation of the three reasonably foreseeable actions together with the Proposed Action. The five alternative locations for the Live-Fire Training Range Complex are 7 to 12 miles from the Port Modernization Program site, which would not have a cumulative effect on land use due to the lack of proximity. The preferred alternative location for the CVN deep draft wharf is approximately 1.5 miles (aerial distance) to the south of the Port Modernization Program site, but approximately 4 miles to the south via Route 1. The development of the new wharf is consistent with historical use of the proposed project area for ship berthing. Cumulatively, the CVN deep water wharf and the Port Modernization Program site would not have a significant impact on land use, as both projects represent the continuation of historical uses for the respective areas. Therefore, no significant cumulative impacts on land use would be expected from these actions.

- *Visual Resources* – Cumulatively, no significant short-term or long-term adverse effects on visual resources would be anticipated with construction and operation of the three reasonably foreseeable actions together with the Proposed Action. The locations of two of these actions (the Live-Fire Training Range Complex and the Guam and CNMI Divert Activities and Exercises) are not located near the Proposed Action. The preferred alternative for the CVN deep draft wharf that would support a transient nuclear powered aircraft carrier (CVN) is at Polaris Point on the US Naval Base at the mouth of Inner Apra Harbor, approximately 1.5 miles south of the Port Modernization Program site. While a panoramic view of the western shore of Guam from certain viewpoints may include both of these sites, views of the wide expansive landscape would not be anticipated to be significantly impacted with implementation of these actions.
- *Socioeconomic Resources and Environmental Justice* – Cumulatively, no significant short-term or long-term adverse effects on socioeconomic resources and environmental justice would be anticipated with construction and operation of the three reasonably foreseeable actions together with the Proposed Action. To accommodate the quicker and more efficient transport of materials at the Port Modernization Program site, there could be a slight increase in demand for long-term jobs; the potential increase would depend on overall economic conditions, which includes the demand for goods and materials. No impact to residential communities would be anticipated. For the CVN deep draft wharf, the Navy would not transfer any permanent shore-side operational personnel or dependents to Guam, nor would it transfer any federal civilian workers. Most of the economic impacts of the transient visits (63 per year) would result from personal expenditures in the Guam economy (as opposed to expenditures made on base) by personnel while vessels are in port. The Live-Fire Training Complex would serve the Marines relocated to Guam from Okinawa, but the project itself would not transfer additional population to Guam nor provide additional economic benefit. None of these projects would displace existing residents or significantly impact individual populations. Therefore, individually and collectively, these projects would not have a significant impact on socioeconomic resources or environmental justice.

6.2 Irreversible and Irretrievable Commitment of Resources

The irreversible environmental changes that would result from implementation of the Proposed Action involve the consumption of natural resources (i.e., benthic and marine resources) and human resources (i.e., land use). Use of these resources is considered to be permanent. Irreversible and irretrievable resource commitments are related to the use of non-renewable resources and effects that use of these resources will have on future generations. Irreversible and Irretrievable commitment of resources related to the Port Modernization Program would include:

- *Loss of land below the HTL and soft bottom habitat* – Approximately 1,530 square feet (0.035 acres) due to placement of rip-rap associated with the proposed outfalls. Marine survey results indicate the habitat in this area is degraded. Existing benthic species in the area of construction could be disturbed or displaced. Rip-rap would provide hardbottom habitat and increase immediate species diversity and utilization after construction is completed. Construction of the proposed outfalls would be conducted in compliance with GEPA and USACE permits. These permits may include compensation for loss of land below the HTL.

- *Land use conversion* – Conversion of approximately 19 acres of primarily vegetated area in the Expansion Area to Terminal Yard Operations use. This area has been previously disturbed and impacted by human activities and does not contain threatened and endangered species.
- *Disturbance of roosting areas for migratory birds* – Roosting areas for non-threatened or endangered migratory shorebird species would be identified during a field survey prior to construction as requested by DAWR. If found, roosting areas would be evaluated for potential direct impacts from construction and operational activities. To the extent feasible, construction activities would avoid direct impacts during the nesting season. To the extent feasible, operational controls would be installed to minimize stray light from construction activities.
- *Loss of terrestrial habitat* – Elimination of the majority of the existing vegetation in the Expansion Area to the Terminal Yard (vegetation in the areas within 50 feet of the shoreline, except for immediately surrounding the storm water outfalls, would be retained). Most of the Expansion Area is of low value to native plants and wildlife as a result of past disturbance, as well as the high percentage of non-native species in this area. The area to be cleared of vegetation is not expected to provide habitat for any threatened and endangered species.

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