Final
Environmental Impact Statement
for Designation of an Ocean Dredged Material Disposal Site
Offshore of Guam

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Prepared for:

United States Environmental Protection Agency

ABSTRACT

This Environmental Impact Statement (EIS) covers the proposed designation of the Northwest Ocean Dredged Material Disposal Site (ODMDS) Alternative as a permanent site for the ocean disposal of dredged material. This ocean disposal site will be available as an alternative for placement of dredged material when no practicable upland placement or viable beneficial reuse options are available.

Use of the Northwest ODMDS Alternative is not anticipated to cause significant long-term adverse environmental impacts beyond the site boundaries. Temporary physical impacts to benthos are expected within the site by sediment disposal but the environmental effects are not anticipated to extend beyond the site boundaries. Water quality impacts will be localized, short-term and negligible. The few identified potentially adverse impacts are not anticipated to be irreversible or to involve any irretrievable commitment of resources. As part of the site designation process, the United States Army Corps of Engineers (USACE) and United States Environmental Protection Agency (USEPA) have developed a Site Monitoring and Management Plan (SMMP) included in an appendix to this EIS that will ensure that environmental impacts remain insignificant.

The alternatives considered in this EIS are: 1) No Action, 2) North ODMDS Alternative, and 3) Northwest ODMDS Alternative. The Preferred Alternative identified in this EIS is the Northwest ODMDS Alternative. This decision is based on the absence of significant long-term environmental impacts beyond the site boundaries, the greater potential for adverse environmental impacts (particularly air quality) associated with the other alternatives, and the demonstrated need for continued availability of an ocean disposal site for dredged material.

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ENVIRONMENTAL IMPACT STATEMENT
FOR DESIGNATION OF AN OCEAN DREDGED MATERIAL DISPOSAL SITE
OFFSHORE Of GUAM

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ACRONYMS AND ABBREVIATIONS

°C	Celcius
°F	Farenheit
µg/L	micrograms per liter
Ag	Silver
AVS	acid volatile sulfide
BSP	Bureau of Statistics and Plans
CAA	Clean Air Act
CCC	Criterion Continuous Concentration
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	Carbon Monoxide
CNMI	Commonwealth of the Northern Mariana Islands
cm	centimeter
CMC	Criterion Maximum Concentration
CTD	conductivity/temperature/depth
CWA	Clean Water Act
cy	cubic yards
CZM	Coastal Zone Management
CZMA	Coastal Zone Management Act
DAWR	Division of Aquatic and Wildlife Services
DDT	Dichlorodiphenyltrichloroethane
DEIS	Draft Environmental Impact Statement
DoD	U.S. Department of Defense
DON	Department of the Navy
E	East
EDL	Estimated Detection Limit
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
EO	Executive Order
ERA	Ecological Reserve Area
ESA	Endangered Species Act
FAD	Fish Aggregation Device
FeS	Iron Sulfide
FMP	Fishery Management Plan
FR	Federal Register
ft	feet
FY	Fiscal Year
G	gram
GEPA	Guam Environmental Protection Agency
GFCA	Guam Fisherman's Cooperative Association
GIS	Geographic Information Systems
GOVGUAM	Government of Guam
GPS	Global Positioning System
Guam	Territory of Guam
GVB	Guam Visitors Bureau
GWA	Guam Waterworks Authority
In	inch
IUCN	International Union for the Conservation of Nature
IWC	International Whaling Commission
kg	kilogram
km	kilometers
km^2	square kilometers
kph	kilometers per hour
kt	knots
LPC	limiting permissible concentration
m	meters
mi	miles
mi^2	square miles

m^2	square meters
m^3	cubic meters
MBTA	Migratory Bird Treaty Act
mcy	million cubic yards
MDL	method detection limit
mg	milligrams
mg/L	milligrams per liter
MISTCS	Mariana Islands Sea Turtle and Cetacean Survey
MLLW	Mean Lower Low Water
MMPA	Marine Mammal Protection Act
MODAS	Modular Ocean Data Assimilation System
MPA	Marine Protected Area
mph	miles per hour
MPRSA	Marine Protection Research and Sanctuaries Act
MSFCMA	Magnuson-Stevens Fisheries Conservation and Management Act
N	North
NAAQS	National Ambient Air Quality Standards
NAVFACPAC	Naval Facilities Engineering Command Pacific
NAVO	Naval Oceanographic Office
NCOM	Naval Coastal Ocean Model
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NLOM	Navy Layered Ocean Model
nm	nautical miles
NMFS	National Marine Fisheries Service
NO_x	Nitrogen Dioxide
NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPDW	North Pacific Deep Water
NPEC	North Pacific Equatorial Current
NRHP	National Register of Historic Places
NTU	Nephelometric Turbidity Units
NWS	National Weather Service
ODMDS	Ocean Dredged Material Disposal Site
PAG	Port Authority of Guam
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyls
pg/g	picrograms per gram
ROI	region of influence
SAP	sampling and analysis Plan
SEM	Simultaneously Extracted Metals
SHPO	State Historic Preservation Officer
SMMP	Site Management and Monitoring Plan
SO^2	Sulfur Dioxide
SST	sea surface temperature
TBT	tributyltin
TIAS	Treaties and Other International Act Series
TKN	Total Kjeldahl Nitrogen
TOC	total organic carbon
TON	Total Organic Nitrogen
U.S.	United States of America
USACE	U.S. Army Corps of Engineers
USC	United States Code
USCG	U.S. Coast Guard
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
WAPA	War in the Pacific National Historic Park
WPRFMC	Western Pacific Regional Fishery Management Council
WQC	Water Quality Criteria
ZSF	Zone of Siting Feasibility

EXECUTIVE SUMMARY

Introduction

The United States Environmental Protection Agency (USEPA), Region 9 proposes to designate an ocean dredged material disposal site (ODMDS) west of the Territory of Guam (Guam). The Guam location map is shown on Figure ES-1. It is USEPA's policy to publish and process a National Environmental Policy Act (NEPA) Environmental Impact Statement (EIS) for all ODMDS designations (39 Federal Register [FR] 37119, October 21, 1974), even if the action would not result in any potentially significant adverse impacts. This NEPA EIS discloses potential environmental impacts associated with disposal of dredged material at the alternative ODMDS locations.

By law, starting in 1997, ocean disposal may only occur at sites that have gone through a formal designation process to ensure that significant adverse impacts to the marine environment and human uses of the ocean would not occur. This EIS is part of the formal process to identify and designate an environmentally acceptable ODMDS for Guam.

Formal designation of an ODMDS in the FR does not constitute approval of dredged material for ocean disposal. Designation of an ODMDS provides an additional dredged material management option for consideration in the review of each proposed dredging project. Ocean disposal is only allowed when USEPA and United States Army Corps of Engineers (USACE) determine, on a case-by-case basis, that the dredged material: 1) is environmentally suitable according to testing criteria (40 Code of Federal Regulations [CFR] Parts 225 and 227), as determined from physical, chemical, and bioassay/bioaccumulation testing that is briefly described in Section 2.7 (USEPA and USACE 1991), 2) does not have a viable beneficial reuse, and 3) there are no practical land placement options available. This EIS only addresses management options for dredged material suitable for ocean disposal.

This document was prepared in accordance with the NEPA of 1969 (42 United States Code [USC] §4321 et seq.), as implemented by the Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500-1508); and USEPA Procedures for Implementing the Requirements of the Council on Environmental Quality on the NEPA (40 CFR Part 6), as amended October 19, 2007 (FR Vol. 72, No. 181, pp 53652-53672).

Purpose and Need

The purpose of the proposed action is to provide an additional option for the management of suitable material dredged from Guam and surrounding waters. Dredged material is defined as "suitable" when it meets the standard criteria (40 CFR Parts 225 and 227), as determined by physical, chemical, and bioassay/bioaccumulation testing (USEPA and USACE 1991). After an ODMDS is designated, other management options for suitable material, including beneficial use, will continue to be preferred over ocean disposal when such options are practicable and would not have unacceptable adverse effects.

An "interim" ODMDS was designated 3 nautical miles (nm) offshore of Apra Harbor (Figure ES-1) in 1977, but was never used. The designation was never finalized, and the interim site expired (along with all other "interim" disposal sites in the United States (U.S.) and Pacific Territories) on January 1, 1997. Since then, there has been an increased need for dredging in Guam, and the lack of a designated ODMDS has complicated dredged material management.

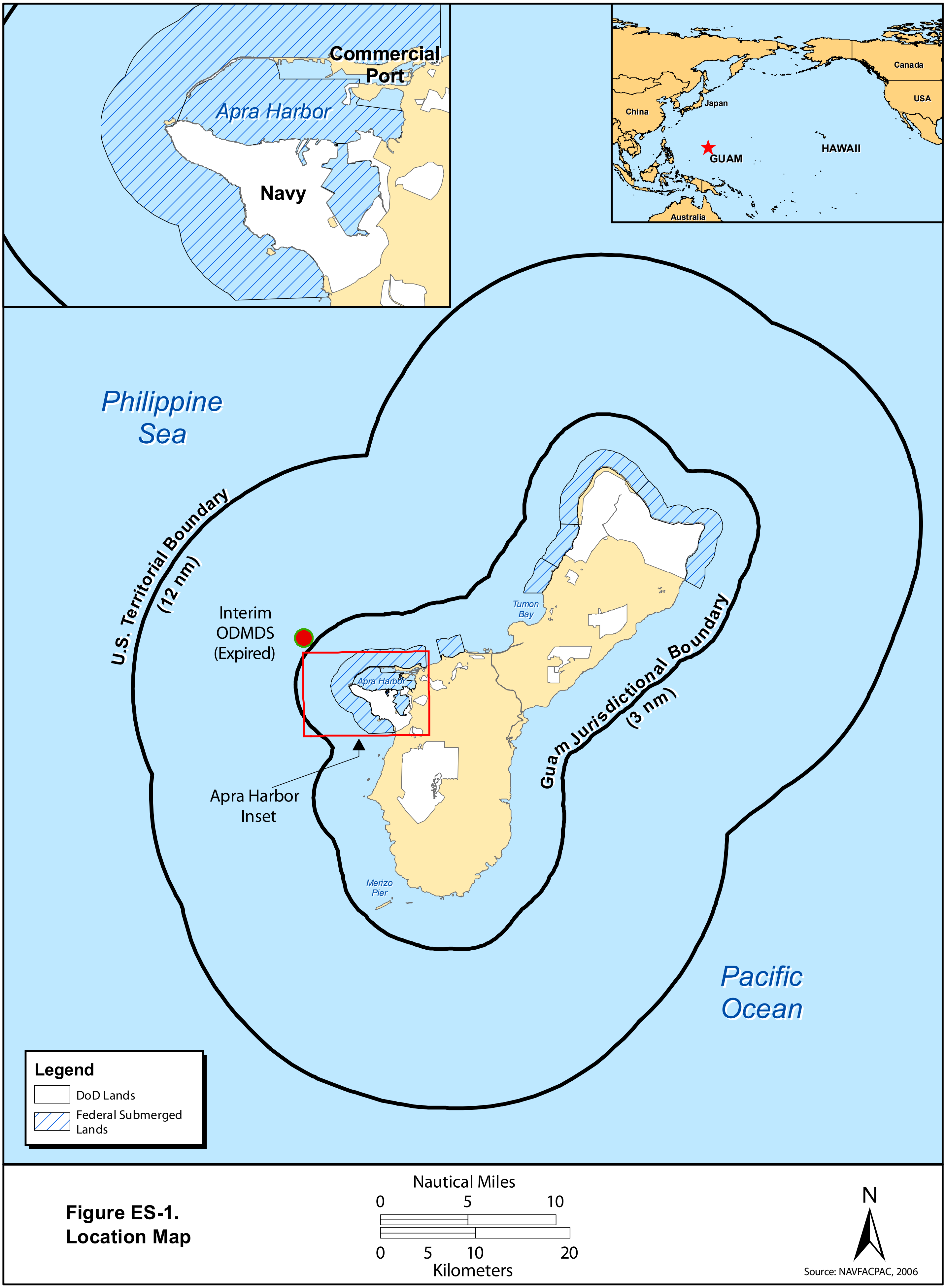

Figure ES-1. Location Map

The anticipated volume of dredged material generated around Guam over the next 30 years would exceed the capacity of known or existing stockpile or beneficial use options. The need for additional dredged material disposal options is exacerbated by the planned increase in military presence on Guam, which requires Navy and Port Authority of Guam (PAG) harbor and navigation improvements. Assuming all existing upland dewatering facilities are used and all known beneficial use options are fully implemented, there would still be a substantial excess of dredged material to be managed.

ODMDS Alternatives

Ocean disposal is regulated under Title I of the Marine Protection Research and Sanctuaries Act (MPRSA) (33 USC 1401 *et seq*). USEPA has the responsibility for designating an acceptable location for the ODMDS (MPRSA Section 102).

In summary, the steps required to designate an ODMDS are:

1. Demonstrate a need for an ODMDS.
2. Conduct a constraints analysis (Zone of Siting Feasibility [ZSF] study), based on existing information to identify areas with the least conflicting uses and the least potential for any environmental impacts.
3. Evaluate the identified study areas in detail, to determine the most suitable location within each study area for a candidate ODMDS.
4. Evaluate the specific candidate site in each study area using the USEPA general and specific criteria (40 CFR Part 228) (see Table 2-1) and document the findings in the EIS.
5. Identify the preferred alternative (e.g., the site that best meets the criteria) and proceed with rulemaking published in the FR to formally designate the ODMDS.

Alternatives were eliminated from detailed impact analysis in this EIS if they did not meet specified USEPA siting criteria. The ZSF study for a Guam ODMDS, prepared by Weston and Belt Collins in September 2006, was a rigorous assessment used to identify any and all reasonable alternatives for potential ODMDS siting and the information is summarized in this EIS section. Based on the ZSF study, two study areas in the Philippine Sea met the siting criteria. Based on their location relative to Apra Harbor, these study areas are described as the North and Northwest Study Areas. Within these two study areas, field analysis was conducted to identify the most suitable ODMDS within each of the two study areas.

This process resulted in the two ODMDS alternatives carried forward through the EIS analysis. These two alternatives are referred to as the Northwest Alternative ODMDS and the North Alternative ODMDS (Figure ES-2). These alternative ODMDSs, along with the No Action Alternative, are discussed in detail in Sections 2.4, 2.5 and 2.6.

No significant adverse impacts were identified under either ODMDS alternative and no mitigation is proposed beyond the standard conditions and operating procedures presented in the site management and monitoring plan (Appendix C), including avoidance of dredging and disposal during coral spawning periods.

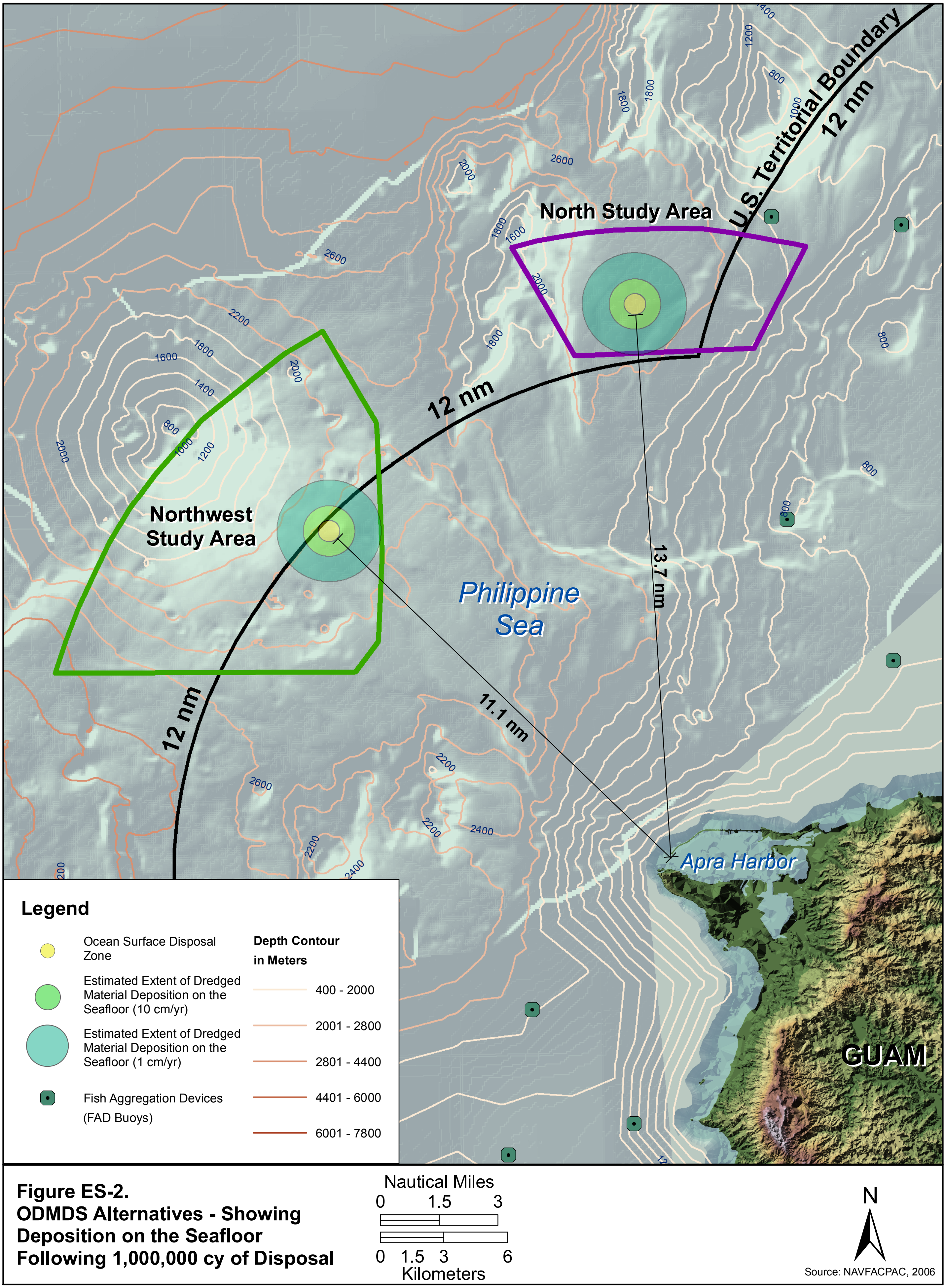

Figure ES-2. ODMDS Alternatives - Showing Deposition on the Seafloor Following 1,000,000 cy of Disposal

Affected Environment

The following sections summarize the physical, biological, and socioeconomic environments of the preferred and other alternatives.

Physical Environment

Guam has warm and humid weather, typical of a tropical marine climate. The average daily temperature range is between 76 and 88°Farenheit (°F) (24 and 31°Celcius [°C]). Tradewinds are fairly consistent throughout the year with an average wind speed of 10 miles per hour (mph) (16 kilometers per hour [kph]) from the east. Guam has two primary seasons: wet and dry. The dry season occurs from January to April with a monthly average of 3.25 inches (in) (8.3 centimeters [cm]) of rain. July through October comprise the wet season with rainfall averaging approximately 12 in/month (0.3 meters [m]/month). Typhoons can occur at any time on Guam; however, they typically occur during the wet months.

Guam has "attained" the USEPA's air quality standards with the exception of two areas classified as nonattainment for sulfur dioxide (SO_2) as of September 1999. These areas are within a 2.2 mile (mi) (3.5 km) radius of the Piti Power Plant and the Tanguisson Power Plant (Figure 3-1, Chapter 3). None of nonattainment areas around Piti Power Plant or Tanguisson Power Plant encompass either of the proposed study areas.

Surface currents in the vicinity of Guam are dominated by the North Pacific Equatorial Current (NPEC), though coastal eddies may develop in the lee (westward side) of the island as a result of the NPEC flowing past Guam. The NPEC flows westward at an average speed of 0.33 to 0.66 feet (ft/s) (0.1 to 0.2 m/s, 0.2 to 0.4 kt) and reaching a maximum speed of approximately 0.98 ft/s (0.3 m/s, 0.6 kt) in response to tradewinds typically occurring between 10° North and 15° North. Deep water currents in this region are dominated by the North Pacific Deep Water (NPDW) and the Lower Circumpolar Water (LCPW). The NPDW flows westward from the northeastern Pacific Ocean and the LCPW, branches into two limbs, a northward flow into the Pacific Basin and a westward flow towards the West Marianas Basin. Regional current characterization varied between modeled and *in situ* measurements, with field-collected data showing more variability in direction. Therefore, dredged material will likely deposit on an even smaller area of the seafloor than predicted by the model.

The conventional and chemical characteristics of water collected from stations located in the North and Northwest Study Areas were similar. Overall, nutrients tended to increase in concentration with increasing water depth, whereas Total Organic Carbons (TOCs) tended to decrease in concentration with increasing water depth. Metals concentrations were relatively low compared to Criterion Continuous Concentration and Criterion Maximum Concentration values and were within the same order of magnitude of other deep ocean reference site water samples. Very few polycyclic aromatic hydrocarbons (PAH) or chlorinated pesticides were detected in any of the water samples.

The island of Guam is volcanic and not part of a continental land mass, and therefore does not have a continental shelf. In the absence of a shelf break, continental shelf can be defined as submerged land between shoreline and a depth of 656 ft (200 m). On Guam, this typically occurs within 1 nm (1.9 km) of shore. The slope tends to increase rapidly offshore of Guam and depths can reach 6,000 ft (1.829 km) within 3 nm (5.6 km) (Weston Solutions and Belt Collins 2006). The study areas that contain both ODMDS alternative sites are well beyond the continental shelf, with the closest center point being 11.1 nm (20.6 km) from the shoreline. In general, the physical, conventional, chemical and radiological characteristics of sediments collected from stations located in the North and Northwest Study Areas are similar with the exception of grain size and few trace metals.

Biological Environment

The invertebrate community was typical of the deep offshore environment in the in the vicinity of either alternative disposal site. Overall, polychaetes dominated the benthic populations, while crustaceans and molluscs were in low abundance. Echinoderms were absent at all of the collection stations. Meiofaunal organisms were absent throughout all of the study areas with the exception of the North study site where one nematode was found.

Deep-sea demersal species were typical of the deep offshore environment in the vicinity of either alternative disposal site. Sampling was done by three methods: Beam Trawling; Fish Traps; and Photo Surveys. In the North Study Area, one tripod fish (*Bathypterois longipes*), one Stomiiforme Stomiiforme (a mid-water column organism), two giant hagfish (*Eptatretus carlhubbsi*), three individual Ophidiform (cuskeel) specimens, one Anguilliform (likely from the family Halosauridae: *Aldovandria* sp., deep sea spiny eel), and possibly a small shark or an Ophidiiform were identified in samples.

In the Northwest Study Area one demersal cuskeel (*Bassogigas gillii*), three water column bristlemouths (*Cyclothone pallida*), one small Ophidiiform, two hagfish, and five Ophidiiforms were identified in samples.

Commercial and Recreational Fishery Species were typical of the environment in the vicinity of either alternative disposal site, including numerous representatives of the pelagic, bottomfish, coral reef, and marine invertebrate fisheries. The most common species in the Guam pelagic fishery are mahimahi (*Coryphaena hippurus*), ono (*Acanthocybium solandri)*, skipjack tuna (*Katsuwonus pelamis)*, yellowfin tuna *(Thunnus albacares),* and Pacific blue marlin (*Makaira mazara).* The deep water bortomfish species that are targeted include groupers and snappers of the genera *Pristipomoides*, *Etelis*, *Aphareus*, *Epinephelus*, and *Cephalopholis*. Essential Fish Habitat (EFH) for bottomfish includes the entire water column extending from the shore to depths of 1,310 ft (400 m). Due to habitat preferences, there is some overlap between the coral reef fish and bottomfish fisheries species. Common reef fish species that comprise the fishery in Guam include parrotfishes (Family *Scaridae*), surgeonfish (Family *Acanthuridae*), wrasses (Family *Labridae*), and groupers (Family *Serranidae*). The marine invertebrates that comprise the fishery in Guam include crustaceans, cephalopods, echinoderms, and shelled molluscs. The major focus of the marine invertebrate fishery around Guam is crustaceans (lobsters and crabs), including the green spiny lobster (*Panulirus penicillatus)* and slipper lobster (Family *Scyllaridae)*. At this time there is not a substantial crustacean fishery in waters surrounding Guam, so EFH has not been designated for this region (WPRFMC 1995 (Amendment 9).

Marine birds on Guam fall into three main groups: shorebirds (such as plovers, sandpipers), water birds (such as ducks, cormorants, and loons) and seabirds (such as albatross, petrels, puffins, penguins, frigate birds and boobies). Seabirds are those species that obtain most of their food from the ocean and are found over water for more than half of the year. All marine birds that occur in the vicinity of either alternative disposal site are protected under the Migratory Bird Treaty Act and Executive Order 13186.

The Marine Mammal Protection Act of 1972 protects all marine mammals from harvesting within the borders of the U.S., regardless of status. Therefore, all marine mammals encountered in the offshore region of Guam must be given due consideration. Previous reports were used as a reference for marine mammals that may be in the proposed ODMDS vicinity, and suggested that the sperm whale was the species that had the highest frequency of sightings, followed by the Bryde's and sei whales. Dolphins and green sea turtles are also commonly sighted in the region. There are 20 species of marine mammals listed as having regular occurrence in the vicinity of either alternative disposal site.

There are numerous Marine Protected Areas (MPAs) in the vicinity of Guam, which are shown on Figure 3-29 (Chapter 3).

Socioeconomic Environment

Commercial fishing contributes less than $1 million annually on average to the total economy of Guam, which was $3.4 billion in 2002. The military and tourism sectors are the major economic generators. Nonetheless, fishing is an important social and cultural activity for the people of Guam. Most small-scale commercial fishing on the western side of Guam takes place in shallower waters, near reefs and near Fish Aggregation Devices (FADs), all located within 6 nm (11.1 km) of the shore. The 200 nm Exclusive Economic Zone around Guam prohibits commercial fishing by foreign boats and ships. In addition, there is a prohibition on longline fishing in the waters 50 nm around Guam; this area is shown in Figure 3-30 (Chapter 3). No registered mariculture operations were identified offshore of Guam.

There are in-water military training areas established around Guam and ship traffic shares the shipping lanes with all other ocean going traffic. The majority of in-water training sites are located within or south of Apra Harbor, more than 9 nm distance from the ODMDS alternatives.

Tourism has become a $1.3 billion industry and is Guam's largest source of income after U.S. military spending. Guam tourism generates 60% of gross revenues and provides 20,000 jobs, approximately 35% of the island's employment. Japan and Korea comprise 90% of Guam's visitors.

Recreational fishing has been growing in Guam over the years. Fishermen focusing on areas of bottom relief not only catch reef-associated fishes but also coastal pelagic species that may be attracted to the habitat. Galvez Bank, located off the southeastern shore outside the military restricted area, is fished the most often due to accessibility and distance. White Tuna Bank and Santa Rosa Bank off the southern coast, and Rota Bank north of Guam are remote and only fished during good weather conditions. Although the banks make good fishing grounds due to the shallower depths, fishing is not limited to these areas. The entire western seaboard of Guam is recognized as having fishing potential and is used periodically where permissible by weather conditions.

Five surface ship safety lanes (shipping lanes) are used by commercial ship traffic approaching Guam and Apra Harbor (see Figure 2-3, Chapter 2). All ship traffic is restricted to these lanes. All ship traffic is subject to strict navigation regulations designed to ensure safe vessel separations and operating conditions. Moreover, the ODMDS Alternative study areas were located to avoid the shipping lanes and have been placed between those that approach from the north and west.

Although no underwater archaeological surveys have specifically been conducted for this study region, underwater archaeological sites are unlikely to be located within the project area given its distance from land and reefs and the depth of the ocean bottom. No oil or other mineral extraction platforms were identified offshore of Guam.

Environmental Consequences

Potential environmental consequences associated with the ocean disposal of dredged material corresponding to the alternatives evaluated in this EIS are summarized in Table 2-4.

Physical Environment

The potential impacts of dredging operations on air quality in the North and Northwest ODMDS Alternative Areas are expected to be transient during barge transport and localized in the disposal site during the disposal action. Under the No Action Alternative the ODMDS would not be designated, and managing material in an upland setting would likely result in air quality impacts associated with the use of heavy equipment for rehandling and placement of the dredged material.

The disposal of dredged material at an ODMDS is not expected to have any measurable effect on the regional or site-specific physical oceanographic or geologic conditions. Additionally, there would be no affect of the No Action Alternative on physical oceanographic or geologic conditions.

Overall, potential impacts on water quality from suitable dredged material permitted for ocean disposal at the North and Northwest Study Areas are expected to be transient and localized (e.g., contained within the overall boundary of the disposal site) within four hours of the initial disposal activity, and no significant water quality impacts are expected outside of site boundaries. Therefore, there will be no overall unacceptable adverse impacts to water quality with ocean disposal. There would be no adverse impacts on the water column under the No Action Alternative (no ocean disposal site designated).

As only sediments determined to be suitable (non-toxic) for ocean disposal in accordance with USEPA and USACE protocols will be permitted for ocean disposal, there would be no unacceptable adverse impacts to the seabed outside the ODMDS disposal site boundary. There would be no adverse impacts on sediment characteristics under the No Action Alternative.

Biological Environment

Impacts to infauna, epifauna, invertebrates, and fishes are anticipated to be temporary and limited to the areas within the boundaries of the alternative disposal sites. Impacts to the benthic community are anticipated to be greatest as a result of smothering of some organisms and alteration of sediment characteristics. However, even these impacts are expected to be limited to areas receiving the greatest amounts of annual deposition thickness near the center of the disposal site.

Impacts on water column organisms such as plankton, pelagic fishes, and marine mammals are expected to be minimal, temporary, and limited to the area within the site boundaries. Suspended sediment plumes are expected to be confined to the disposal area and short in duration. The proposed disposal area is an extremely small percentage of the total regional area within which the pelagic fish are normally found. No significant impacts to seabirds are anticipated for any of the alternatives. Furthermore, the exposure of marine organisms and other fauna to dredged material is not expected to result in significant adverse effects given that the dredged material proposed for ocean disposal must be tested and determined suitable (non-toxic) for ocean disposal according to Environmental Protection Agency (EPA) and USACE testing criteria.

Socioeconomic Environment

Potential hazards to commercial, military, and recreational navigation resulting from the transport and disposal of dredged material at the sites are also expected to be insignificant. The commercial and recreational fisheries mirror the temporal and spatially dynamic ranges of pelagic fish occurring throughout the region and are not statically concentrated within the proposed disposal site. Vessel traffic in the region is highly regulated and conflicts with disposal barges are anticipated to be minimal. The disposal of materials that are considered hazardous is prohibited at an ODMDS. Dredged material proposed for ocean disposal will be subject to strict testing requirements established by the EPA and USACE. Material found not to be suitable for ocean disposal will be prohibited from disposal at either the North or Northwest

ODMDS Alternative sites. Therefore, the potential for human health and safety hazards is minimal and not significant for all of the alternatives.

There are no known cultural or historical resources within the North or Northwest ODMDS Alternative site boundaries. Potential impacts to human safety would be very small as the number of disposal barge trips, even under maximum possible trip scenarios, is small compared to the overall vessel traffic in the region. There are no existing or planned oil developments within the North or Northwest ODMDS Alternative site boundaries.

Comparison of the Alternative Ocean Disposal Sites with the 5 General and 11 Specific Site Selection Criteria.

Table ES-1 presents an assessment of the extent to which the two alternative ODMDS meet the five general site selection criteria 40 CFR 228.5 (a) to (e). Both sites meet the general criteria.

Table ES-1. Compliance with General Criteria (40 CFR 228.5)

Statute	Compliance
40 CFR 228.5(a) The dumping of materials into the ocean will be permitted only at sites or in areas selected to minimize the interference of disposal activities with other activities in the marine environment, particularly avoiding areas of existing fisheries or shellfisheries, and regions of heavy commercial or recreational navigation.	The ZSF specifically screened the marine environment to avoid areas of existing fisheries or shellfisheries, and regions of heavy commercial or recreational navigation.
40 CFR 228.5(b) Locations and boundaries of disposal sites will be so chosen that temporary perturbances in water quality or other environmental conditions during initial mixing caused by disposal operations anywhere within the site can be expected to be reduced to normal ambient seawater levels or to undetectable contaminant concentrations or effects before reaching any beach, shoreline, marine sanctuary, or known geographically limited fishery or shellfishery.	Both alternative site boundaries are located sufficiently from shore (minimum 10.5 nm [19.5 km]) and fishery resources to allow temporary water quality perturbations caused by dispersion of disposal material to be reduced to ambient conditions before reaching environmentally sensitive areas.
40 CFR 228.5(c) If at any time during or after disposal site evaluation studies, it is determined that existing disposal sites presently approved on an interim basis for ocean dumping do not meet the criteria for site selection set forth in Sections 228.5 through 228.6, the use of such sites will be terminated as soon as suitable alternate disposal sites can be designated.	The interim ODMDS established for Guam does not meet current USEPA criteria. It was never used and the designation was terminated.
40 CFR 228.5(d) The sizes of the ocean disposal sites will be limited in order to localize for identification and control any immediate adverse impacts and permit the implementation of effective monitoring and surveillance programs to prevent adverse long-range impacts. The size, configuration, and location of any disposal site will be determined as a part of the disposal site evaluation or designation study.	The size and shape of the alternative ODMDS has been determined by computer modeling to limit environmental impacts to the surrounding area and facilitate surveillance and monitoring operations. The designation of the size, configuration, and location of sites was determined as part of this evaluation study.
40 CFR 228.5(e) USEPA will, wherever feasible, designate ocean dumping sites beyond the edge of the continental shelf and other such sites that have been historically used.	The island of Guam is volcanic and not part of a continental land mass and does not have a continental shelf. In the absence of a shelf break, continental shelf can be defined as submerged land between shoreline and depth of 656 ft (200 m). On Guam, this typically occurs within 1 nm (1.9 km) of shore. The slope tends to increase rapidly offshore of Guam and depths can reach 6,000 ft (1.829 km) within 3 nm (5.6 km) (Weston Solutions and Belt Collins 2006). The center points of both ODMDS alternative sites are well beyond the continental shelf, with the closest ODMDS being 11.1 nm (20.6 km) from the shoreline. No ocean dumping sites have been used for Guam dredging projects.

Table ES-2 summarizes the evaluation of the ODMDS alternatives against the 11 USEPA Specific Site Selection Criteria (40 CFR 228.6 (a)). More detail on the existing conditions and potential environmental impacts is presented in Sections 3 and 4.

Table ES-2. ODMDS Alternatives and USEPA Specific Site Selection Criteria

		ODMDS – North Alternative	ODMDS – Northwest Alternative
1	Geographical position, depth of water, bottom topography, and distance from the coast.	Centered at 13° 41.300’ N and 144° 36.500’ E and 13.7 nm (25.4 km) from Apra Harbor. The bottom topography at the site is flat and the depth is 7,415 ft (2,260 m) (see Figure 2-4, Chapter 2).	Centered at 13° 35.500’ N and 144° 28.733’ E and 11.1 nm (20.6 km) from Apra Harbor. The bottom topography at the site is flat and the depth is 8,790 ft (2,680 m) (see Figure 2-4, Chapter 2).
2	Location in relation to breeding, spawning, nursery, feeding, or passage areas of living resources in adult or juvenile phases.	This alternative site is located in a marine open water area away from any special or unique habitats and shares the same general characteristics of the study region.	Same as North Alternative
3	Location in relation to beaches and other amenity areas.	The site is greater than 8.0 nm (14.8 km) from the jurisdictional 3nm coastal zone boundary and unlikely to interfere with coastal amenities.	The site is greater than 10.0 nm (18.5 km) from the jurisdictional 3 nm coastal zone boundary and unlikely to interfere with coastal amenities.
4	Types and quantities of wastes proposed to be disposed of, and proposed methods of release, including methods of packaging the waste, if any.	Dredged material to be disposed will likely be fine-grained material (clays and silts) originating from the Inner Apra Harbor area and coarser-grained material (sands and gravels) originating from the Outer Apra Harbor area. Maximum annual dredged material volumes would be set at 1 mcy (764,555 m^3). Dredged material is expected to be released from split hull barges and no packaging of waste is proposed.	Same as North Alternative
5	Feasibility of surveillance and monitoring.	USEPA (and USACE for federal projects in consultation with USEPA) is responsible for site and compliance monitoring. USCG is responsible for vessel traffic-related monitoring. Monitoring of the disposal site is feasible and facilitated through use of a remote tracking system as specified in the SMMP.	Same as North Alternative
6	Dispersal, horizontal transport, and vertical mixing characteristics of the area, including prevailing current direction and velocity, if any.	Oceanographic current velocities are greatest at the surface due to atmospheric circulation (e.g., wind) driven events while intermediate and bottom layer currents, driven by thermohaline circulation and influenced by tidal circulation, are variable resulting in a 2.86 mile diameter footprint of deposits greater than 1 cm.	Oceanographic current velocities are greatest at the surface due to atmospheric circulation (e.g., wind) driven events while intermediate and bottom layer currents, driven by thermohaline circulation and influenced by tidal circulation, are variable resulting in a 2.98 mile diameter footprint of deposits greater than 1 cm.
7	Existence and effects of current and previous discharges and dumping in the area (including cumulative effects).	No evidence of previous dumping activities was observed during field reconnaissance and there are no designated discharge areas in the vicinity.	Same as North Alternative

		ODMDS – North Alternative	ODMDS – Northwest Alternative
8	Interference with shipping, fishing, recreation, mineral extraction, desalination, fish and shellfish culture, areas of special scientific importance, and other legitimate uses of the ocean.	Minor short-term interferences with commercial and recreational boat traffic due to the transport of dredged material along established shipping lanes to/from ODMDS. There is no oil or other mineral extraction platforms offshore of Guam. The site has not been identified as an area of special scientific importance. There are no fish/shellfish culture enterprises near the site. There may be recreational vessels passing through the site, but the area is not a recreational destination.	Same as North Alternative
9	Existing water quality and ecology of the site as determined by available data or by trend assessment or baseline surveys.	Water quality is excellent with no evidence of degradation.	Same as North Alternative
10	Potentiality for the development or recruitment of nuisance species in the disposal site.	Unknown, but due to the great water depth and temperature differences between the disposal site and the potential near shore dredge areas it is unlikely that any transported nuisance species would survive at the ODMDS.	Same as North Alternative
11	Existence at, or in close proximity to, the site of any significant natural or cultural features of historical importance.	No culturally significant natural or cultural features were identified in the vicinity of the ODMDS.	Same as North Alternative

Conclusion

The No Action Alternative does not meet the goals and objectives for the designation of an offshore site for the disposal of dredged material anticipated to be generated in Apra Harbor and elsewhere around Guam. Impacts resulting from disposal of suitable dredged material under the Preferred Alternative (Northwest Alternative) are expected to be minimal for the following reasons:

- The availability of an offshore disposal site provides more flexibility in managing the dredged material disposal needs for the region;
- Air quality impacts are anticipated to be potentially significant for the No Action Alternative. These potentially significant air quality impacts can be reduced through the designation of a dredged material disposal site. In contrast, air quality impacts associated with North and Northwest Alternatives are not anticipated to be significant;
- Computer simulations of regional and site specific ocean currents in conjunction with bathymetric and sediment surveys indicate that the North and Northwest Alternative sites are located in flat non-dispersive areas that are likely to retain dredged material deposited on the ocean floor;
- No significant impacts to other resources or amenity areas (e.g., marine sanctuaries, beaches, etc.) are expected to result regardless which of the alternatives is selected;
- Existing and potential fisheries resources within the North and Northwest Alternative sites are temporally and spatially dynamic with individual species having greater ranges than the area of the proposed disposal site, such that the relative percentage of the potentially impacted area in relation to the entire fishery (within an 18 nm [33 km] arc from Apra Harbor) is small (e.g., less than 1%). Furthermore, there were no uniquely

distinguishable characteristics of the upper water column (e.g., shallower than 656 ft [200 m]) within or near the proposed disposal sites that would concentrate the pelagic fishery or their prey in these areas;

- Potential impacts to benthic infauna and epifauna are anticipated to be temporary and limited to the area within the North and Northwest Alternative site boundaries and thus not significant; and
- Potential impacts to fishes, marine mammals, seabirds, and other midwater organisms are expected to be insignificant regardless which of the alternatives is selected.

Table ES-3 summarizes the potential impacts to resource areas for both the North and Northwest Alternative ODMDS locations. No significant adverse impacts were identified under either ODMDS alternative and no mitigation is proposed beyond the standard conditions and operating procedures presented in the site management and monitoring plan, including avoidance of dredging and disposal during coral spawning periods (Appendix C).

Table ES-3. ODMDS Alternatives, Summary of Impacts

		ODMDS – North Alternative	ODMDS – Northwest Alternative
1	Air Quality	Less than Significant	Same as North Alternative
2	Water Quality	Less than Significant	Same as North Alternative
3	Sediment Quality	Less than Significant	Same as North Alternative
4	Marine Birds, Mammals and Fish	Less than Significant	Same as North Alternative
5	Benthic Communities	Less than Significant	Same as North Alternative
6	Threatened and Endangered Species	Less than Significant	Same as North Alternative
7	Marine Protected Areas	Less than Significant	Same as North Alternative
8	Recreational Use	Less than Significant	Same as North Alternative
9	Commercial Use	Less than Significant	Same as North Alternative
10	Cultural Resources	Less than Significant	Same as North Alternative
11	Public Health and Welfare	Less than Significant	Same as North Alternative

The ODMDS alternatives are not readily distinguishable from each other based on water quality and sediment quality. Both ODMDS alternatives have similar physical and biological properties and there would be less than significant impacts to other resource areas evaluated in this Environmental Impact Statement (EIS) (see Table ES-3). However, the Northwest Alternative is closer to Apra Harbor and farther away from FADS and the Visual Resource Area defined in the ZSF than the North Alternative (see Figure 2-3, Chapter 2). By reducing the distance needed to travel to the ODMDS, the already less-than-significant potential impacts to air quality are further reduced in addition to reductions in fossil-fuel consumption, operational duration, and operating costs. Based on these differences, the Northwest Alternative is the Environmentally Preferred Alternative and the Proposed Action.

1.0 PURPOSE OF AND NEED FOR ACTION

Chapter 1:

1.1 INTRODUCTION

The United States Environmental Protection Agency (USEPA), Region 9 proposes to designate an ocean dredged material disposal site (ODMDS) west of the Territory of Guam (Guam). The Guam location map is shown on Figure 1-1. It is USEPA's policy to publish and process a National Environmental Policy Act (NEPA) Environmental Impact Statement (EIS) for all ODMDS designations (39 *Federal Register* [FR] 37119, October 21, 1974), even if the action would not result in any potentially significant adverse impacts. This NEPA EIS discloses potential environmental impacts associated with disposal of dredged material at the alternative ODMDS locations.

By law, starting in 1997, ocean disposal may only occur at sites that have gone through a formal designation process to ensure that significant adverse impacts to the marine environment, and human uses of the ocean would not occur. This EIS is part of the formal process to identify and designate an environmentally acceptable ODMDS for Guam.

This document was prepared in accordance with the NEPA of 1969 (42 United States Code [USC] §4321 et seq.), as implemented by the Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508); and USEPA Procedures for Implementing the Requirements of the Council on Environmental Quality on the NEPA (40 CFR Part 6), as amended October 19, 2007 (FR Vol. 72, No. 181, pp 53652-53672).

Dredging is the removal of sediment from the bottom of oceans, rivers, streams or lakes to facilitate safe navigation, flood control, building in-water structures, mining of material, and other activities. The "dredging and disposal process" is defined as the excavation, transport and placement of dredged material. Periodically, harbors and marinas may require maintenance dredging to remove material that: 1) has accreted since the previous dredging, and 2) represents an impediment to navigation and or commercial viability of the operation. Construction dredging removes material in areas and/or to depths that have not been previously dredged.

Formal designation of an ODMDS in the FR does not constitute approval of dredged material for ocean disposal. Designation of an ODMDS provides one additional dredged material management option for consideration in the review of each proposed dredging project. Ocean disposal is only allowed when USEPA and United States Army Corps of Engineers (USACE) determine, on a case-by-case basis, that the dredged material: 1) is environmentally suitable according to testing criteria (40 CFR Parts 225 and 227), as determined from physical, chemical, and bioassay/ bioaccumulation testing that is briefly described in Section 2.7 (USEPA and USACE 1991), 2) does not have a viable beneficial reuse, and 3) there are no practical land placement options available. This EIS only addresses management options for suitable dredged material.

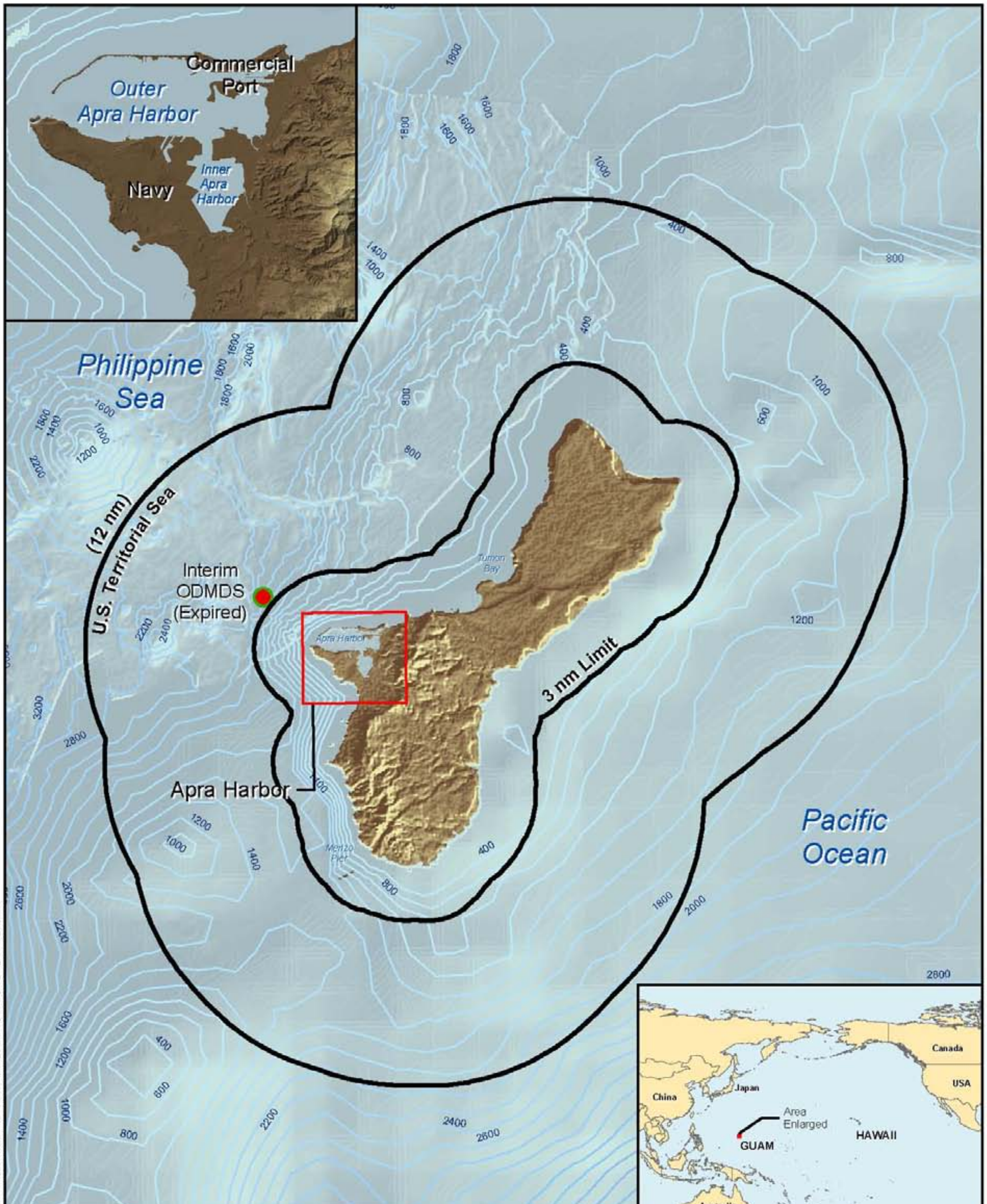

Figure 1-1
Location Map

1.2 PURPOSE FOR ACTION

The proposed action is the designation of an ODMDS near Guam. The purpose of the proposed action is to provide an additional option for the management of suitable material dredged from Guam and surrounding waters. Dredged material is defined as "suitable" when it meets the standard criteria (40 CFR Parts 225 and 227), as determined by physical, chemical, and bioassay/bioaccumulation testing (USEPA and USACE 1991). After an ODMDS is designated, other management options for suitable material, including beneficial use, will continue to be preferred over ocean disposal when such options are practicable and would not have unacceptable adverse effects. Figure 1-2 summarizes the management options for dredged material.

1.3 NEED FOR ACTION

An "interim" ODMDS was designated 3 nautical miles (nm) offshore of Apra Harbor (see Figure 1-1) in 1977, but was never used. The designation was never finalized, and the interim site expired (along with all other "interim" disposal sites in the U.S. and Pacific Territories) on January 1, 1997. Since then, there has been an increased need for dredging in Guam, and the lack of a designated ODMDS has complicated dredged material management. Historically, dredged material generated around Guam by the Navy and the Port Authority of Guam (PAG) has either been stockpiled in upland dewatering sites or beneficially used. These continue to be the only management options for dredged material. Guam simply does not have enough options for managing dredged material.

The anticipated volume of dredged material generated around Guam over the next 30 years would exceed the capacity of known or existing stockpile or beneficial use options. The need for additional dredged material disposal options is exacerbated by the planned increase in military presence on Guam, which requires Navy and PAG harbor and navigation improvements. Assuming all existing upland dewatering facilities are used and all known beneficial use options are fully implemented, there would still be a substantial excess of dredged material to be managed. An ODMDS provides an important management option for dredged material that is suitable and non-toxic, but for which other management options are not practical.

1.3.1 Beneficial Reuse

Beneficial reuse is managing dredged material as a valuable resource as opposed to disposing of it as a waste (Figure 1-2). Some typical beneficial reuse options include beach replenishment, construction fill and landfill cover. Beneficial reuse is the preferred management option but it may not always be practical for individual projects for a variety of reasons, including:

- The physical or chemical characteristics of the dredged material may not meet the standards for the specific beneficial use alternative.
- The timing of the beneficial use project may not coincide with the availability of appropriate dredged material.

Potential dredged material beneficial reuse options on Guam are limited and may include:

- Construction material.
- Landfill cover.
- Fill for the planned PAG commercial port expansion.

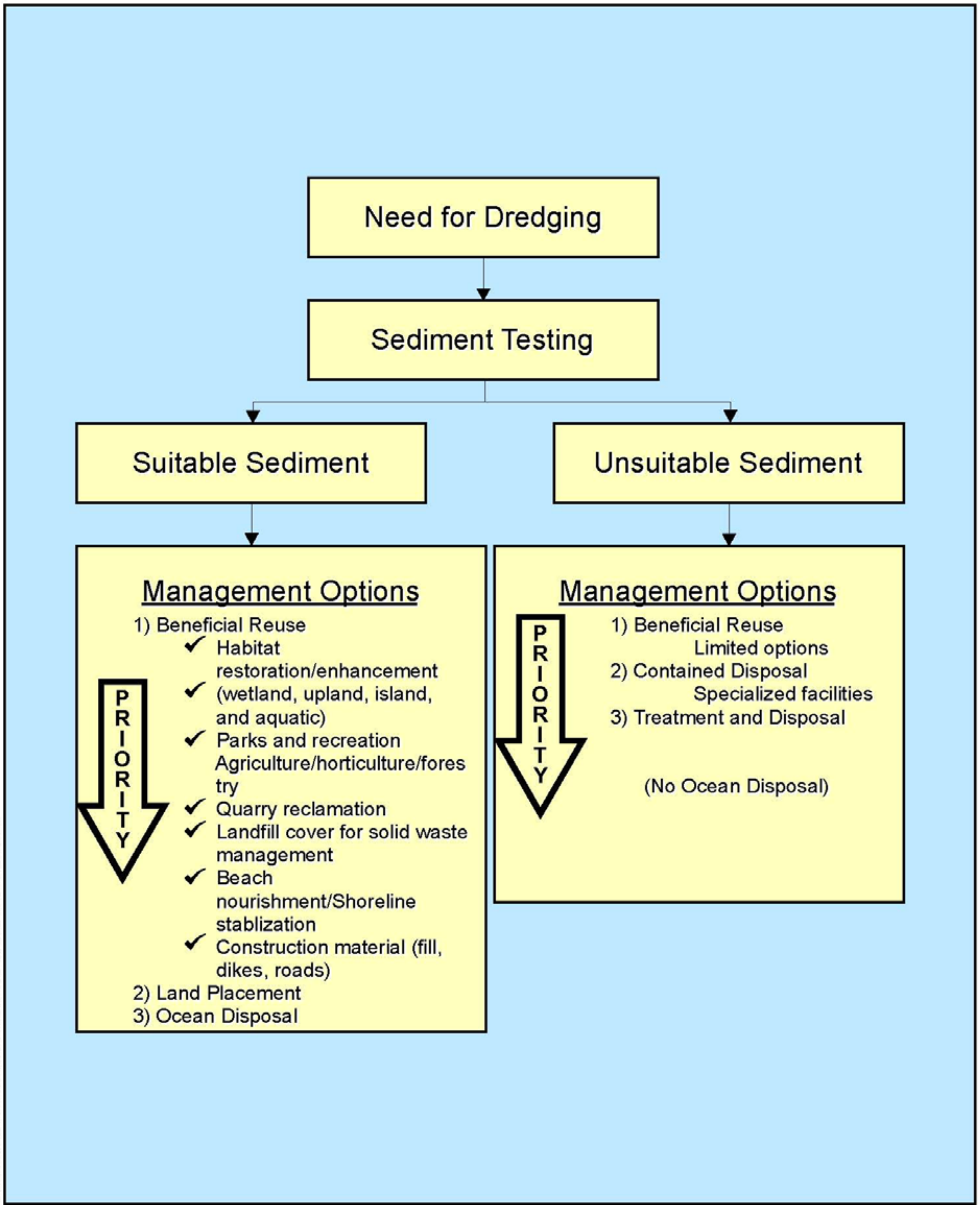

Figure 1-2
Dredged Material
Management Options

The estimated volume of dredged material that may have a beneficial use is 900,000 cubic yards (cy) as shown in Table 1-1.

Table 1-1. Summary of Excess Dredged Material

Activity	Approximate Volume (cy)
Dredged material generated (2010 and beyond[1])	4,500,000
Dredged material stockpiled (before 2010)	900,000
Subtotal Future Dredged Material Stockpiled	**5,400,000**
Identified beneficial uses	- 900,000
Total capacity of existing upland dewatering facilities	- 2,100,000
Future Excess Dredged Material to be Managed	**2,400,000**

[1] The Zone of Siting Feasibility Study (Weston Solutions and Belt Collins 2006) assumed a 30-year period for reasonably anticipated or likely projects identified in the Master Plan for Apra Harbor.

1.3.2 Dewatering Sites

It is often necessary to dry the dredged material before it can be either beneficially reused or disposed at an upland site (see Figure 1-2). In these cases a dewatering site is needed. Material is often temporarily stockpiled at a dewatering site until a location for placement can be determined. The existing dewatering sites on Guam are at or soon to be at maximum capacity. However, establishing new dewatering sites can be difficult for the following reasons:

- There may be insufficient capacity at the dewatering facilities for stockpiling material. Priority would be given to containment of material that is unsuitable for ocean disposal.
- New dewatering facilities can be time consuming to create, conflict with other land uses, and have their own environmental impacts.

The estimated capacity of existing dewatering facilities is 2,100,000 cy as shown in Table 1-1.

If a designated ODMDS were not available, additional dewatering facilities and/or beneficial use options would need to be developed to absorb this anticipated excess of 2,400,000 cy. The existing dewatering facility capacity (2,100,000 cy) would have to be doubled to absorb the anticipated excess dredged material volume (2,400,000 cy) [Table 1-1]. An ODMDS is an important option for the management of dredged material. Ocean disposal is primarily an option for materials as they are dredged. It is generally not a viable option for stockpiled dredged materials. There will always be the need for upland placement of some dredged material, but the ODMDS would result in less land area being used for dredged material dewatering and stockpiling.

1.4 NEPA PROCESS

1.4.1 Public Involvement

NEPA, CEQ and Coastal Zone Management Act (CZMA) regulations guide the public involvement process for designation of an ODMDS. Figure 1-3 illustrates the public participation process for the proposed action.

1.4.2 Notice of Intent (NOI) and Scoping Period

The first opportunity for public comment occurred during the scoping period.

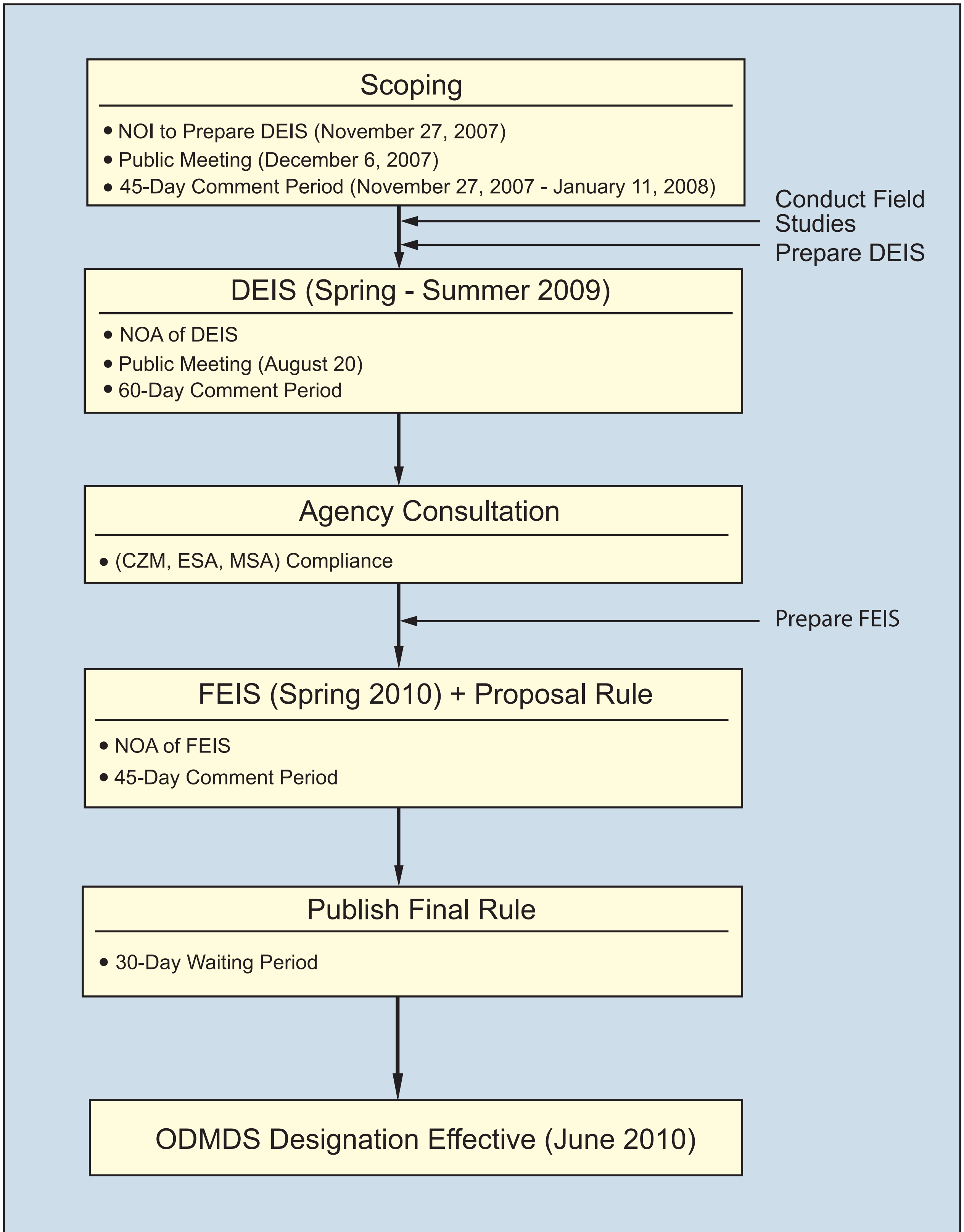

Figure 1-3.
Opportunities for Public Comment

1.4.2.1 Notice of Intent (NOI)

The NOI to prepare an EIS for the proposed action was published on November 27, 2007 (Appendix A). Copies of the NOI were also mailed directly to elected officials (Appendix A) including the Governor, U.S. Congressional Representative, Guam Legislators, and Guam Mayors on November 26, 2007. The NOI initiated the 45-day public scoping comment period that ended on January 11, 2008. During this period, the public was invited to communicate concerns, issues, and questions regarding the proposed action. Comments were provided by mail, email and orally at the scoping meeting.

1.4.2.2 Scoping Period

A scoping meeting announcement was published in the Pacific Daily News on November 27, 2007 (Appendix A). The scoping meeting was held at the Westin Hotel in Tumon between 6:00 pm and 8:00 pm. The format of the meeting was as follows:

- Attendees were asked to sign an attendance sheet and indicate if they wanted to be on the mailing list.
- USEPA made a presentation.
- USEPA responded to comments and questions from the audience.

The meeting was recorded and transcribed by a court reporting service. The transcript is provided in Appendix A. In addition, individual meetings were held with representatives of the following agencies/entities to describe the proposed action and solicit comments:

- U.S. Fish and Wildlife Services (USFWS), USEPA and National Oceanic and Atmospheric Administration (NOAA) – Honolulu.
- Port Authority of Guam (PAG).
- Navy Base Guam, Commanding Officer.
- Guam, Division of Aquatic and Wildlife Services (DAWR).
- Guam Environmental Protection Agency (GEPA).
- Bureau of Statistics and Plans (BSP).
- USACE, Guam Representative.
- Guam Environmental Partnering Forum.
- Guam Fisherman's Cooperative Association (GFCA).

The following issues were raised during the scoping period that ended on January 11, 2008, and are addressed in this EIS in the section noted in parenthesis:

- Describe the ODMDS designation process (Section 2.1).
- Why was Mariana Trench not considered? (Section 2.2.1).
- Explain the ODMDS operation, management, monitoring and enforcement procedures and responsibilities (Chapter 5).
- What is the impact of ODMDS on recreational uses, fishing, the marine food web, and navigation? (Sections 3.3 and 4.3)
- What is the impact of ODMDS on marine benthic communities? (Sections 3.2 and 4.2).
- Have you considered natural hazards: seismicity, typhoons, and high seas in the siting and management of the ODMDS? (Sections 3.1, 4.1, Chapter 5).

- Is there potential for barge-tug accidents with other vessels or other navigational safety issues? (Sections 3.3, 4.3, Chapter 5).
- Who decides whether to dewater dredged material for beneficial use or dispose of material in the ODMDS? (Chapter 5).

Some comments raised during scoping were determined to be outside the scope of the proposed action. These issues are not directly addressed in this EIS:

- Evaluation of future projects' dredged material suitability for ODMDS disposal. Existing information indicates that a large proportion of material likely to be dredged from Apra Harbor in the future would probably qualify as suitable for ocean disposal. However, this will be assessed during each project's USACE permitting process. Only dredged material meeting USEPA suitability guidelines may be considered for ocean disposal.
- Evaluation of future dredging projects' impacts at the specific dredging site. This will be assessed during each project's USACE permitting process.
- Development of a Strategic Plan for beneficial use of dredged material on Guam. USEPA encourages the Navy and the Government of Guam (GOVGUAM) to develop a Strategic Plan that minimizes the need for ocean disposal by coordinating projects in order to maximize opportunities for beneficial reuse of dredged material. However, an ODMDS is still needed as an additional management option.
- Impacts of establishing new navigation routes. This EIS describes the proposed routes between Apra Harbor and the ODMDS alternatives, but does not propose or evaluate establishing new shipping routes. Existing shipping lanes will be used to transport dredged material to any ODMDS. Barges of dredged material are subject to the same navigation rules and regulations that govern all other ship traffic including requirements for a notice to mariners, and respecting rights-of-way.

1.4.3 DEIS Status Meeting

During the week of May 18, 2009, project update meetings were held in Hawaii and Guam, with representatives from multiple agencies and organizations including the USFWS, NOAA/National Marine Fisheries Services (NMFS), GEPA, Guam BSP, Guam Department of Agriculture, Guam Waterworks Authority (GWA), Navy Base Guam, Commanding Officer, PAG, and GFCA. The briefings focused on updating the audience with field research findings.

The following issues were raised during the project update meetings, and are addressed in this EIS in the section noted in parenthesis:

- ODMDS designation process (Section 2.1).
- Interim ODMDS designation (Section 2.3).
- ODMDS operation, management, monitoring and enforcement procedures and responsibilities (Chapter 5).
- Water currents in the vicinity of the ODMDS (Sections 3.1 and 4.1).
- Impact of ODMDS on recreational uses, fishing, and navigation (Sections 3.3 and 4.3).
- Fate of dredged material (Sections 2.4, 2.5, 5.2).
- Impact of ODMDS on marine pelagic and benthic communities (Sections 3.2 and 4.2).
- Effect of natural hazards, including typhoons, and high seas, effect on management of the ODMDS (Sections 3.1, 4.1, Chapter 5).

1.4.4 Draft EIS (DEIS) / Coastal Zone Management (CZM) Consistency Review

The CZM consistency review by the BSP was conducted concurrently with DEIS review. The BSP correspondence has been included in the Final EIS (FEIS).

The DEIS addressed the relevant comments received during the scoping period. A Notice of Availability (NOA) of the DEIS was published in the FR on August 7th, 2009, which initiated a 60-day public comment period. The standard public comment period is 45-days; however, at the request of the regulatory agencies the public comment period was extended. Copies of the DEIS were mailed directly to interested parties, made available to the public through the USEPA project website (www.epa.gov/region09/water/dredging/index.html), and at RFK Memorial Library at the University of Guam and the Nieves M. Flores Memorial Library. The DEIS distribution list is included in Appendix A.

Public hearing announcements were published in the Pacific Daily News on July 25, 2009. The public hearing will be held at the Westin Hotel in Tumon on August 20, 2009. The format of the meeting was as described for the scoping meeting. Appendix A includes a transcript of the public hearing, copies of all written comments and USEPA responses, and the transcript of the public meeting.

1.4.5 Final EIS (FEIS) / Proposed Rule

This FEIS and the Proposed Rule for the designation of the ODMDS have been prepared following review of and in response to public comments on the DEIS. Copies of the FEIS/Proposed Rule have been sent to all parties who offered comments on the DEIS, all recipients of the DEIS, and those who requested a copy. The NOA for the FEIS/Proposed Rule was published in the FR and Pacific Daily News, which initiated another 45-day public comment period.

1.4.6 Final Rule / Site Designation

The Final Rule will be published in the FR and will include responses to any comments on the Proposed Rule. The Guam ODMDS designation will then take effect 30 days later in accordance with provisions contained in the Final Rule. From that time project proponents can apply for a USACE permit to use the site.

1.5 SCOPE OF THE EIS

This EIS evaluates impacts associated with dredged material disposal at either of the ODMDS alternatives. It does not address project specific dredging actions. The following are excluded from the scope of the EIS:

- potential impacts of any specific actions/projects associated with proposed military buildup on Guam;
- potential impacts of designating and using specific new upland dewatering sites;
- potential impacts of specific beneficial uses;
- suitability of any particular dredged material for specific beneficial uses;
- impacts of dredging methods or actions on the environment and coastal zone;
- purpose and need for future dredging projects and locations; and
- management of dredged materials deemed unacceptable for ocean disposal.

These would be addressed under project-specific permit applications and conditions, NEPA documentation, or CZM consistency determination.

1.6 COOPERATING AGENCIES AND AGENCY CONSULTATION

The USACE was invited to be a cooperating agency and accepted on March 4, 2009. In addition, the USFWS and NOAA/NMFS were consulted prior to release of the DEIS. Correspondence is included in Appendix A.

1.7 REGULATORY FRAMEWORK

There are numerous federal laws and regulations that guide or restrict the disposal of dredged material into the waters of the U.S. and its territories. These laws are designed to protect the environment, coastal resources and commerce. In addition, several Acts have been adopted to protect archaeological and historical resources. The relevant laws and regulations are summarized in Table 1-2.

Table 1-2. Summary of Compliance with the Key Laws, Regulations and Executive Orders

Statute	Compliance	Status of Compliance
London Convention (26 U.S. Treaties and other International Agreements (UST) 2403: Treaties and Other International Acts Series (TIAS) 8165)	Full	Implemented through the Marine Protection, Research and Sanctuaries Act (MPRSA) of 1972
MPRSA of 1972, as amended (33 U.S.C. 1401 et seq.)	Full	In compliance with Section 103 of the MPRSA, a Site Management and Monitoring Plan (SMMP) was developed in support of the proposed ODMDS final designation. USACE will issue ocean disposal permits for future dredged material through regulations promulgated under Section 103 of the MPRSA. USEPA is responsible for MPRSA compliance of all ocean disposal activities.
NEPA of 1969 (42 U.S.C. 4341 et seq.)	Full	This EIS was prepared for public review pursuant to NEPA with the USEPA as the lead agency and USACE as cooperating agency.
Clean Water Act (CWA) of 1972 (33 U.S.C. 1251 et seq.)	N/A	All barges of dredged material will pass through CWA jurisdiction; however, the alternative ODMDSs are outside the jurisdiction of CWA (3 nm).
Section 10, Rivers and Harbors Act	N/A	The dredging activity that generates material for the ODMDS requires compliance with this Act; however, the designation of an ODMDS would not require a Section 10 approval.
Magnuson-Stevens Fisheries Conservation and Management Act (MSFCMA) (16 U.S.C. 1801 et seq.)	Full	Formal consultation with the National Marine Fisheries Service (NMFS) was initiated on January 9, 2009 (see Chapter 5 of this DEIS). The EIS concludes that the proposed action will not result in any significant adverse impacts to any species addressed in the "Mariana Archipelago Fishery Ecosystem Plan."

Statute	Compliance	Status of Compliance
Clean Air Act (CAA), as amended (42 U.S.C. 1451 et seq.)	Full	The air emissions at the site would be from the vessels delivering dredged material to the ODMDS and would be short-term.
Coastal Zone Management Act of 1972 (16 U.S.C. 1456 et seq.)	Full	Although the ODMDS would be outside of Guam's coastal zone, transport to this site will be through the coastal zone, therefore USEPA has drafted a coastal zone consistency determination for review and concurrence by the Guam Coastal Zone Management Office, within the BSP.
Fish and Wildlife Coordination Act of 1958 (16 U.S.C. 661 et seq.)	Full	Formal consultation with the USFWS and the NMFS was initiated on January 9, 2009. The EIS concludes that the proposed action would not adversely impact fish or wildlife.
Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531 et seq.)	Full	Formal consultation with the USFWS and NMFS was initiated on January 9, 2009. The EIS concludes that the proposed action would not adversely impact endangered species.
National Historic Preservation Act (NHPA) of 1966 (16 U.S.C. 470 et seq.)	Full	Per 36 CFR 800.3(a) (1) the proposed action is not anticipated to cause effects on historic resources.
Executive Order (EO) 11593, Protection and Enhancement of the Cultural Environment (36 FR 8921, May 15, 1971)	Full	Full Per 36 CFR 800.3(a) (1) the proposed action is not anticipated to cause effects on cultural environment.
EO 12372, Intergovernmental Review of Federal Programs (47 FR 30959, July 16, 1982)	Full	For this EIS, the USEPA is consulting and coordinating with GOVGUAM and federal resources agencies regarding the proposed action.
EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations	Full	No minority and/or low income communities will be disproportionately exposed to environmental harms and risks, and the proposed action does not affect the level of protection provided to human health or the environment.
EO 13089, Protection of Coral Reefs	Full	The ODMDS alternatives are in water too deep to support coral reefs. However, dredging projects will have to comply with EO 13089 and the SMMP will address compliance to safeguard from transport impacts.
Presidential Proclamation under the authority of the Antiquities Act (16 U.S.C. 431), Designation of Mariana Trench Marine National Monument	Full	Neither the ODMDS alternatives nor the transport route to the ODMDS alternatives lay within the designated monument areas: the Trench Unit, Islands Unit, or Volcanic Unit.

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2.0 ALTERNATIVES

Chapter 2:

This chapter describes how potential alternative ocean disposal site locations were screened, some alternatives were eliminated from further consideration, and an appropriate range of final alternatives was developed. This chapter then described the final alternatives in detail.

Section 2.1 describes the ocean disposal site designation process. This process begins with USEPA's ocean disposal site selection criteria. A constraints analysis ("Zone of Siting Feasibility Study") used USEPA selection criteria and best available information on the marine environment around Guam to identify areas that were potentially suitable for an ODMDS site. Those areas that did not meet the criteria were dismissed from further impact analysis in this EIS (Section 2.2). This process identified two areas (the Northwest Study Area and the North Study Area) that met the criteria. Field studies within the two zones were conducted to identify the best ODMDS site within each zone. These locations became the "action" alternatives carried forward for detailed evaluation in this EIS. Sections 2.4 and 2.5 describe the two "action" alternatives in detail and Section 2.6 describes the No Action Alternative, which is the *status quo* for Guam and would not designate any ODMDS. Section 2.7 summarizes the degree to which the two action alternatives comply with the USEPA ocean disposal site selection criteria. Section 2.8 is a statement of the Preferred Alternative, and Section 2.9 shows a comparison of impacts between the two action alternatives.

2.1 ODMDS DESIGNATION PROCESS

Ocean Disposal is regulated under Title I of the Marine Protection, Research, and Sanctuaries Act (MPRSA) (33 USC 1401 *et seq*). USEPA has the responsibility for designating an acceptable location for the ODMDS (MPRSA Section 102).

In summary, the steps required to designate an ODMDS are:

1. Demonstrate a need for an ODMDS.
2. Conduct a constraints analysis (Zone of Siting Feasibility [ZSF] study), based on existing information to identify areas with the least conflicting uses and the least potential for any environmental impacts.
3. Evaluate the identified zones in detail, to determine the most suitable location within each zone for a candidate ODMDS.
4. Evaluate the specific candidate site in each zone using the USEPA general and specific criteria (40 CFR Part 228) (Table 2-1) and document the findings in the EIS.
5. Identify the preferred alternative (e.g., the site that best meets the criteria) and proceed with rulemaking published in the FR to formally designate the ODMDS.

Table 2-1. Five General and Eleven Specific ODMDS Selection Criteria

General Site Selection Criteria (40 CFR 228.5)	
1	The disposal of materials into the ocean will be permitted only at sites or in areas selected to minimize the interference of disposal activities with other activities in the marine environment particularly avoiding areas of existing fisheries or shellfisheries and regions of heavy commercial or recreational navigation.
2	Locations and boundaries of disposal sites will be so chosen that temporary perturbances in water quality or other environmental conditions during initial mixing caused by disposal operations anywhere within the site can be expected to be reduced to normal ambient seawater levels or to undetectable contaminant concentrations or effects before reaching any beach shoreline marine sanctuary or known geographically limited fishery or shellfishery.
3	If at any time during or after disposal site evaluation studies it is determined that existing disposal sites presently approved on an interim basis for ocean dumping do not meet the criteria for site selection set forth in Sections 228.5 through 228.6 the use of such sites will be terminated as soon as suitable alternate disposal sites can be designated.
4	The sizes of the ocean disposal sites will be limited in order to localize for identification and control any immediate adverse impacts and permit the implementation of effective monitoring and surveillance programs to prevent adverse long-range impacts. The size configuration and location of any disposal site will be determined as a part of the disposal site evaluation or designation study.
5	USEPA will wherever feasible designate ocean dumping sites beyond the edge of the continental shelf and other such sites that have been historically used.
Specific Site Selection Criteria (40 CFR 228.6(a))	
1	Geographical position, depth of water, bottom topography, and distance from the coast.
2	Location in relation to breeding, spawning, nursery, feeding, or passage areas of living resources in adult or juvenile phases.
3	Location in relation to beaches and other amenity areas.
4	Types and quantities of wastes proposed to be disposed of, and proposed methods of release, including methods of packaging the waste, if any.
5	Feasibility of surveillance and monitoring.
6	Dispersal, horizontal transport, and vertical mixing characteristics of the area, including prevailing current direction and velocity, if any.
7	Existence and effects of current and previous discharges and dumping in the area (including cumulative effects).
8	Interference with shipping, fishing, recreation, mineral extraction, desalination, fish and shellfish culture, areas of special scientific importance, and other legitimate uses of the ocean.
9	Existing water quality and ecology of the site as determined by available data or by trend assessment or baseline surveys.
10	Potentiality for the development or recruitment of nuisance species in the disposal site.
11	Existence at, or in close proximity to, the site of any significant natural or cultural features of historical importance.

2.2 ALTERNATIVE DEVELOPMENT

Alternatives were eliminated from detailed impact analysis in this EIS if they did not meet specified USEPA siting criteria. The ZSF study for a Guam ODMDS, prepared by Weston and Belt Collins in September 2006, was a rigorous assessment used to identify any and all reasonable alternatives for potential ODMDS siting and the information is summarized in this EIS section. Based on the ZSF study, two zones in the Philippine Sea met the siting criteria. Based on their location relative to Apra Harbor, the zones are described as North and Northwest zones. Within these two zones, field analysis was conducted to identify the most suitable ODMDS within each of the two zones. It is these two specific sites within the two zones that are carried forward in the impact analysis as the North and Northwest Alternative ODMDS.

2.2.1 Zone of Siting Feasibility Methods

A schematic representation of the ZSF process is shown on Figure 2-1. The initial assumption of the ZSF is that most of the Guam dredging would occur in Apra Harbor; therefore, the most economic regional location, with respect to travel distance from the dredged site to ODMDS, would be west of Guam. The ZSF methodology uses best available information to screen for areas acceptable for an ODMDS by using Geographic Information Systems (GIS) to graphically represent the following siting constraints:

- Regulated navigation lanes
- Military operating areas and safety zones / danger areas
- GOVGUAM jurisdictional boundaries
- Marine protected areas
- Parks
- Ocean outfalls from wastewater treatment plants
- Oil and mineral extraction installations (not applicable to Guam)
- Continental Shelf considerations (not applicable to Guam)
- Important fishing areas including Fish Aggregation Devices (FADS)
- Important visual resources

ODMDS designation should avoid these constrained areas. The description of these resources is provided in detail in Chapter 3. Finally, the location must be within the economic feasibility distance that is described in Section 2.2.2.

These evaluation factors were considered and it was determined that most were applicable to Guam. Active shipping lanes eliminated areas west of Guam. Military operating zones were eliminated west, southwest and south of Guam. Areas containing FADS or shallow bathymetric features capable of supporting coral habitat, pelagic and bottomfish fisheries, and recreational fishing were eliminated north, west, and southwest of Guam. Marine protected areas, ecological reserve areas, and park areas were eliminated south, west and northeast of Guam. Important visual areas were eliminated northwest of Guam. After eliminating these areas, the economic feasibility distance was applied as described in Section 2.2.2 below.

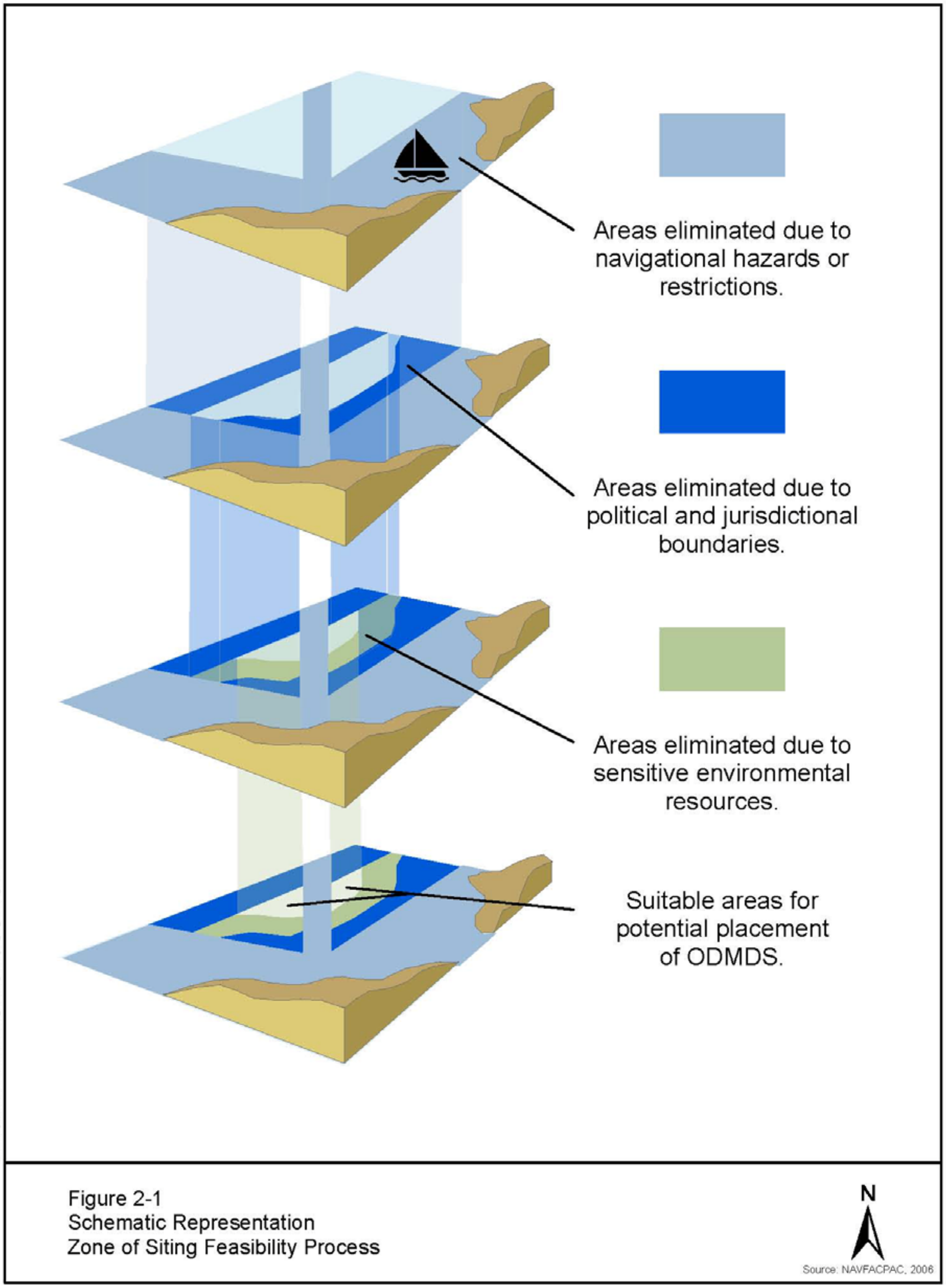

Figure 2-1
Schematic Representation
Zone of Siting Feasibility Process

2.2.2 Economic Feasibility Distance

The extent of the ZSF should be equal to the transport distance that is economically feasible for both construction and maintenance dredging projects. For Guam, the ZSF would be an area inside an arc originating from the entrance of Apra Harbor (where most dredging would occur) and radiating offshore to the economic transport distance. The economic transport distance is dependent on a number of factors, including the kind of project (maintenance versus new construction), the type and size of dredging equipment used, production rate of the dredge equipment and acceptable production downtime (Weston Solutions and Belt Collins 2006). Mechanical dredging is the method historically utilized by the Navy and others on Guam for both maintenance and construction dredging, and it was assumed in the ZSF that this would continue to be the method of choice. Although mechanical dredging was assumed in the ZSF, other dredging methods such as hydraulic dredging may be used in Apra Harbor in the future.

In a typical mechanical dredging operation, a large clamshell-shaped bucket is affixed to the moveable arm of the dredge equipment, which is secured to a barge and transported to the dredge site by tugs. The dredging process consists of lowering the bucket to the seafloor, closing the bucket to grab the bottom sediment, raising it back to the water surface, and depositing the dredged material into a scow (Figure 2-2). When full, the scow is towed by a tug to the ODMDS where it is released from the scow. It is most efficient to have two scows so that one can be loaded while the other is transiting to and from the ODMDS.

The size of the dredge bucket and scows, and number of scows available factor into the maximum transport distance. The most efficient mechanical dredging operations use at least two scows so that the dredge can continue to work filling one scow while the other is being towed to and from the ODMDS. The ZSF analysis indicated that for the clamshell dredging options using two scows, the economically feasible transit distance for maintenance projects is up to 18 nm (33 km) from the entrance to Apra Harbor.

Figure 2-2
Dredging Equipment

2.2.3 Zone of Siting Feasibility (ZSF) Conclusions

Figure 2-3 shows the composite of all constraints identified in the ZSF. The results suggest there are two zones located offshore of Guam that are unconstrained and may be suitable for placement of an ODMDS. The first zone, the Northwest Study Area, begins approximately 8.9 nm (16.4 km) northwest of the entrance to Outer Apra Harbor with an area of approximately 59 square miles (mi^2) (152 km^2). The second zone, the North Study Area, begins approximately 12.4 nm (23 km) north of the entrance to Outer Apra Harbor with an area of approximately 22 mi^2 (58 km^2).

There is a third zone, located southwest of the entrance to Outer Apra Harbor, that appears to be free of constraints and to meet the ZSF requirements. However, the travel route to this southwest zone must circumvent the firing danger zone and submarine operating area. The scow and barge would be required to transit 10 nm (18 km) due west from Apra Harbor then 5.5 nm (10 km) south to reach the boundary of the southwest zone. The 15.5 nm (28.7 km) minimum transit distance to the edge of the zone is already close to the economic transport distance of 18 nm (33 km). Also, the potential to transit into a restricted area is much greater than for the other alternatives. Therefore, this zone has been excluded from further consideration for placement of an ODMDS.

2.2.4 Identification of a Specific ODMDS Alternative Within Each ZSF Study Area

Following the ZSF study, additional field research and analyses were conducted to identify the least constrained areas within each of the two study areas. Studies were conducted to determine physical, biological, and socioeconomic site constraints and are detailed in Chapter 3, Affected Environment. The study findings suggest that the two study areas could be described as pristine and are not readily distinguishable from each other based on water quality and sediment quality. The physical characteristics within the study areas were the basis of selecting a preferred site. Favorable sites had relatively flat, featureless sea floor to avoid potentially unique features or potentially more valuable aquatic habitats (e.g., seamounts). Unfavorable areas appeared unique or potentially valuable based on the field study results. Among those areas that meet these environmental and physical criteria, the alternative site within each of the two study areas was the one that was closest to Apra Harbor.

For each alternative site, the discharge zone on the surface would be round, with a radius of 1,640 feet (ft) (500 m) at the center of the site. The overall boundary of the disposal site is the outer extent of the area on the bottom of the ocean where maximum deposition of 0.4 in (1 centimeter [cm]) is predicted to occur if 1,000,000 cy (760,555 cubic meters [m^3]) of dredged material were disposed in one year. This area is defined as a circle approximately 3.1 nm (5.0 km) in diameter when modeled to a depth of 6,560 ft (2,000 m). At a deposit thickness of 3.9 in (10 cm), the area modeled would be a circle approximately 1.2 nm (1.9 km) in diameter; therefore, there is a buffer for deposition of approximately two-and-one-half times the area (3.1 nm/1.2 nm). This volume (1,000,000 cy in one year, or approximately 333 disposal events of 3,000 cy of dredged material each) represents the worst reasonable case scenario and is therefore used for planning and impact evaluation purposes; it is expected that such a large quantity would only rarely, if ever, be disposed at the Guam ODMDS in any one year.

This process resulted in the two ODMDS alternatives carried forward through the EIS analysis. These two alternatives are referred to as the Northwest Alternative ODMDS and the North Alternative ODMDS. These alternative ODMDSs, along with the No Action Alternative, are discussed in detail in Sections 2.4, 2.5 and 2.6.

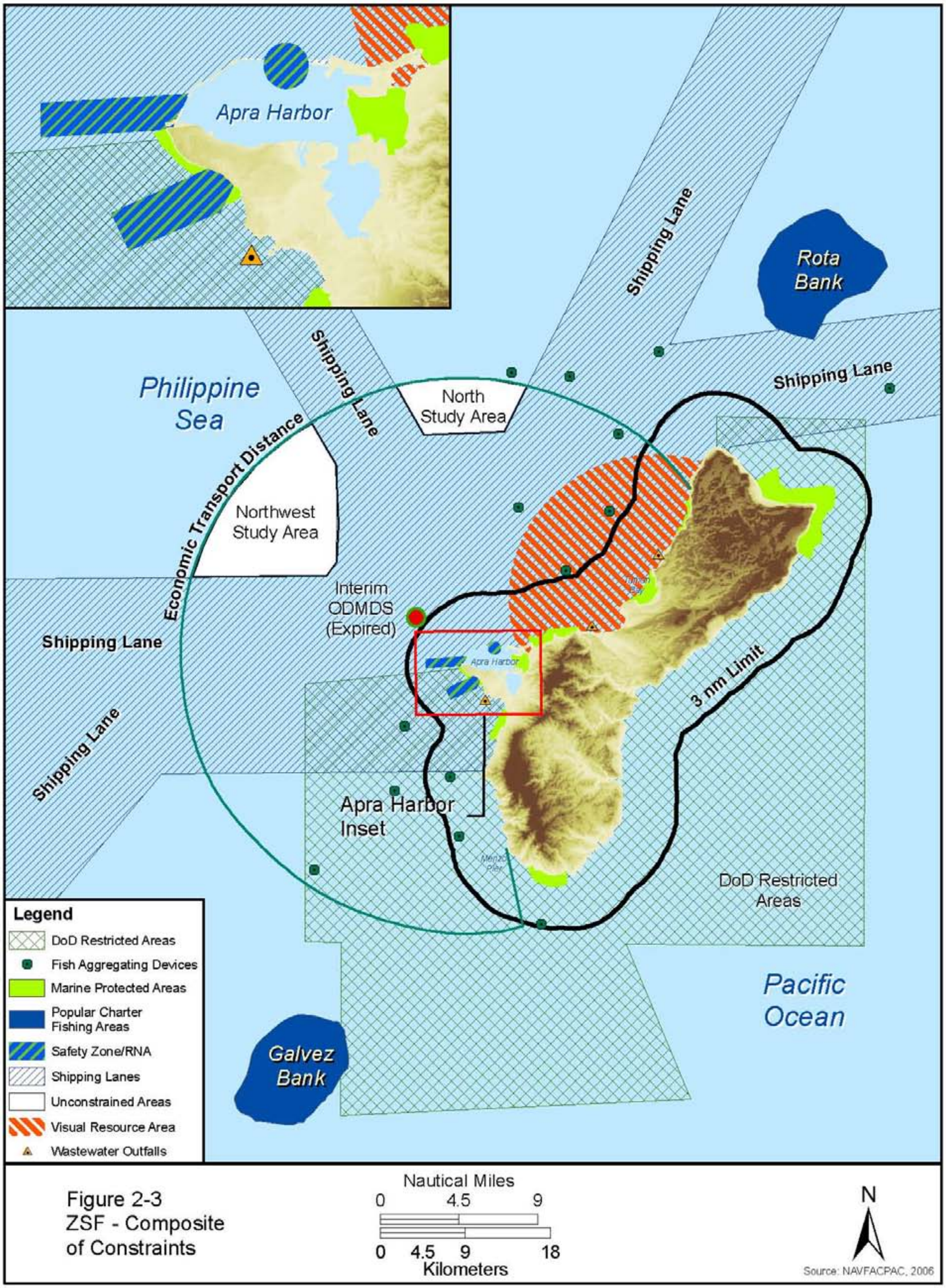

Figure 2-3
ZSF - Composite of Constraints

2.3 ALTERNATIVES CONSIDERED AND DISMISSED FROM FURTHER CONSIDERATION

During the scoping process, the following three alternatives to the disposal of the material in an ODMDS were suggested:

- Mariana Trench
- Off-island upland placement
- Interim ODMDS (reactivate)

2.3.1 Mariana Trench

The Mariana Trench is located in the Pacific Ocean, approximately 220 nm (400 km) southwest of Guam, and has a maximum depth of approximately 6.8 mi (11 km). The transportation of material to the Mariana Trench would not be economically feasible. Due to the distance required to reach the Mariana, transportation of the material would not be energy efficient and there would be political / jurisdictional considerations associated with disposal so far away of from Guam. Additionally, the unique benthic, near-benthic and thermal vent communities are not fully understood and therefore, potential impacts of introducing material to this environment cannot presently be determined.

2.3.2 Off-island upland placement

The transportation of material to other off-island upland locations would not be economically feasible. The nearest likely location for off-island upland placement, Rota, is greater than 45 nm (80 km) from Apra Harbor, Guam. Due to the distance required to reach Rota or other islands, transportation of the material would not be energy efficient and there would be political / jurisdictional considerations associated with disposal on islands other than Guam. Additionally, the material would have to be handled multiple times to transfer from vessel to barge, from barge to truck, and truck to upland location.

2.3.3 Interim ODMDS

An interim Guam ODMDS was designated (40 CFR, Part 228 Section 14) in 1977, approximately 5.3 mi (8.5 km) northwest of the entrance to Outer Apra Harbor (13° 29’ 30” N, 144° 34’ 30” E). It had a 1,000-yard (914.4-m) radius (see Figure 1-1). The interim designation was approved for the disposal of dredged material from Apra Harbor, Guam; however, the designation was never finalized, and as a result no dredged material was disposed at the site. The designation expired in 1997. The process for designating an ODMDS is more stringent today than in 1977. The interim site is constrained by multiple screening criteria assessed in the ZSF study (refer to Section 2.2), including being situated with regulated navigation lanes—creating a potential navigation hazard—and is no longer a suitable ODMDS alternative.

2.4 NORTH ALTERNATIVE ODMDS

This section describes the site-specific characteristics of the North Alternative ODMDS, and how dredged material discharged at this location would deposit on the seafloor.

2.4.1 Description of the North ODMDS

Under the North Alternative ODMDS, USEPA would designate an ODMDS north of Outer Apra Harbor (Figure 2-4). The North Study Area is approximately 12.4 nm (23.0 km) offshore of Guam. This northern region occupies an area approximately 17 square nm (58 km^2) and depth at target sampling areas ranged from approximately 6,560 ft to 7,710 ft (2,000 m to 2,350 m). The Sampling and Analysis Plan (SAP) for the ODMDS sampled random target stations within the North Study Area and determined the physical and biological characteristics to be homogeneous across the overall site (Weston Solutions and Belt Collins 2007a). Since the characteristics of the target stations were highly similar, the location at 13° 41.300' N and 144° 36.500' E was chosen as the Northwest ODMDS alternative, based on flatter bathymetry and proximity to Apra Harbor.

The North ODMDS is approximately 13.7 nm (25.4 km) offshore of Guam (Figure 2.4) and occurs at a depth of approximately 6,560 ft (2,000 m). The discharge zone on the surface would be round, with a radius of 1,640 ft (500 m) at the center of the site. The overall boundary of the disposal site (e.g., the seafloor disposal boundary) is the outer extent of the area on the bottom of the ocean where maximum deposition of 0.4 in (1 cm) is predicted to be wholly contained within (including a buffer area) if 1,000,000 cy (760,555 m^3) of dredged material were disposed in one year. This area is defined as a circle approximately 3.1 nm (5.0 km) in diameter. Figure 2-3 shows that the North ODMDS meets the ZSF characteristics.

There would be no temporary or permanent infrastructure constructed to support the ODMDS designation or use. Access to the ODMDS would be via established commercial shipping lanes.

2.4.2 Fate of Dredged Material Discharged at the North ODMDS

Dredged material discharged at the North ODMDS would settle through the water column, disperse under the influence of local oceanographic currents until ultimately depositing on the seafloor. The fate and transport of dredged material was modeled using grain size data characteristic of sediments likely to be dredged from Apra Harbor, Guam and *in situ* measurements of oceanographic currents collected near the proposed disposal site. Under the maximum possible scenario (the discharge of 1,000,000 cy [764,555 m^3] of coarse-grained dredged material during a given year), the maximum footprint of dredged material deposits greater than 0.4 in (1 cm) would be roughly circular in shape with a diameter of approximately 2.8 mi (4.6 km) and cover an area of approximately 6.4 sq. mi (16.7 km^2). Deposits greater than 3.9 in (10 cm) would be contained within an area of only 0.58 sq. mi (1.51 km^2) and deposits greater than 7.9 in (20 cm) would be contained within an area of only 0.36 sq. mi (0.92 km^2). These are shown as concentric rings on Figure 2-4. The maximum thickness of accumulated dredged material under this scenario would be 25.6 in (64.9 cm) and would decrease to approximately 4.3 in (10.8 cm) within 3,000 ft (914 m) from the center of the disposal site. These deposits would be wholly contained within the seafloor disposal boundary of 3.1 nm (5.0 km).

Additional information regarding the fate and transport model (STFATE) used to predict the area of dredged material deposits and the thickness of dredged material accumulations on the seafloor is located in Section 4.1.4 (Environmental Consequences to Regional Geology).

2.5 NORTHWEST ALTERNATIVE ODMDS

This section describes the site-specific characteristics of the Northwest Alternative ODMDS, and how dredged material discharged at this location would deposit on the seafloor.

2.5.1 Description of the Northwest ODMDS

Under the Northwest Alternative ODMDS, USEPA would designate an ODMDS northwest of Outer Apra Harbor (Figure 2-4). The Northwest Study Area is approximately 8.9 nm (16.4 km) offshore of Guam. This region occupies an area approximately 45 sq. nm (152 km^2) and depth at target sampling areas ranged from approximately 8,200 ft to 9,055 ft (2,500 m to 2,760 m).

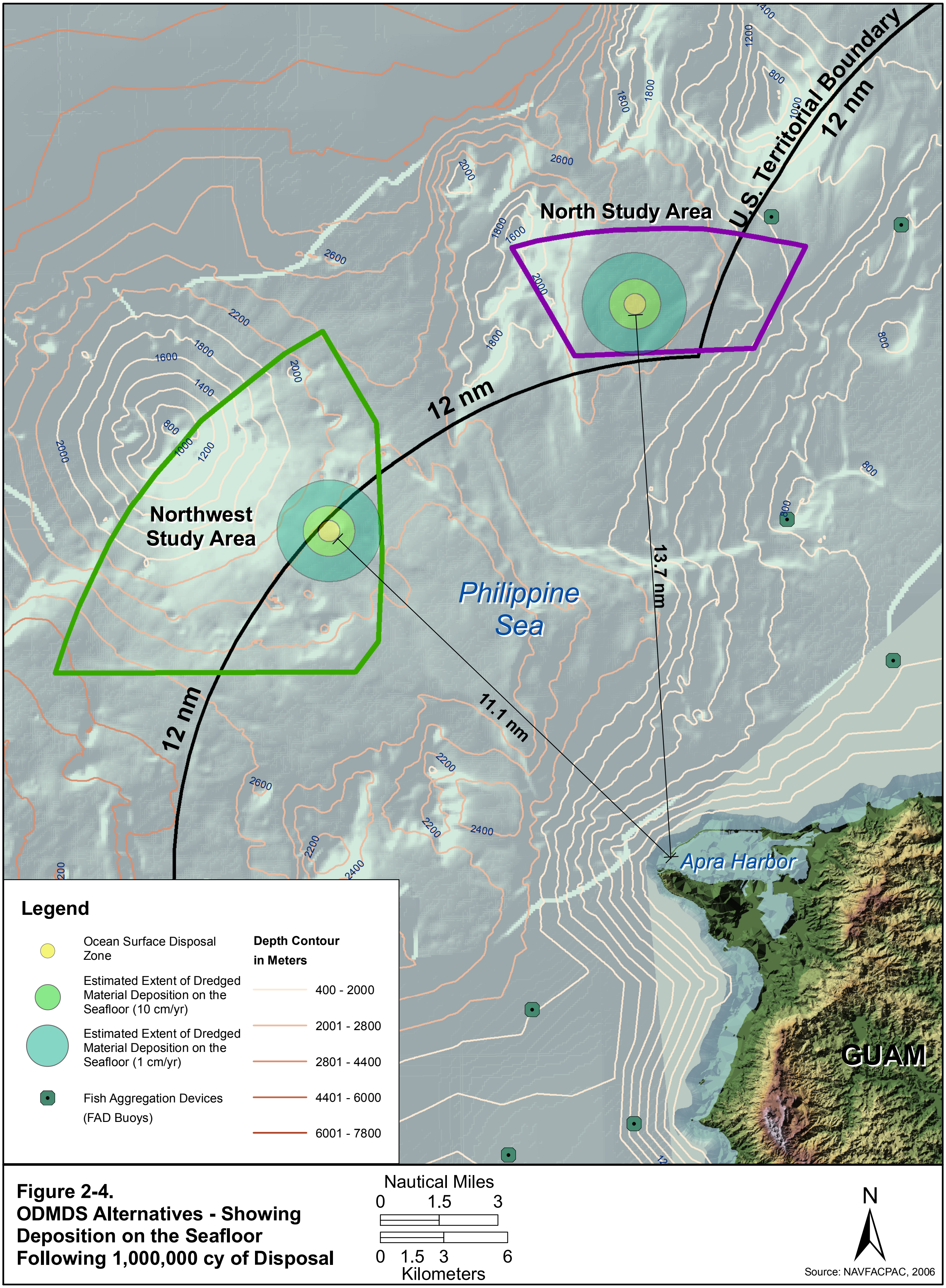

Figure 2-4.
ODMDS Alternatives - Showing Deposition on the Seafloor Following 1,000,000 cy of Disposal

The SAP for the ODMDS sampled random target stations within the Northwest Study Area and determined the physical and biological characteristics to be homogeneous across the overall site (Weston Solutions and Belt Collins 2007a). Since the characteristics of the target stations were highly similar, the location at 13° 35.500’ N and 144° 28.733’ E was chosen as the Northwest ODMDS alternative, based on flatter bathymetry and proximity to Apra Harbor.

The Northwest ODMDS is approximately 11.1 nm (20.6 km) offshore of Guam (see Figure 2-4), and occurs at a depth of approximately 8,200 ft (2,500 m). The discharge zone on the surface would be round, with a radius of 1,640 ft (500 m) at the center of the site. The overall boundary of the disposal site (e.g., the seafloor disposal boundary) is the outer extent of the area on the bottom of the ocean where maximum deposition of 0.4 in (1 cm) is predicted to be wholly contained within (including a buffer area) if 1,000,000 cy (760,555 m^3) of dredged material were disposed in one year. This area is defined as a circle approximately 3.1 nm (5.0 km) in diameter. Figure 2-3 shows that the Northwest ODMDS meets the ZSF characteristics.

There would be no temporary or permanent infrastructure constructed to support the ODMDS designation or use. Access to the ODMDS would be via established commercial shipping lanes.

2.5.2 Fate of Dredged Material Discharged at the Northwest ODMDS

Dredged material discharged at the Northwest ODMDS would settle through the water column, disperse under the influence of local oceanographic currents until ultimately depositing on the seafloor. The fate and transport of dredged material was modeled using grain size data characteristic of sediments likely to be dredged from Apra Harbor, Guam and *in situ* measurements of oceanographic currents collected near the proposed disposal site. Under the maximum possible scenario (the discharge of 1,000,000 cy [764,555 m^3] of coarse-grained dredged material during a given year), the maximum footprint of dredged material deposits greater than 0.4 in (1 cm) would be roughly circular in shape with a diameter of approximately 3.0 mi (4.8 km) and cover an area of approximately 7.0 sq. mi (18.0 km^2). Deposits greater than 3.9 in (10 cm) would be contained within an area of only 0.56 sq. mi (1.45 km^2) and deposits greater than 7.9 in (20 cm) would be contained within an area of only 0.34 sq. mi (0.89 km^2). These are shown as concentric rings on Figure 2-4. The maximum thickness of accumulated dredged material under this scenario would be 24.2 in (61.4 cm) and would decrease to approximately 4.0 in (10.2 cm) within 3,000 ft (914 m) from the center of the disposal site. These deposits would be wholly contained within the seafloor disposal boundary of 3.1 nm (5.0 km).

Additional information regarding the fate and transport model (STFATE) used to predict the area of dredged material deposits and the thickness of dredged material accumulations on the seafloor is located in Section 4.1.4 (Environmental Consequences to Regional Geology).

2.6 NO ACTION ALTERNATIVE

Under the No Action Alternative, USEPA would not designate an ODMDS for Guam. Guam would rely on the two existing management options for dredged material: 1) beneficial use and 2) upland dewatering sites. As described in Section 1.3, additional beneficial uses and dewatering facilities would need to be identified and constructed to manage the anticipated volume of dredged material.

The Dredged Material Upland Placement Study identified five feasible alternatives for upland placement of dredged material (Weston Solutions and TEC 2008a). All of the sites would require one or more of the following: site construction and maintenance, relocation of utility (power, sewer, or water) lines, and/or relocation of structures. Each of the alternatives would have the capacity to accommodate maintenance dredging scheduled for 2010, but would be insufficient to handle maximum volumes projected for reasonably foreseeable projects. Without the designation of an ODMDS, multiple upland disposal sites would be required to accommodate the dredging needs of projects anticipated in the reasonably foreseeable future.

Existing stockpiles of dewatered material are growing and there is currently not enough capacity to handle anticipated future projects. Present beneficial use opportunities are insufficient to appreciably reduce existing stockpiled material. Current upland dewatering sites are expected to exceed capacity even without the construction to support the proposed Guam and Commonwealth of the Northern Mariana Islands (CNMI) Military Relocation. Under the No Action Alternative, future projects could be delayed if a designated ODMDS is not available.

2.7 COMPLIANCE WITH USEPA CRITERIA

This section summarizes the assessment of the two alternative ODMDSs and their consistency with the USEPA general and specific criteria for the selection of a location for an ODMDS. Sections 3 and 4 of this EIS provide a more detailed discussion of the assessment.

2.7.1 General Criteria (40 CFR 228.5)

Table 2-2 of this section presents an assessment of the extent to which the two alternative ODMDS meet the five general site selection criteria 40 CFR 228.5 (a) to (e). Both sites meet the general criteria.

Table 2-2. Compliance with General Criteria (40 CFR 228.5)

Statute	Compliance
40 CFR 228.5(a)	The dumping of materials into the ocean will be permitted only at sites or in areas selected to minimize the interference of disposal activities with other activities in the marine environment, particularly avoiding areas of existing fisheries or shellfisheries, and regions of heavy commercial or recreational navigation. The ZSF specifically screened the marine environment to avoid areas of existing fisheries or shellfisheries, and regions of heavy commercial or recreational navigation.
40 CFR 228.5(b)	Locations and boundaries of disposal sites will be so chosen that temporary perturbances in water quality or other environmental conditions during initial mixing caused by disposal operations anywhere within the site can be expected to be reduced to normal ambient seawater levels or to undetectable contaminant concentrations or effects before reaching any beach, shoreline, marine sanctuary, or known geographically limited fishery or shellfishery. Both alternative site boundaries are located sufficiently from shore (minimum 10.5 nm [19.5 km]) and fishery resources to allow water quality perturbations caused by dispersion of disposal material to be reduced to ambient conditions before reaching environmentally sensitive areas.
40 CFR 228.5(c)	If at any time during or after disposal site evaluation studies, it is determined that existing disposal sites presently approved on an interim basis for ocean dumping do not meet the criteria for site selection set forth in Sections 228.5 through 228.6, the use of such sites will be terminated as soon as suitable alternate disposal sites can be designated. The interim ODMDS established for Guam does not meet current USEPA criteria. It was never used and the designation was terminated.
40 CFR 228.5(d)	The sizes of the ocean disposal sites will be limited in order to localize for identification and control any immediate adverse impacts and permit the implementation of effective monitoring and surveillance programs to prevent adverse long-range impacts. The size, configuration, and location of any disposal site will be determined as a part of the disposal site evaluation or designation study. The size and shape of the alternative ODMDS has been determined by computer modeling to limit environmental impacts to the surrounding area and facilitate surveillance and monitoring operations. The designation of the size, configuration, and location of sites was determined as part of this evaluation study.
40 CFR 228.5(e)	USEPA will, wherever feasible, designate ocean dumping sites beyond the edge of the continental shelf and other such sites that have been historically used. The island of Guam is volcanic and not part of a continental land mass and does not have a continental shelf. In the absence of a shelf break, continental shelf can be defined as submerged land between shoreline and depth of 656 ft (200 m). On Guam, this typically occurs within 1 nm (1.9 km) of shore. The slope tends to increase rapidly offshore of Guam and depths can reach 6,000 ft (1.829 km) within 3 nm (5.6 km) (Weston Solutions and Belt Collins 2006). The center points of both ODMDS alternative sites are well beyond the continental shelf, with the closest ODMDS being 11.1 nm (20.6 km) from the shoreline. No ocean dumping sites have been used for Guam dredging projects.

2.7.2 Specific Site Selection Criteria (40 CFR 228.6)

Table 2-3 summarizes the evaluation of the ODMDS alternatives against the USEPA Specific Site Selection Criteria (40 CFR 228.6 (a)). More detail on the existing conditions and potential environmental impacts is presented in Sections 3 and 4.

Table 2-3. ODMDS Alternatives and USEPA Specific Site Selection Criteria

		ODMDS – North Alternative	ODMDS – Northwest Alternative
1	Geographical position, depth of water, bottom topography, and distance from the coast.	Centered at 13° 41.300' N and 144° 36.500' E and 13.7 nm (25.4 km) from Apra Harbor. The bottom topography at the site is flat and the depth is 7,415 ft (2,260 m). (see Figure 2-4).	Centered at 13° 35.500' N and 144° 28.733' E and 11.1 nm (20.6 km) from Apra Harbor. The bottom topography at the site is flat and the depth is 8,790 ft (2,680 m) (see Figure 2-4).
2	Location in relation to breeding, spawning, nursery, feeding, or passage areas of living resources in adult or juvenile phases.	Due to the marine open water locale of this site, the presence of aerial, pelagic, or benthic living resources is likely within these areas, though the site location, water depth and sparse biological communities would minimize any potential impacts to pelagic and benthic resources.	Same as North Alternative
3	Location in relation to beaches and other amenity areas.	The site is greater than 8.0 nm (14.8 km) from the jurisdictional 3nm coastal zone boundary and unlikely to interfere with coastal amenities. Slightly more visible from the coast.	The site is greater than 10.0 nm (18.5 km) from the jurisdictional 3nm coastal zone boundary and unlikely to interfere with coastal amenities. Less visible.
4	Types and quantities of wastes proposed to be disposed of, and proposed methods of release, including methods of packaging the waste, if any.	Dredged material to be disposed will likely be fine-grained material (clays and silts) originating from the Inner Apra Harbor area and coarser-grained material (sands and gravels) originating from the Outer Apra Harbor area. Maximum annual dredged material volumes would be set at 1 mcy (764,555 m^3). Dredged material is expected to be released from split hull barges and no packaging of waste is proposed. Greater transport distance would generate more exhaust.	Same as North Alternative, but less exhaust generated.
5	Feasibility of surveillance and monitoring.	USEPA (and USACE for federal projects in consultation with USEPA) is responsible for site and compliance monitoring. USCG is responsible for vessel traffic-related monitoring. Monitoring of the disposal site is feasible and facilitated through use of a remote tracking system as specified in the SMMP.	Same as North Alternative

		ODMDS – North Alternative	ODMDS – Northwest Alternative
6	Dispersal, horizontal transport, and vertical mixing characteristics of the area, including prevailing current direction and velocity, if any.	Oceanographic current velocities are greatest at the surface due to atmospheric circulation (e.g., wind) driven events while intermediate and bottom layer currents, driven by thermohaline circulation and influenced by tidal circulation, are variable resulting in a 2.86 mile diameter footprint of deposits greater than 1 cm.	Oceanographic current velocities are greatest at the surface due to atmospheric circulation (e.g., wind) driven events while intermediate and bottom layer currents, driven by thermohaline circulation and influenced by tidal circulation, are variable resulting in a 2.98 mile diameter footprint of deposits greater than 1 cm.
7	Existence and effects of current and previous discharges and dumping in the area (including cumulative effects).	No evidence of previous dumping activities was observed during field reconnaissance and there are no designated discharge areas in the vicinity.	Same as North Alternative
8	Interference with shipping, fishing, recreation, mineral extraction, desalination, fish and shellfish culture, areas of special scientific importance, and other legitimate uses of the ocean.	Minor short-term interferences with commercial and recreational boat traffic due to the transport of dredged material along established shipping lanes to/from ODMDS. There is no oil or other mineral extraction platforms offshore of Guam. The site has not been identified as an area of special scientific importance. There are no fish/shellfish culture enterprises near the site. There may be recreational vessels passing through the site, but the area is not a recreational destination.	Same as North Alternative, but further from FADs.
9	Existing water quality and ecology of the site as determined by available data or by trend assessment or baseline surveys.	Water quality is excellent with no evidence of degradation.	Same as North Alternative
10	Potentiality for the development or recruitment of nuisance species in the disposal site.	Unknown, but due to the great water depth and temperature differences between the disposal site and the potential near shore dredge areas it is unlikely that any transported nuisance species would survive at the ODMDS.	Same as North Alternative
11	Existence at, or in close proximity to, the site of any significant natural or cultural features of historical importance.	No culturally significant natural or cultural features were identified in the vicinity of the ODMDS.	Same as North Alternative

2.8 COMPARISON OF ALTERNATIVES

No significant adverse impacts were identified under either ODMDS alternative and no mitigation is proposed (Table 2-4).

Table 2-4. ODMDS Alternatives, Summary of Impacts

		ODMDS – North Alternative	ODMDS – Northwest Alternative
1	Air Quality	Less than Significant	Same as North Alternative
2	Water Quality	Less than Significant	Same as North Alternative
3	Sediment Quality	Less than Significant	Same as North Alternative
4	Marine Birds, Mammals and Fish	Less than Significant	Same as North Alternative
5.	Benthic Communities	Less than Significant	Same as North Alternative
6	Threatened and Endangered Species	Less than Significant	Same as North Alternative
7	Marine Protected Areas	Less than Significant	Same as North Alternative
8	Recreational Use	Less than Significant	Same as North Alternative
9	Commercial Use	Less than Significant	Same as North Alternative
10	Cultural Resources	Less than Significant	Same as North Alternative
11	Public Health and Welfare	Less than Significant	Same as North Alternative

2.9 PREFERRED ALTERNATIVE

Based upon a comparison of the two ODMDS alternatives, the Northwest Alternative is the Preferred Alternative. Both ODMDS alternatives meet the five general site selection criteria 40 CFR 228.5 (a) to (e) and USEPA Specific Site Selection Criteria (40 CFR 228.6 (a). The ODMDS alternatives are not readily distinguishable from each other based on water quality and sediment quality. Additionally, both ODMDS alternatives have similar physical and biological properties and there would be less than significant impacts to other resource areas evaluated in this EIS (see Table 2-4). However, the Northwest Alternative is closer to Apra Harbor and farther away from FADS and the Visual Resource Area defined in the ZSF than the North Alternative (see Figure 2-3). By reducing the distance needed to travel to the ODMDS, the already less-than-significant potential impacts to air quality are further reduced in addition to reductions in fossil-fuel consumption, operational duration, and operating costs. Based on these differences, the Northwest Alternative is the Environmentally Preferred Alternative and the Proposed Action.

3.0 EXISTING ENVIRONMENT

Chapter 3:

Section 3.0, Existing Environment, and Section 4.0, Environmental Consequences, are organized by the USEPA general and specific selection criteria for designating an ODMDS (40 CFR 228.5 and 228.6). This organization by criteria is different from the typical NEPA EIS of other federal actions, but the key environmental resources are addressed.

The geographic area described and assessed for each selection criteria/resource area varies. The Region of Influence (ROI) for each resource is a geographic area within which the proposed action may exert some influence. For example, discussions of climate or commercial traffic would cover a large geographic ROI, while bathymetry and sediment discussions would be limited to a narrowly defined ROI, such as the immediate vicinity of alternative ODMDSs located within two study areas. Surveys were conducted by Weston Solutions to obtain measurements of various physical oceanographic and biological parameters. Results of surveys are incorporated into the following discussions of the Physical Environment (Section 3.1) and the Biological Environment (Section 3.2). Physical and chemical parameters measured were selected to provide data on the background concentrations of potential contaminants of concern in the receiving sediments collected from the two study areas, a proposed reference site, and the surrounding study region, in accordance with the guidance document for designation of ODMDS (Pequegnat et al. 1990). Current USEPA SW-846 analytical methods were used in chemical analysis (USEPA 2001). The specific sediment analyses and target detection limits are specified in the SAP developed for this project (Weston Solutions and Belt Collins 2007a). Detailed results from these surveys are included in Weston Solutions and TEC (2008b), which comprises the field report resulting from these surveys. Section 3.3 contains a discussion of the Socioeconomic Environment.

3.1 PHYSICAL ENVIRONMENT

The physical environment in the study region includes waters offshore of Guam from the surface to the seafloor and the associated physical and oceanographic characteristics of this environment. The following sections include descriptions of the overall climate and air quality, physical oceanography, characteristics of the water column, regional geology, and characteristics of marine sediments. Gathering information on characteristics of the various physical parameters allows for a determination of baseline conditions that may be affected by dredged material disposal operations.

3.1.1 Climate and Air Quality

3.1.1.1 Climate

The ROI for climate is the general region of Guam, which includes the ODMDS study areas, the Island of Guam, and the offshore area between them. Guam consistently has warm and humid weather, typical of a tropical marine climate. The average daily temperature range is between 76 and 88°Farenheit (°F) (24 and 31°Celcius [°C]). The relative humidity ranges between 65-75% during the day and 85-100% at night (DON 2003). Tradewinds are fairly consistent throughout the year with an average wind speed of 10 miles per hour (mph) (16 kilometers per hour [kph]) from the east (National Weather Service [NWS] 2004). Table 3-1 summarizes the basic meteorological conditions for Guam.

Guam has two primary seasons. The dry season occurs from January to April with a monthly average of 3.25 in (8.3 cm) of rain. July through October comprise the wet season with rainfall averaging approximately 12 inch (in)/month (0.3 m/month) (NWS 2004). The remaining months, May/June and November/December are transitional with no distinct pattern of dry or wet conditions (DON 2003).

Typhoons can occur at any time on Guam; however, they typically occur during the wet months. Typhoons are tropical storms originating in the South Pacific that have sustained winds of at least 75 mph (121 kph). Along with high winds, typhoons bring heavy rains and storm surge. Between the years 1959 and 2007, an annual mean of 31 typhoons occurred in the western North Pacific (U.S. Naval Maritime Forecast Center/Joint Typhoon Warning Center 2007); however, only 19 typhoons passed over Guam in a 57 year span from 1948 to 2005 (e.g., 1 typhoon every 3 years) (Guam Power Authority 2005). In recent years, the frequency of typhoons impacting Guam has risen, with the most devastating occurring in late 2002. Super Typhoon Pongsona occurred on December 8, 2002 with sustained winds greater than 150 mph (241 kph) and gusts exceeding 180 mph (290 kph).

Table 3-1. Summary of Meteorological Conditions for Guam

Weather Elements	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean Wind Speed (mph)	11.9	12.8	12.5	12.8	11.3	10.2	8.7	8.3	7.7	8.6	11.1	12.9	10.7
Prevailing Wind Direction (deg. N)	080E	070E	080E	090E	090E	100E	100E	100E	100E	100E	080E	090E	090E
Precipitation (in)	3.91	2.78	2.88	3.46	5.66	5.93	9.83	12.32	14.04	11.69	8.02	5.27	85.78
Mean Temperature (°C)	24	25	26	26	26	27	27	27	26	27	27	26	26.17
Mean Relative Humidity (%)	77	76	75	74	73	76	76	81	81	80	80	78	77.25

3.1.1.2 Air Quality

The ROI for air quality is the general region of Guam, which includes the ODMDS study areas, the Island of Guam, and the offshore area between them. The Clean Air Act (CAA) designated the EPA to establish primary air quality standards to protect public health and secondary air quality standards to protect ecosystems, including plants and animals, and to protect against decreased visibility and damage to crops, vegetation and buildings. The USEPA set national ambient air quality standards (NAAQS) for six criteria pollutants which include nitrogen dioxide, ozone, sulfur dioxide, particulate matter, carbon monoxide (CO) and lead. Monitors measure the air quality throughout the country, including U.S. Territories, and determine areas that have met (attainment) or not met (nonattainment) these standards (USEPA 2003).

Guam has “attained” the USEPA’s air quality standards with the exception of two areas classified as nonattainment for sulfur dioxide (SO_2) as of September 1999. These areas are within a 2.2 mi (3.5 km) radius of the Piti Power Plant and the Tanguisson Power Plant (USEPA 2003) (Figure 3-1). The Piti Power Plant is approximately 13.7 nm (25.4 km) south-southeast of the North Study Area and 13.5 nm (25.0 km) southeast of the Northwest Study Area. The Tanguisson Power Plant is approximately 14.9 nm (27.6 km) southeast of the Northwest Study Area and 19.3 nm (35.7 km) east of the Northwest Study Area. None of nonattainment areas around Piti Power Plant or Tanguisson Power Plant encompass either of the proposed study areas.

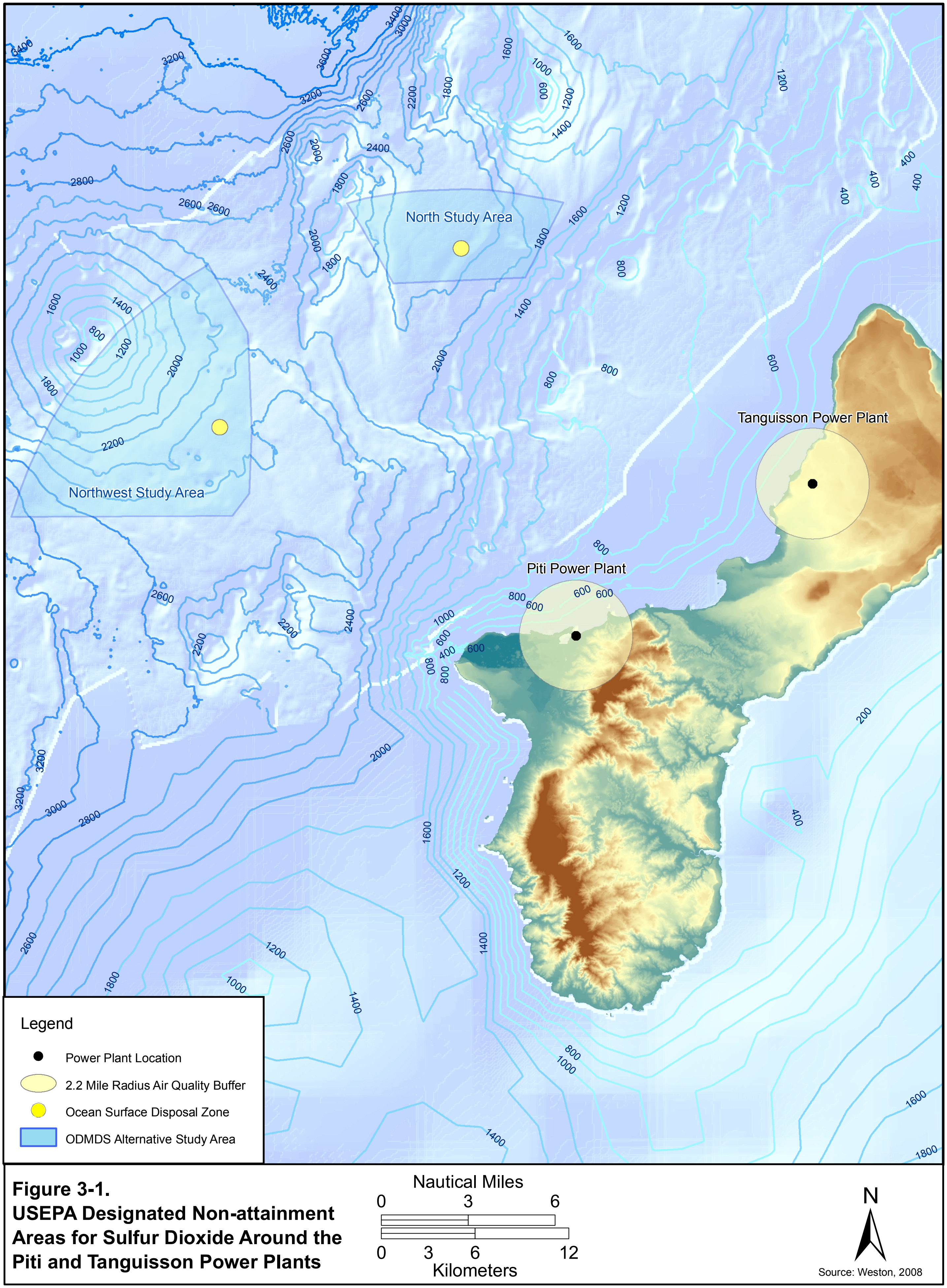

Figure 3-1.
USEPA Designated Non-attainment Areas for Sulfur Dioxide Around the Piti and Tanguisson Power Plants

3.1.2 Physical Oceanography

Oceanographic currents are distinguished by wind-driven surface currents in the upper portion of the water column and thermohaline currents in the intermediate and bottom layers of the oceans. Surface currents consist predominantly of the horizontal movement of water whereas vertical movement (e.g., upwelling or downwelling) resulting from density differences is characteristic of deeper waters.

Surface currents in the vicinity of Guam are dominated by the North Pacific Equatorial Current (NPEC), though coastal eddies may develop in the lee (westward side) of the island as a result of the NPEC flowing past Guam. The NPEC flows westward at an average speed of 0.33 to 0.66 ft/s (0.1 to 0.2 m/s, 0.2 to 0.4 kt; DON 2005) and reaching a maximum speed of approximately 0.98 ft/s (0.3 m/s, 0.6 kt; Wolanski et al. 2003) in response to tradewinds typically occurring between 10° N and 15° N (Reid 1997). Seasonal differences were identified with respect to the direction of the tradewinds. The direction of the tradewinds tend to be more uniform during the dry season (winter months) with more directional variability during the wet season (summer months) (NOAA 2009a). The strength and location of coastal eddies west of Guam are dependent on the angle at which the NPEC approaches and subsequently bifurcates around the island mass. These eddies are capable of producing eastward moving currents on the lee (westward side) of Guam (Wolanski et al. 2003).

The Pacific El Nino/Southern Oscillation (ENSO) is an important coupled ocean-atmosphere phenomenon that can cause climate variability. During El Niño, tradewind activity is weakened or in a strong El Nino even reversed due to higher-than-average air pressure covering Indonesia and the western tropical Pacific and below-average air pressure covering the eastern tropical Pacific. During La Niña, the tradewinds become stronger than normal due to below-average air pressure covering Indonesia and the western tropical Pacific and above-average air pressure covering the eastern tropical Pacific (PEAC 2006).

Deep water currents in this region are dominated by the North Pacific Deep Water (NPDW) and the Lower Circumpolar Water (LCPW). The NPDW flows westward from the northeastern Pacific Ocean and the LCPW, after flowing northwestward across the equator east of Guam, branches into two limbs, a northward flow into the Pacific Basin and a westward flow towards the West Marianas Basin (Siedler et al. 2004).

The following sections describe the regional and ODMDS specific surface, intermediate layer and bottom currents from both modeled (satellite-derived) data and *in situ* (instrument-measured) data collection. The ROI for the following sections on oceanic currents is the water column within the ODMDS study areas.

3.1.2.1 Modeled Currents

Data generated from the global Navy Coastal Ocean Model (NCOM) was first used to evaluate currents surrounding the vicinity of the ODMDS alternative sites to determine consistency of regional current patterns and to understand the currents that dredged material may be subject to as a consequence of horizontal dispersion after the initial placement of material. The NCOM is an assimilative ocean model nowcast/forecast system developed and administered by the Naval Oceanographic Office (NAVO). Barron et al. (2007) discusses model validation using both observational data and other global ocean models for comparison. Detailed results of the modeled current data assessment are presented in the *Ocean Current Study, Ocean Dredged Material Disposal Site, Apra Harbor, Guam* (Weston Solutions and Belt Collins 2007b) and summarized briefly below.

Resolution of the model is 1/8°, or 7.5 x 7.5 nm. Input parameters for the model are satellite-measured sea surface temperature (SST) and sea surface height (SSH; altimetry) derived from the Modular Ocean Data Assimilation System (MODAS) and Navy Layered Ocean Model (NLOM), respectively. SST and SSH measurements are then used to project a vertical profile of temperature and density, from which thermohaline currents are derived. Thermohaline currents occur at depth and are driven by differences in density rather than wind patterns, which derive surface currents. Surface currents are derived from atmospheric conditions provided by the Navy Operational Global Atmospheric Prediction System (NOGAPS) which force NCOM predictions. Ocean depth and coastline boundaries used in the NCOM are based on a global dataset of two minute (1/30°) bathymetry data. Tidal currents were not incorporated in the model results.

Current data were provided for the entire 2005 calendar year. Data were provided for a 1° x 1° square area bounded by 14° N and 13° N latitude in the north and south, respectively and 145° E and 144° E longitude in the east and west, respectively. Thus, at the resolution of the model (1/8°), data were provided at 81 discrete locations. At each of these stations, data were provided for 17 separate depths. Currents were provided at finer (shorter) intervals near the surface with increasingly coarse (longer) intervals at deeper depths. At each station and depth, current data were provided for each six hour increment. Current data were provided as u (east-west) and v (north-south) vectors.

During processing of the text files, the individual vector data were used to calculate speed and direction for each location and depth. Rose diagrams representing the frequency distribution of current directions and speed for each depth at a single location and vector plots representing daily averaged current velocities at each location by month and depth were created. These plots provided a cursory review of the spatial (both horizontal and vertical) as well as temporal patterns in the data. Once patterns were identified, more quantitative statistical analyses were conducted using SAS software to identify significant trends or differences in the currents.

3.1.2.2 Regional Current Patterns

<u>Surface Currents</u>

During the fall and winter months (predominantly the dry season; Figure 3-2), surface currents tend to be quite uniform, having a significant west-northwesterly component across much of the study area. As the surface current approaches and bifurcates around Guam from the east, the currents in the southern portion of the study area tend to be more westerly, while currents in the northern portion of the study area tend to be towards the west-northwest. Once past Guam and beyond the site-specific study areas, these currents converge, with the currents in the southern portion of the study area trending more northwesterly and currents in the northern portion of the study area trending more westerly. This pattern creates an area of variable current patterns directly in the lee of the island, with surface currents capable of flowing back towards Guam on occasion. This pattern is most evident in February and March when the surface currents are highly uniform, however, it is also observed in the three preceding months (November through January) and one succeeding month (April).

In the summer months (predominantly the wet season; Figure 3-2), surface currents are slightly more variable on a month to month basis and the net current direction tends to flow in more southwesterly direction. During this time, the currents approaching Guam in the southern portion of the study area continue to be predominantly to the west, but having an increasingly greater southwesterly component through time such that currents approaching Guam in September are primarily trending to the southwest. The currents approaching Guam in the northern portion of the study typically trend towards the west-southwest, with directional variability being greater than those observed in the south during the same time period. In the lee of the island, the area of variable current patterns continued to persist.

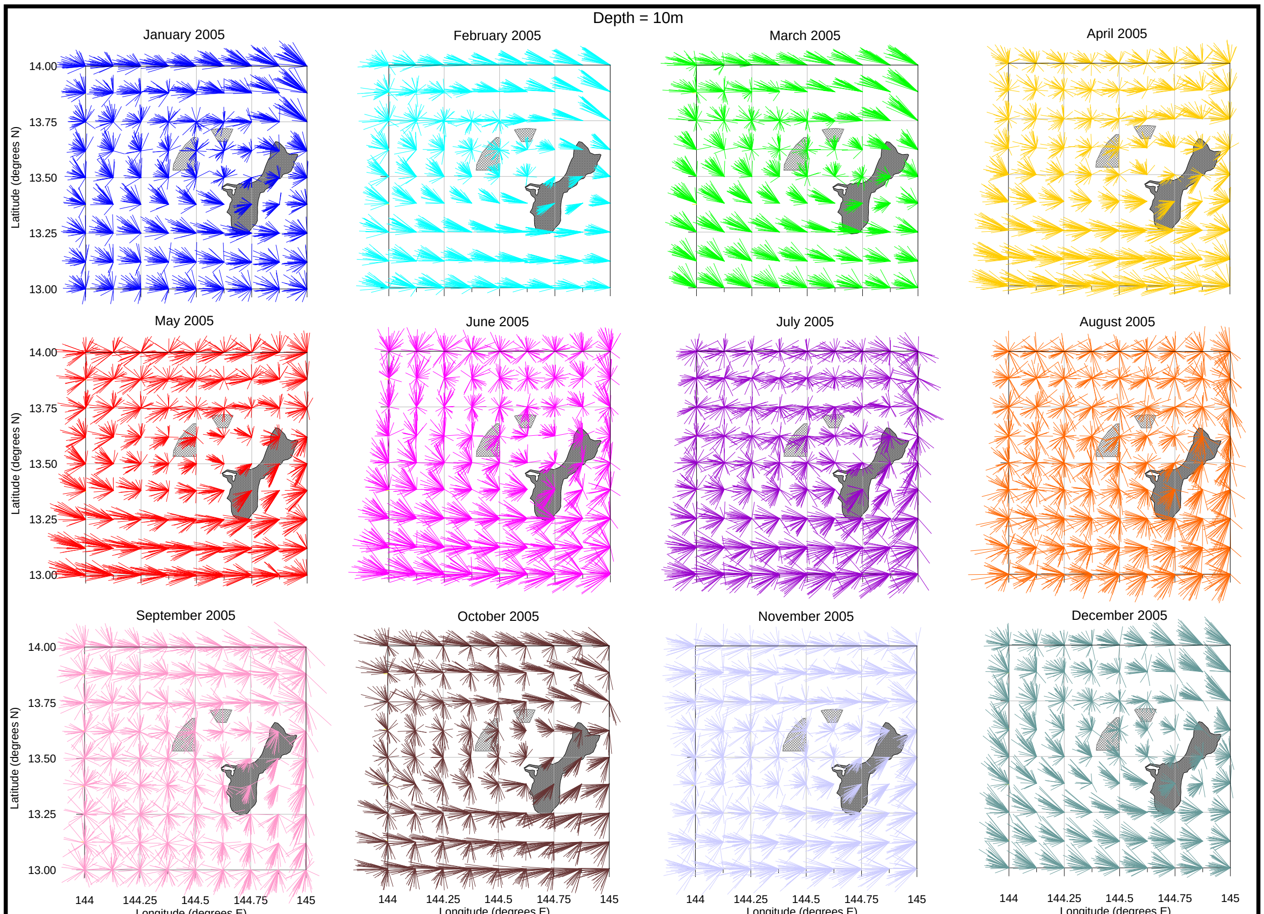

Figure 3-2.
Vector Plots of Daily Averaged Current Velocities by Month for Each Location at 33 ft (10 m) Depth

Note: Vectors indicate the current direction and relative speed for each day at each station.

<u>Intermediate Layer Currents</u>

Figure 3-3 and Figure 3-4 illustrate the intermediate layer currents on a regional scale. Figure 3-3 shows the upper portion of this layer at 1,300 ft (400 m) and Figure 3-4 shows the lower portion of this layer at 4,900 ft (1,500 m). At 1,300 ft (400 m), seasonal differences in the current pattern are apparent, but negligible. Throughout most of the year, the currents approach Guam from the east, similar to the currents at the surface. At this intermediate depth, the currents begin to show evidence of flowing along the isobaths, with the structure of the Marianas Ridge influencing current patterns. Directly east and southeast of Guam, the currents trend in a southwesterly direction, then once past the southern part of the island, the currents uniformly turn towards the northwest. Along the western boundary of the regional study area, the currents are strong and towards the north. Directly on the west side of Guam, the currents wrapping around the southern tip of the island turn further, trending northeast and eventually returning to the eastern side of the island as they cross the Rota Banks, just north of Guam.

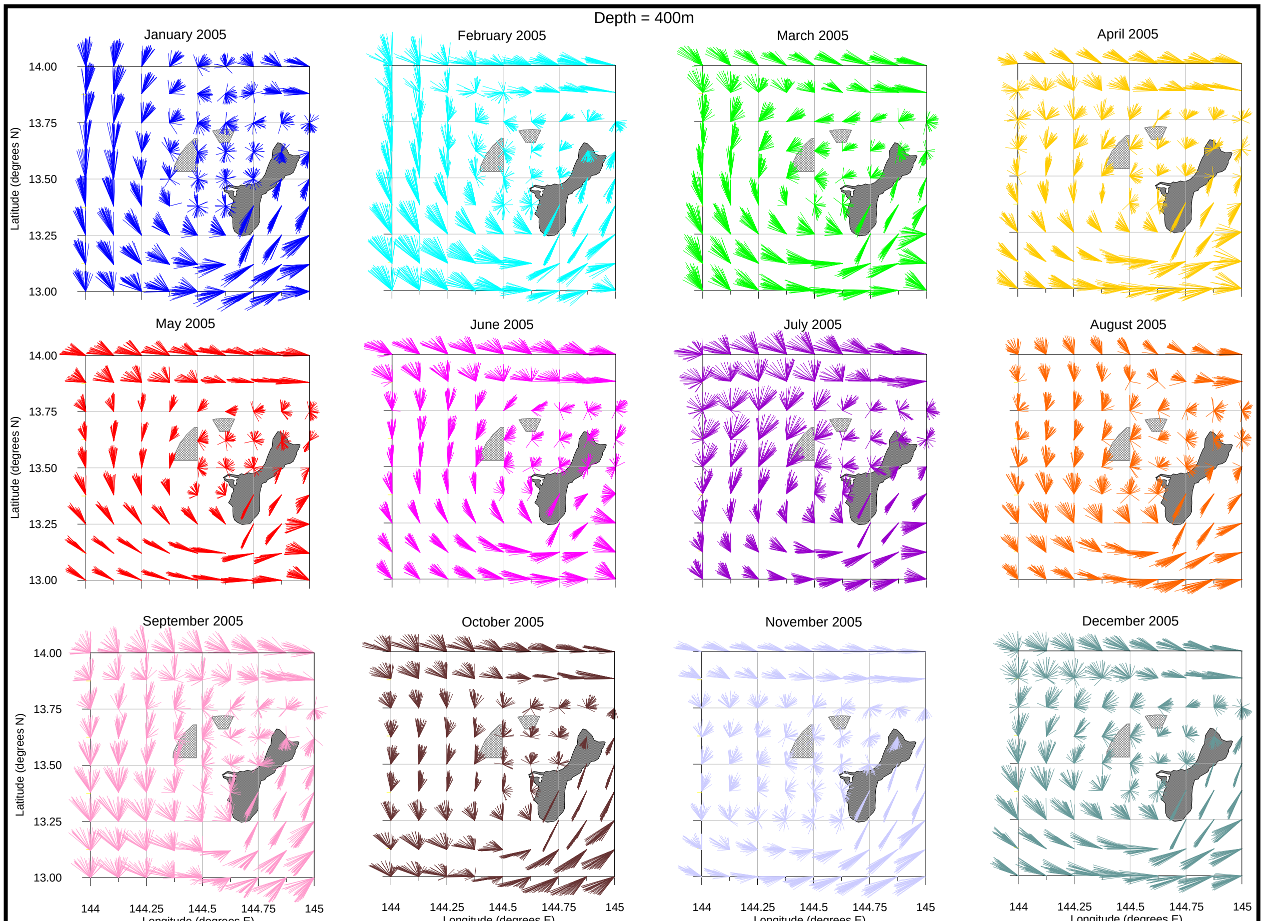

Figure 3-3.
Vector Plots of Daily Averaged Current Velocities by Month for Each Location at 1,300 ft (400 m) Depth

Note: Vectors indicate the current direction and relative speed for each day at each station.

Currents approaching northeast of Guam, north of the Rota Banks, flow in a uniform westerly direction.

At 4,900 ft (1,500 m), there is no evidence of seasonal patterns. The Marianas Ridge, which trends from the southwest of Guam and continues towards the northeast is apparent and strongly influences the current patterns. On the east side of the Marianas Ridge, currents are highly uniform, trending in a southwesterly direction along isobaths at an average speed of 0.16 ft/s (0.05 m/s, 0.09 kt). It is not evident if the currents at this depth, approaching Guam from the Eastern Marianas Basin, flow through a gap in the ridge or if another water body is responsible for the currents on the west side of the Marianas Ridge; however, on the west side of Guam, currents at 4,900 ft (1,500 m) are also highly uniform, though flowing counter to the currents on the east side of the ridge, in a north-northeast direction along isobaths at an average speed of about 0.07 to 0.16 ft/s (0.02 to 0.05 m/s, 0.04 to 0.09 kt).

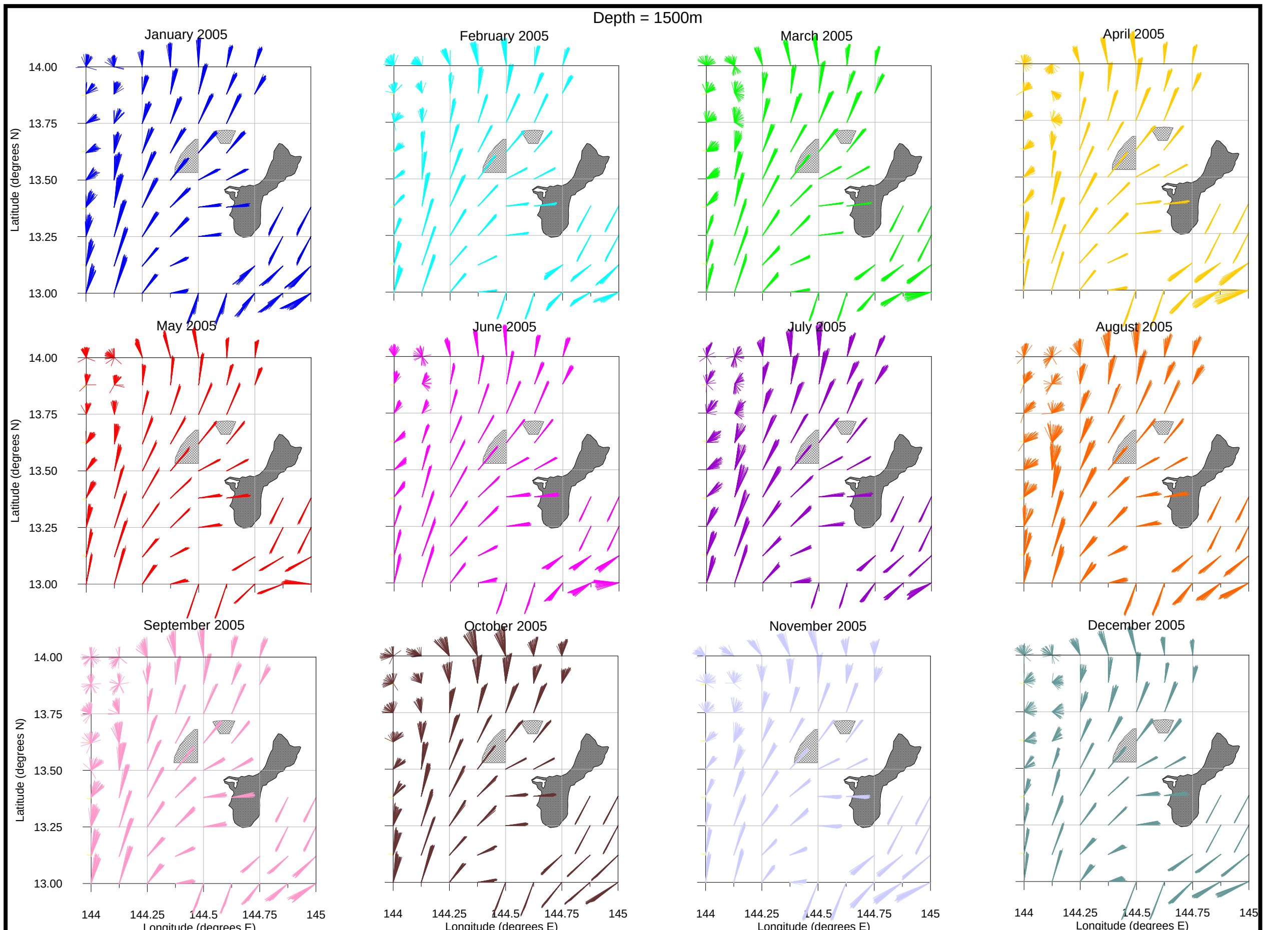

Figure 3-4.
Vector Plots of Daily Averaged Current Velocities by Month for Each Location at 4,900 ft (1,500 m) Depth

Note: Vectors indicate the current direction and relative speed for each day at each station.

Bottom Currents

Figure 3-5 illustrates the bottom layer currents on a regional scale. Two distinct bottom currents are evident, depending on the relation to the Marianas Ridge. East of the Marianas Ridge, the bottom current below 8,200 ft (2,500 m) continued to be very uniform and trends in a southwesterly direction at an average speed of about 0.10 to 0.13 ft/s (0.03 to 0.04 m/s, 0.06 to 0.07 kt), flowing along isobaths, similar to the currents in the intermediate layer. West of the Marianas Ridge, there appears to be a poorly developed countercurrent relative to the intermediate layer with erratic currents, ranging from a north-northwesterly direction to a south-southwesterly direction, though areas with a predominant easterly component occur. Current speeds average about 0.03 to 0.07 ft/s (0.01 to 0.02 m/s, 0.02 to 0.04 kt).

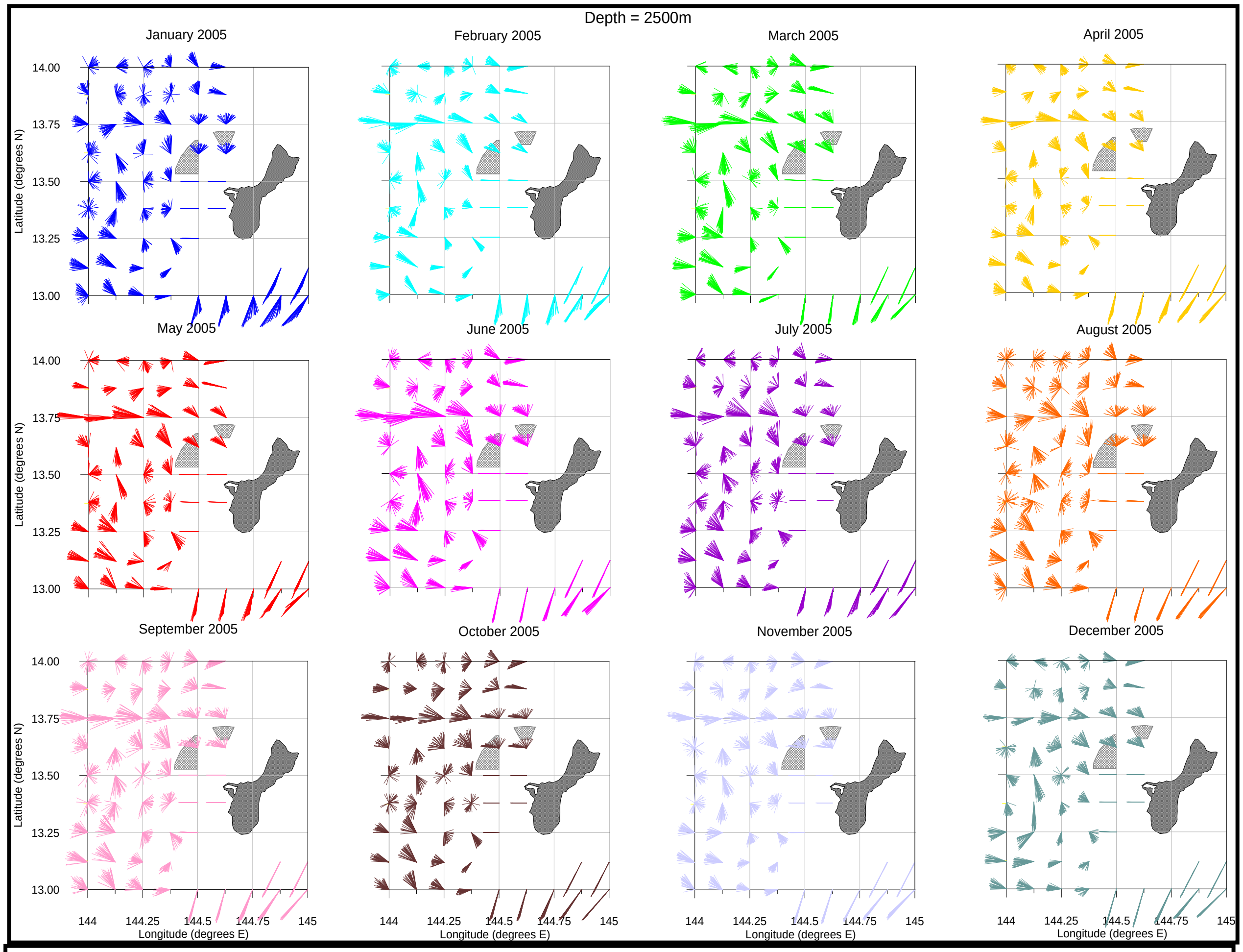

Figure 3-5.
Vector Plots of Daily Averaged Current Velocities by Month for Each Location at 8,200 ft (2,500 m) Depth

Note: Vectors indicate the current direction and relative speed for each day at each station.

North Alternative Study Area (Modeled) Current Patterns

Surface currents at the North Alternative Study Area exhibit a more consistent pattern than those at the Northwest Alternative, having a stronger and more westerly component ranging from 0.08 to 0.30 ft/s (0.03 to 0.1 m/s, 0.05 to 0.18 kt). This is likely a result of its closer proximity to the uniform westward flows around the north side of the island. However, two to three week periods consisting of irregular, poorly developed currents occurred at this site. The southern portion of this site experiences greater variability than the northern portion. Intermediate layer currents (1,300 ft [400 m] to 6,550 ft [2,000 m]) at the North Alternative area trend towards the northeast with decreasing variability with increasing depth. Current speeds are about 0.10 to 0.16 ft/s (0.03 to 0.05 m/s, 0.06 to 0.09 kt) in the intermediate layer. The bottom currents (below 8,200 ft [2,500 m]) in the North Alternative area were fairly consistent, trending in a north-northwesterly direction at a speed of approximately 0.07 ft/s (0.02 m/s, 0.04 kt).

Northwest Alternative Study Area (Modeled) Current Patterns

Surface currents at the Northwest Alternative Study Area tend to be highly variable during most of the year, with periods of strong and consistent southward flowing pulses during the wet weather season. Intermediate layer and bottom currents at the Northwest Alternative area are similar to those modeled in the North Alternative area.

3.1.2.3 *In Situ* Currents

Arrays of four in-line current meters and one upward-looking current profiler were moored at two sites, CM1 and CM2 (Figure 3-6), for the purpose of recording surface, midwater, and bottom currents over a period of one year in the vicinity of the proposed ODMDS. In-line current meters were positioned at depths of approximately 1,000 ft (305 m), 3,281 ft (1,000 m), 5,702 ft (1,738 m), and at a depth of 328 ft (100 m) above the ocean floor (7,497 ft [2,285 m] at CM1 and 6,982 ft [2,128 m] at CM2). Current direction and velocity were logged by the current meters in 1-hour intervals. For determining the speed and direction of surface currents, a current profiler was located in-line with the current meters at a depth of approximately 492 ft (150 m) below the surface at each location. The current profiler logged surface current data (current velocity and direction) in 16.4 ft (5 m) intervals every 1 hour from the water's surface to a depth of 492 ft (150 m). Due to electrical problems in the current profiler installed at CM1, surface current data was not obtained at this site. Upper surface currents at CM1, to a depth of approximately 82 ft (25 m), appeared to be predominantly wind driven and therefore were assumed to be similar to those measured at CM2. For ease in interpretation and discussion, vector speeds were averaged for each day of the year and plotted as speed and direction in vector plots. Vector plots of average daily mid-water and bottom currents at CM1 are provided in Figure 3-7 while vector plots of surface water, mid-water and bottom currents at CM2 are provided in Figure 3-8 and Figure 3-9.

CM1 Currents

Surface Currents- Depths of 0-82 ft (0-25 m)

It was assumed that sites CM1 and CM2 experienced similar current speeds and directions in their upper surface waters as a result of their close proximity to one another and as a result of the wind-driven nature of upper surface currents. Because surface current data were not collected at CM1, as previously mentioned, CM2 data were used to represent the uppermost surface conditions (82 ft (25 m) at both sites. During the months of January, February, March, and April 2008, the average daily currents measured at 82 ft (25 m) trended almost exclusively in a west, southwesterly direction with maximum velocities of 1.3 ft/s (0.40 m/s, 0.77 kt) (Figure 3-7). The upper surface currents then ran in a predominantly westerly direction in May and in a west, southwesterly direction in June. The months of July and August showed the greatest variability in current direction at 82 ft (25 m) depth, trending from northeast to northwest to southwest and also had the highest measured current velocities (1.7 ft/s [0.54 m/s, 1.0 kt]). In September, the current direction ranged from northeast to southwest but trend predominantly in a southwest direction. In October through early December the upper surface currents returned to trending almost exclusively in a west, southwesterly direction. Speeds of the upper surface currents were slightly lower during the mid-summer (June and July) and mid-winter months (January and February) (average velocity= 0.89 ft/s [0.27 m/s, 0.53 kt]) than at other times of the year (average velocity = 1.1 ft/s [0.33 m/s, 0.65 kt]).

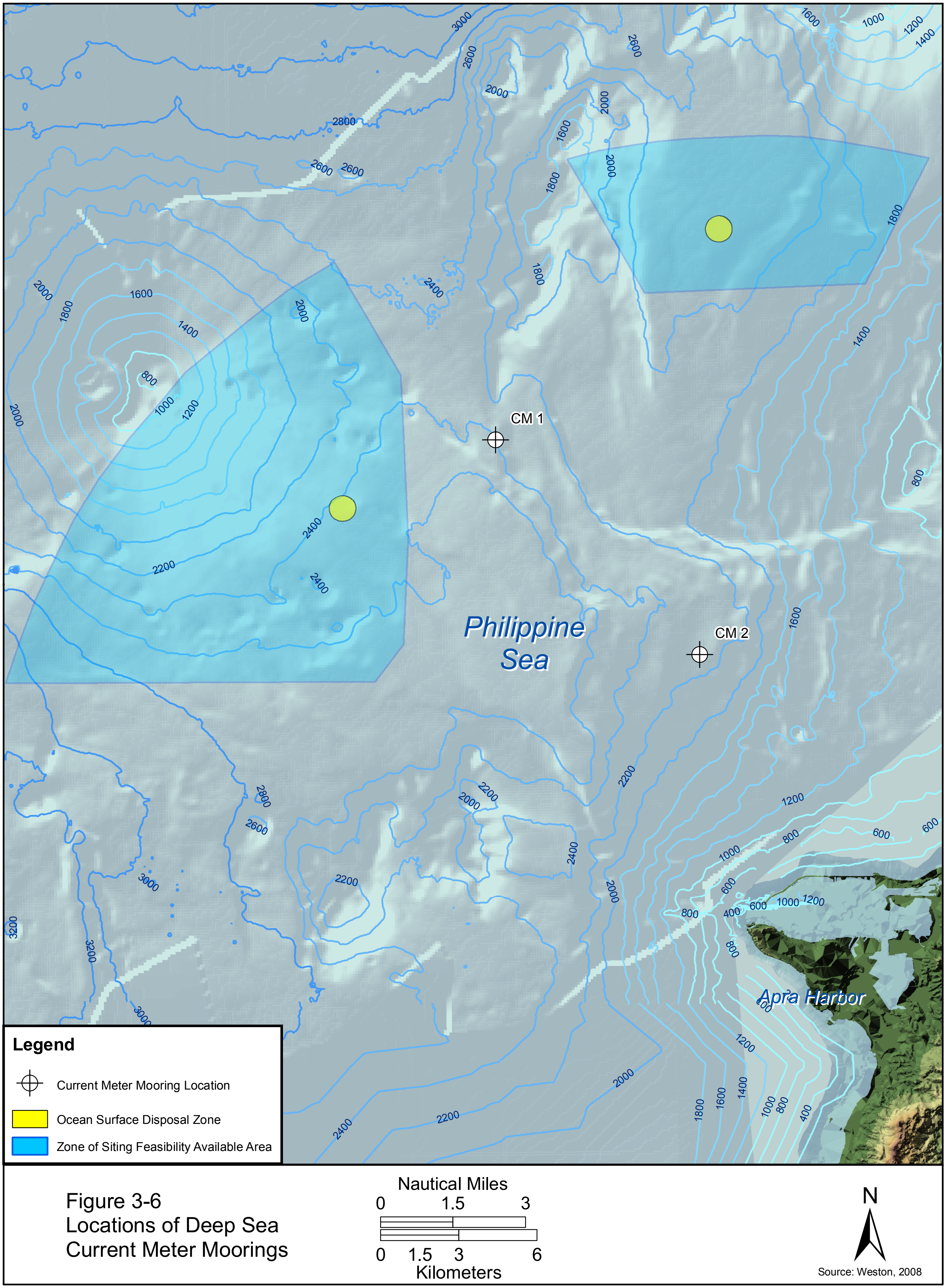

Figure 3-6
Locations of Deep Sea
Current Meter Moorings

Source: Weston, 2008

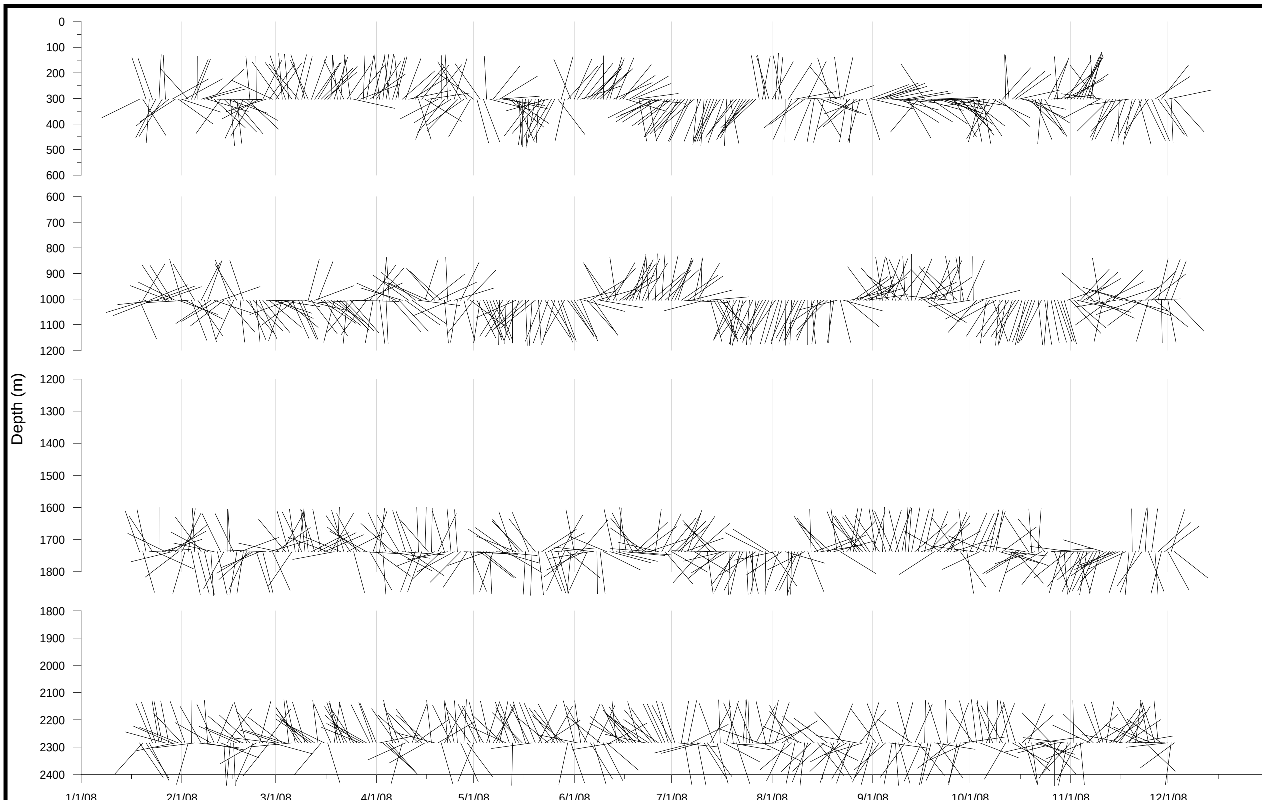

Figure 3-7.
Vector Plots of Average Daily Current Direction in 303 m, 1005 m, 1,738 m, and 2,285 m Depths at CM1

Mid-water Currents- Depths of 995 ft-5,702 ft (303m-1,738m)

Currents in 995 ft (303 m) of depth at CM1 flowed predominantly in a northerly direction during the first half of the year and in a southerly direction during the second half of the year (see Figure 3-7). The current direction at 995 ft (3,035 m) in depth was erratic during large periods of January, April, August, and October, when no persistent directional pattern was observed. From mid-February through the beginning of April, the current trended in a north/northeasterly direction, before becoming erratic in the latter portion of April and the beginning of May. A southerly shift in current direction occurred in May and was followed by a northeasterly current flow throughout most of June. Currents at CM1 in 995 ft (303 m) depth were the most highly organized in late June through July when they flowed consistently in a southeasterly direction and again in September when they flowed consistently in an easterly direction. In November, currents were somewhat disorganized, initially flowing in a northeasterly direction before shifting and flowing in a predominantly southwesterly direction.

The CM1 yearly average current speed at 995 ft (303 m) depth was 0.20 ft/s (0.06 m/s, 0.12 kt). Daily average current speeds ranged from 0.007 to 0.65 ft/s (0.002 to 0.197 m/s, 0.004 to 0.385 kt). Periods in which erratic current directions were observed over several days generally corresponded with weaker than average current speeds. Disorganized and erratic currents observed throughout the months of January and August were correlated to the weakest average monthly current speeds (0.13 ft/s [0.04 m/s, 0.08 kt]). Similarly, periods which had consistent and organized current directions over the course of 1 week or more corresponded with higher than average current speeds. July and November had the strongest average monthly current speeds (0.30 ft/s and 0.26 ft/s [0.091 m/s and 0.080 m/s, 0.178 kt and 0.154 kt], respectively). Currents in 3,297 ft (1,005 m) of depth at CM1 flowed predominantly in a southeasterly to southwesterly direction throughout the majority of the year (Figure 3-7). The current direction was erratic during the months of January, February, March, April, and November and corresponded to periods in which below average current velocities were recorded. During the months of May, August, October, and most of July, the CM1 currents at 3,297 ft (1,005 m) consistently flowed in a southerly or southwesterly direction. Throughout the months of June and September the currents trended in a northeasterly to northwesterly direction.

CM1 average current speeds at 3,297 ft (1,005 m) depth (0.13 ft/s [0.040 m/s, 0.078 kt]) were approximately 40 percent slower than the average yearly velocities measured at 995 ft (303m) in depth (0.20 ft/s [0.060 m/s, 0.118 kt]). The months of January and February had the weakest current velocities (0.06 ft/s and 0.07 ft/s [0.017 m/s and 0.020 m/s, 0.036 kt and 0.041 kt], respectively) while the months of June, July, and October had the strongest average current velocities (0.25 ft/s, 0.19 ft/s, and 0.19 ft/s [0.076 m/s, 0.057 m/s, and 0.057 m/s; 0.148 kt, 0.112 kt, and 0.112 kt], respectively).

Currents in 5,702 ft (1,738 m) at CM1 were generally less organized than those observed at other depths, flowing predominantly in either a northerly, northwesterly or southwesterly direction for the majority of the year (Figure 3-7). The currents at 5,702 ft (1,738 m) flowed consistently in a southwesterly direction from mid-July through the first week of August and the end of October through the second week of November. In contrast, currents ran consistently in a northerly direction throughout March and from mid-August through mid-October. During all other times of the year, current flow at 5,702 ft (1,738 m) was disorganized and erratic, rarely flowing in the same direction for longer than two or three days at a time.

CM1 average yearly current velocities (0.09 ft/s [0.027m/s, 0.053 kt]) at 5,702 ft (1,738 m) were 33% slower than those (0.13 ft/s [0.040 m/s, 0.078 kt]) measured at 3,297 ft (1,005 m). The seamounts located to the west and north of CM1 likely alter the flow of these deepwater currents. Average monthly current velocities were relatively stable throughout the year, ranging from 0.06 ft/s (0.017 m/s, 0.035 kt) in May to 0.12 ft/s (0.037 m/s, 0.071 kt) in September.

Bottom Currents- Depth of 7,497 ft (2,285 m)

In general, bottom currents at CM1 (7,497 ft [2,285 m] in depth) were somewhat organized, flowing in a northwesterly direction approximately 60% of the year (Figure 3-7). As stated previously, deep water currents in this region are typically dominated by the NPDW and the LCPW. Bathymetrically, CM1 is located in a sloping valley between two seamounts. The northeasterly flow of the measured current at 7,497 ft (2,285 m) in depth is likely attributed to the LCPW, which after being split by the island of Guam, deflects in a northward trajectory over the study area as it flows past CM1 into the Pacific Basin (Siedler et al. 2004). Bottom currents in this region flowed in a northward direction from February through June and in a mixed direction (primarily northerly or southerly) between the months of July through October. The currents returned to trending in a northerly direction in November.

CM1 average yearly current velocities (0.06 ft/s [0.018 m/s, 0.035 kt]) at 7,497 ft (2,285 m in depth) were less than those (0.09 ft/s [0.027 m/s, 0.053 kt]) measured at CM1 at 5,702 ft (1,738 m) and similar to those (0.07 ft/s [0.021 m/s, 0.041 kt]) measured at CM2 at a depth of 6,982 ft (2,128 m). The month of March had the highest average current velocity (0.08 ft/s [0.024 m/s, 0.047 kt]) while the months of August and September had the lowest average current velocities (0.04 ft/s [0.013 m/s, 0.024 kt]). During all other months, the average monthly current velocity varied little, ranging from 0.05 to 0.07 ft/s (0.015 to 0.022 m/s, 0.029 to 0.041 kt).

CM2 Currents

Surface Currents – Depth of 0 to 492 ft (0 to 150 m)

During the months of January, February, March, and April 2008, the average daily currents measured at 82 ft (25 m) trended almost exclusively in a west, southwesterly direction with maximum speeds of 1.3 ft/s (0.4 m/s, 0.77 kt) (Figure 3-8). The upper surface currents ran in a predominantly westerly direction in May and in a west, southwesterly direction in June. July and August had the greatest variability in current direction at 82 ft (25 m) depth, trending from northeast to northwest to southwest and also had the highest measured current speeds (1.8 ft/s [0.54 m/s, 1.07 kt]). In September, the current direction ranged from northeast to southwest but ran predominantly in a southwest direction. In October through early December the upper surface currents returned to running almost exclusively in a west, southwesterly direction. Velocities of the upper surface current were slightly lower during the mid-summer (June and July) and mid-winter months (January and February) (average velocity= 0.9 ft/s [0.27 m/s, 0.53 kt]) than at other times of the year (average velocity = 1.1 ft/s [0.33 m/s, 0.65 kt]).

The direction of surface currents at 164 ft (50 m) in depth was well-correlated with currents at 328 ft (100 m) and 492 ft (150 m) throughout most of the year (Figure 3-8). Average surface current speeds declined slightly with increasing depth, slowing appreciably below 82 ft (25 m) in depth. While the yearly average current speed at 82 ft (25 m) was 1.0 ft/s (0.31 m/s, 0.592 kt), the average yearly current speeds at 164 ft (50 m), 328 ft (100 m), and 492 ft (150 m) were 0.46 ft/s, 0.43 ft/s, and 0.33 ft/s (0.14 m/s, 0.13 m/s and 0.10 m/s; 0.27 kt, 0.25 kt, and 0.20 kt), respectively.

Surface current directions at 164 ft (50 m) to 492 ft (150 m) in depth often ran counter to directions of currents measured at 82 ft (25 m) in depth (Figure 3-8). In January, currents at 164 ft (50 m), 328 ft (100 m), and 492 ft (150 m) were erratic and not well correlated among the surface depths. In February, March, and April, the surface currents at 164 ft (50 m), 328 ft (100 m), and 492 ft (150 m) were well correlated, and ranged from flowing in a north, northeasterly direction to a south, southeasterly direction. In May and June, the currents predominantly flowed in an easterly direction (ranging from east northeast to southwest) while from July through September the currents changed direction regularly, with no prevailing directional pattern observed. In October, the currents at 164 ft (50 m) and 328 ft (100 m) in depth flowed primarily in a northeasterly direction at the beginning of the month and in a south-southwesterly direction in the middle of the month while at 492 ft (150 m) in depth, the current flowed a predominantly in a northerly direction at the beginning of the month and in a southerly direction at the end of the month. November currents at 164 ft (50 m), 328 ft (100 m), and 492 ft (150 m) flowed predominantly easterly, trending in a northeasterly direction at the end of November and beginning of December.

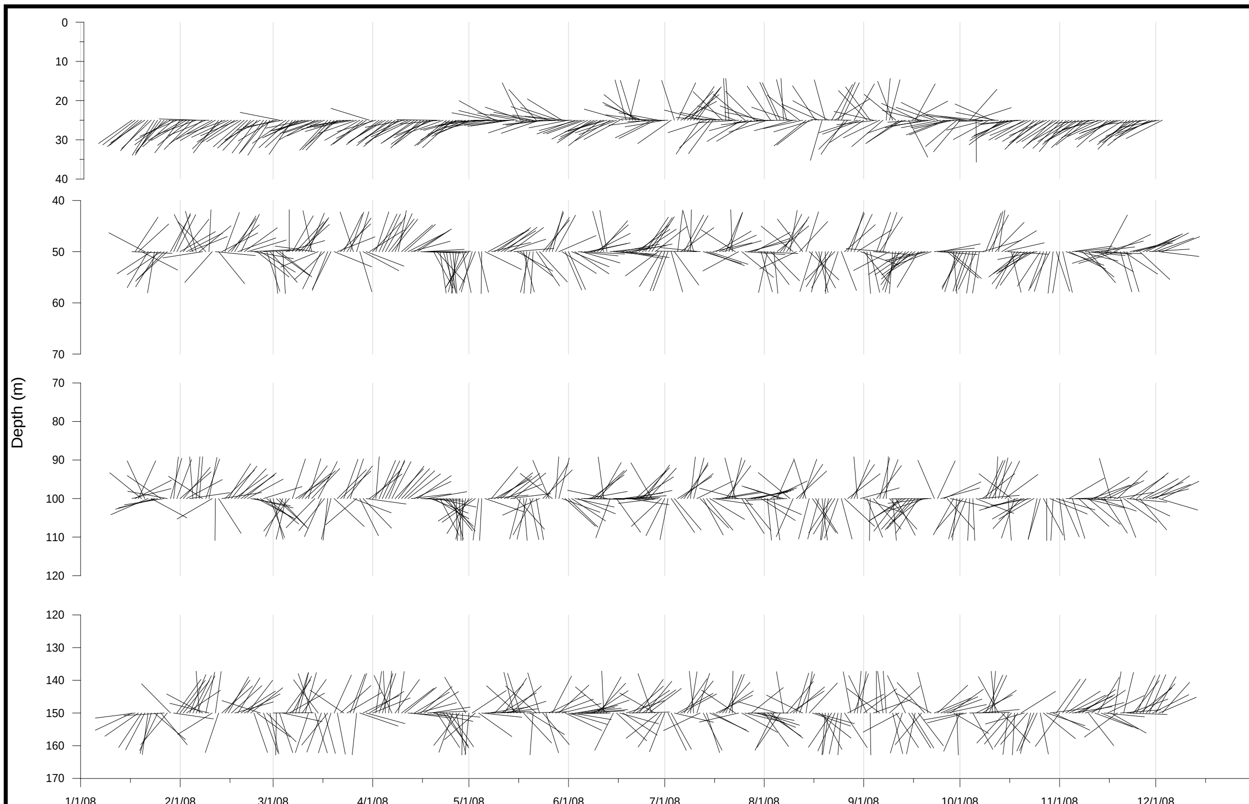

Figure 3-8.
Vector Plots of Average Daily Current Direction in 25 m, 50 m, 100 m, and 150 m Depths at CM2

Mid-water Currents- Depths of 984 ft-5,630 ft (303 m-1,716m)

Currents in 984 ft (300 m) of depth at CM2 flowed in a northeasterly direction throughout the majority of the year (Figure 3-9). The current direction at 984 ft (300 m) in depth was erratic in January and during a portion of the middle of February when no persistent directional pattern was observed. From mid-February through the beginning of April, the current trended in a north/northeasterly direction, before shifting direction and flowing predominantly southwesterly through mid-May. From mid-May through mid-June and from mid-July through the end of October, the current flowed in a northeasterly direction. Current flow from mid-June through mid-July and from mid-November through the end of November was predominantly in a southerly direction.

CM2 average current velocities at 984 ft (300 m) in depth (0.20 ft/s [0.06 m/s, 0.12 kt]) were approximately 40% slower than the averaged velocities measured at 492 ft (150 m) in depth (0.33 ft/s [0.10 m/s, 0.20 kt]). Disorganized and erratic currents observed in January corresponded with the weakest average current velocity (0.07 ft/s [0.02 m/s, 0.04 kt]) measured for a given month. Periods in which erratic current directions were observed over several days often corresponded with weaker than average current velocities. The highest current velocities were observed from mid-July through mid-November.

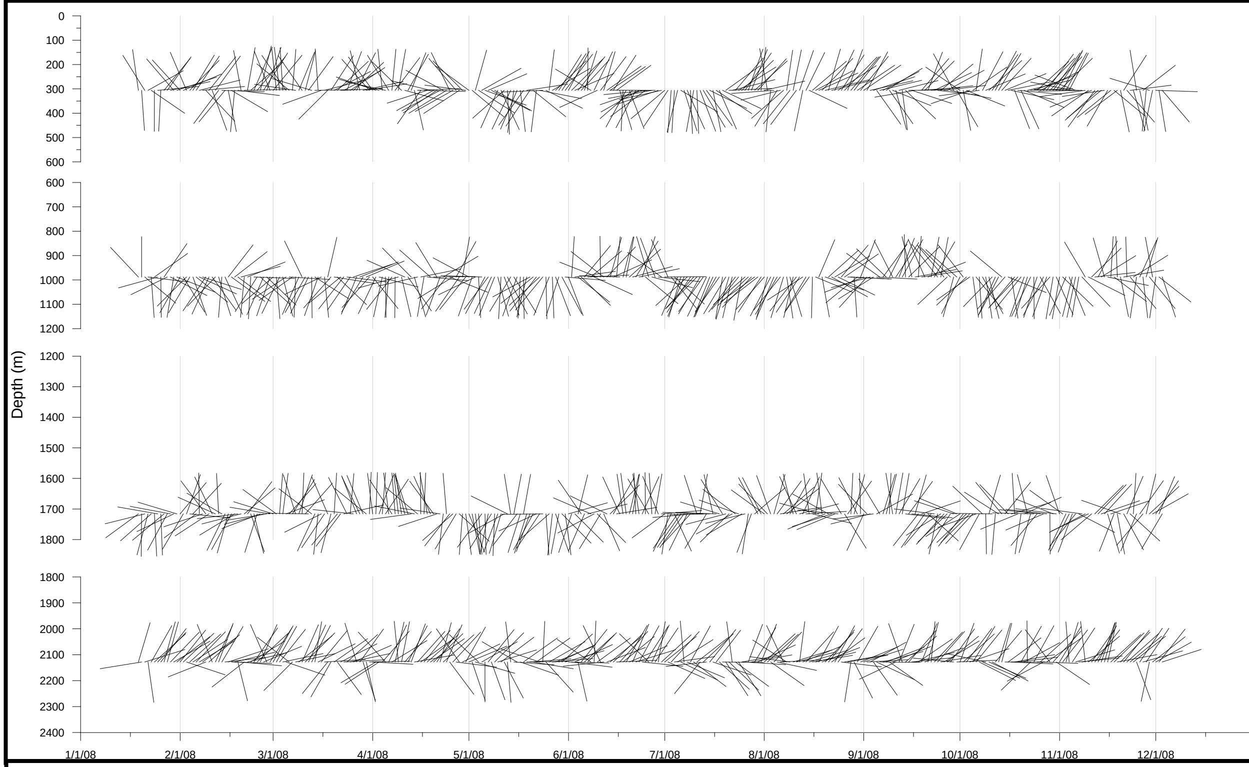

Figure 3-9.
Vector Plots of Average Daily Current Direction in 306 m, 988 m, 1716 m, and 2128 m Depths at CM2

Currents in 3,281 ft (1,000 m) of depth at CM2 flowed in a southerly or southwesterly direction throughout the majority of the year. The current direction at 3,281 ft (1,000 m) in depth was erratic during the months of January, April, and November. These months corresponded to periods in which below average current velocities were recorded. During the months of February, March, May, July, October, and portions of August, the CM2 currents at 3,281 ft (1,000 m) flowed in a predominantly southerly or southwesterly direction. Throughout June, September, and for several days at the end of August, the currents trended in a northeasterly to northwesterly direction.

CM2 average current velocities at 3,281 ft (1,000 m) in depth (0.10 ft/s [0.03 m/s, 0.06 kt]) were approximately 50% slower than the average yearly velocities measured at 984 ft (300 m) in depth (0.33 ft/s [0.10 m/s, 0.20 kt]). Periods of weak current velocities were generally correlated with disorganized and erratic current directions. The months of January and March had the weakest current velocities (0.05 ft/s and 0.06 ft/s [0.014 m/s and 0.017 m/s, 0.029 kt and 0.035 kt], respectively) while the months of July, October, and August had the strongest average current velocities (0.19 ft/s, 0.14 ft/s, and 0.13 ft/s [0.059 m/s, 0.042 m/s, and 0.040 m/s; 0.112 kt, 0.083 kt, and 0.077 kt], respectively).

Currents in 5,630 ft (1,716 m) of depth at CM2 were generally less organized than those observed at other depths, flowing predominantly in either a northerly or southwesterly direction for most of the year (see Figure 3-9). During the months of March, April, June, August, and the first two weeks of September, the current flowed mostly in a northerly or northwesterly direction. The current direction was erratic during the months of February, and March, the first two weeks of June, and the months of October and November. These months corresponded to periods in which below average current velocities were recorded. During the months of January and May, the first week of July, and the last two weeks in September, the currents at 5,630 ft (1,716 m) flowed in a predominantly southerly or southwesterly direction.

CM2 average yearly current velocities (0.07 ft/s [0.020 m/s, 0.041 kt]) at 5,630 ft (1,716 m) were slightly less than those (0.10 ft/s [0.032 m/s, 0.059 kt]) measured at 3,281 ft (1,000 m). Periods of weak current velocities at 5,630 ft (1,716 m) in depth were generally correlated with erratic current directions. In contrast to trends observed in upper waters, the month of January had the highest average current velocity (0.1 ft/s [0.029 m/s, 0.059 kt]). The months of June, October, and November had the weakest average current velocities (0.05 ft/s, 0.05 ft/s, and 0.06 ft/s [0.016 m/s, 0.16 m/s, and 0.017 m/s; 0.029 kt, 0.029 kt, and 0.035 kt], respectively) while the months of January, April, and May had the strongest average current velocities (0.1 ft/s, 0.08 ft/s, and 0.07 ft/s [0.029 m/s, 0.024 m/s, and 0.022 m/s; 0.059 kt, 0.047 kt, and 0.041 kt], respectively).

Bottom Currents- Depth of 6,928 ft (2,128 m) depth

In general, bottom currents at CM2 were highly organized, flowing in a northeasterly direction over 70 percent of the year (see Figure 3-9). As stated previously, deep water currents in this region are typically dominated by the NPDW and the LCPW. The northeasterly flow of the measured current at 6,928 ft (2,128 m) in depth is likely attributed to the LCPW, which after being split by the island, deflects in a northward trajectory over the study area as it flows into the Pacific Basin (Siedler et al. 2004). During the months of May and July, bottom currents flowed in a southerly to southwesterly direction for one to two-week periods of time. The remainder of the year, the bottom currents ran almost exclusively in a northeasterly direction.

CM2 average yearly current velocities (0.07 ft/s [0.021 m/s, 0.041 kt]) at 6,928 ft (2,128 m) in depth were nearly identical to those (0.07 ft/s [0.020 m/s, 0.041 kt]) measured at 5,577 ft (1,700 m). The month of January had the highest average current velocity (0.13 ft/s [0.039 m/s, 0.077 kt]). During all other months, the average monthly current velocity varied little, ranging from 0.06 ft/s (0.017 m/s, 0.035 kt) in May to 0.08 ft/s (0.024 m/s, 0.047 kt) in February.

3.1.2.4 Comparison between Modeled Currents and *In Situ* Current Measurements

Current data modeled by the NAVO for use in predicting the transport and deposition of dredged material at the proposed ODMDS offshore from Guam were compared to *in situ* current measurements collected to determine if modeled currents accurately predicted localized currents within the study area. The two closest sites for which NCOM results were available were used for comparison to sites CM1 and CM2.

The local features of the offshore environment surrounding Guam significantly affect current flows. Coastal eddy development in the lee of the island as a result of the NPEC flowing past Guam was predicted by Wolanski et al. (2003) and is also represented in the NCOM data. Wolanski's findings indicated that the strength and locations of coastal eddies were dependent upon the angle at which the NPEC approaches Guam and were affected significantly by storm systems. During seasons when tropical storms are most prevalent, vector plots of currents derived from NCOM data show greater variability.

The ENSO phenomenon was considered for the modeled current data and *in situ* measurements based on observations and forecasts provided by the Pacific ENSO Applications Center (PEAC) and a comparison to the Multivariate ENSO Index (MEI) developed by NOAA's Earth System Research Laboratory. Based on the results of this comparison, it was determined the NCOM current data appropriately reflected what is known about the regional current patterns around Guam and were representative of near-normal conditions with respect to ENSO (Weston 2007b). With respect to the ENSO phenomenon during the *in situ* measurements, May through June of 2008 were classified as near-normal conditions. January through April, and July through December, were classified as weak La Niña events with the exception of February and March, which were classified as moderate or stronger La Nina events (NOAA 2009b). The PEAC observed that while the prevailing state of the climate was ENSO-neutral, climatic effects typical of La Niña were noted for much of 2008 and included abnormally strong and widespread easterly surface winds in the low latitudes (PEAC 2009).

Surface Currents - Site CM1

Surface currents at 984 ft (300 m) in depth were predicted by NCOM to flow most frequently in either a westerly (19% of the time) or southwesterly direction (18% of the time) and to flow least frequently in a southerly direction (7% of the time) (Table 3-2). *In situ* measurements of currents in 994 ft (303 m) of depth at CM1 determined that currents flowed most frequently in either a southwesterly (19% of the time) or northerly direction (18% of the time) and least frequently in a westerly direction (2% of the time; Table 3-3). In general, the current direction frequencies predicted by NCOM for surface currents at 984 ft (300 m) in depth were not well-correlated to observed currents at CM1 (Figure 3-10).

Midwater Currents - Site CM1

Modeled currents at depths of 3,281 ft (1,000 m), 4,921 ft (1,500 m), and 6,561 ft (2,000 m) were largely uniform in direction. NCOM predicted currents at midwater depths to flow predominantly in a northeasterly direction at depths of 3,281 ft (1,000 m), 4,921 ft (1,500 m), and 6,561 ft (2,000 m). At 3,281 ft (1,000 m) the model predicted currents to flow northeasterly 99% of the time and northerly 1% of the time, while at 4,921 ft (1,500 m) and 6,561 ft (2,000 m) the currents were predicted to flow northerly 32% and 18% of the time, respectively, and to flow in a northeasterly direction 68% and 82% of the time, respectively (Table 3-2). *In situ* current readings indicated that currents flowed predominantly in a southerly or southeasterly direction (22% and 17% of the time, respectively) at 3,281 ft (1,000 m) and in a predominantly northerly or southerly direction (19% and 17% of the time, respectively) at 5,577 ft (1700 m; Table 3-3). Northeasterly flows that were predicted to comprise the majority of the flow direction according to NCOM data accounted for less than 15% of the measured current direction frequency at 3,281 ft (1,000 m) and 5,702 ft (1,738 m). The variable current direction measured *in situ* at CM1 suggests that eddy currents in the lee of the island and/or local bathymetric features or weather patterns may be affecting the nearshore current flow around Guam significantly more than is predicted by NCOM data. Additionally, tidal fluctuations which are not accounted for in NCOM results also likely impact current direction to some extent.

Bottom Currents - Site CM1

Currents at 2,500 m in depth were predicted by NCOM data to flow in northwesterly, westerly, or northerly directions 61%, 16% and 14% of the time, respectively (Table 3-2). Currents measured approximately 328 ft (100 m) above the ocean floor at CM1 flowed mainly in a northwesterly direction 25% of the time and in a northerly direction 24% of the time. Southerly and westerly flows were recorded 11% and 9% of the time, respectively (Table 3-3). With the exception of the predominant northerly and northwesterly flow direction frequencies, all other compass headings had relatively similar current direction frequencies.

Current Speed - Site CM1

Current speeds were predicted by NCOM data to be below 0.7 ft/s (0.2 m/s, 0.4 kt) in all but the uppermost surface waters (Table 3-4). In 164 ft (50 m) of depth, current speeds were modeled to be below at 0.7 ft/s (0.2 m/s, 0.4 kt) 80% of the time and between 0.7 and 1.0 ft/s (0.2 and 0.3 m/s, 0.4 and 0.6 kt) 16% of the time, while at 328 ft (100 m) in depth, currents were modeled to flow at speeds below 0.7 ft/s (0.2 m/s, 0.4 kt) 73% of the time and at 0.7-1.0 ft/s (0.2-0.3 m/s, 0.4-0.6 kt) 19% of the time. Currents were modeled to flow at speeds below 0.7 ft/s (0.2 m/s, 0.4 kt) 100% of the time below 984 ft (300 m) in depth. *In situ* current measurements at 984 ft (300 m) in depth and below were less than 0.7 ft/s (0.2 m/s, 0.4 kt) over 99% of the time and were well correlated to the current speeds predicted by NCOM (Figure 3-10 and Table 3-5).

Table 3-2. Relative Frequencies for Modeled Current Direction at Navy Site 1

	Relative Percent Frequency of Current Direction at Navy Site 1 (13.750º N, 144.500º E)							
Depth (m)	**North**	**North east**	**East**	**South east**	**South**	**South west**	**West**	**North west**
20	2%	4%	10%	9%	13%	17%	36%	9%
50	3%	3%	6%	13%	16%	22%	33%	4%
100	2%	1%	2%	3%	11%	28%	47%	6%
300	16%	10%	8%	9%	7%	18%	19%	15%
1000	1%	99%	0%	0%	0%	0%	0%	0%
1500	32%	68%	0%	0%	0%	0%	0%	0%
2000	18%	82%	0%	0%	0%	0%	0%	0%
2500	14%	10%	0%	0%	0%	0%	16%	61%
Frequency Total	8%	24%	6%	5%	6%	12%	30%	8%

Table 3-3. Relative Frequencies for *In Situ* Current Direction at CM1

	Relative Percent Frequency of Current Direction at CM1							
Depth (m)	**North**	**North east**	**East**	**South east**	**South**	**South west**	**West**	**North west**
303	18%	17%	15%	12%	13%	19%	2%	5%
1005	11%	14%	11%	17%	22%	13%	5%	7%
1738	19%	12%	9%	7%	17%	13%	9%	14%
2285	24%	10%	4%	8%	11%	9%	9%	25%
Frequency Total	18%	13%	10%	11%	16%	14%	6%	13%

Table 3-4. Modeled Current Speeds at Navy Site 1

Depth (m)	North Speed (m/s)	North east Speed (m/s)	East Speed (m/s)	South east Speed (m/s)	South Speed (m/s)	South west Speed (m/s)	West Speed (m/s)	North west Speed (m/s)
20	0.06	0.06	0.09	0.08	0.10	0.13	0.19	0.09
50	0.07	0.06	0.08	0.08	0.09	0.13	0.19	0.08
100	0.06	0.05	0.05	0.04	0.06	0.14	0.19	0.08
300	0.04	0.02	0.02	0.02	0.02	0.03	0.03	0.03
1000	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.08
1500	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
2000	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
2500	0.01	0.02	0.02	0.01	0.02	0.02	0.02	0.02

Table 3-5. Measured Current Speeds at CM1

Depth (m)	North Speed (m/s)	North east Speed (m/s)	East Speed (m/s)	South east Speed (m/s)	South Speed (m/s)	South west Speed (m/s)	West Speed (m/s)	North west Speed (m/s)
303	0.06	0.06	0.05	0.06	0.07	0.07	0.04	0.06
1005	0.04	0.04	0.03	0.03	0.05	0.05	0.02	0.04
1738	0.04	0.03	0.02	0.02	0.02	0.03	0.02	0.03
2285	0.02	0.01	0.01	0.01	0.02	0.01	0.01	0.02

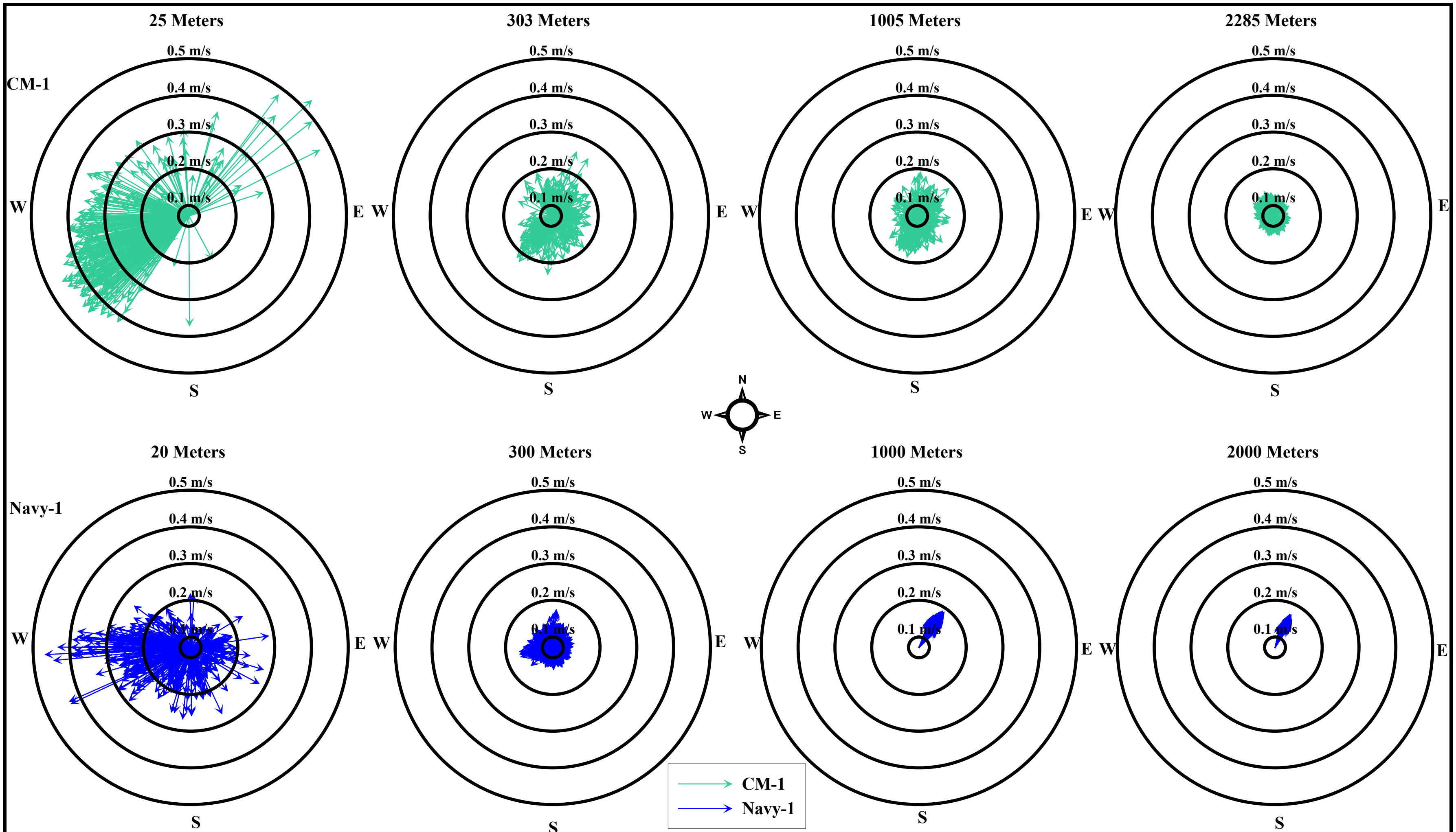

Figure 3-10.
Rose Diagram Plots of Daily Average Current Direction and Speed Over 1 Year Period, Comparing Modeled Navy Currents and *in situ* Currents at CM1

Surface Currents - Site CM2

Modeled surface currents at 66 ft (20 m) in depth were somewhat accurate in predicting upper surface current direction frequencies. NCOM predicted currents to flow in a westerly direction 34% of the time, a northwesterly direction 21% of the time and in a northerly direction 15% of the time (Table 3-6). In 2008, *in situ* currents in 66 ft (20 m) of depth at CM2 were observed flowing in a westerly direction 49% of the time, a northwesterly direction 4% of the time, and in a northerly direction 33% of the time (Table 3-7). However, as depth increased, the model became increasingly less accurate with respect to current direction. At 164 ft (50 m) in depth, although the model predicted that currents would flow predominantly westerly (37% of the time) or southwesterly (21% of the time), actual flow at CM2 in 164 ft (50 m) of depth was mainly northwesterly (25% of the time), easterly (21% of the time) and southeasterly (16% of the time).

Current direction frequencies were predicted to remain consistent between depths of 328 ft (100 m) and 984 ft (300 m) at CM2. The model predicted currents to flow primarily westerly (51% and 53% of the time, respectively), southerly (10% and 16% of the time, respectively), or northwesterly (18% and 15% of the time, respectively) (Table 3-6). Measured current direction frequencies at CM2 in 328 ft (100 m) and 984 ft (300 m) of depth however, did not correlate well with the model's predicted current directions and were not consistent between the two depths (Figure 3-11). Currents flowed in a northwesterly direction 27% and 6% of the time at 328 ft (100 m) and 984 ft (300 m) in depth, respectively, while flowing in a northeasterly direction 9% and 29% of the time, at 328 ft (100 m) and 984 ft (300 m) in depth, respectively (Table 3-7). The westerly current direction predicted by the model was observed only 5% and 9% of the time, respectively in 328 ft (100 m) and 984 ft (300 m) at CM2.

Midwater Currents - Site CM2

Modeled currents at depths of 3,281 ft (1000 m), 4,921ft (1,500 m), and 6,562 ft (2,000 m) were largely uniform in direction. NCOM predicted currents at midwater depths to flow almost exclusively in a northwesterly direction (Table 3-6). At 3,281 ft (1000 m) in depth, the model predicted currents to flow easterly 12% of the time and northwesterly 88% of the time, while at 4,921ft (1,500 m) and 6,562 ft (2,000 m) in depth, the currents were predicted to flow northwesterly 100% of the time. *In situ* current readings indicated that currents flowed in a southwesterly direction the majority of the time (27% and 21% at 3,281 ft (1,000 m) and 5,557 ft (1,700 m; Table 3-7), respectively) while flowing only a small fraction of the time in a northwesterly direction (7% and 12% of the time at 3,281 ft (1,000 m) and 5,630 ft (1,716 m), respectively). The variable current direction measured *in situ* at CM2 suggests that eddy currents in the lee of the island or local bathymetric features may be affecting the nearshore current flow around Guam significantly more than is predicted by NCOM data. Additionally, tidal fluctuations are not accounted for in NCOM results and may impact current directions.

Bottom Currents - Site CM2

Bottom currents in 8,202 ft (2,500 m) of depth were predicted by NCOM data to flow mainly northwesterly, westerly, or northerly directions 61%, 16% and 14% of the time, respectively (Table 3-6). Currents measured approximately 328 ft (100 m) above the ocean floor at CM2 flowed in a northeasterly direction 45% of the time and in an easterly direction 24% of the time (Table 3-7). Westerly and northerly flows were recorded 3% and 11% of the time, respectively.

Table 3-6. Relative Frequencies for Modeled Current Direction at Navy Site 2

Depth (m)	Relative Frequency of Direction at Navy Site 2 (13.625º N, 144.625ºE)							
	North	Northeast	East	Southeast	South	Southwest	West	Northwest
20	15%	10%	2%	2%	3%	13%	34%	21%
50	7%	13%	5%	2%	2%	21%	37%	13%
100	3%	5%	4%	1%	2%	10%	56%	18%
300	8%	5%	1%	1%	1%	16%	53%	15%
1000	0%	88%	12%	0%	0%	0%	0%	0%
1500	0%	100%	0%	0%	0%	0%	0%	0%
2000	0%	100%	0%	0%	0%	0%	0%	0%
2500	14%	10%	0%	0%	0%	0%	16%	61%
Frequency Total	6%	29%	6%	1%	1%	8%	34%	15%

Table 3-7. Relative Frequencies for *In Situ* Current Direction at CM2

Depth (m)	Relative Frequency of Direction at Site CM2							
	North	Northeast	East	Southeast	South	Southwest	West	Northwest
20	33%	4%	1%	1%	9%	0%	49%	4%
50	13%	8%	21%	16%	2%	10%	4%	25%
100	10%	9%	18%	15%	3%	14%	5%	27%
306	11%	29%	14%	9%	11%	11%	9%	6%
988	8%	9%	11%	12%	24%	27%	3%	7%
1716	20%	10%	5%	3%	14%	21%	14%	12%
2128	11%	45%	24%	7%	4%	3%	3%	4%
Frequency Total	14%	11%	17%	12%	5%	12%	7%	21%

Current Speed - Site CM2

Current speeds were predicted by NCOM data to below 0.7 ft/s (0.2 m/s, 0.4 kt) in all but the uppermost surface waters (Table 3-8). At 66 ft (20 m) in depth, currents were modeled to flow at speeds below 0.7 ft/s (0.2 m/s, 0.4 kt) 98% of the time and at speeds between 0.7 and 1.0 ft/s (0.2 and 0.3 m/s, 0.4 and 0.6 kt) 2% of the time, while at 164 ft (50 m) in depth, currents were modeled to flow at speeds below 0.7 ft/s (0.2 m/s, 0.4 kt) 99% of the time and at speeds of 0.7-1.0 ft/s (0.2-0.3 m/s, 0.4-0.6 kt) 1% of the time. For all other depths, modeled current speeds were less than 0.7 ft/s (0.2 m/s, 0.4 kt) 100% of the time. The *in situ* current profiler at CM2 detected current speeds that were greater than 1.3 ft/s (0.4 m/s, 0.8 kt) 94% of the time at 66 ft (20 m) in depth and detected current speeds below 0.7 ft/s (0.2 m/s, 0.4 kt) only 1% of the time (Table 3-9). Current speeds diminished markedly with increasing depth and were measured below 0.7 ft/s (0.2 m/s, 0.4 kt) 82% of the time at 164 ft (50 m) in depth. Only 1 percent of the measured current speeds at 164 ft (50 m) were above 1.3 ft/s (0.4 m/s, 0.8 kt). At 328 ft (100 m) depth, 89% of the measured currents were below 0.7 ft/s (0.2 m/s, 0.4 kt) and at 984 ft (300 m) or greater, the current speed was less than 0.7 ft/s (0.2 m/s, 0.4 kt) 99% of the time. Although upper surface current speeds were underestimated by the modeled data, the measured speed below 328 ft (100 m) was well correlated with the current speed predicted by NCOM (Figure 3-11 and Table 3-8).

3.1.2.5 Summary

Modeled NCOM current data and *in situ* measurements of regional oceanographic currents were consistent with respect to average speeds; however, *in situ* measurements showed greater variability in current direction. The NCOM model does not account for tidal fluctuations and this is the main source of spatial disparity between actual *in situ* measurement locations and NCOM model locations. With these differences noted, it is likely that the fate and transport of dredged material modeled using NCOM data is conservative (predicts a maximum possible scenario of a larger area of deposits) due to the uniformity of in NCOM current data. Dredged material disposed at the Guam ODMDS will likely settle within a smaller area due to the more variable current directions as measured at the site during the 2008 survey.

3.1.3 Water Column Characteristics and Chemical Analysis

The ROI for all water column characteristics is the water column within the ODMDS study areas. Water column characteristics include temperature, salinity, turbidity, light transmittance and dissolved oxygen. These characteristics were evaluated within the study region using a Seabird Electronics (SBE) 9*plus* conductivity/temperature/depth (CTD) instrumentation package as well as collecting water samples for ammonia-N, dissolved orthophosphate-P, nitrate-N, nitrite-N, total organic carbon (TOC), trace metals, polycyclic aromatic hydrocarbons (PAHs), chlorinated pesticides and polychlorinated biphenyls (PCBs) (both Aroclors and individual congeners). Results of the CTD casts and water sampling tests are described below for both study areas, and approximate sampling locations are displayed in Figure 3-12.

Table 3-8. Modeled Current Speeds at Navy Site 2

	Directions							
	North	North east	East	South east	South	South west	West	North west
Depth (m)	Speed (m/s)	Speed (m/s)	Speed (m/s)	Speed (m/s)	Speed (m/s)	Speed (m/s)	Speed (m/s)	Speed (m/s)
20	0.07	0.08	0.07	0.08	0.09	0.08	0.07	0.09
50	0.08	0.07	0.06	0.05	0.07	0.07	0.07	0.07
100	0.06	0.07	0.08	0.03	0.03	0.08	0.07	0.07
300	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.03
1000	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
1500	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
2000	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
2500	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01

Table 3-9. Measured Current Speeds at CM2

	Directions							
	North	North east	East	South east	South	South west	West	North west
Depth (m)	Speed (m/s)	Speed (m/s)	Speed (m/s)	Speed (m/s)	Speed (m/s)	Speed (m/s)	Speed (m/s)	Speed (m/s)
303	0.06	0.06	0.05	0.06	0.07	0.07	0.04	0.06
1005	0.04	0.04	0.03	0.03	0.05	0.05	0.02	0.04
1738	0.04	0.03	0.02	0.02	0.02	0.03	0.02	0.03
2285	0.02	0.01	0.01	0.01	0.02	0.01	0.01	0.02

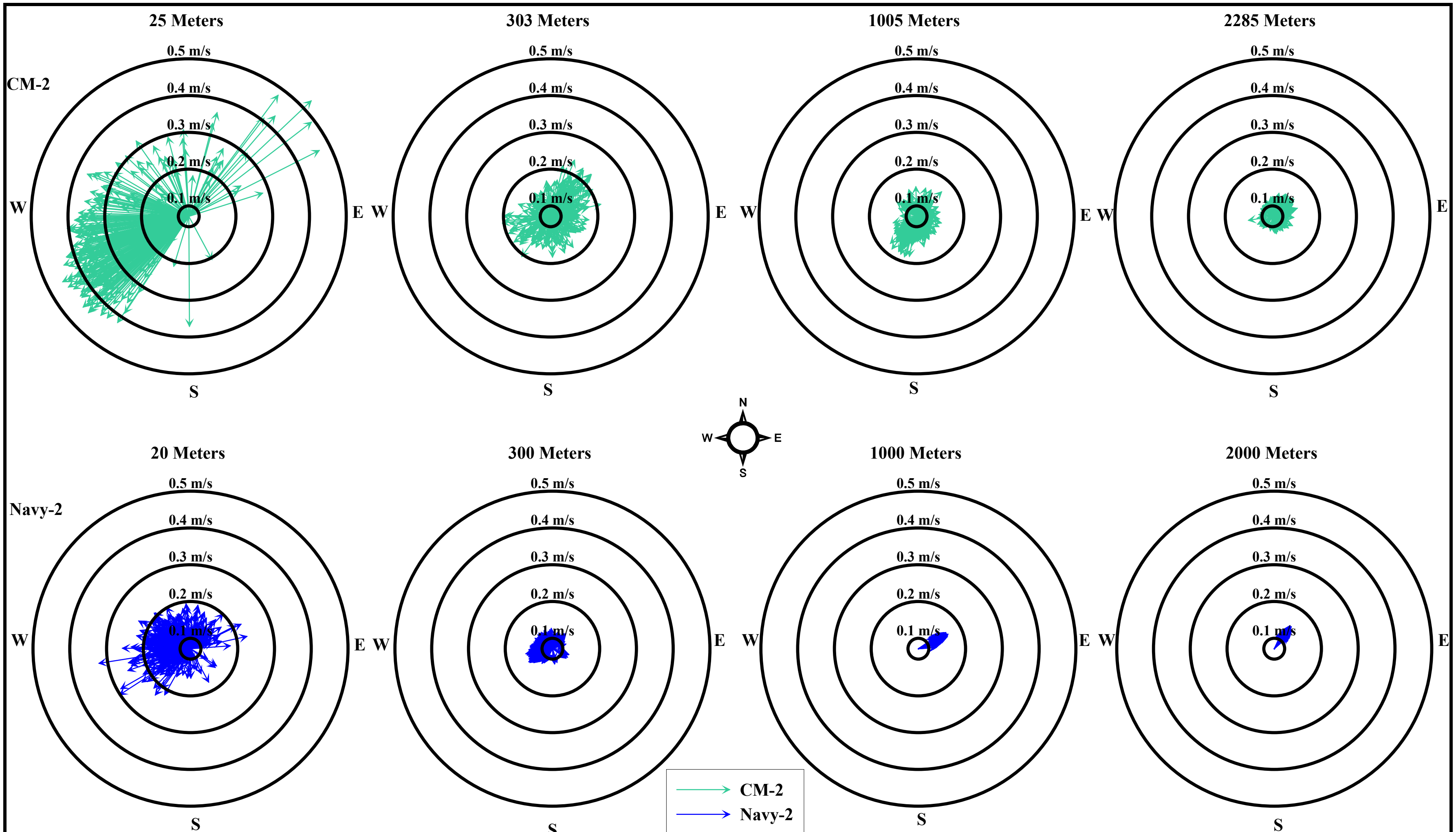

Figure 3-11.
Rose Diagram Plots of Daily Average Current Direction and Speed Over 1 Year Period, Comparing Modeled Navy Currents and *in situ* Currents at CM2

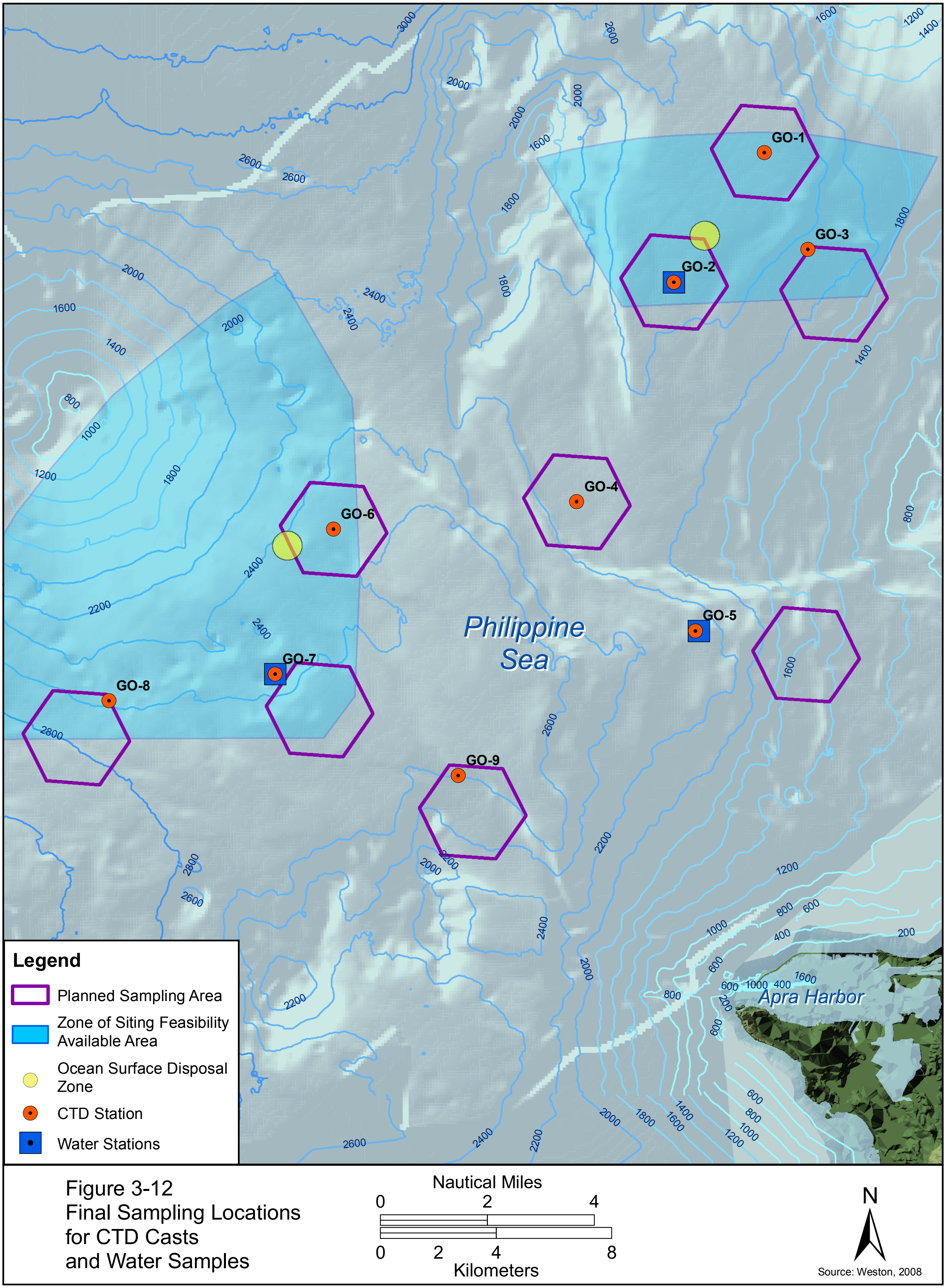

Figure 3-12
Final Sampling Locations for CTD Casts and Water Samples

3.1.3.1 Temperature

Temperature profiles in the open oceans typically have a well mixed surface layer in the upper 330 to 660 ft (100 to 200 m) underlain by a region of rapid temperature decline, known as the thermocline, which may be several hundreds of meters thick. Below the thermocline, temperature gradually decreases until temperatures of approximately 34 to 37°F (1 to 3°C) are reached at the seafloor. The maximum water temperatures, as expected, are located in the surface layer, where energy from direct sunlight is present but is rapidly dissipated with increasing depth.

Historical sea surface temperatures (January 2001 through June 2008) measured offshore of the southwest corner of Guam range from a winter-time low of 80.2°F (26.8°C) to a summer-time high of 86.7°F (30.4°C), with an annual average temperature of 83.7°F (28.7°C) (NOAA 2008a).

<u>North Study Area</u>

During the Site Characterization Survey conducted in the Guam ODMDS study region in April 2008, the average sea surface temperature (measured at 50 ft [15 m]) for the North Study Area (Stations 1-3) averaged 83.7°F (28.7°C), which is consistent with historical data. Temperatures within the upper water column were fairly uniform, averaging 82.8°F (28.2°C) from the surface down to the top of the thermocline. The top of the thermocline was located between approximately 425 and 525 ft (130 and 160 m), with an average temperature of 81.1°F (27.3°C). The thermocline was approximately 820 ft (250 m) thick, extending to depths of approximately 1,310 ft (400 m). Below the thermocline, temperatures gradually decreased from an average of 48.0°F (8.9°C) to an average of 35.6°F (2.0°C) near the ocean floor.

<u>Northwest Study Area</u>

During the Site Characterization Survey conducted in the Guam ODMDS study region in April 2008, the average sea surface temperature (measured at 50 ft [15 m]) for the Northwest Study Area (Stations 6-8) averaged 83.7°F (28.7°C), which is consistent with historical data. Similar to conditions in the North Alterative Study Area, temperatures within the upper water column were fairly uniform, averaging 82.8°F (28.2°C) from the surface down to the top of the thermocline. The top of the thermocline was located between approximately 410 and 490 ft (125 and 150 m), with an average temperature of 81.0°F (27.2°C). The thermocline was approximately 790 ft (240 m) thick, extending to depths of approximately 1,250 ft (380 m). Below the thermocline, temperatures gradually decreased from an average of 50.9°F (10.5°C) to an average of 35.2°F (1.8°C) near the ocean floor.

<u>Inshore/Proposed Reference Site</u>

In addition to collecting data from three stations within the North and Northwest Study Areas, three other stations were surveyed to gain a more comprehensive understanding of the regional marine biology, geology and physical oceanographic characteristics. These stations were located inshore of the two study areas and one of these stations was identified as a potential reference location for future Tier III testing. Tier III testing is required under the MPRSA and is described in the Ocean Testing Manual (USEPA and USACE 1991). Tier III testing includes the chemical, bioassay and bioaccumulation testing of project-specific proposed dredged materials to determine their suitability for ocean disposal. Results of Tier III tests are compared to similar tests conducted on reference material. Reference material is collected from a predetermined reference site having similar characteristics of the study area. Therefore, the surveys conducted in April 2008, included the collection of data from a location close to, but beyond the range of possible impacts of a potential ODMDS, to determine its suitability as a possible reference site.

During the Site Characterization Survey conducted in the Guam ODMDS study region in April 2008, the average sea surface temperature (measured at 50 ft [15 m]) measured at sites inshore of the two study areas, including the proposed reference location for future Tier III testing (Stations 4, 5 and 9) averaged 83.7°F (28.7°C), which is consistent with historical data. Similar to conditions in the North and Northwest Alterative Study Areas, temperatures within the upper water column were fairly uniform, averaging 82.9°F (28.3°C) from the surface down to the top of the thermocline. The top of the thermocline was located between approximately 401 and 460 ft (125 and 140 m), with an average temperature of 81.3°F (27.4°C). The thermocline was approximately 900 ft (275 m) thick, extending to depths of approximately 1,400 ft (425 m). Below the thermocline, temperatures gradually decreased from an average of 48.7°F (9.3°C) to an average of 35.6°F (2.0°C) near the ocean floor.

3.1.3.2 Salinity

Salinity is the measure of the amount of dissolved salts (predominantly chloride and sodium) in seawater. Salinity tends to remain relatively constant through the water column, but may vary slightly near the surface due to evaporation and precipitation, and at depth due to mixing of surface and deep waters. A feature called a halocline is a significant, vertical salinity gradient that may be found in seawater and affects the density of seawater. Typically located near thermoclines, haloclines interact with the thermocline and may result in the development of a pronounced pycnocline (e.g., strong density gradient).

<u>North Study Area</u>

During the Site Characterization Survey conducted in the Guam ODMDS study region in April 2008, the average salinity in the surface waters (measured at 50 ft [15 m]) for the North Study Area (Stations 1-3) averaged 34.4 parts per thousand (ppth). At the base of the surface water and just above the thermocline, salinity increased rapidly to a maximum average value of 35.0 ppth at approximately 575 ft (175 m) depth. Salinity then decreased to a minimum average value of 34.2 ppth near the base of the thermocline. Below the thermocline, the salinity remained relatively constant, with an average concentration of 34.6 ppth near the seafloor.

<u>Northwest Study Area</u>

In the Northwest Study Area (Stations 6-8), salinity in the surface waters averaged 34.5 ppth across the three stations. Similar to the salinity profile observed at stations in the North Study Area, the salinity was consistent in the upper surface waters, then rapidly increased to a maximum concentration of 35.1 ppth at approximately 560 ft (170 m) depth. Salinity then decreased to a minimum concentration of 34.3 ppth near the bottom of the thermocline (1,400 ft [425 m]). Below the thermocline, salinity remained constant, with an average concentration of 34.6 ppth near the seafloor.

<u>Inshore/Proposed Reference Site</u>

Water column salinity profiles at the inshore and proposed reference sites were similar to the North and Northwest Study Areas. The average salinity in the surface water was 34.5 ppth. Below the surface layer, salinity rapidly increased to a maximum concentration of 35.1 ppth at approximately 560 ft (170 m) depth. The minimum salinity concentration occurred at approximately 1,410 ft (430 m) depth with a concentration of 34.3 ppth. Below the thermocline, salinity remained constant, having an average concentration of 34.6 ppth near the seafloor.

3.1.3.3 Transmissivity and Turbidity

Transmissivity and turbidity are measures of the visual water quality. Transmissivity refers to the amount of light that passes through a sample (high transmissivity values suggest clearer water) whereas turbidity is a measure of the amount of light scattered by a sample (high turbidity values suggest turbid or cloudy water). The presence of sediments, excessive algal growth and plankton may result in lower transmissivity or higher turbidity values. Water clarity tends to be higher in oceanic regions due to the absence of suspended sediments from freshwater discharge or resuspension by waves and tides. Transmissivity and turbidity of seawater near Guam is not likely to be effected by seasonal changes due to the consistently warm climate.

<u>North Study Area</u>

Transmissivity was slightly lower in surface waters of the North Study Area (Stations 1-3) than in the middle and lower water column. At the surface, the average transmissivity value was 84.5%, while in the mid-water column transmissivity values were higher at 85.5%.

Turbidity measured in the North Study Area (Stations 1-3) was relatively constant through the water column; however, slight changes in the turbidity measurements did have a discernable trend. Turbidity in the surface waters averaged 44.9 nephelometric turbidity units (NTU). Minimum turbidity values were measured just below the thermocline, averaging approximately 43.3 NTU. Turbidity increased slightly through the remainder of the water column, with an average value of 44.5 NTU near the seafloor.

<u>Northwest Study Area</u>

Similar to the findings in the North Study Area, the Northwest Study Area (Stations 6-8) had fairly consistent transmissivity values throughout the water column, with slightly increased values when approaching the middle water column and elevated values down to the bottom water in comparison to surface waters. Transmissivity measurements in the surface waters were 85.2%, and increased slightly to 85.7% approaching the mid-water column.

Turbidity measured in the Northwest Study Area (Stations 6-8) followed the same pattern as in the North Study Area. Turbidity in the surface waters averaged 43.9 NTU. Minimum turbidity values were measured just below the thermocline, averaging approximately 42.2 NTU. Turbidity increased slightly through the remainder of the water column, having an average value of 44.9 NTU near the seafloor.

<u>Inshore/Propose Reference Site</u>

The sites inshore of the two study areas, including the proposed reference location for future Tier III testing (Stations 4, 5 and 9) had fairly consistent transmissivity values throughout the water column, with a slight increase approaching the middle water column and remaining elevated to the bottom water when compared to surface waters. Transmissivity measurements at the inshore and reference sites were 84.8% and increased slightly to 85.8% approaching the mid-water column.

Turbidity measured in inshore of the two study areas and at the proposed reference site (Stations 4, 5 and 9) followed the same pattern as in the North and Northwest Study Areas. Turbidity in the surface waters averaged 43.5 NTU. Minimum turbidity values were measured just below the thermocline, averaging approximately 42.1 NTU. Turbidity increased slightly through the remainder of the water column, with an average value of 44.9 NTU near the seafloor. It should be noted that turbidity values measured at Station 9 in the upper 130 ft (40 m) of the water column were inconsistent with measurements made at all other stations visited during the Site Characterization Surveys in April 2008. Measured values at this station were up to 10 NTU lower than other stations. These lower measurements were likely a result of incorrect sensor readings rather than greater water clarity, since a corresponding signature was not evident in transmissivity measurements.

3.1.3.4 Dissolved Oxygen

Sufficient oxygen levels are critical because significant decreases in dissolved oxygen may cause mortality of some organisms, leading to decreases in overall species diversity. In areas such as the North Pacific Ocean, seawater generally has higher oxygen content relative to its low rate of consumption near the surface. Below the surface layer, dissolved oxygen tends to decrease, having a minimum concentration near the bottom of the light or photic zone. This is likely due to greater rates of oxygen consumption by the processes of respiration of animals and plants and microbial decomposition of organic matter or detritus than is being generated by photosynthesis. At greater depths, dissolved oxygen concentrations tend to increase due to the capacity for denser and colder seawater to contain more oxygen.

<u>North Study Area</u>

Dissolved oxygen concentrations in the surface waters of the North Study Area (Stations 1-3) averaged approximately 6.00 milligrams per liter (mg/L). Dissolved oxygen concentrations slowly increased through the surface layer to an average 6.19 mg/L at 260 ft (80 m) depth. Concentrations then decreased to 2.19 mg/L at approximately 600 m depth. From 1,970 ft (600 m) to the bottom of the water column, dissolved oxygen concentrations slowly increased to 3.66 mg/L.

<u>Northwest Study Area</u>

The average sea surface dissolved oxygen concentration (measured at 50 ft [15 m]) for the Northwest Study Area (Stations 6-8) was 5.98 mg/L. The maximum dissolved oxygen concentration occurred at approximately 260 ft (80 m) depth with a value of 6.16 mg/L, and the minimum dissolved oxygen concentration occurred at approximately 1,800 ft (550 m) with a value of 2.21 mg/L. Below 1,800 ft (550 m), dissolved oxygen concentrations slowly increased until nearly reaching 3.92 mg/L the seafloor.

<u>Inshore/Proposed Reference Site</u>

Dissolved oxygen concentrations in the surface waters measured at sites inshore of the two study areas, including the proposed reference location for future Tier III testing (Stations 4, 5 and 9), averaged 5.98 mg/L. Similar to the dissolved oxygen profiles for the North and Northwest Study Areas, the dissolved oxygen concentration slowly increased to 6.16 mg/L at approximately 260 ft (80 m) depth, then decreased to a concentration of 2.21 mg/L at approximately 1,800 ft (550 m) depth. Below the photic zone, concentrations of dissolved oxygen increased to an average of 3.76 mg/L.

3.1.3.5 Regional Summary

As expected, water quality parameters, including temperature, salinity, transmissivity, turbidity and dissolved oxygen, measured across the entire study region were consistent with each other and followed oceanographic trends typical for tropical latitudes. Temperature remained relatively constant in the surface layer, decreased rapidly through a thermocline layer between water depths of approximately 490 to 1,310 ft (150 to 400 m), and then steadily decreased to minimum values observed near the seafloor. Salinity concentrations also remained constant in the mixed surface layer, increased sharply near the top of the thermocline, decreased to a minimum value near the base of the thermocline, and remained relatively constant through the remainder of the water column. Transmissivity and turbidity values were relatively constant throughout the entire water column with minor changes. Dissolved oxygen concentrations were greatest near the surface, decreasing to a minimum near the base of the photic zone. Below the photic zone, dissolved oxygen concentrations steadily increased towards the bottom of the water column. These trends are evident in Figures 3-13 through 3-16, which depict a representative station from each study area (Station 2 for the North Study Area and Station 7 for the Northwest Study Area), the proposed reference site (Station 5) and an average of the remaining six study stations. These figures further illustrate the similarity between study areas (e.g., there were no significant differences between the North and Northwest Study Areas).

3.1.4 Water Column Chemical Analyses

Conventional and chemical analyses were performed on water samples from four discrete depths at each of three locations: one in the North Study Area, one in the Northwest Study Area and one at the proposed reference site. Analyses included nitrogen (ammonia, nitrate, nitrite), dissolved orthophosphate, TOC, dissolved trace metals and organic pollutants (PAHs, chlorinated pesticides/PCBs). The results of these analyses are presented in Table 14 of the Field Report Baseline Studies Conducted for the Designation of an Ocean Dredged Material Disposal Site, Apra Harbor, Guam (Weston Solutions and TEC 2008b) and described in the following sections.

3.1.4.1 Conventional Parameters

Ammonia, dissolved orthophosphate, nitrate, nitrite, and TOC were measured to determine typical nutrient levels in samples collected offshore of Guam. Seasonal current patterns, uptake by marine plants (phytoplankton), and upwelling may alter nutrient levels in marine ecosystems. However, these changes are also caused by biogeochemical processes and regeneration due to decomposition of sinking particulate matter.

<u>North Study Area</u>

With the exception of nitrite, which was not detected in any of the depth specific samples at Station 2, nutrients generally increased with depth; whereas TOC generally decreased with depth (Figure 3-17 and Figure 3-18). Ammonia ranged from non-detectable levels at the surface to 0.03 mg/L in the near bottom sample (Figure 3-17). Dissolved orthophosphate concentrations ranged from non-detectable levels at the surface to 0.08 mg/L in the near bottom sample. Nitrate concentrations ranged from non-detectable levels in the surface sample to 0.5 mg/L in the near bottom sample, with a maximum concentration in the mid-water column sample of 0.84 mg/L. TOC concentrations ranged from 0.6 mg/L in the surface sample to an estimated value of 0.1 mg/L in the near bottom sample (Figure 3-18). The Dixon's Test for extreme values was utilized to determine the homogeneity of nutrient values throughout the water column. There were no significant differences in nutrient levels among samples collected at each of the four different water depths at Station 2 in the North Study Area.

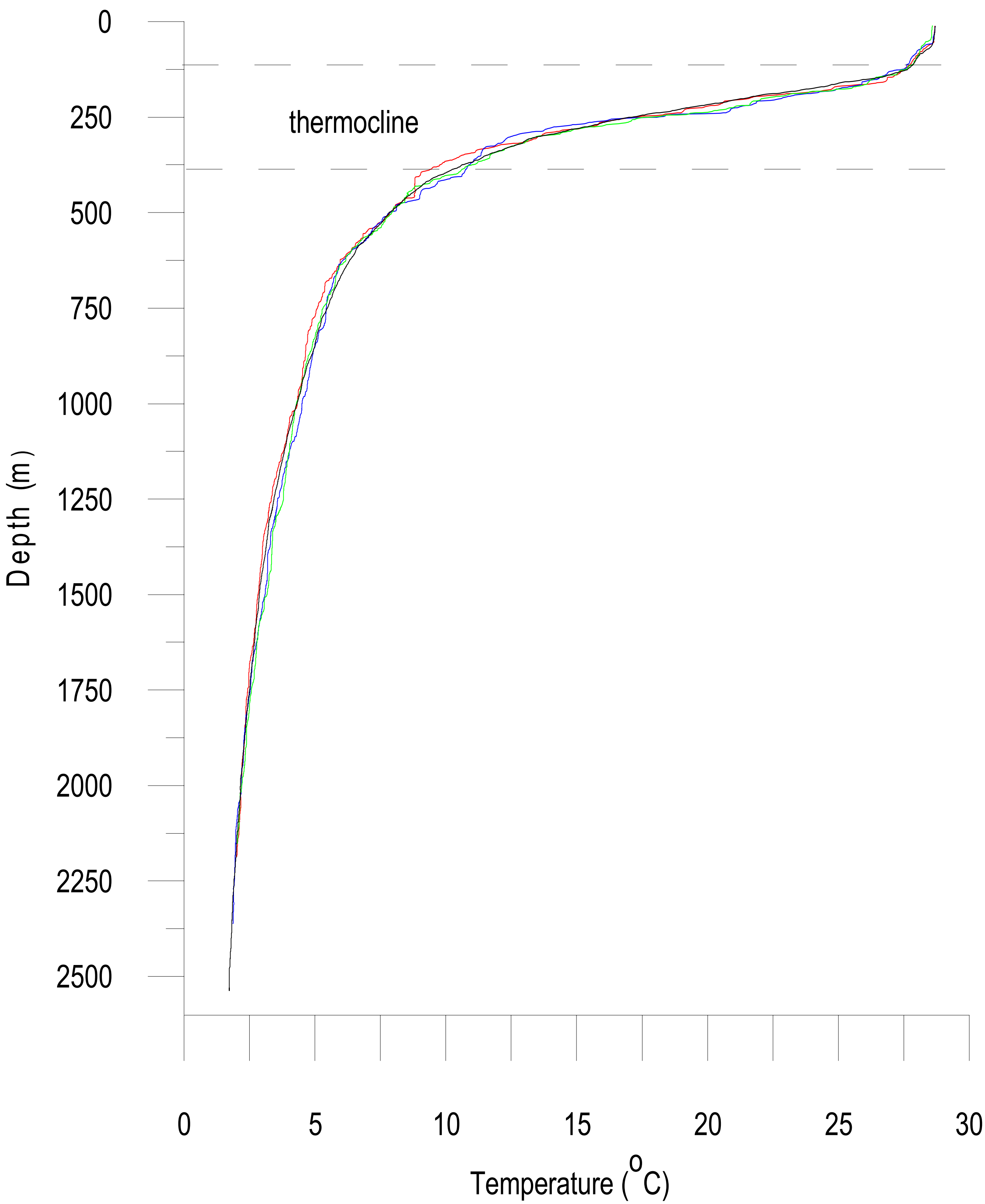

Figure 3-13.
Comparison of Temperature Profiles between Representative Stations in the North Study Area, Northwest Study Area and Proposed Reference Site

Source: Weston, 2008

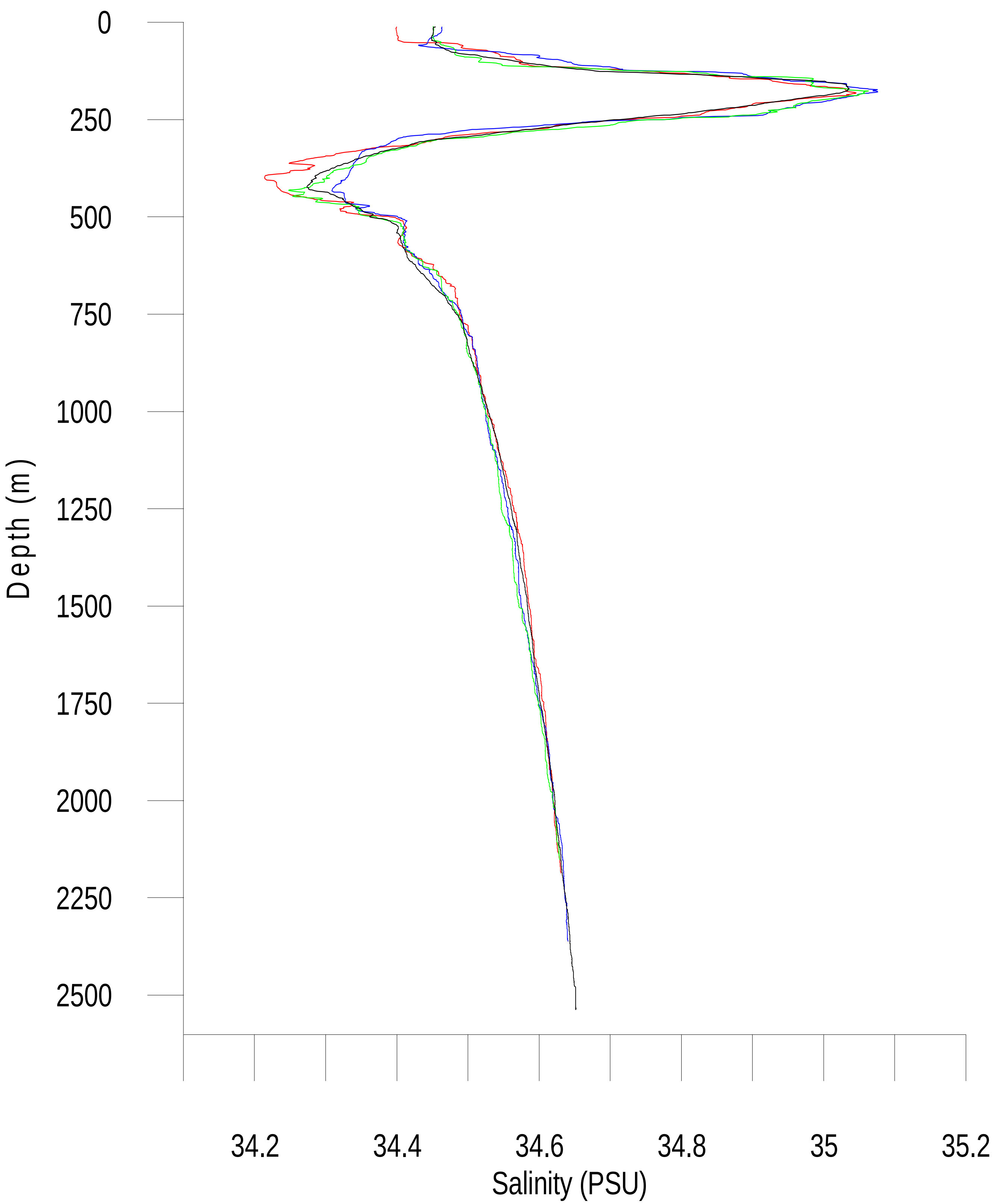

Figure 3-14.
Comparison of Salinity Profiles between Representative Stations in the North Study Area, Northwest Study Area and Proposed Reference Site

Source: Weston, 2008

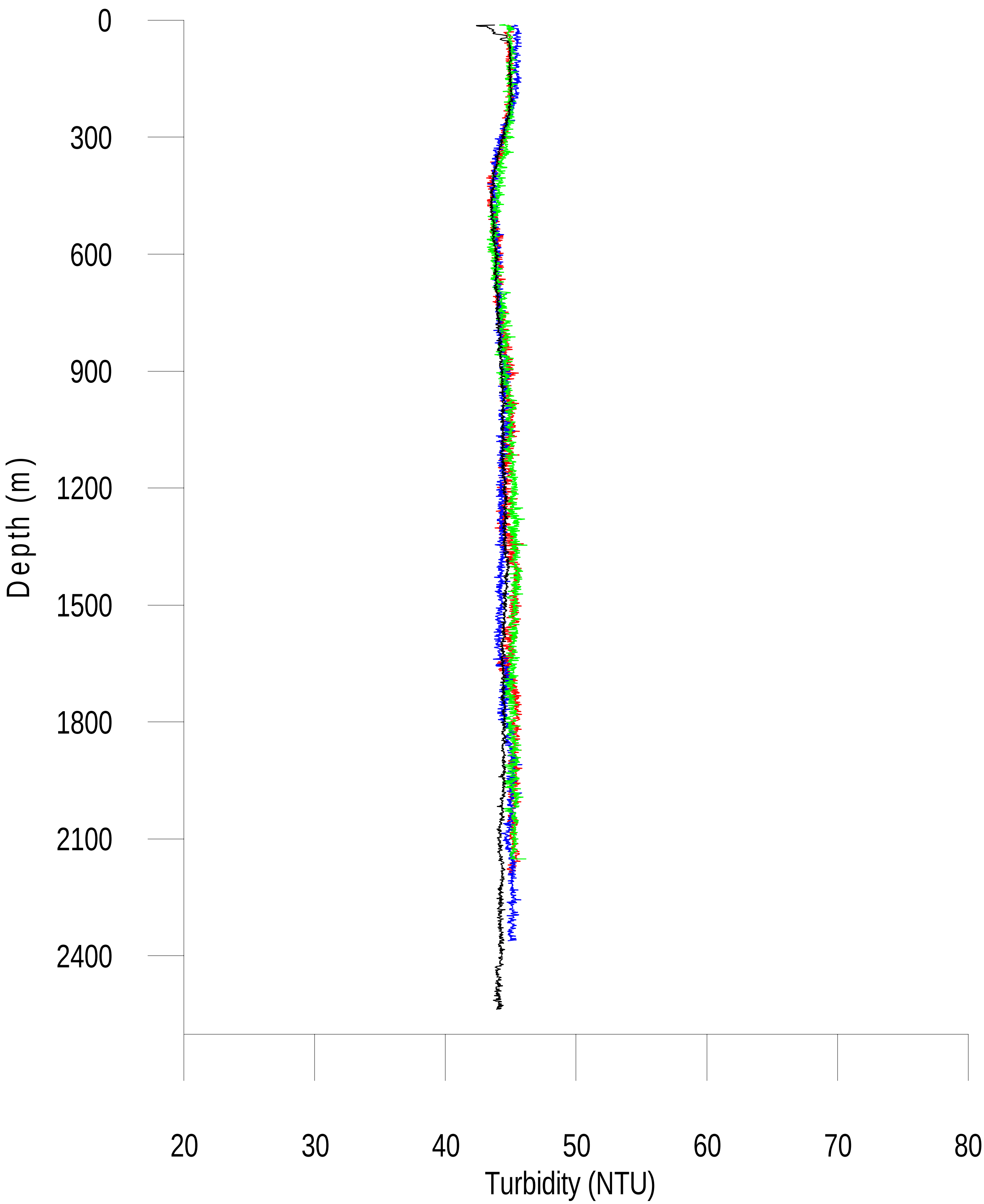

Figure 3-15.
Comparison of Turbidity Profiles between Representative Stations in the North Study Area, Northwest Study Area and Proposed Reference Site

Source: Weston, 2008

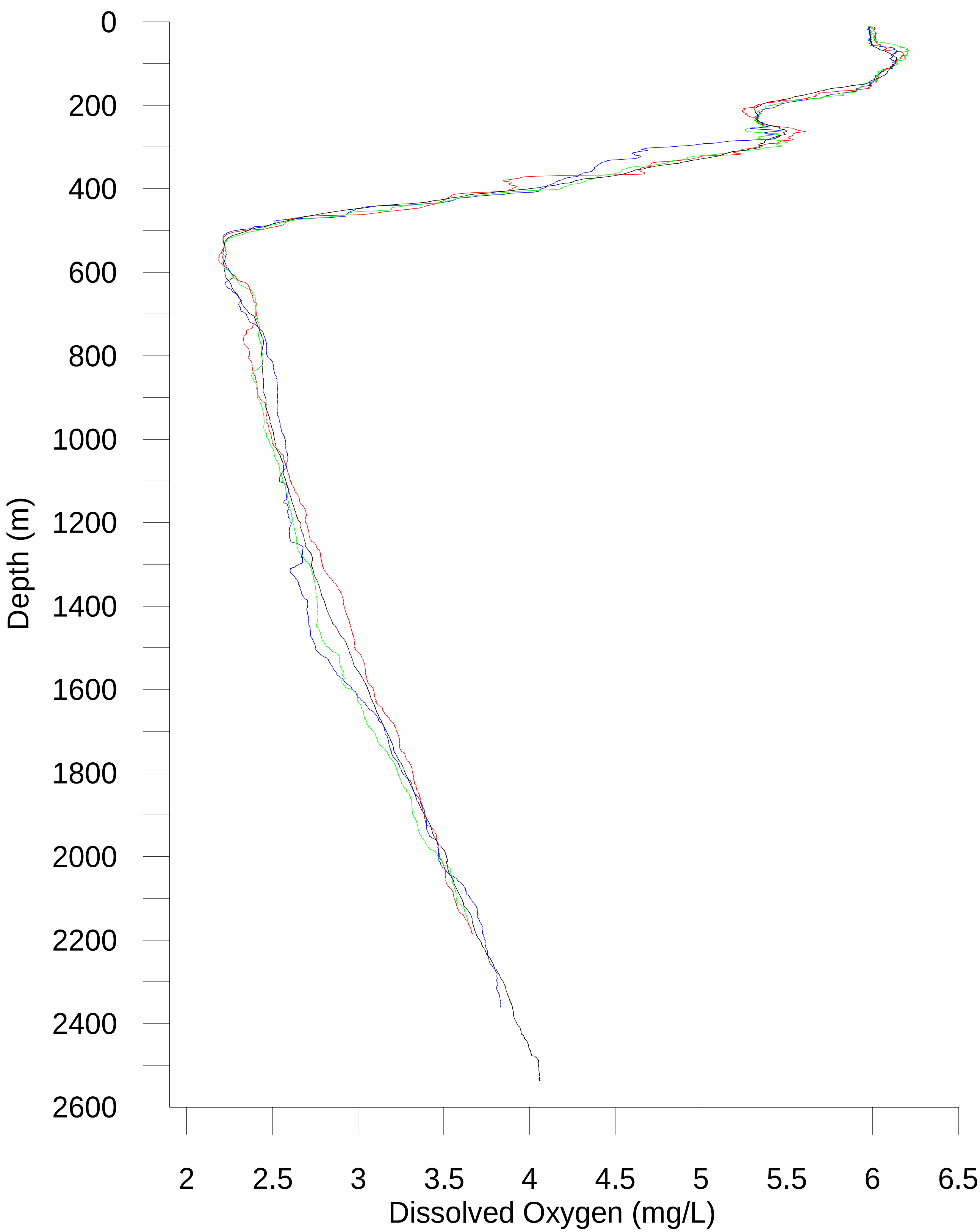

Figure 3-16.
Comparison of Dissolved Oxygen Profiles between Representative Stations in the North Study Area, Northwest Study Area and Proposed Reference Site

Source: Weston, 2008

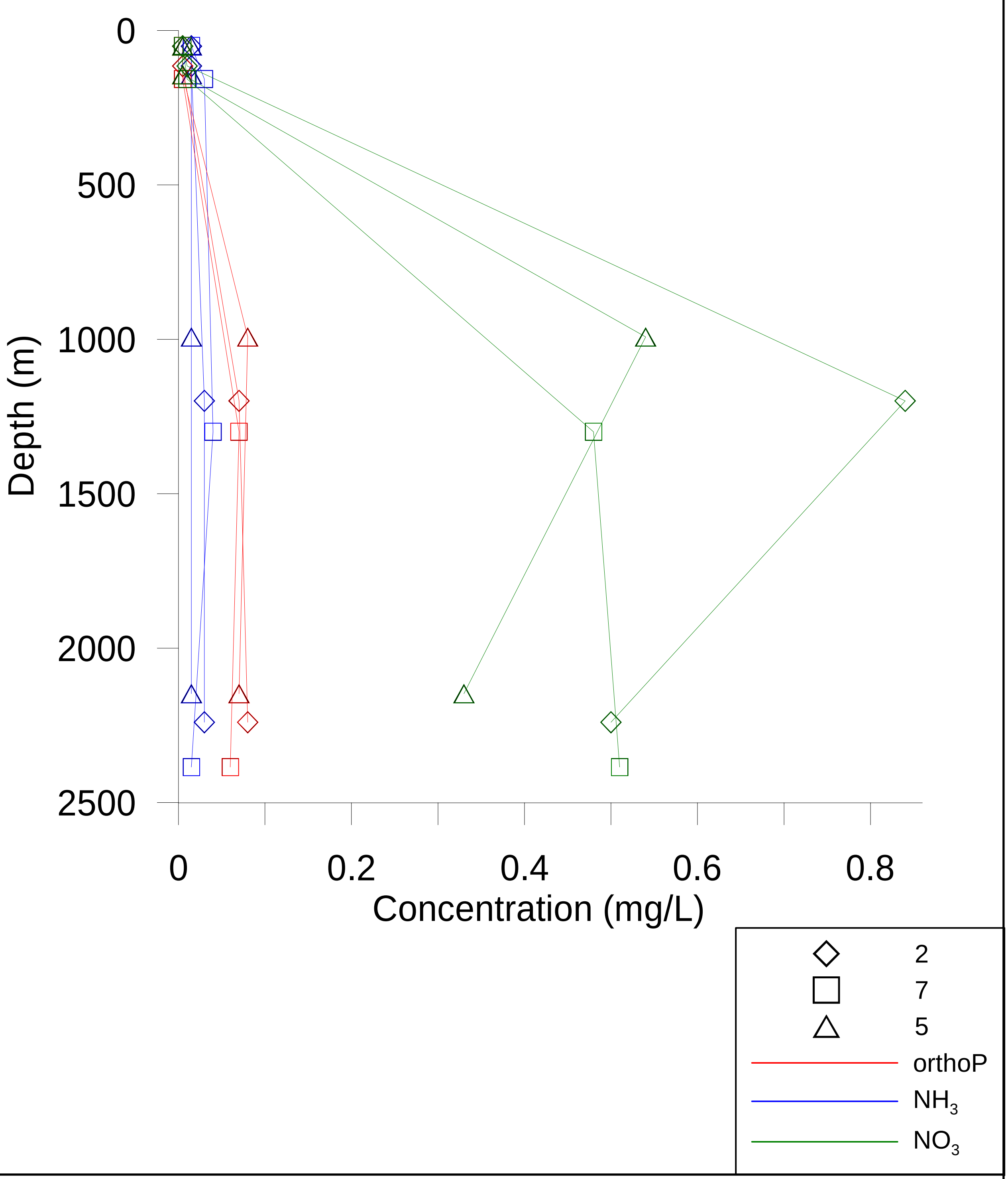

Figure 3-17.
Nutrient Concentrations with Depth in the North Study Area, Northwest Study Area and Proposed Reference Site

Source: Weston, 2008

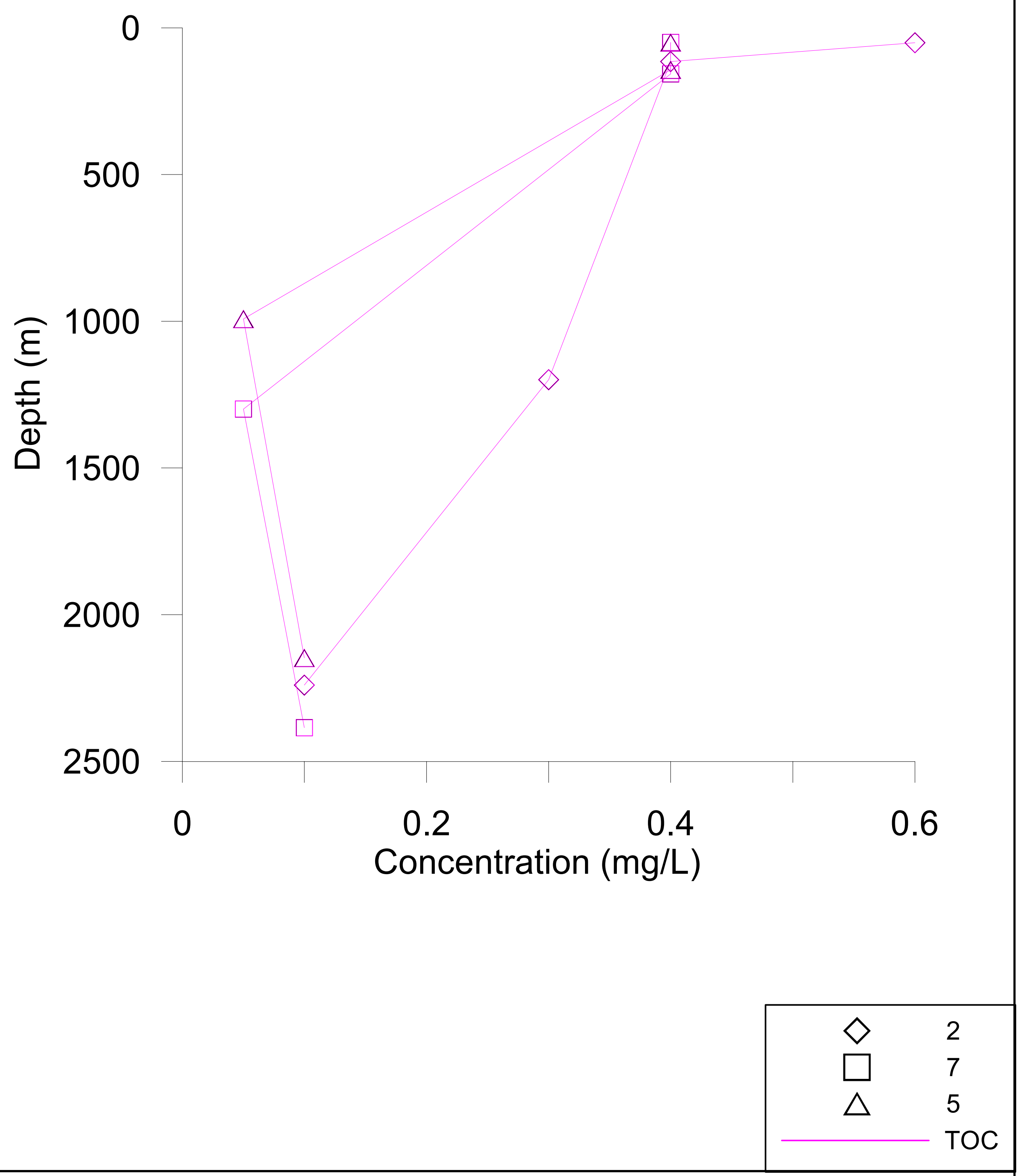

Figure 3-18.
Total Organic Carbon (TOC) Concentrations with Depth in the North Study Area, Northwest Study Area, and Proposed Reference Site

Source: Weston, 2008

Northwest Study Area

With the exception of nitrite which was not detected in any of the depth specific samples at Station 7, nutrients tended to have an increasing trend with depth, whereas TOC tended to have a decreasing trend with depth (see Figure 3-17 and Figure 3-18). Ammonia ranged from non-detectable levels at the surface to 0.04 mg/L in the mid-water column sample; ammonia was not detected in the near bottom sample (see Figure 3-17 and Figure 3-18). Dissolved orthophosphate concentrations ranged from non-detectable levels at the surface to 0.06 mg/L in the near bottom sample. Nitrate concentrations ranged from non-detectable levels in the surface sample to 0.51 mg/L in the near bottom sample. TOC concentrations ranged from 0.4 mg/L in the surface sample to an estimated value of 0.1 mg/L in the near bottom sample. The Dixon's Test for extreme values was utilized to determine the homogeneity of nutrient values throughout the water column. There were no significant differences in nutrient levels between samples collected at each of the four different water depths at Station 7 in the Northwest Study Area.

Inshore/Proposed Reference Site

At the proposed reference site, ammonia and nitrite were not detected in any of the depth specific samples. Contrary to the trends identified in nutrient levels at the North and Northwest Study Areas, dissolved orthophosphate, nitrate and TOC did not exhibit a trend with depth (see Figure 3-17 and Figure 3-18). Dissolved orthophosphate concentrations ranged from non-detect at the surface and mid-column water samples to 0.08 and 0.07 mg/L in the thermocline and near bottom samples, respectively. Nitrate concentrations ranged from non-detectable levels in the surface and mid-column water samples to 0.54 and 0.33 mg/L in the thermocline and near bottom samples, respectively. TOC concentrations ranged from 0.4 mg/L in the surface and mid-column water samples to non-detectable levels in the thermocline sample; TOC had an estimated concentration of 0.1 mg/L in the near bottom sample. The Dixon's Test for extreme values was utilized to determine the homogeneity of nutrient values throughout the water column. There were no significant differences in nutrient levels between samples collected at each of the four different water depths at Station 5, the proposed reference site.

3.1.4.2 Trace Metals

North Study Area

In the North Study Area, samples were collected from four distinct depths at Station 2. In the dissolved form, all trace metals were detected in the four samples with the exception of aluminum, beryllium, iron, mercury and tin (Table 14 of Weston Solutions and TEC 2008b). Throughout the water column, dissolved metals concentrations were consistent with other deep ocean reference samples (Brown et al. 1989a) and had the ranges listed in Table 3-10.

Table 3-10. Upper and Lower Trace Metal Concentration Values at the North Study Area

Trace Metal	Lower Value (µg/L)	Upper Value (µg/L)
Antimony	0.11	0.17
Arsenic	1.63	2.04
Cadmium	0.007 (estimated)	0.073
Chromium	0.179	0.273
Cobalt	0.114	0.258
Copper	0.25	2.09
Lead	0.005 (estimated)	0.03
Manganese	0.12	0.22
Molybdenum	5.79	6.45
Nickel	0.243	0.608
Selenium	Non-detectable levels	0.07
Silver	0.04	0.06
Thallium	0.008 (estimated)	0.01
Titanium	Non-detectable levels	0.063
Vanadium	1.93	2.23
Zinc	7.11	10.7

All of the dissolved metals concentrations were one to three orders below their respective Criterion Continuous Concentration (CCC) values. Figure 3-19 illustrates metals concentrations with depth for those analytes having corresponding CCC and Criterion Maximum Concentration (CMC) values.

Using the Dixon's Test for detecting extreme values, it was determined that all four depths had similar concentrations for each metal with the exception of manganese and zinc. The dissolved manganese concentration was slightly higher in the bottom sample compared to the other three depths and the dissolved zinc concentration was slightly lower in the sample collected from the thermocline than the other three depths. Although these outliers were identified, due to the relatively low concentrations of these metals in the water samples, the metals concentrations were averaged across depths for subsequent comparison between alternative study areas.

Northwest Study Area

In the Northwest Study Area, samples were collected from four distinct depths at Station 7. In the dissolved form, all trace metals were detected in the four samples with the exception of aluminum, beryllium, iron, mercury and tin (Table 14 of Weston Solutions and TEC 2008b).

Throughout the water column, dissolved metals concentrations were consistent with other deep ocean reference samples (Brown et al. 1989a) and had the ranges listed in Table 3-11.

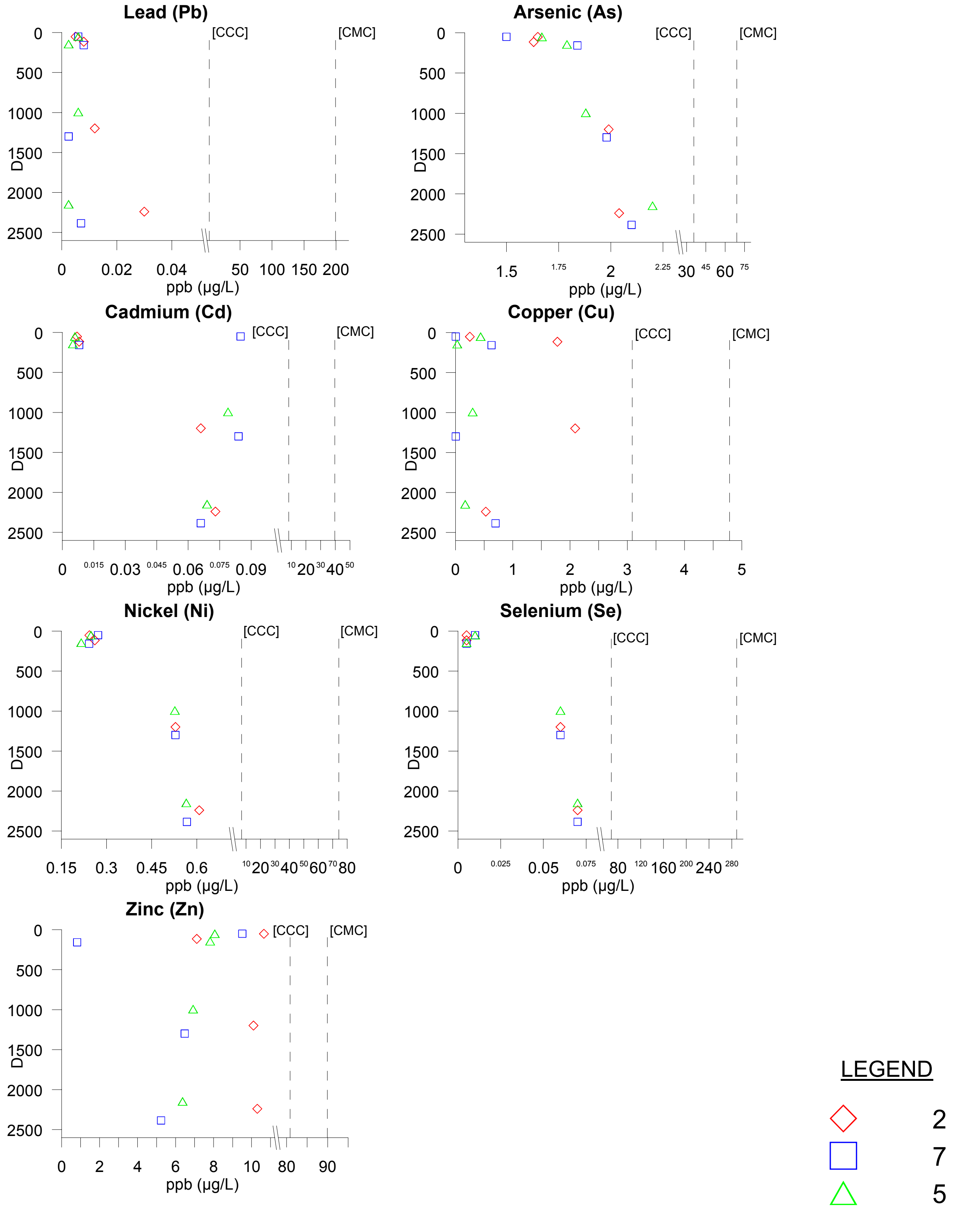

Figure 3-19.
Dissolved Metals Concentrations with Depth in the North Study Area, Northwest Study Area and Proposed Reference Site

Source: Weston, 2008

Table 3-11. Upper and Lower Trace Metal Concentration Values at the Northwest Study Area

Trace Metal	Lower Value (µg/L)	Upper Value (µg/L)
Antimony	0.13	0.15
Arsenic	1.50	2.10
Cadmium	0.008 (estimated)	0.085
Chromium	0.181	0.253
Cobalt	0.103	0.126
Copper	Non-detectable levels	0.70
Lead	Non-detectable levels	0.008 (estimated)
Manganese	0.11	0.28
Molybdenum	6.08	6.37
Nickel	0.242	0.567
Selenium	Non-detectable levels	0.07
Silver	0.03 (estimated)	0.04
Thallium	0.009 (estimated)	0.01
Titanium	Non-detectable levels	0.04
Vanadium	1.94	2.20
Zinc	0.819	9.51

All of the dissolved metals concentrations were one to three orders below their respective CCC values. Figure 3-19 illustrates metals concentrations with depth for those analytes having corresponding CCC and CMC values.

Using the Dixon's Test for detecting extreme values, it was determined that all four depths had similar concentrations for each metal with the exception of manganese and molybdenum. The dissolved manganese concentration was slightly higher in the bottom sample compared to the other three depths and the dissolved molybdenum concentration was slightly higher in the sample collected from the surface than the other three depths. Although these outliers were identified and due to the relatively low concentrations of these metals in the water samples, the metals concentrations were averaged across depths for subsequent comparison between study areas.

Inshore/Proposed Reference Site

At the proposed reference site, samples were collected from four distinct depths at Station 5. In the dissolved form, all trace metals were detected in the four samples with the exception of beryllium, iron, mercury and tin (Table 14 of Weston Solutions and TEC 2008b). Throughout the water column, dissolved metals concentrations were consistent with other deep ocean reference samples (Brown et al. 1989a) and had the ranges listed in Table 3-12.

Table 3-12. Upper and Lower Trace Metal Concentration Values at the Proposed Reference Site

Trace Metal	Lower Value (µg/L)	Upper Value (µg/L)
Aluminum	Non- detectable levels	3.3 (estimated)
Antimony	0.13	0.16
Arsenic	1.67	2.20
Cadmium	0.005 (estimated)	0.079
Chromium	0.175	0.263
Cobalt	0.089	0.101
Copper	0.03	0.44
Lead	Non-detectable levels	0.006 (estimated)
Manganese	0.08	0.16
Molybdenum	5.90	6.20
Nickel	0.216	0.565
Selenium	Non-detectable levels	0.07
Silver	0.03 (estimated)	0.04
Thallium	0.009 (estimated)	0.01
Titanium	Non-detectable levels	0.049
Vanadium	2.00	2.23
Zinc	6.37	8.06

All of the dissolved metals concentrations were one to three orders below their respective CCC values. Figure 3-19 illustrates metal concentrations with depth for those analytes having corresponding CCC and CMC values.

Using the Dixon's Test for detecting extreme values, it was determined that all four depths had similar concentrations for each metal; therefore, the metals concentrations were averaged across depths for subsequent comparison between study areas.

3.1.4.3 Polycyclic Aromatic Hydrocarbons (PAHs)

<u>North Study Area</u>

At Station 2 in the North Study Area, PAHs analyzed from water samples collected at four distinct depths were not detected with the exception of 1-methynaphthalene, 2-methylnaphthalene and naphthalene (Table 14 of Weston Solutions and TEC 2008b). The analyte 1-methynapthalene was estimated at a concentration of 1.5 ng/L in the surface sample (taken at 170 ft [51 m] depth) and 2-methylnapthalene was estimated at a concentration of 1.9 ng/L in the bottom sample (taken at 2,240 m depth). Napthalene was detected in all four water samples collected at Station 2, ranging in concentration from 5.6 to 10.8 ng/L, five orders of magnitude below the CMC for naphthalene. The presence of 1-methylnaphthalene, 2-methylnaphthalene and naphthalene in these samples may have been attributable to the proximity of the designated smoking area on board the *R/V Melville* to the deployment and retrieval area of the water samplers. Regardless, the concentrations observed in samples from Station 2 were well below CMC values and considered biologically insignificant. There were no significant differences in PAH concentrations between samples collected at each of the four different water depths at Station 2 in the North Study Area.

Northwest Study Area

At Station 7 in the Northwest Study Area, PAHs analyzed from water samples collected at four distinct depths were not detected with the exception of 2-methylnaphthalene, naphthalene and perylene (Table 14 of Weston Solutions and TEC 2008b). The analyte 2-methylnapthalene was estimated at a concentration of 1.3 ng/L in the sample collected at the top of the thermocline (taken at 515 ft [157 m] depth). Napthalene was detected in three water samples collected at Station 7, ranging in concentration from 5.1 to 14.4 ng/L, five orders of magnitude below the CMC for naphthalene; naphthalene was not detected in the bottom sample. Perylene was estimated at a concentration (3.6 ng/L) below the MRL (5 ng/L) in the sample collected at the top of the thermocline. Similar to the North Study Area samples cross-contamination of the sample may have caused the 2-methylnaphthalene and naphthalene detections. There were no significant differences in PAH concentrations between samples collected at each of the four different water depths at Station 7 in the Northwest Study Area.

Inshore/Proposed Reference Site

At Station 5, the proposed reference site, PAHs analyzed from water samples collected at four distinct depths were not detected with the exception of naphthalene and perylene (Table 14 of Weston Solutions and TEC 2008b). Napthalene was detected in all four water samples collected at Station 5, ranging in concentration from 4.5 ng/L in the surface sample to 8.5 ng/L in the mid-column and near bottom samples, six orders of magnitude below the CMC for naphthalene. Perylene was estimated at a concentration of 3.4 ng/L in the sample collected at the top of the thermocline. Similar to the North and Northwest Study Area samples cross-contamination of the sample may have caused the naphthalene detections. There were no significant differences in PAH concentrations between samples collected at each of the four different water depths at Station 5 at the proposed reference site.

3.1.4.4 Organochlorine Pesticides/PCBs

North Study Area

Concentrations of all chlorinated pesticides, including PCBs (both Aroclors and individual congeners), were not detected at each depth interval at each of the three stations in the North Study Area (Stations 1-3) (Table 14 of Weston Solutions and TEC 2008b). There were no significant differences in chlorinated pesticide concentrations between samples collected at each of the four different water depths at Station 2 in the North Study Area.

Northwest Study Area

Concentrations of all chlorinated pesticides, including PCBs (both Aroclors and individual congeners), were not detected at each depth interval at each of the three stations in the Northwest Study Area (Stations 6-8) with the exception of 4,4'-DDT (estimated at a concentration of 4.8 ng/L in the bottom water sample (7,825 ft [2,385 m] depth) collected at Station 7 (Table 14 of Weston Solutions and TEC 2008b). There were no significant differences in chlorinated pesticide concentrations between samples collected at each of the four different water depths at Station 7 in the Northwest Study Area.

Inshore/Proposed Reference Site

Concentrations of all chlorinated pesticides, including PCBs (both Aroclors and individual congeners), were not detected at each depth interval at each of the three stations inshore of the two alternative areas (Stations 4, 5 and 9) (Table 14 of Weston Solutions and TEC 2008b). There were no significant differences in chlorinated pesticide concentrations between samples collected at each of the four different water depths at Station 5 at the proposed reference site.

3.1.4.5 Regional Summary

The conventional and chemical characteristics of water collected from stations located in the North and Northwest Study Areas were similar. Overall, nutrients tended to increase in concentration with increasing water depth, whereas TOC tended to decrease in concentration with increasing water depth. Metals concentrations were relatively low compared to CCC and CMC values and were within the same order of magnitude of other deep ocean reference site water samples. Very few PAH or chlorinated pesticides were detected in any of the water samples.

As mentioned previously, a few metals were identified as outliers using the Dixon's Test for extreme values. However, due to the relatively low concentrations of these metals in the water samples, averages values were calculated for these metals concentrations at each station in order to compare results from the North and Northwest Study Areas to each other and to the proposed reference site. Figure 3-20 and Figure 3-21 show that the mean value for each analyte at a particular station falls within one standard deviation of the mean for that analyte at another station. Consequently, no significant differences were observed in water quality between the North and Northwest Study Areas as well.

3.1.5 Regional Geology

The ROI for regional geology is the general region of Guam, which includes the ODMDS study areas, the Island of Guam, and the offshore area between them. Guam is the largest and southernmost of the Mariana Islands, located at 13° 28' North latitude, 144° 45' East longitude in the western Pacific Ocean. The Marianas Islands are part of the Marianas Ridge, a complex island-arc system which is located west and on the concave side of the Mariana Trench (Figure 3-22). The Marianas Ridge was formed from the subduction of the oceanic Pacific Plate under the oceanic Philippine Plate. To the east, generally uniform underwater slopes descend from Guam at a rate of approximately 4° into the subduction zone area known as the Mariana Trench, located approximately 70 mi (113 km) away from Guam (Emery 1962) with depths greater than 36,000 ft (11,000 m). To the west, more complex underwater slopes descend rapidly from Guam at a rate up to 14° to approximately 6,000 ft (1,830 m) into two depressions, interpreted by Tracey et al. (1964) as collapse or graben-like features, and identified as the northwest and southwest collapse areas. These depressions are bounded by normal faults with two seamounts, likely underwater volcanoes, occurring to their west, approximately 15 nm (28 km) from the island of Guam. Further west, water depths increase to over 12,000 ft (3,600 m) in the East Mariana Basin of the Philippine Sea (Emery 1962; Tracey et al. 1964).

The island of Guam was formed through a combination of geologic processes; two volcanoes (identified in Tracey et al. [1964] as the Eocene and Miocene volcanoes) to the west of present day Guam collapsed and the related faulting with this event resulted in uplift of submerged areas, eventually creating the island of Guam. Today, the island is characterized by two distinct terrain features, a limestone plateau in the northern half and volcanic uplands in the southern half. The northern plateau, bounded by steep cliffs, is approximately 600 ft (183 m) in elevation in the north and gently slopes to approximately 200 ft (60 m) in the central portion of Guam. The southern uplands are distinguished by a ridge of mountains trending parallel to the long axis of the island with elevations above 1,000 ft (305 m) and a maximum of 1,334 ft (406 m) at Mount Lamlam. An interior basin area characterized by rolling lowlands and karst occurs in the south central portion of Guam. Coastal lowland features are predominant along the coast in the southern half and sporadic in the north. Fringing reefs occur around the majority of the island. Guam is approximately 30 mi (48.3 km) in length, trending northeast-southwest in the northern half and trending north-south in the southern half. Guam ranges from 4 to 11 mi (6.4 to 17.7 km) wide and has a total land area of approximately 212 sq. mi (549 square km) (Tracey et al. 1964).

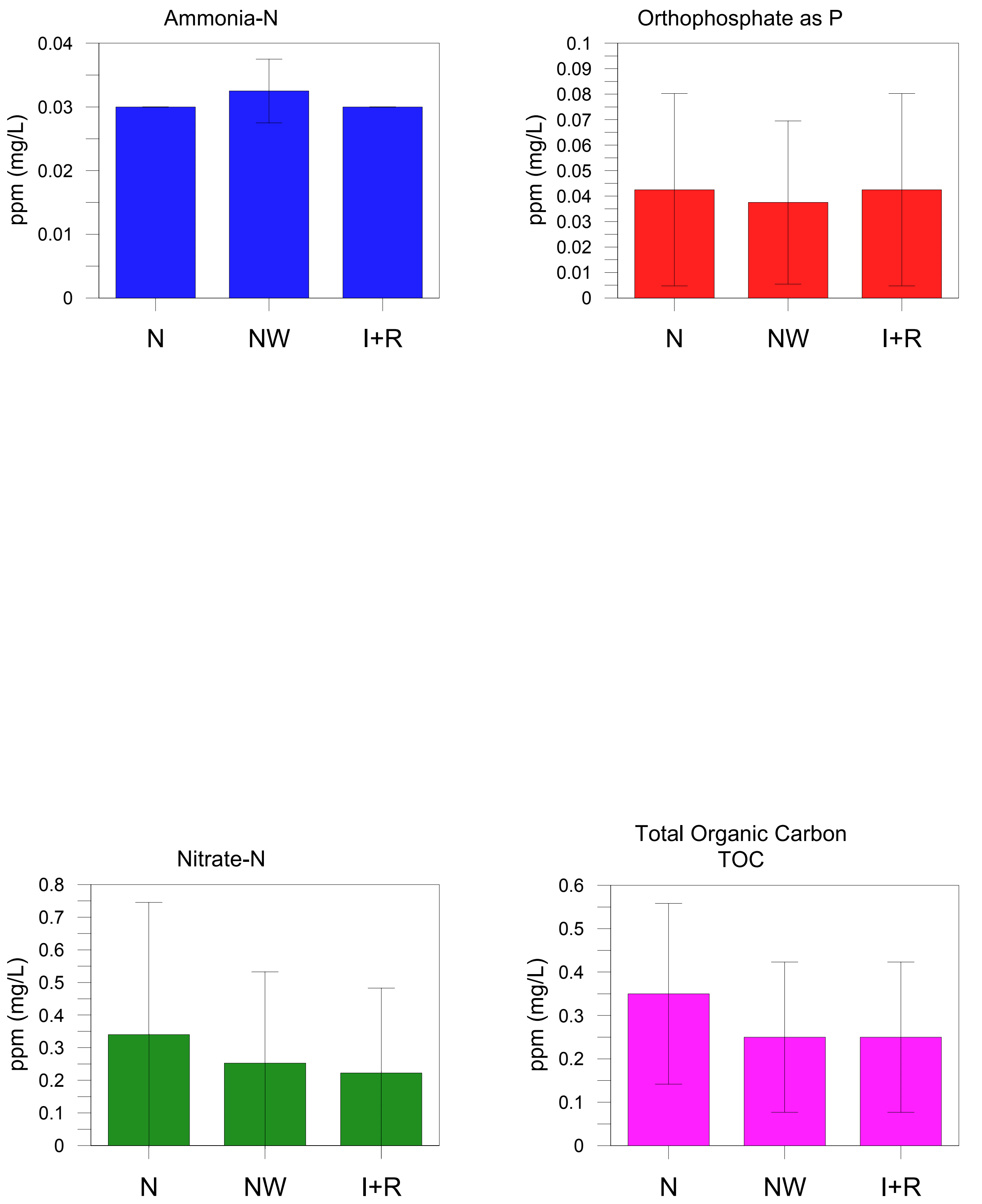

Figure 3-20. Mean and Standard Deviation of Selected Conventional Chemistry Constituents of Water Samples Collected Offshore of Guam, Showing Comparison of Study Areas (N and NW) to Each Other and Proposed Reference (I+R)

Source: Weston, 2008

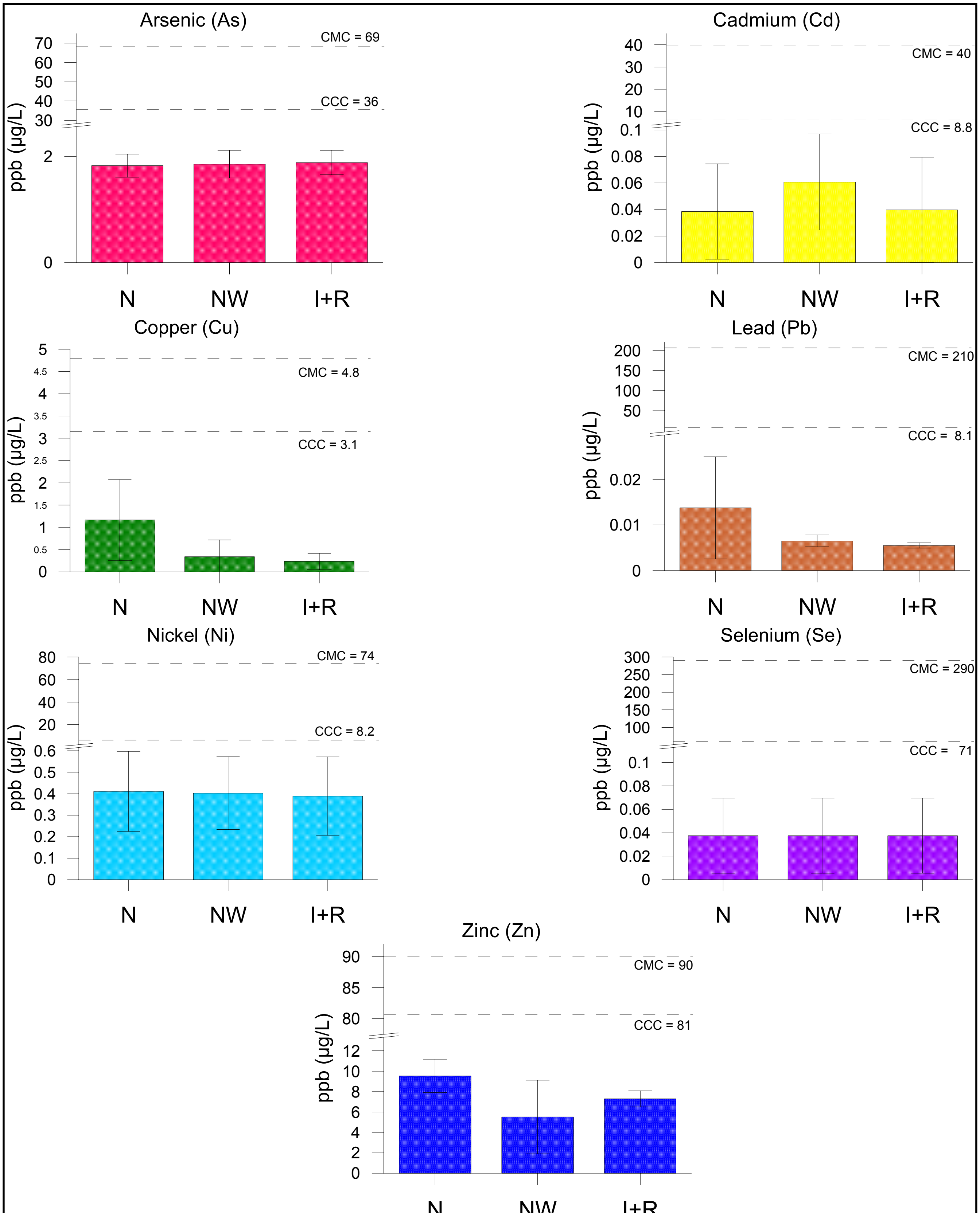

Figure 3-21.
Mean and Standard Deviation of Selected Metals Showing Comparison of Study Areas (N and NW) to Each Other, Proposed Reference (I+R) and CMC and CCC Values

Source: Weston, 2008

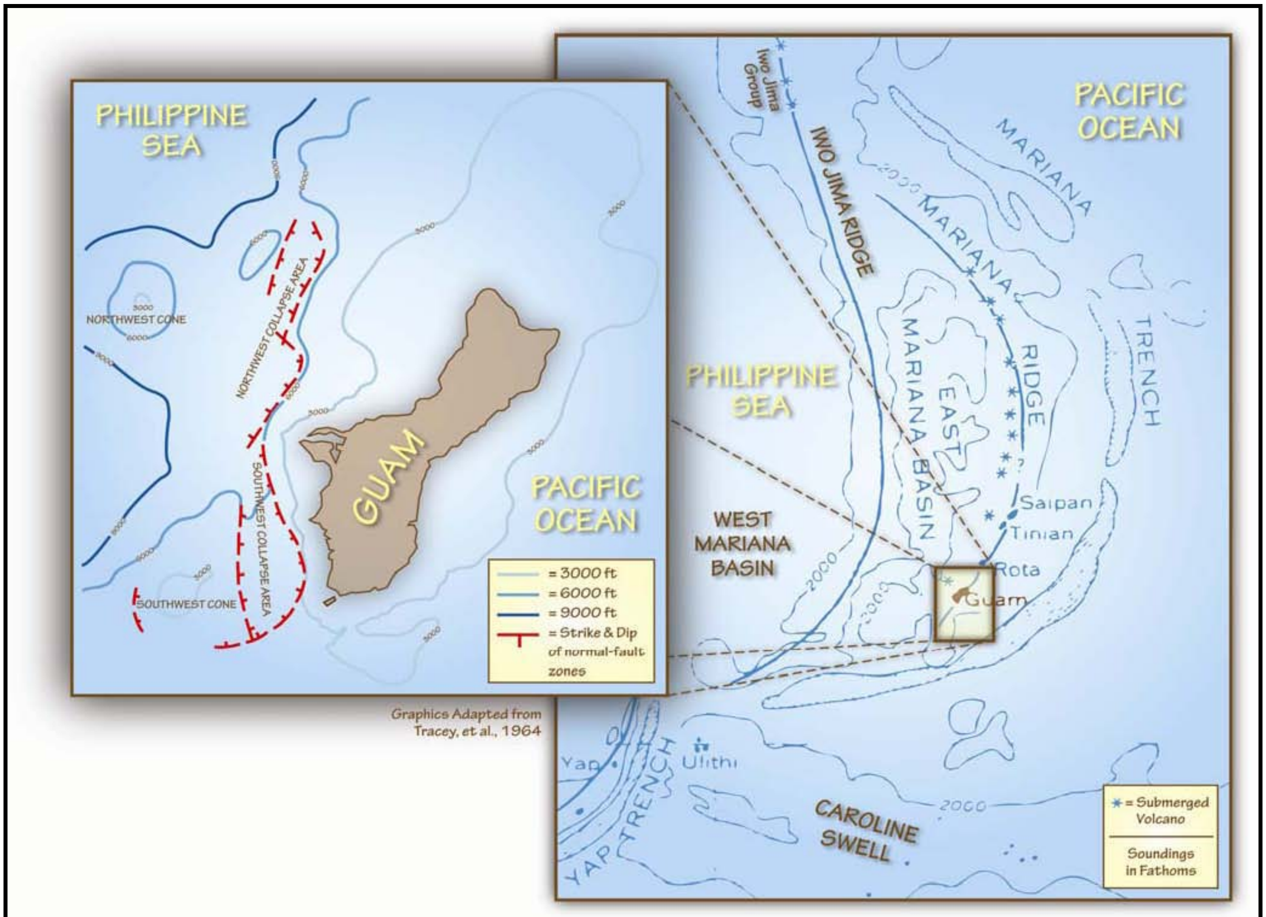

Figure 3-22.
Marine Geology Offshore of Guam and Surrounding Vicinity

Several underwater terraces have been observed around Guam and adjacent underwater banks such as Santa Rosa Reef and Galvez Bank. These terraces occur in relatively shallow water, with mean depths of 55 ft (17 m), 105 ft (32 m), 195 ft (59 m) and 315 ft (96 m). These terraces may likely be indicative of historical sea levels (Emery 1962).

3.1.5.1 Proximity to Continental Shelf

The island of Guam is volcanic and not part of a continental land mass, and therefore does not have a continental shelf. In the absence of a shelf break, continental shelf can be defined as submerged land between shoreline and a depth of 656 ft (200 m). On Guam, this typically occurs within 1 nm (1.9 km) of shore. The slope tends to increase rapidly offshore of Guam and depths can reach 6,000 ft (1.829 km) within 3 nm (5.6 km) (Weston Solutions and Belt Collins 2006). The study areas that contain both ODMDS alternative sites are well beyond the continental shelf, with the closest center point being 11.1 nm (20.6 km) from the shoreline.

3.1.5.2 Study Region Bathymetry

The Guam ODMDS study region is located northwest of the island of Guam, approximately 5 nm (9.2 km) to 15 nm (28 km) offshore. During the 2008 Site Characterization Survey, a bathymetric survey of the region and surrounding area was conducted using by multibeam hydrographic survey system. Figures 3-23 through 3-25 show the results of this survey. Water depths increase rapidly offshore of Orote Point, Guam, to 6,550 ft (2,000 m). Several underwater canyons are apparent in the slope. The center of the study region is bisected by a broad shelf extending west from the base of the slope at depths of approximately 7,220 ft (2,200 m). South and southwest of this shelf, water depths continue to increase to 12,470 ft (3,800 m) into the East Mariana Basin. To the west, the shelf connects with Perez Bank, a large conical seamount (identified in Figure 3-22 as the Northwest Cone), which rises to depths of only 2,625 ft (800 m). A ridge extends from the northeast to the shelf, separating the northern half of the study region into two sections. The eastern section consists of a depression between the island slope to the east, the shelf-like feature to the south and ridge to the west. The western section consists of increasing water depths to 11,150 ft (3,400 m) into the East Mariana Basin.

Seamounts are large bathymetric features on the seafloor, which can interact with oceanic currents and create variability in the physical flow field. Seamount effects, which can include internal wave generation, eddy formation, local upwelling and closed circulation patterns have the potential to impact pelagic and benthic ecosystems over seamounts (Boehlert and Genin 1987). However, not all seamounts generate the same effects, due to different shapes, sizes, summit depths, and distance from other bathymetric features (Porteiro and Sutton 2007). Shallow seamounts reach into the euphotic zone, intermediate seamounts have summits below the euphotic zone but within approximately 1,315 ft (400 m) of the sea surface, and deep seamounts have peaks below approximately 1,315 ft (400 m) depth (Genin 2004). The conical Tracey Seamount (e.g., Perez Bank) west of Guam, is considered a deep seamount, which rises from bottom depths of approximately 9,840 ft (3000 m) up to a summit at approximately 2,625 ft (800 m) below the sea surface. The euphotic zone, or surface water shallow enough to receive sufficient light to support photosynthesis, extends to a depth of approximately 495 ft (150 m) in tropical waters (Lalli and Parsons 1993), well above the summit of Perez Bank. Figure 3-26 shows the plan and profile views of both study areas, their distance from Guam and local seamounts, and the relationship to ocean depth at the seafloor disposal boundary.

North Study Area

The North Study Area, as determined through the ZSF process, is trapezoidal in shape and is predominantly located across a depression, identified in the previous section as the northwest collapse area of an ancient volcano (Figure 3-24). This depression is bounded by increasing slopes on all sides except to the north. The eastern portion of the North Study Area is located over slopes declining towards the northwest at 9°. The easternmost boundary is located in approximately 5,900 ft (1,800 m). A narrow canyon bisects this slope. The central and western portion of this area is located over a relatively flat region, with a <1° slope slightly declining towards the north. A ridge of seamounts bounds the extreme western portion of this region, with depths rising to approximately 6,550 ft (2,000 m) in the southwest and 5,575 ft (1,700 m) in the northwest corner. To the north of the North Study Area, a canyon trending towards the northwest bisects the ridge of seamounts including Spoon Bank, extending to depths of 11,150 ft (3,400 m).

Northwest Study Area

The Northwest Study Area, as determined through the ZSF process, is triangular in shape and is predominantly located across the southeastern flank of Perez Bank, a conical seamount approximately 15 nm (28 km) northwest of Apra Harbor, Guam (Figure 3-25). The northwest extent of this alternative area arcs across the tip of the seamount at only 2,625 ft (800 m) depth. The bathymetry slopes down off the seamount at approximately 7° to depths of approximately 8,200 ft (2,500 m) in the eastern portion of this area and 8,860 ft (2,700 m) in the southern portion.

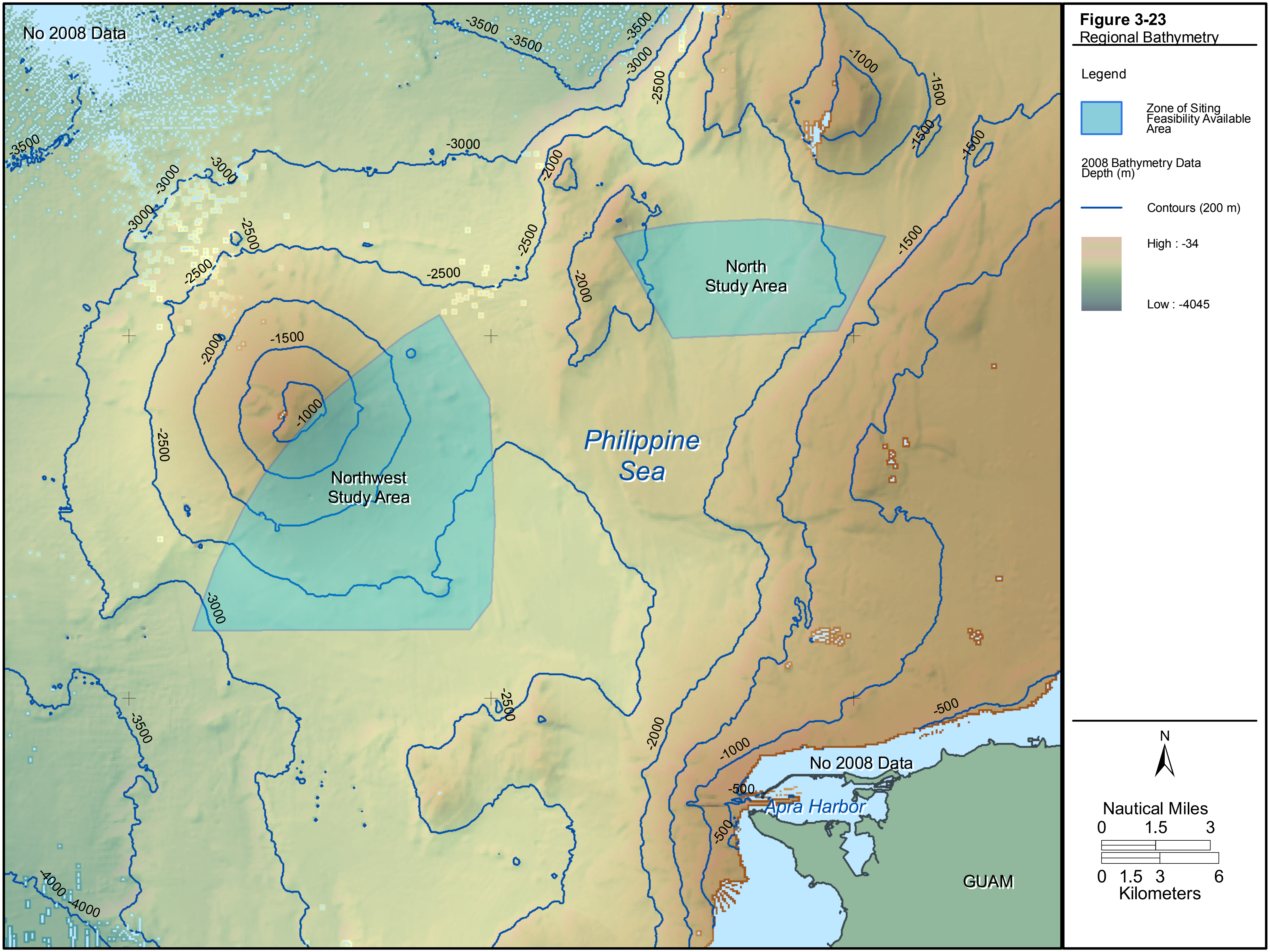

Figure 3-23
Regional Bathymetry

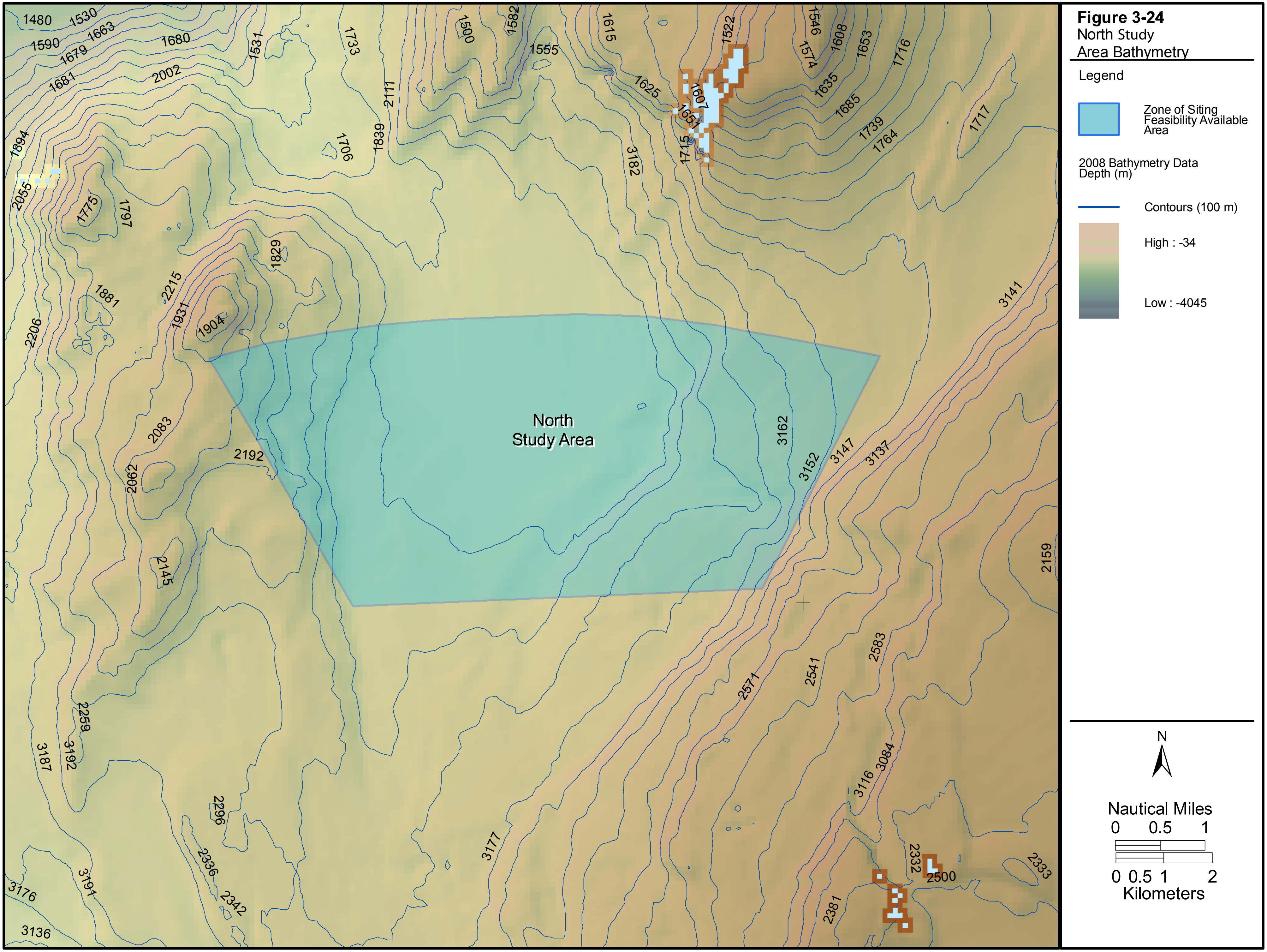

Figure 3-24
North Study Area Bathymetry

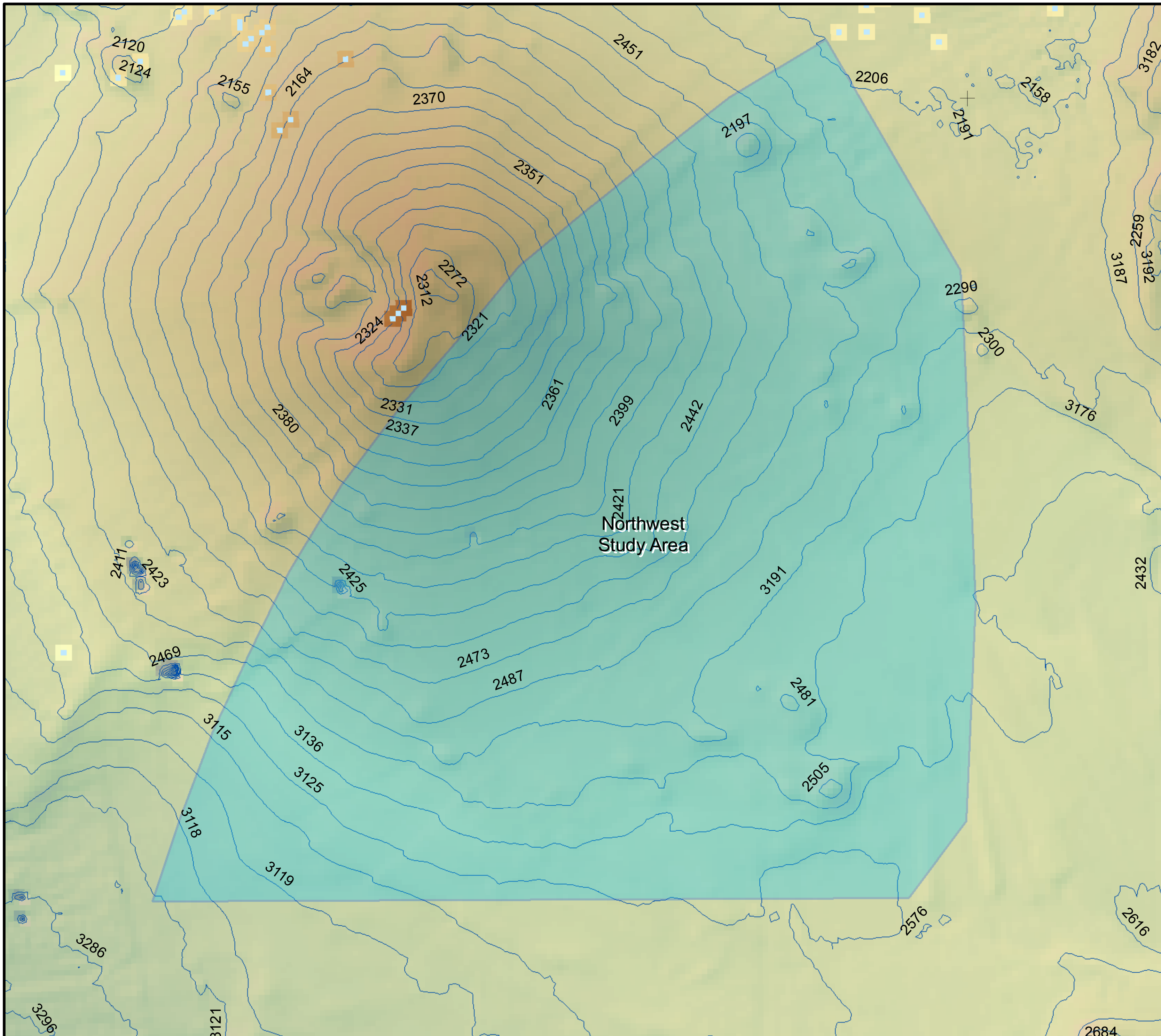

Figure 3-25
Northwest Study Area Bathymetry

Legend

Zone of Siting Feasibility Available Area

2008 Bathymetry Data Depth (m)

Contours (100 m)

High : -34

Low : -4045

Nautical Miles
0 0.5 1

0 0.5 1 2
Kilometers

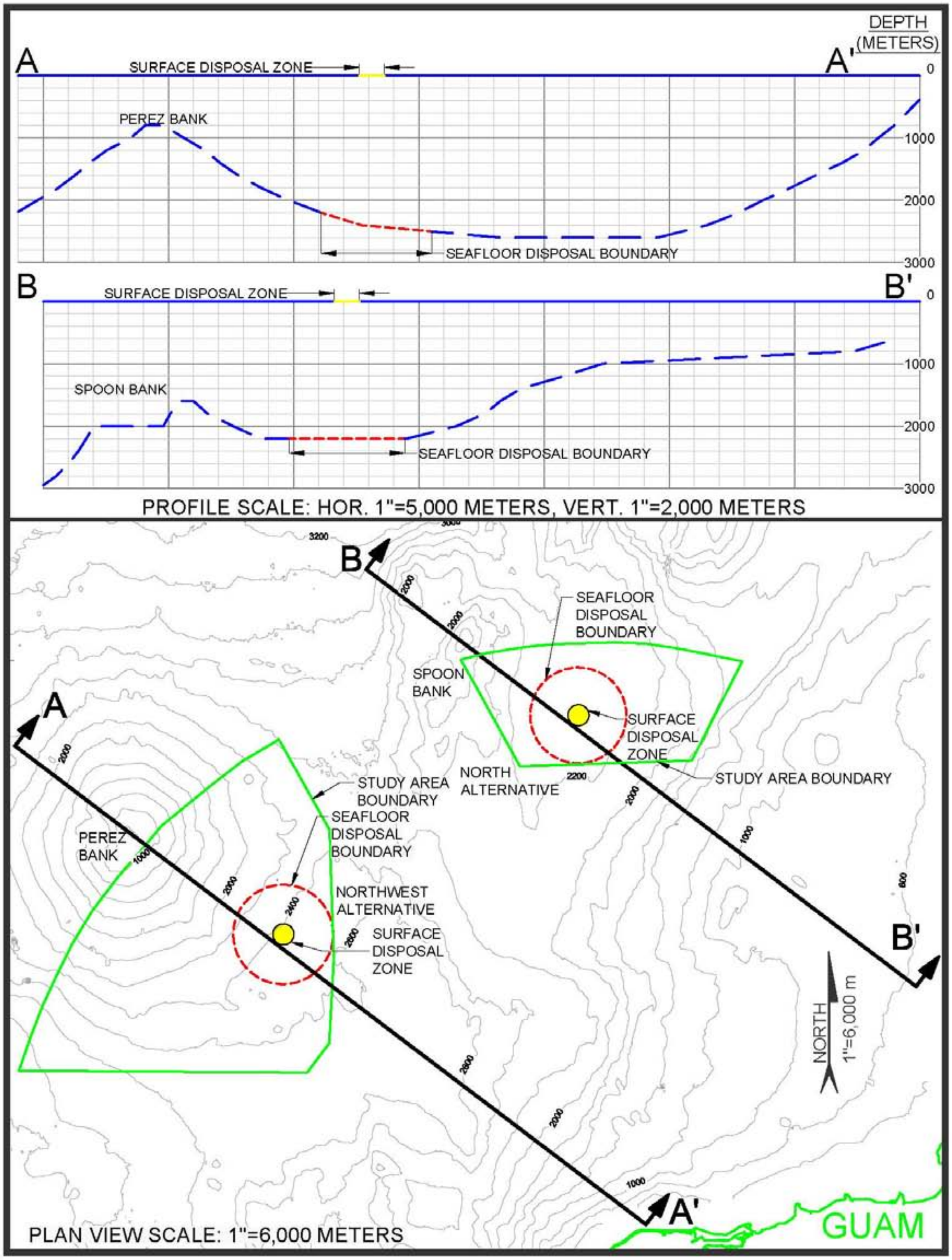

Figure 3-26.
Plan and Profile Views of Upper Water Column Sediment Dispersion in the North and Northwest Study Areas During La Niña Conditions

3.1.6 Sediment Characteristics

The ROI for sediment characteristics is the ocean floor within the ODMDS study areas. Physical, conventional, chemical and radiological sediment characteristics were examined to determine current baseline conditions in the study region. Measurements included grain size, TOC, nitrogen (ammonia, Total Kjeldahl Nitrogen (TKN), Total Organic Nitrogen (TON), sulfides, solids, trace metals, Acid volatile sulfides Simultaneously Extracted Metals (AVS-SEM), persistent organic pollutants (PAHs, chlorinated pesticides/PCBs, organotins, dioxins/furans) and gross alpha/beta. Results of sediment characteristics tests are described below for the alternative sites and a reference site. Complete details of the study are included in Weston Solutions and TEC (2008b).

3.1.6.1 Physical Analyses

Grain size is the most essential physical characteristic of sediment. Information on sediment grain size is used in determining trends of chemical processes, surface processes related to transportation and deposition, sample permeability/stability, affinities of contaminants and movement of subsurface fluids (Blatt et al. 1972; McCave and Syvitski 1991). Grain size measurements were analyzed in sediments from nine stations in this study and presented in Figure 3-27 and Table 14 of Weston Solutions and TEC (2008b).

North Study Area

Sediment samples collected from Stations 1, 2 and 3 located in the North Study Area were primarily sand with some silt and clay. The dominant sand fraction had an average of 69.82%, with a range of 58.93% at Station 1 to 80.10% at Station 2. The lesser silt fraction averaged 25.17%, with a range of 16.14% at Station 2 to 35.47% at Station 1. The minor clay fraction averaged 5.01%, with a range of 3.76% at Station 2 to 5.68% at Station 3. Results indicate that there was no gravel fraction detected in sediments collected from the North Study Area.

Northwest Study Area

Sediment samples collected from Stations 6, 7 and 8 located in the Northwest Study Area were primarily sand and silt with some clay. The major sand fraction had an average of 52.05%, with a range of 42.57% at Station 8 to 63.44% at Station 6. The minor silt fraction averaged 39.48%, with a range of 30.33% at Station 6 to 47.79% at Station 8. The lesser clay fraction averaged 8.47%, with a range of 6.22% at Station 6 to 9.64% at Station 8. Results indicate that there was no gravel fraction detected in sediments from the Northwest Study Area.

Inshore/Proposed Reference Site

Sediment samples collected from Stations 4 and 9 located inshore of the two alternative areas, including the proposed reference site located at Station 5, were primarily sand with some silt and clay. The dominant sand fraction had an average of 65.11%, with a range of 57.30% at Station 5 to 72.38% at Station 9. The lesser silt fraction averaged 27.73%, with a range of 27.31% at Station 4 to 33.96% at Station 5. The minor clay fraction averaged 7.16%, with a range of 5.69% at Station 9 to 8.75% at Station 5. Results indicate that there was no gravel fraction detected in sediments from the inshore study area including the proposed upstream reference site.

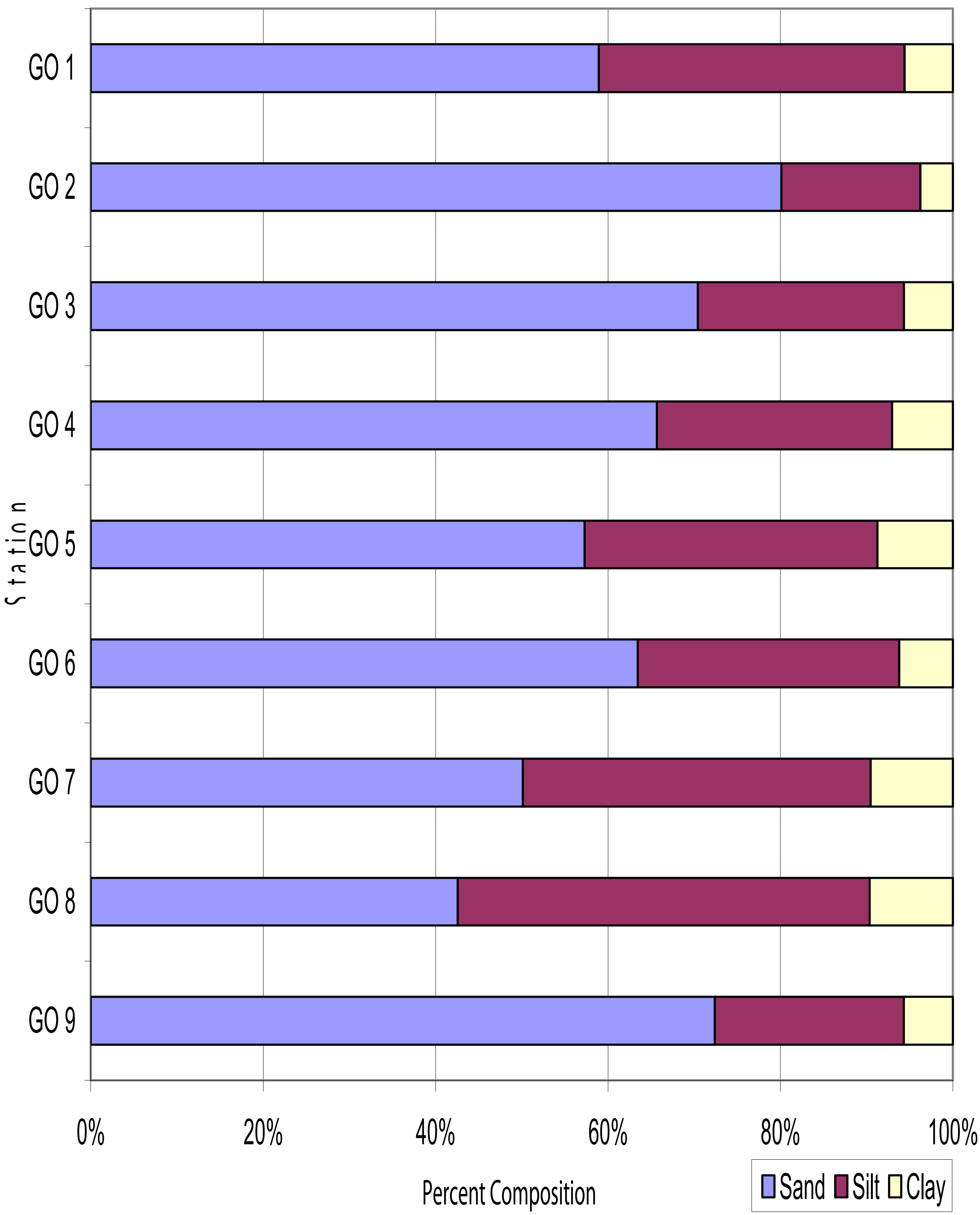

Figure 3-27.
Grain Size Distribution by Size Class (Gravel*, Sand, Silt, Clay) of the Seafloor Sediment Samples Collected in the Guam ODMDS Study Region, April 2008
*Gravel was not present in any of the samples
Source: Weston, 2008

3.1.6.2 Chemical Analyses

Conventional Parameters

Concentrations of carbon (TOC), nitrogen (ammonia, TKN, TON), sulfides and solids were analyzed in sediments from this study and presented in Table 15 of Weston Solutions and TEC (2008b) and Figure 3-28.

North Study Area

Conventional parameters analyzed in sediment samples from Stations 1, 2 and 3 located in the North Study Area were detected in low concentrations. Percent solid content averaged 54.3% with a range of 53.7% at Station 1 to 54.8% at Station 2. TOC averaged 0.22% with a range of 0.17% at Station 3 to 0.29% at Station 1. TON averaged 95.69 mg/dry kg with a range of 76.45 mg/dry kg at Station 2 to 119.64 mg/dry kg at Station 3. Ammonia-N averaged 0.28 mg/dry kg with a range of 0.26 mg/dry kg at Station 3 to 0.32 mg/dry kg at Station 1. These ammonia-N averages were approximately 2 orders of magnitude lower than biologically toxic concentrations (30 ppm) and were supported by toxicity test results conducted on project sediments. TKN averaged 177 mg/wet kg with a range of 140 mg/wet kg at Station 2 to 220 mg/wet kg at Station 3. Total sulfides averaged 0.66 mg/dry kg with a range of 0.50 mg/dry kg at Station 1 to 0.87 mg/dry kg at Station 2. Analysis of conventional parameters using the Dixon’s Test established no relative differences in TOC, nitrogen (ammonia, TKN, TON), sulfides and solids content of sediment between stations located in the North Study Area.

Northwest Study Area

Conventional parameters analyzed in sediment samples from Stations 6, 7 and 8 located in the Northwest Study Area were detected in low concentrations. Percent solid content had averaged 52.5% with a range of 51.5% at Station 7 to 53.8% at Station 6. TOC averaged 0.28% with a range of 0.19% at Station 6 to 0.39% at Station 8. TON averaged 89.01 mg/dry kg with a range of 72.79 mg/dry kg at Station 8 to 97.61 mg/dry kg at Station 7. Ammonia-N averaged 0.24 mg/dry kg with a range of 0.20 mg/dry kg at Station 6 to 0.29 mg/dry kg at Station 8. These ammonia-N averages were approximately 2 orders of magnitude lower than biologically toxic concentrations (30 ppm) and were supported by toxicity test results conducted on project sediments. TKN averaged 170 mg/wet kg with a range of 140 mg/wet kg at Station 8 to 190 mg/wet kg at Station 7.

Total sulfides averaged 0.53 mg/dry kg with a range of 0.51 mg/dry kg at Station 6 to 0.56 mg/dry kg at Station 8. Analysis of conventional parameters using the Dixon’s Test established no relative difference in TOC, ammonia-N, TKN, sulfides and solids content of sediment in the Northwest Study Area. TON concentration was slightly lower at Station 8 (72.79 mg/dry kg) than Stations 6 (96.64 mg/dry kg) and 7 (97.61 mg/dry kg).

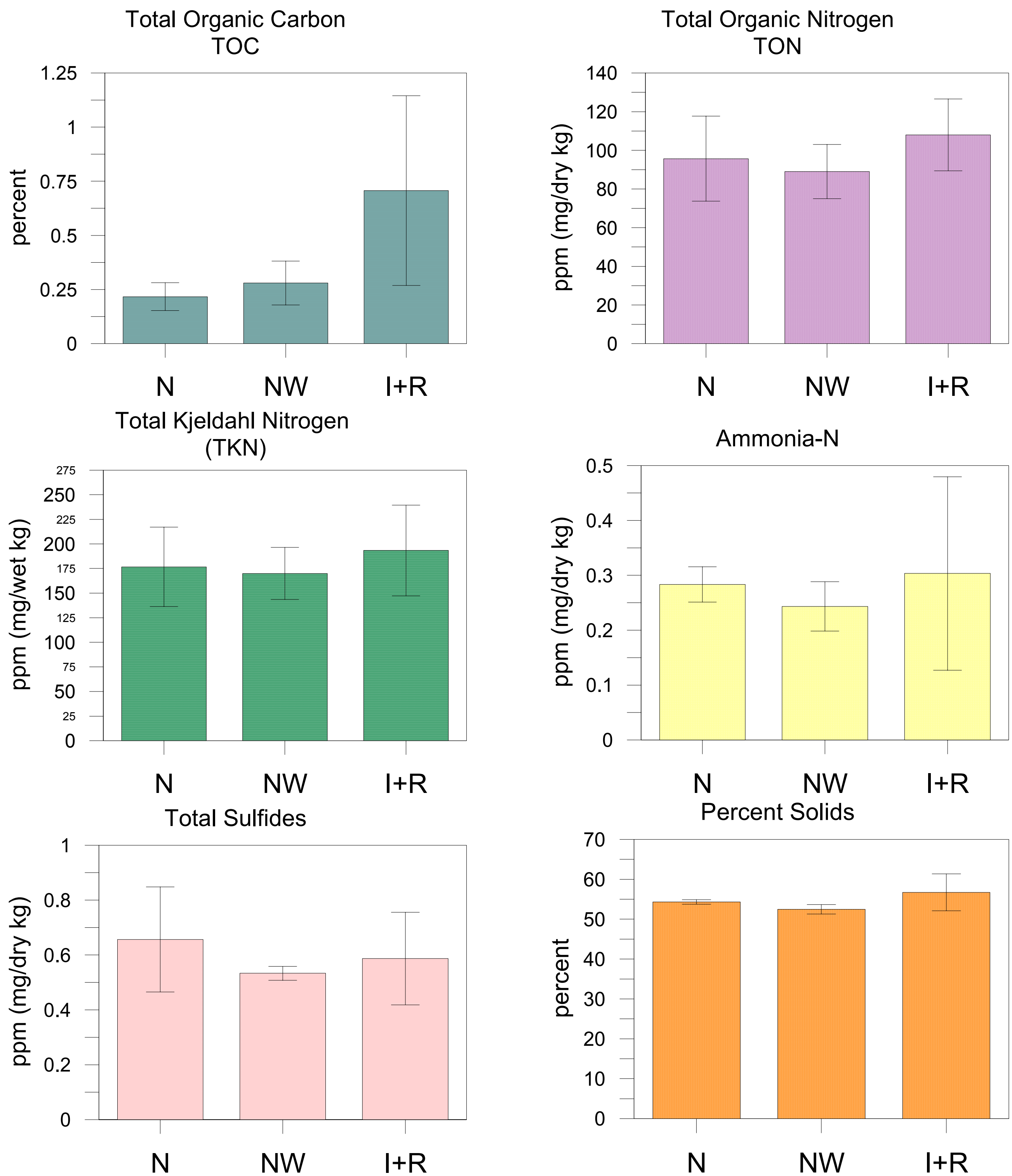

Figure 3-28. Source: Weston, 2008
Mean and Standard Deviation of Selected Conventional Chemistry Constituents Showing Comparison of Study Areas to Each Other and Proposed Reference

Inshore/Proposed Reference Site

Conventional parameters analyzed in sediment samples from Stations 4 and 9 located inshore of the two alternative areas, as well as the proposed reference site located at Station 5, were detected in low concentrations. Percent solid content had an average 56.7% with a range of 53.3% at Station 5 to 62.0% at Station 9. TOC content averaged 0.71 % with a range of 0.22% at Station 4 to 1.07% at Station 9. TON averaged 107.98 mg/dry kg with a range of 86.64 mg/dry kg at Station 9 to 120.53 mg/dry kg at Station 4. Ammonia-N averaged 0.30 mg/dry kg with a range of 0.16 mg/dry kg at Station 9 to 0.50 mg/dry kg at Station 5. These ammonia-N averages were approximately 2 orders of magnitude lower than biologically toxic concentrations (30 parts per million) and were supported by toxicity test results conducted on project sediments. TKN averaged 193 mg/wet kg with a range of 140 mg/wet kg at Station 9 to 220 mg/wet kg at Stations 4 and 5. Total sulfides averaged 0.59 mg/dry kg with a range of 0.47 mg/dry kg at Station 9 to 0.78 mg/dry kg at Station 5. Analysis of conventional parameters using the Dixon's Test established no relative difference in TOC, TON, ammonia-N, sulfides and solids content of sediment in the inshore study area including the proposed reference site. TKN concentration was slightly lower at Station 9 (140 mg/wet kg) than Stations 4 (220 mg/wet kg) and 5 (220 mg/dry kg).

Trace Metals

Although many metals are biologically essential in trace amounts excessive quantities can interfere with fundamental physiological processes in organisms ranging from yeast to humans. Both localized and dispersed metal pollutants such as cadmium, lead, mercury, and silver are not biodegradable, are toxic in solution, and subject to biomagnifications in the tissues of marine organisms causing adverse environmental impacts (Lau et al. 1998). Metals are introduced in marine systems as a result of the weathering of soils and rocks, from volcanic eruptions, and from a variety of human activities involving the mining, processing, or use of metals and/or substances that contain metals. Concentrations in sediments are typically orders of magnitude greater than concentrations in overlying water and constitute an enriched pool of metal (Luoma 1989). A portion of its biologically available form is generally chemically fixed and largely unavailable to organisms without chemical changes in the sediment. Concentrations of 23 metals were analyzed in sediments from this study and presented in Table 15 of Weston Solutions and TEC (2008b) and Figure 3-29. For comparison, available ER-L/ER-M values and data for central Pacific Ocean sediments collected at comparable depths with similar bathymetric features are also presented in Table 15 of Weston Solutions and TEC (2008b).

North Study Area

All 23 metals measured in sediment samples from Stations 1, 2, and 3 located in the North Study Area were detected. Analysis of metals using the Dixon's Test established no relative difference in metal content of sediment between stations located in the North Study Area.

Cadmium, zinc, mercury, arsenic, chromium, lead and silver concentrations in the North Study Area were below ER-L levels. Average copper concentrations slightly exceeded the ER-L (34 µg/dry g) but at concentrations well below the ER-M (270 µg/dry g). Average nickel concentrations were approximately two times the ER-L (20.9 µg/dry g) and slightly less than the ER-M (51.6 µg/dry g).

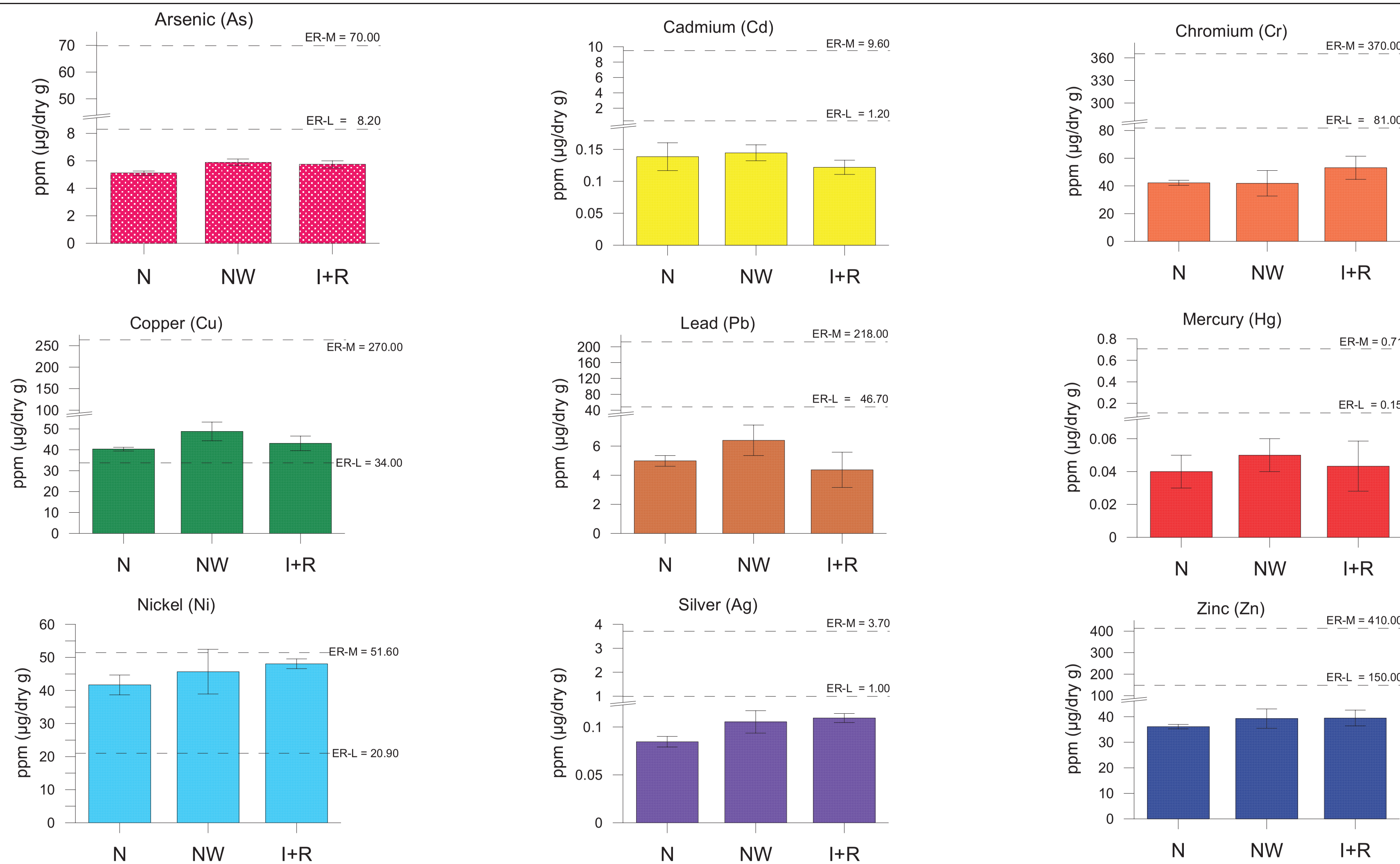

Figure 3-29. Mean and Standard Deviation of Selected Metals Showing Comparison of Alternative Areas to Each Other, Proposed Reference and ER-L and ER-M Values

Source: Weston, 2008

Sediment metal levels in the North Study Area were below average oceanic crustal abundances available for barium, cobalt, copper, iron, lead, manganese, nickel, strontium, titanium, vanadium and zinc. Average aluminum concentrations were an order of magnitude greater than, while average chromium concentrations were more than double the oceanic crustal abundance values measured in the central Pacific Ocean (Wen et al. 1997).

Northwest Study Area

All 23 metals measured in sediment samples from Station 6, 7 and 8 located in the Northwest Study Area were detected. Analysis of metals using the Dixon's Test established no relative difference in all but two metals between stations located in the Northwest Study Area. Strontium concentrations were lower at Station 8 (1,167 µg/dry g) than Stations 6 (1,437 µg/dry g) and 7 (1,440 µg/dry g). Zinc concentrations were also slightly lower at Station 8 (34.89 µg/dry g) than Stations 6 (41.31 µg/dry g) and 7 (41.58 µg/dry g).

Cadmium, zinc, mercury, arsenic, chromium, lead and silver concentrations in the Northwest Study Area were below ER-L levels. Average copper concentrations slightly exceeded the ER-L (34 µg/dry g) but at concentrations well below the ER-M (270 µg/dry g). Average nickel concentrations were more than 2 times the ER-L (20.9 µg/dry g) and slightly less than the ER-M (51.6 µg/dry g).

Sediment metal levels in the Northwest Study Area were below average oceanic crustal abundance levels available for barium, cobalt, copper, iron, lead, manganese, nickel, titanium, vanadium and zinc. Average aluminum concentrations were an order of magnitude greater than, while average chromium concentrations were more than double the oceanic crustal abundance values. Average strontium only slightly exceeds the oceanic crustal abundance values measured in the central Pacific Ocean (Wen et al. 1997).

Inshore/Proposed Reference Site

All 23 metals measured in sediment samples from Stations 4 and 9 located inshore of the two alternative areas, as well as the proposed reference site located at Station 5, were detected. Analysis of metals using the Dixon's Test established no relative difference in all but three metals between stations in the inshore study area including the proposed reference site. Copper concentrations were lower at Station 5 (30.02 µg/dry g) than Stations 4 (45.22 µg/dry g) and 9 (44.96 µg/dry g). Nickel concentrations were also slightly lower at Station 5 (46.36 µg/dry g) than Stations 4 (48.90 µg/dry g) and 9 (48.94 µg/dry g). In contrast, antimony concentrations were slightly greater at Station 9 (0.190 µg/dry g) than Stations 4 (0.151 µg/dry g) and 5 (0.152 µg/dry g).

Cadmium, zinc, mercury, arsenic, chromium, lead and silver concentrations in the inshore study area including the proposed upstream reference site were below ER-L levels. Average copper concentrations slightly exceeded the ER-L (34 µg/dry g) but at concentrations well below the ER-M (270 µg/dry g). Average nickel concentrations were more than two times the ER-L (20.9 µg/dry g) and slightly lower than the ER-M (51.6 µg/dry g).

Sediment metal levels in the inshore study area including the proposed upstream reference site were below average oceanic crustal abundance values available for barium, cobalt, copper, iron, lead, manganese, nickel, titanium, vanadium and zinc. Average aluminum concentrations were an order of magnitude greater than, while average chromium concentrations were more than double the oceanic crustal abundance values. Average strontium only slightly exceeds the oceanic crustal abundance values measured in the central Pacific Ocean (Wen et al. 1997).

Acid Volatile Sulfides/Simultaneously Extracted Metals (AVS-SEM)

In sediments depleted of oxygen, there is commonly a substantial pool of sulfide in the form of solid Iron Sulfide (FeS), referred to as AVS. The availability of metals such as cadmium, copper, nickel, lead, zinc, and silver is thought to be controlled in part by its precipitation as insoluble sulfides complexes. This property allows the presence of excess AVS to influence the toxicity potential of these metals to benthic organisms by acting as a sink for and immobilizing its biologically available, ionic form (Ankley et al. 1996). AVS is operationally defined as the amount of sulfides that can be changed into a vapor during a cold acid extraction. The AVS-bound metals are extracted at the same time and are referred to as SEM. Laboratory and field experiments have shown that if the ratio of SEM:AVS is less than one, there are likely to be no biologically available metals in solution. This ratio approach can be used to predict the lack of toxicity but not the onset of toxicity (Di Toro et al. 2001). AVS are naturally produced by the bacterial breakdown of organic material and cannot exist in the presence of oxygen, therefore have no utility in oxygenated sediment or terrestrial environments. Table 3-13 presents the SEM results for six metals (cadmium, copper, nickel, lead, zinc, and silver) that are likely to bind to AVS and the concentration of AVS for each sample.

North Study Area

AVS and SEM analyzed in sediment samples collected from Stations 1, 2 and 3 located in the North Study Area were detected in low concentrations. AVS averaged 0.041 µmol/dry g with a range of 0.034 µmol/dry g at Station 3 to 0.046 µmol/dry g at Station 1. Combined SEM averaged 0.111 µmol/dry g with a range of 0.068 µmol/dry g at Station 3 to 0.165 µmol/dry g at Station 1. The calculated ∑SEM:AVS ratio averaged 2.66 with a range of 2.01 at Station 3 to 3.63 at Station 1. While this implies the potential for toxicity due to metal bioavailability, studies suggests that a ∑SEM:AVS ratio greater than 40 is required for certainty of metal toxicity predictions (Di Toro et al. 2001). Analysis of SEM:AVS using the Dixon's Test established no relative difference in the SEM:AVS ratio of sediment between stations located in the North Study Area.

Northwest Study Area

AVS and SEM analyzed in sediment samples from Stations 6, 7 and 8 located in the Northwest Study Area were detected in low concentrations. AVS averaged 0.039 µmol/dry g with a range of 0.032 µmol/dry g at Station 6 to 0.047 µmol/dry g at Station 8. Combined SEM had an average of 0.154 µmol/dry g with a range of 0.109 µmol/dry g at Station 6 to 0.211 µmol/dry g at Station 8. The calculated ∑SEM:AVS ratio averaged 3.93 with a range of 3.40 at Station 6 to 4.45 at Station 8. While this implies the potential for toxicity due to metal bioavailability, studies suggests that a ∑SEM:AVS ratio greater than 40 is required for certainty of metal toxicity predictions (Di Toro et al. 2001). Analysis of SEM:AVS using the Dixon's Test established no relative difference in the SEM:AVS ratio of sediments between stations located in the Northwest Study Area.

Table 3-13. Simultaneously Extracted Metals/Acid Volatile Sulfides Results and ∑SEM:AVS for Seafloor Sediment Samples Collected in the Guam ODMDS Study Region, April 2008

Analyte	Units	MDL	RL	Station ID								
				GO 1	GO 2	GO 3	GO 4	GO 5	GO 6	GO 7	GO 8	GO 9
Cadmium (Cd) - SEM	µmol/dry g	0.0018	0.0036	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018
Copper (Cu) - SEM	µmol/dry g	0.0062	0.0124	0.0825	0.0378	0.0217	<0.0062	0.0569	0.0435	0.0745	0.113	0.0416
Lead (Pb) - SEM	µmol/dry g	0.0002	0.0004	0.0007	<0.0002	<0.0002	<0.0002	0.0003J	<0.0002	0.0002J	0.0013	<0.0002
Nickel (Ni) - SEM	µmol/dry g	0.0033	0.0066	0.0106	0.0097	0.0066	0.0049J	0.0126	0.008	0.0077	0.0107	0.0076
Silver (Ag) - SEM	µmol/dry g	0.0047	0.0094	<0.0047	<0.0047	<0.0047	<0.0047	<0.0047	<0.0047	<0.0047	<0.0047	<0.0047
Zinc (Zn) - SEM	µmol/dry g	0.0015	0.003	0.0696	0.0494	0.0379	0.0256	0.0533	0.0557	0.058	0.0841	0.0423
∑SEM[1]	µmol/dry g	-	-	0.165	0.099	0.068	0.036	0.125	0.109	0.142	0.211	0.094
Acid Volatile Sulfides (AVS)	mg/dry kg	0.05	0.1	1.46	1.37	1.09	0.9	2.01	1.03	1.16	1.52	1.01
Acid Volatile Sulfides (AVS)	µmol/dry g	0.002	0.003	0.046	0.043	0.034	0.028	0.063	0.032	0.036	0.047	0.031
∑SEM:AVS	ratio	-	-	3.63	2.32	2.01	1.27	2.00	3.40	3.94	4.45	2.97

J = estimated value above the MDL and below the RL

[1] ∑SEM = sum (Cd + Cu + Pb + Ni + (Ag/2) + Zn): if ND, then 1/2 MDL used

∑SEM:AVS = >1, indicating potential for metal toxicity due to presence of unbound, ionized metal

Inshore/Proposed Reference Site

AVS and SEM analyzed in sediment samples from Stations 4 and 9 located inshore of the two alternative areas, as well as the proposed reference site located at Station 5, were detected in low concentrations. AVS averaged 0.041 µmol/dry g with a range of 0.028 µmol/dry g at Station 4 to 0.063 µmol/dry g at Station 5. Combined SEM averaged 0.085 µmol/dry g with a range of 0.036 µmol/dry g at Station 4 to 0.125 µmol/dry g at Station 5. The calculated ∑SEM:AVS ratio averaged 2.08 with a range of 1.27 at Station 4 to 2.97 at Station 9. While this implies the potential for toxicity due to metal bioavailability, studies suggests that a ∑SEM:AVS ratio are greater than 40 is required for certainty of metal toxicity predictions (Di Toro et al. 2001). Analysis of SEM:AVS content using the Dixon's Test established no relative difference in the SEM:AVS ratio between stations in the inshore study area including the proposed reference site.

Polycyclic Aromatic Hydrocarbons (PAHs)

PAHs are one of the most widespread organic pollutants due to their collective natural and manufactured origins. They are a group of over 100 different chemicals that occur naturally in oil, coal, tar deposits and are formed during the incomplete combustion of petroleum products, garbage, tobacco, and even charbroiled meat. Different types of incinerations yield unique distributions of PAHs in both relative amounts of individual PAHs and in which compounds are produced, making them potentially useful in source identification. PAHs are also manufactured in their pure form and used in medicines or to make dyes and plastics. Because of its chemical affinity for lipids, PAHs in the marine environment are found primarily in carbon rich sediments. A total of 25 individual PAHs were analyzed in sediments from this study and presented in Table 15 of Weston Solutions and TEC (2008b).

North Study Area

PAHs analyzed in sediment samples from Stations 1, 2 and 3 located in the North Study Area were not detected, with the exception of one station. Station 3 had detectable concentrations of two PAHs at estimated results for anthracene (1.6 ng/dry g) and phenanthrene (1.2 ng/dry g).

Northwest Study Area

PAHs analyzed in sediment samples from Stations 6, 7, and 8 located in the Northwest Study Area were not detected.

Inshore/Proposed Reference Site

PAHs analyzed in sediment samples from Stations 4 and 9 located inshore of the two study areas, as well as the proposed reference site located at Station 5, were not detected, with the exception of one station. Station 4 had detectable concentrations of PAHs at estimated results for dibenzothiophene (2.1 ng/dry g).

Organochlorine Pesticides/PCBs

Unlike PAHs, organochlorine pesticides and PCBs are solely human-related in origin. DDT is the first and one of the most renowned chlorinated organic insecticides. In the 1970s and 1980s, applications of DDT were banned in most developed countries although its limited use in disease control continues in certain parts of the world where malaria persists (Larson 2007). While the DDT family is the best known organochlorine pesticide, it is only one of a large number of related compounds used for a variety of pest control needs.

Due to their chemical stability and nonflammable properties, PCBs are valuable as coolants and insulating fluids, stabilizing additives, pesticide extenders, cutting oils, flame retardants, hydraulic fluids, sealants, adhesives, wood finishes, paints, aspirating agents, and in carbonless copy paper. There are theoretically 209 different PCB congeners, although only approximately 130 of these were found in commercial PCB mixtures. Aroclor is the trade name of commercial PCB mixture marketed from the 1930s until its ban in the 1970s. Commercial PCBs are known to be contaminated with levels of other significantly toxic compounds such as dioxins and furans through chemical reactions with oxygen. Concentrations of 31 individual organochlorine pesticides, 53 PCB congeners and 7 unique Aroclor PCB mixtures were analyzed in sediments from this study and presented in Table 15 of Weston Solutions and TEC (2008b).

North Study Area

Chlorinated pesticides and PCBs analyzed in sediment samples from Stations 1, 2, and 3 located in the North Study Area were not detected.

Northwest Study Area

Chlorinated pesticides and PCBs analyzed in sediment samples from Stations 6, 7, and 8 located in the Northwest Study Area were not detected.

Inshore/Proposed Reference Sites

Chlorinated pesticides and PCBs analyzed sediment samples from Stations 4 and 9 located inshore of the two alternative areas, as well as the proposed reference site located at Station 5, were not detected.

Organotins

Organotin compounds or stannanes have no known natural sources and therefore have exclusively human-related origins. These compounds are used in plastics manufacturing, as wood preservatives, slimicides, and disinfectants. Organotins are also potent biocides for cooling systems, power station cooling towers, pulp and paper mills, breweries, leather processing, textile mills and marine antifouling paints. The environmentally toxic biocidal properties of organotins are unique to tributyltin (TBT). The monobutyltins and dibutyltins do not exhibit these properties. Tetrabutyltins are very stable molecules that are also unusable as biocides, but can be metabolized into TBT compounds by microorganisms. Controls on the use of TBT in antifouling paints were introduced in 1986 when the sale of TBT-based paints was banned. In 1987, the use of TBT-based paints on boats under 25 meters and mariculture equipment was also prohibited. These measures have reduced the potential routes of entry into the marine environment and successfully reduced environmental concentrations (Waite et al. 1991). Organotins have low water solubility and a strong tendency to adsorb strongly to suspended materials and sediments (Laughlin et al. 1986). Organotins were analyzed in sediments from this study and presented in Table 15 of Weston Solutions and TEC (2008b).

North Study Area

Organotins analyzed in sediment samples from Stations 1, 2, and 3 located in the North Study Area were not detected.

Northwest Study Area

Organotins analyzed in sediment samples from Stations 6, 7, and 8 located in the Northwest Study Area were not detected.

Inshore/Proposed Reference Site

Organotins analyzed sediment samples from Stations 4 and 9 located inshore of the two alternative areas, as well as the proposed upstream reference site located at Station 5, were not detected.

Dioxins/Furans

The general term ‘dioxins’ is often used for a family of 210 structurally and chemically related polychlorinated dibenzodioxins, polychlorinated dibenzofurans and even some PCBs. Dioxins and furans are chemical compounds inadvertently generated and released into the environment as by-products of various combustion and chemical processes involving chlorine, including smelting, waste incineration, plastic production, pulp and paper bleaching, and the manufacturing of chemicals and pesticides such as PCBs. They can also result from natural processes such as volcanic eruptions and forest fires. Low levels of dioxins and furans are expected in the environment due to natural sources or the dechlorination of chlorinated pesticides due to biological or abiotic processes (Gaus et al. 2002 and Holt et al. 2008). The most toxic chemical in the group is 2,3,7,8-TCDD (2,3,7,8-tetrachlorodibenzo-para-dioxin), it should be noted that 2,3,7,8-TCDD was detected at concentrations in the sediment samples collected from both alternative ODMDS sites. Because it is the most toxic, 2,3,7,8-TCDD is the standard to which other dioxins are compared. Furans are approximately a tenth as toxic while twelve of the 209 congeners of PCBs are approximately one hundredth as toxic (Eisler 1986). Although formation of dioxins is localized, environmental distribution is global due to its chemical affinity for lipids. The highest levels of dioxins are found in soil, sediment and the fatty tissues of animals, with much lower levels found in plants, water and air. Complex mixtures of 17 family member dioxin and furan compounds were analyzed in sediments from this study and presented in Table 15 of Weston Solutions and TEC (2008b). For each analyte that was not detected, an Estimated Detection Limit (EDL) was calculated. The EDL is a sample specific, laboratory estimate of the minimum analyte concentration required to produce a signal with a peak height of at least 2.5 times the background noise signal level. Because of the toxicological significance of dioxins and furans, the EDL value is reported for non-detected analytes rather than simply reporting the respective Method Detection Limits (MDLs).

North Study Area

Dioxins and furans analyzed in sediment samples from Stations 1, 2, and 3 located in the North Study Area were detected in low concentrations. The sum of all detectable dioxins averaged 19.66 pg/g with a range of 17.51 pg/g at Station 2 to 22.49 pg/g at Station 1. The sum of all detectable furans averaged 2.50 pg/g with a range of 2.00 pg/g at Station 3 to 3.49 pg/g at Station 1. Analysis of dioxins and furans using the Dixon's Test established no relative difference in the dioxin concentration of sediment between Stations located in the North Study Area. Furan concentration was slightly higher at Station 1 (3.49 pg/g) than Stations 2 (2.02 pg/g) and 3 (2.00 pg/g).

Northwest Study Area

Dioxins and furans analyzed in sediment samples from Stations 6, 7, and 8 located in the Northwest Study Area were detected in low concentrations. The sum of all detectable dioxins averaged 18.33 pg/g with a range of 16.19 pg/g at Station 8 to 19.47 pg/g at Station 6. The sum of all detectable furans averaged 2.20 pg/g with a range of 1.17 pg/g at Station 8 to 3.65 pg/g at Station 6. Analysis of dioxins and furans using the Dixon's Test established no relative difference in the furan concentration of sediment between Stations located in the Northwest Study Area. Dioxin concentration was slightly lower at Station 8 (16.19 pg/g) than Stations 6 (19.47 pg/g) and 7 (19.34 pg/g).

Inshore/Proposed Reference Site

Dioxins and furans analyzed in samples from Stations 4 and 9 located inshore of the two alternative areas, as well as the proposed upstream reference site located at Station 5, were detected in low concentrations. The sum of all detectable dioxins averaged 21.12 pg/g with a range of 17.73 pg/g at Station 9 to 26.98 pg/g at Station 5 (Table 3-14). The sum of all detectable furans averaged 3.03 pg/g with a range of 1.47 pg/g at Station 9 to 5.10 pg/g at Station 5. Analysis of dioxins and furans using the Dixon's Test established no relative difference in the dioxin and furan concentration of sediment between stations located in inshore study area including the proposed upstream reference site.

Table 3-14. Calculated Sum Total Dioxins (CDD) and Furans (CDF) for Sediment Samples Collected Offshore of Guam

Analyte	Units	MDL	RL	Station ID								
				GO 1	GO 2	GO 3	GO 4	GO 5	GO 6	GO 7	GO 8	GO 9
Total Tetra CDD	pg/g	-	-	< 0.30 (1)	0.2	< 0.27 (1)	0.34	< 0.33 (1)	< 0.34 (1)	0.3	< 0.12	< 0.092
Total Penta CDD	pg/g	-	-	4.92	2.18	3.46	2.21	2.67	3.25	1.47	2.4	2.56
Total Hexa CDD	pg/g	-	-	0.85	< 2.1 (1)	< 2.0 (1)	< 1.9 (1)	< 2.4 (1)	0.95	0.17	< 1.8 (1)	0.27
Total Hepta CDD	pg/g	-	-	2.62	1.73	2.14	2.3	1.48	2.33	1.6	0.47	1.61
Octa CDD	pg/g	5.00	100	13.8	11.3	11.1	11.9	20.1	12.6	15.8	11.4	13.2
∑CDD[1]	pg/g			22.49	17.51	18.97	18.65	26.98	19.47	19.34	16.19	17.73
Total Tetra CDF	pg/g	-	-	0.34	0.45	0.43	0.52	0.69	0.42	0.52	0.39	0.25
Total Penta CDF	pg/g	-	-	< 0.90 (1)	< 0.23 (1)	< 0.18 (1)	< 0.24 (1)	< 0.41 (1)	< 1.2 (1)	< 0.25 (1)	< 0.11	< 0.14 (1)
Total Hexa CDF	pg/g	-	-	< 0.22	0.2	0.2	< 0.19	0.55	0.68	0.13	< 0.12 (1)	< 0.23 (1)
Total Hepta CDF	pg/g	-	-	0.84	< 0.48 (1)	< 0.54 (1)	< 0.87 (1)	< 1.9 (1)	< 0.71 (1)	< 0.26 (1)	< 0.20 (1)	0.28
Octa CDF	pg/g	5.00	100	1.19 J	0.66 J	0.65 J	0.71 J	1.55 J	0.64 J	0.63 J	0.35 J	0.57 J
∑CDF[2]	pg/g			3.49	2.02	2.00	2.53	5.10	3.65	1.79	1.17	1.47

[1] ∑CDD = sum (Total Tetra CDD + Total Penta CDD + Total Hexa CDD + Total Hepta CDD + Octa CDD) if ND, then sample-specific laboratory EDL used

[2] ∑CDD = sum (Total Tetra CDF + Total Penta CDF + Total Hexa CDF + Total Hepta CDF + Octa CDF) if ND, then sample-specific laboratory EDL used

J = estimated value above the MDL and below the RL

(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

Gross Alpha/Beta

Radioactive nuclei can emit several kinds of particles that can be classified into three primary types: alpha particles (α), beta particles (β), and photons that are either x rays or gamma rays (γ). For the purposes of this study, gross alpha- and beta-emitting radionuclides were characterized to screen samples for relative levels of radioactivity.

Several properties distinguish alpha and beta particles from one another. One is electric charge; alpha particles are emitted with a positive charge of two, beta particles are emitted with either one negative charge (electron) or one positive charge (positron). Another important property is penetration of the particles through matter. Alpha particles lose energy rapidly and travel relatively slowly due to their electric charge and large mass. Beta particles can travel several feet in open air but are easily stopped by solid materials. Alpha and beta emitters have anthropogenic sources and occur naturally in the environment, present in varying amounts in nearly all rocks, soils, and water. Gross alpha and gross beta radiation were analyzed in sediments from this study and presented in Table 15 of Weston Solutions and TEC (2008b).

North Study Area

Alpha and beta particle activity analyzed in sediment samples from Stations 1, 2 and 3 located in the North Study Area were detected in low concentrations. Gross alpha averaged 9.70 pCi/g with a range of 7.02 pCi/g at Station 3 to 12.4 pCi/g at Station 1. Gross beta averaged 4.96 pCi/g with a range of 0.90 pCi/g at Station 3 to 6.19 pCi/g at Station 1. Analysis of gross alpha and beta using the Dixon's Test established no relative difference in alpha and beta-particle activity of sediment between Stations located in the North Study Area.

Northwest Study Area

Alpha and beta particle activity analyzed in sediment samples from Stations 6, 7 and 8 located in the Northwest Study Area were detected in low concentrations. Gross alpha averaged 11.5 pCi/g with a range of 10.8 pCi/g at Station 7 to 12.10 pCi/g at Station 6. Gross beta averaged 3.31 pCi/g with a range of 1.61 pCi/g at Station 8 to 5.86 pCi/g at Station 6. Analysis of gross alpha and beta using the Dixon's Test established no relative difference in alpha and beta-particle activity of sediment between Stations located in the Northwest Study Area.

Inshore/Proposed Reference Site

Alpha and beta particle activity analyzed in samples from Stations 4 and 9 located inshore of the two alternative areas, as well as the proposed upstream reference site located at Station 5, were detected in low concentrations. Gross alpha averaged 9.51 pCi/g with a range of 6.45 pCi/g at Station 5 to 12.4 pCi/g at Station 9. Gross beta averaged 2.86 pCi/g with a range of 2.17 pCi/g at Station 5 to 3.67 pCi/g at Station 4. Analysis of gross alpha and beta using the Dixon's Test established no relative difference in alpha and beta-particle activity of sediment between stations located in inshore study area including the proposed upstream reference site.

3.1.6.3 Sediment Characteristics Summary

In general, the physical, conventional, chemical and radiological characteristics of sediments collected from stations located in the North and Northwest Study Areas are similar with the exception of grain size and few trace metals. Sediment samples from Stations 6, 7, and 8 located in the Northwest Study Area were finer than those from Stations 1, 2, and 3 located in the North Study Area. The foremost reason for this difference in grain size can be attributed to the contrast in seafloor location of these study areas. Bathymetry charts show that stations in the Northwest Study Area are located on the southeastern slope of a seamount, whereas stations in the North Study Area are located in a depression between seamounts. Mean concentrations of cadmium, chromium, mercury, nickel and zinc were similar in both alternative study areas, while slightly higher mean concentrations of silver, arsenic, copper and lead were measured in sediment samples from Stations 6, 7, and 8, located in the Northwest Study Area. Most persistent organic pollutants were not detected.

3.1.7 Mariana Trench Marine National Monument

The Mariana Trench Marine National Monument (the 'Monument') was established in January 2009 by Presidential Proclamation under the authority of the Antiquities Act (16 U.S.C. 431). The Monument consists of approximately 71,897 sq. nm (246,600 sq. km) of submerged lands and waters of the Mariana Archipelago and was designated with the purpose of protecting the submerged volcanic areas of the Mariana Ridge, the coral reef ecosystems of the waters surrounding the islands of Farallon de Pajaros, Maug, and Asuncion in the Commonwealth of the Northern Mariana Islands, and the Mariana Trench. The Monument includes the waters and submerged lands of the three northernmost Mariana Islands (the 'Islands Unit') and only the submerged lands of designated volcanic sites (the 'Volcanic Unit') and the Mariana Trench (the 'Trench Unit') to the extent that the seaward boundaries of the Islands Unit of the Monument extend to the lines of latitude and longitude depicted on Figure 3-30, which lay approximately 50 nm (93 km) from the mean low water line of Farallon de Pajaros (Uracas), Maug, and Asuncion.

The inland boundary of the Islands Unit of the monument is the mean low water line. The boundary of the Trench Unit of the Monument extends from the northern limit of the Exclusive Economic Zone of the United States in the Commonwealth of the Northern Mariana Islands to the southern limit of the Exclusive Economic Zone of the U.S. in Guam approximately following the points of latitude and longitude identified in Figure 3-31. The boundaries of the Volcanic Unit of the Monument include a circle drawn with a 1 nm-radius centered on each of the volcanic features identified in Figure 3-32 and its legend.

The Monument contains objects of scientific interest, including the largest active mud volcanoes on Earth. The Champagne vent, located at the Eifuku submarine volcano, produces almost pure liquid carbon dioxide. This phenomenon has only been observed at one other site in the world. The Sulfur Cauldron, a pool of liquid sulfur, is found at the Daikoku submarine volcano. The only other known location of molten sulfur is on Io, a moon of Jupiter. Unlike other reefs across the Pacific, the northernmost Mariana reefs provide unique volcanic habitats that support marine biological communities requiring basalt. Maug Crater represents one of only a handful of places on Earth where photosynthetic and chemosynthetic communities of life are known to come together.

The waters of the Monument's northern islands are among the most biologically diverse in the Western Pacific and include the greatest diversity of seamount and hydrothermal vent life yet discovered. These volcanic islands are ringed by coral ecosystems with very high numbers of apex predators, including large numbers of sharks. They also contain one of the most diverse collections of stony corals in the Western Pacific. The northern islands and shoals in the Monument have substantially higher large fish biomass, including apex predators, than the southern islands and Guam. The waters of Farallon de Pajaros (also known as Uracas), Maug, and Asuncion support some of the largest biomass of reef fishes in the Mariana Archipelago.

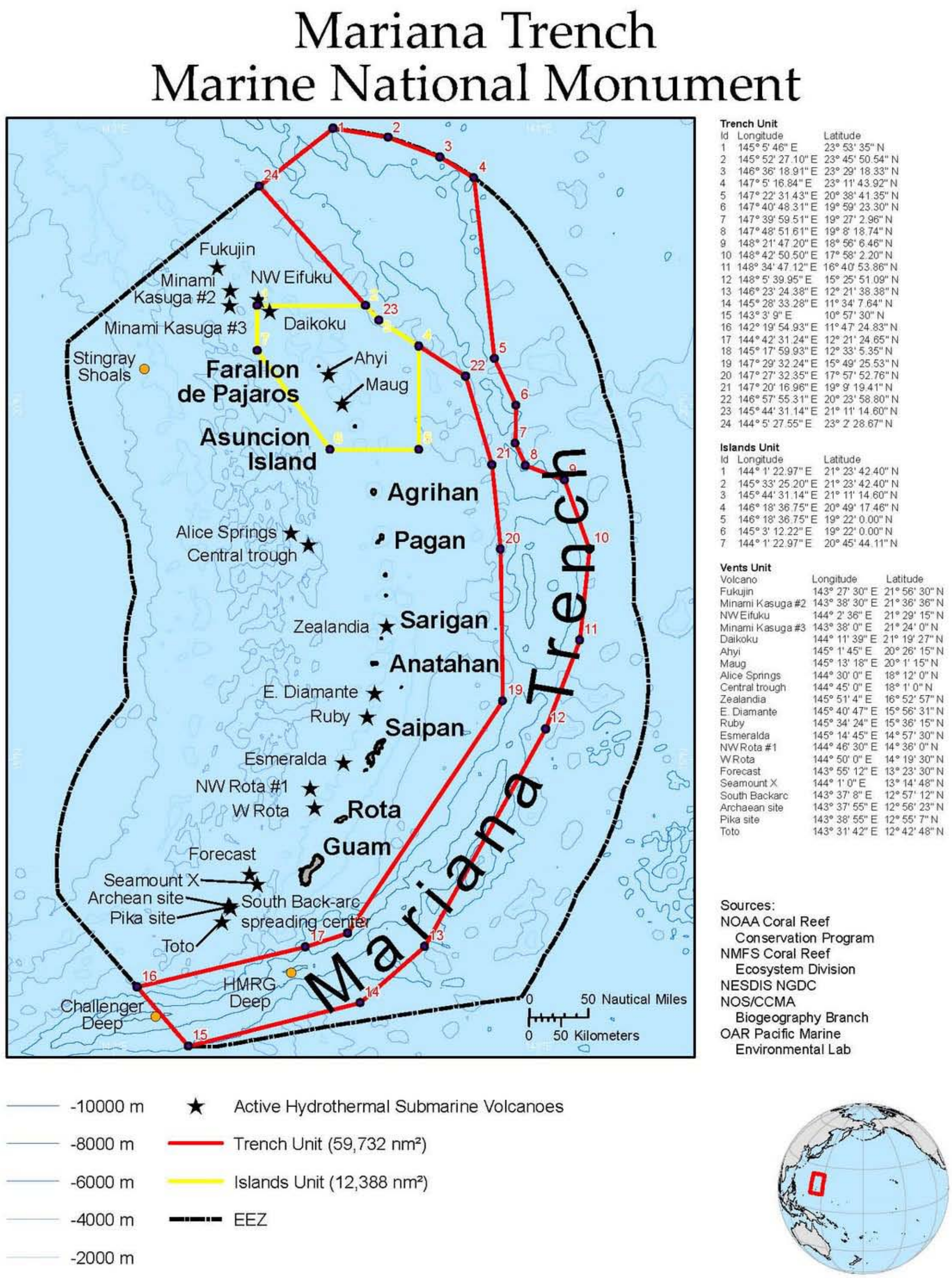

Figure 3-30.
Mariana Trench Marine National Monument

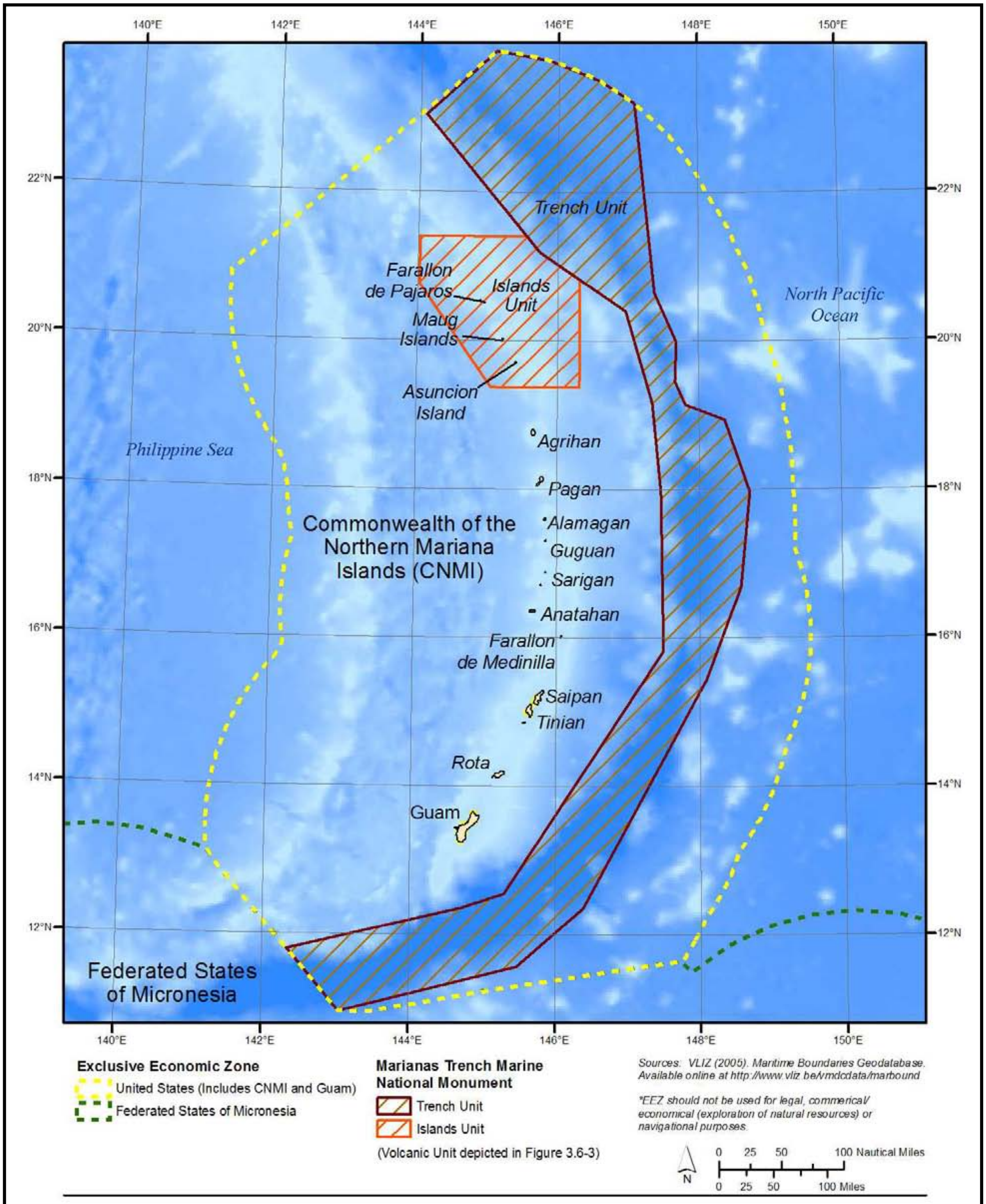

Figure 3-31.
Mariana Trench Marine National Monument Trench and Islands Units

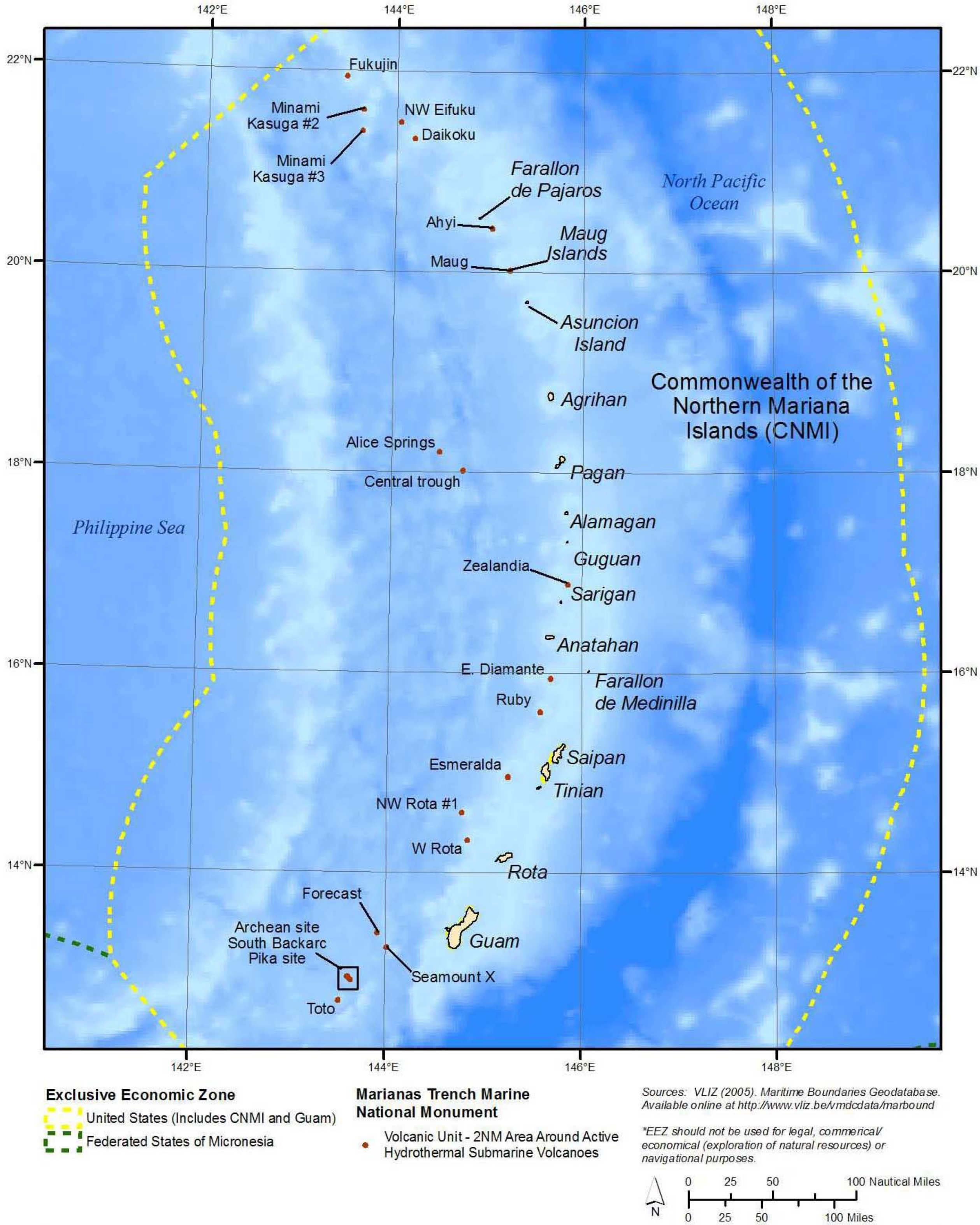

Figure 3-32.
Mariana Trench Marine National Monument Volcanic Unit

3.2 BIOLOGICAL ENVIRONMENT

Biological resources existing in the study region located near Guam include marine flora and fauna and the deep offshore environments these organisms inhabit. Marine biological resources including plankton, invertebrate and fish communities, marine birds, and special-status species such as sea turtles and marine mammals are discussed in relation to the proposed project area. Special topics such as marine protected areas (MPAs), essential fish habitat (EFH), the migratory bird treaty act (MBTA) are also discussed for the study areas. Assessment of the current conditions of the biological resources in the study region will allow for a determination of baseline conditions that may be affected by project activities.

3.2.1 Plankton Communities

The ROI for plankton communities is the general offshore region of Guam, which includes the ODMDS study areas and the area between them and the Island of Guam. Planktonic organisms are those which drift through the water with little chosen directional movement, and consequently are often at the mercy of wind and ocean currents. Phytoplankton are small unicellular algae species such as diatoms and dinoflagellates that photosynthesize and are responsible for a majority of the primary production that occurs in the ocean. These tiny plants form the base of the food web in the ocean environment. Zooplankton are animals that are typically larger than phytoplankton and generally more mobile. The distribution of plankton is usually concentrated in the neritic zone where nutrients and light are abundant and primary production drives secondary production. Plankton can be found in the deep pelagic region, but distribution is patchy and dependent upon resource availability (Nybakken 2001).

In coastal zones wind causes upwelling and enriches the nutrient concentrations in surface waters. Thus, heavier densities of phytoplankton and zooplankton are typically found in coastal waters. Fluctuations in phytoplankton abundance vary seasonally. The rainy season in Guam is from July-November, and the dry months are December-June. Upwelling triggered by tradewinds or storms will bring nutrient-rich deep water to the surface, leading to increased phytoplankton blooms in the coastal areas. Thus, higher densities of zooplankton would most likely be found shortly after the rainy season. Upwelling can also occur in the open ocean by similar means of a steady directional wind that transports surface water away from the area of interest, allowing for deep, nutrient-rich waters to replace nutrient-poor surface water (Wickstead 1965).

In tropical waters like Guam, there is a significant amount of sunlight year round due to little change in the position of the sun in the equatorial region. This causes thermal stratification in the water column, which leads to a large density and temperature gradient. Therefore, there is little or no mixing between the surface waters and deep nutrient-rich water. In tropical seas primary production is constant year round because the light conditions are optimal for phytoplankton to photosynthesize; however, the production rates remain low in these regions due to the limited upward transport of more nutrient-rich water (Nybakken 2001).

3.2.1.1 Phytoplankton

Phytoplankton are the most abundant primary producers in the marine environment. Primary productivity is defined as the amount of carbon dioxide fixed by an organism in a given volume of water, and organisms which are responsible for primary production are termed autotrophic (make their own food). The most common reaction in which primary production occurs is photosynthesis. Photosynthesis is the process in which solar energy is converted into chemical energy in a reaction using water, carbon dioxide, nutrients, and light energy to form sugar and oxygen. There are factors that can limit photosynthesis, and thus affect primary productivity, such as the quality and availability of sunlight, nutrient availability, and seawater temperatures.

Photosynthetic rates can vary from low producing systems (oligotrophic) which produce on the order of less than 0.1 mg of carbon/m^2/per day, to high producing systems in which photosynthetic rates are on the order of 10 mg of carbon/m^2/day (Department of the Navy [DON] 2005). Examples of phytoplankton typically found in tropical marine environments include diatoms, dinoflagellates, and coccolithophores (Tomas et al. 1997).

3.2.1.2 Zooplankton

A large diversity of organisms are classified as zooplankton, ranging from those which feed on phytoplankton (e.g., copepods) to active predators of fish larvae (e.g., arrow worms). Zooplankton grazers feeding on phytoplankton are considered the herbivores of the sea and are the organisms responsible for secondary production. Secondary production is defined as the change in biomass of organisms that consume primary producers; this may include organisms such as marine mammals and fishes that live by heterotrophic (rely on other organisms for food) processes, and will be discussed in later sections. There are two primary functional classifications of zooplankton: meroplankton and holoplankton. Meroplankton usually have a planktonic larval phase, but as they mature become sufficiently motile to swim against the currents. They are most common in the neritic zone, defined as the area from the low tide mark to the edge of the continental shelf. Some examples of meroplankton include the planktonic stages of fish and invertebrates including eggs and larvae. In contrast, holoplankton spend their entire life as plankton, and include such organisms as copepods and large jellyfish. Typically, holoplankton are oceanic or found in the pelagic zone (Nybakken 2001).

Zooplankton species compositions can vary spatially as well as seasonally due to the seawater temperature and salinity fluctuations. In tropical waters there are typically warmer water temperatures, lower salinity, and lower viscosity, therefore making it difficult for plankton to float in the water column (Wickstead 1965).

Examples of zooplankton that are typically found in tropical waters include cladocerans, ostracods, copepods, mysid shrimp, cumaceans, cirripede nauplii and cyprids, and amphipods. The zooplankton mentioned above are found primarily in coastal or shallow waters, however, some species of copepods and ostracods can be found in sparse numbers in oceanic waters. Some of these species are known to be bottom dwelling plankton such as the small crustaceans known as cumaceans. Many zooplankton migrate vertically while following their food source. Some examples of larger crustaceans found in pelagic areas are euphausiids and penaeid shrimp (Wickstead 1965).

3.2.2 Invertebrate Communities

The ROI for invertebrate communities is the ocean floor within the ODMDS study areas. Invertebrate communities consist of organisms living in, on, or above the bottom of the ocean. These organisms are often characterized by body size and where they live in relation to the seafloor. For the study region, the focus is on those invertebrates that live in the sediments (infauna and meiofauna), as these organisms are less able to move from an area if disturbed.

3.2.2.1 Benthic Macroinfauna

Benthic macroinfauna are small invertebrates that live within sediments and can be retained on a 0.5mm sieve. These organisms are important marine ecological community members because they burrow within and oxygenate sediments, may filter large volumes of water, contribute organic materials to the overall marine system, and serve as food for bottom-feeding fish and other invertebrates.

Benthic macroinfauna data from each of the study areas were assessed using various indices common to ecological community structure evaluations, including composition (species present), density (number of individuals/m^2), species richness (number of species) and

Shannon-Wiener species diversity index (number of different species relative to the total number of individuals; weighted for evenness of species composition). A cluster analysis was also performed to determine similarities between species assemblages of invertebrate macroinfauna among stations. The benthic infaunal communities were characterized for the North Study Area (Stations 1, 2, and 3), Northwest Study Area (Stations 6, 7, and 8), and the sample stations located inshore of the two alternative Study Areas (Stations 4 and 9), and the proposed reference site (Station 5). Three replicate samples were taken at each of the stations within a study area. It should be noted that large quantities of foraminifera (both living specimens and empty shells) were present in all of the samples. The following species composition descriptions are specific for both alternative sites and a reference site.

North Study Area

At Station 1, the density per replicate ranged from 16 individuals/m^2 in Rep 1 to 26 individuals/m^2 in Rep 3 (Table 3-15). Species richness ranged from 8 species in Rep 1 to 10 species in Rep 3. The Shannon-Wiener species diversity ranged from 2.01 in Rep 3 to 2.15 in Rep 2.

At Station 2, the density per replicate ranged from 10 individuals/m^2 in Rep 3 to 22 individuals/m^2 in Rep 1 (Table 3-15). Species richness ranged from 5 species in Rep 3 to 9 species in Rep 1. The Shannon-Wiener species diversity ranged from 1.56 in Rep 3 to 2.02 in Rep 2.

At Station 3, the density per replicate ranged from 8 individuals/m^2 in Rep 2 to 13 individuals/m^2 in Reps 1 and 3 (Table 3-15). Species richness ranged from 4 species in Rep 2 to 7 species in Reps 1 and 3. The Shannon-Wiener species diversity ranged from 1.33 in Rep 2 to 1.91 in Reps 1 and 3.

In summary, a total of 37 different species were collected in the North Study Area. Station 3 had the lowest density of organisms and diversity while Station 1 had the highest. Polychaetes dominated the benthic populations at Stations 1 and 3 while Station 2 was comprised of a mix of polychaetes and miscellaneous phyla (Table 3-15). Overall, crustaceans and molluscs were in low abundance. Echinoderms were absent at all of the stations.

Table 3-15. Macroinfauna Community Composition in the North Study Area

Parameter	North Alternative Site											
	Station GO1				Station GO2				Station GO3			
	Rep 1	Rep 2	Rep 3	Mean	Rep 1	Rep 2	Rep 3	Mean	Rep 1	Rep 2	Rep 3	Mean
Density (number/m^2)	16	18	26	20	22	18	10	17	13	8	13	11
Species Richness (# of species)	8	9	10	9	9	8	5	7	7	4	7	6
Shannon-Wiener diversity	2.03	2.15	2.01	2.06	1.97	2.02	1.56	1.85	1.91	1.33	1.91	1.72
% Polychaetes	100	91	44		22	64	50		88	0	75	
% Crustaceans	0	9	6		7	0	0		0	80	0	
% Molluscs	0	0	6		14	0	0		0	20	0	
% Echinoderms	0	0	0		0	0	0		0	0	0	
% Misc. Phyla	0	0	44		57	36	50		12	0	25	

Northwest Study Area

At Station 6, the density per replicate ranged from 18-19 individuals/m^2 and species richness ranged from 8-9 species in each of the replicates (Table 3-16). The Shannon-Wiener species diversity ranged from 1.97 in Rep 3 to 2.10 in Rep 1.

At Station 7, the density per replicate ranged from 11 individuals/m^2 in Rep 2 to 21 individuals/m^2 in Reps 1 and 3 (Table 3-16). Species richness ranged from 5 species in Rep 2 to 12 species in Rep 1. The Shannon-Wiener species diversity ranged from 1.48 in Rep 2 to 2.46 in Rep 1.

At Station 8, the density per replicate ranged from 8-10 individuals/m^2 and species richness ranged from 4-6 species in each of the replicates (Table 3-16). The Shannon-Wiener species diversity ranged from 1.33 in Rep 3 to 1.79 in Rep 2.

In summary, a total of 30 different species were collected in the Northwest Study Area. Station 8 had the lowest densities of organisms and diversity. Stations 6 and 7 had similar values. At all of the stations, the majority of the benthic populations were comprised of polychaetes (Table 3-16). There were no molluscs or echinoderms present in any of the stations.

Table 3-16. Macroinfauna Community Composition in the Northwest Study Area

Parameter	Northwest Alternative Site											
	Station GO6				Station GO7				Station GO8			
	Rep 1	Rep 2	Rep 3	Mean	Rep 1	Rep 2	Rep 3	Mean	Rep 1	Rep 2	Rep 3	Mean
Density (number/m^2)	18	19	18	18	21	11	21	18	8	10	8	9
Species Richness (# of species)	9	8	8	8	12	5	7	8	5	6	4	5
Shannon-Wiener diversity	2.10	1.98	1.97	2.02	2.46	1.48	1.63	1.86	1.61	1.79	1.33	1.58
% Polychaetes	64	50	73		69	57	23		60	67	60	
% Crustaceans	9	25	9		31	0	31		20	17	0	
% Molluscs	0	0	0		0	0	0		0	0	0	
% Echinoderms	0	0	0		0	0	0		0	0	0	
% Misc. Phyla	27	25	18		0	43	46		20	16	40	

<u>Inshore/Proposed Reference Site</u>

At Station 4, the density per replicate ranged from 2 individuals/m^2 in Rep 3 to 16 individuals/m^2 in Reps 1 and 2 (Table 3-17). Species richness ranged from 1 species in Rep 3 to 10 species in Rep 2. The Shannon-Wiener species diversity ranged from 0 in Rep 3 to 2.30 in Rep 2.

At Station 9, the density per replicate ranged from 10 individuals/m^2 in Rep 2 to 14 individuals/m^2 in Rep 1 (Table 3-17). Species richness ranged from 6-8 species in each of the replicates. The Shannon-Wiener species diversity ranged from 1.73 in Rep 3 to 2.04 in Rep 1.

At Station 5, the proposed reference site, the density per replicate ranged from 13 individuals/m^2 in Rep 1 to 48 individuals/m^2 in Rep 2 (Table 3-17). Species richness ranged from 6 species in Rep 1 to 15 species in Rep 2. The Shannon-Wiener species diversity ranged from 1.67 in Rep 1 to 2.35 in Rep 2.

In summary, a total of 35 different species were collected in the stations located inshore of the two alternative study areas, including the proposed reference site. Stations 4 and 9 had similar organism densities and species richness; however, Station 4 had a slightly lower diversity than Station 9. Station 5, the proposed reference site, had the highest organism density and species diversity with a mean value of 30 and 2.08, respectively. Polychaetes comprised the majority of species at all of the stations (Table 3-17). No molluscs were present at Station 4 or 9 and only one Pelecypoda was found at Station 5. Echinoderms were absent from all of the stations from this study area.

Table 3-17. Macroinfauna Community Composition at the Inshore and Proposed Reference Sites

Parameter	Inshore/Proposed Reference Site											
	Station GO4				Station GO5				Station GO9			
	Rep 1	Rep 2	Rep 3	Mean	Rep 1	Rep 2	Rep 3	Mean	Rep 1	Rep 2	Rep 3	Mean
Density (number/m^2)	16	16	2	11	13	48	29	30	14	10	13	12
Species Richness (# of species)	9	10	1	7	6	15	11	32	8	6	6	7
Shannon-Wiener diversity	2.16	2.30	0.00	1.49	1.67	2.35	2.22	2.08	2.04	1.79	1.73	1.85
% Polychaetes	70	50	0		75	50	72		78	83	75	
% Crustaceans	10	10	0		13	20	22		0	17	0	
% Molluscs	0	0	0		12	0	0		0	0	0	
% Echinoderms	0	0	0		0	0	0		0	0	0	
% Misc. Phyla	20	40	100		0	30	6		22	0	25	

Regional Analysis for Benthic Macroinfauna

Results of the cluster analysis, an assessment to determine the degree of similarity of macrofauna species assemblages amongst stations, indicate that there was no difference in species composition between the North and Northwest Study Areas. Further, the results show the proposed reference site had similar macrofauna assemblages to the North and Northwest Study Areas, suggesting this is a suitable reference site.

3.2.2.2 Benthic Meiofauna

Benthic meiofauna are described as small organisms that live within the sediment and can be retained on a 63µm sieve, but pass through a 0.5-mm sieve. Nematodes and harpactacoid copepods make up the majority of meiofauna; therefore, the presence of only these two taxa were accounted for in the samples collected to characterize the study areas and potential reference sites. The benthic meiofauna communities were characterized for the North Study Area (Stations 1, 2, and 3), Northwest Study Area (Stations 6, 7, and 8), and the sample stations located inshore of the two study areas (Stations 4 and 9), including the proposed reference study site (Station 5). Two replicate samples were taken at each of the stations within a study area.

North Study Area

At Station 1, Rep 3, one nematode was found. There were no harpactacoid copepods in the sediment sample collected at Station 1. No meiofaunal nematodes or harpactacoid copepods were present at Stations 2 or 3.

Northwest Study Area

No meiofaunal nematodes or harpactacoid copepods were present at Stations 6, 7, or 8.

Inshore/Proposed Reference Site

No meiofaunal nematodes or harpactacoid copepods were present at Stations 4, 5, or 9.

Regional Summary

Meiofaunal organisms were absent throughout all of the study areas with the exception of Station 1 in the North study site. Only one nematode was found in a sample collected at this station. In addition to the absence of nematodes and harpactacoid copepods in the majority of the samples, it must be noted that when the samples were analyzed there were no other meiofaunal organisms present. Similar to the macroinfauna samples, there were large quantities of foraminifera (both living specimens and empty shells) present in all of the samples.

3.2.3 Fish Communities and Essential Fish Habitat (EFH)

The ROI for Fish Communities and EFH is the water column and ocean floor within the ODMDS study areas.

3.2.3.1 Deep-sea Demersal Species

The demersal fish community in the deep offshore environment are those that reside directly in the action area, as these species live on or near the bottom where a potential ODMDS would be located. Species assemblages were assessed using three gear types: beam trawl, traps, and photography. All specimens collected by trawl and traps were retained for identification to species level by Scripps Institution of Oceanography scientists. Fish captured by images in photographs and video were generally unable to be identified to an advanced taxonomic level due to the quality of the camera equipment. These typically fell into two morphological types that were referred to as Ophidiiform (e.g., cuskeels that are relatively short and "tadpole" shaped, often with a bulbous head) and Anguilliform (e.g., true eels that are long and slender). The following sections provide brief descriptions of the specimens collected during the Site Characterization Study conducted in April 2008.

Bassogigas gillii

This species is a type of fish commonly called a cuskeel, although it is not a true eel. The dorsal and ventral fins are continuous with the caudal fin. Individuals typically reach a size of at least 33.5 in (85 cm), and the deepest recorded depth of capture is 7,050 ft (2,150 m), although the specimen caught in this study likely came from a depth of about 8,530 ft (2,600 m). This species has been collected from all major oceans but is considered uncommon (Smith and Heemstra 1986; Nielsen et al. 1999).

Bathypterois longipes

This species is in a group of fishes commonly called tripod fish, named for the elongated extensions of the pelvic and caudal fin which form a tripod on which the fish rests on the seafloor. This particular species is known as the abyssal spiderfish. Tripod fish swim very little, and feed by facing into the current and waiting for small planktonic organisms to contact their outstretched (and also elongated) pectoral fins. Maximum recorded size is 9.8 in (24.9 cm) and the depth range is 8,580 – 18,400 ft (2,615 - 5,610 m) (Merrett 1990).

Cyclothone pallida

The genus *Cyclothone* is one of the most abundant of all types of fishes and is estimated to be the most abundant vertebrate genus in the world. The common name of bristlemouth is derived from the presence of numerous fine teeth. Its maximum size is approximately 3 in (75 mm), and this species has a very large mouth and several rows of photophores (bio-luminescent spots) along the body. *Cyclothone pallida* is found in all major oceans. *Cyclothone* typically live in the 1,300 – 3,300 ft (400-1,000 m) mesopelagic depth range, although they may be found much deeper. The specimens collected by beam trawl in this study were likely captured in the water column while the net was being deployed or retrieved, as opposed to the ocean floor (Smith and Heemstra 1986; Gon 1990).

Eptatretus carlhubbsi

The giant hagfish (*Eptatretus carlhubbsi*) is the largest known hagfish. In the order Myxiniforme, hagfish are primitive jawless fishes that are unique in that they have a cranium, but lack a vertebral column. Colloquially known as “slime eels” the fish is known for its ability to produce copious amounts of slime when agitated. The largest recorded size for this species is 46 in (116 cm), and the deepest recorded depth is 5,160 ft (1,574 m) (Fernholm 1998). The largest specimen collected in this study was 50 in (127 cm); two smaller specimens were collected at a depth of about 8,530 ft (2,600 m) at Station 6.

Tauredophidium hextii

This uncommon species of cuskeel is quite unique in that it has three long spines on the operculum, does not have eyes, and is the only species in the genus *Tauredophidium*. The specimen collected in this study was a gravid adult female very near the maximum recorded size of 4 in (10.5 cm). The recorded depth range for the fish is from 4,920 – 8,725 ft (1,500 - 2,660 m), while the trawl depth in this study ranged from 8,740 – 8,900 ft (2,665 - 2,713 m) (Nielsen et al. 1999).

North Study Area

Sampling was done by three methods: Beam Trawling; Fish Traps; and Photo Surveys.

Beam trawl sampling in the North Study Area was conducted over a one-hour period at Station 1, Station 2, and Station 3. At each station, the 12-ft beam trawl was in contact with the bottom for 60 minutes each, covering an area of 0.006 mi^2 (0.015 km^2) at Station 1, 0.005 mi^2 (0.014 km^2) at Station 2 and 0.005 mi^2 (0.013km^2) at Station 3. The trawls collected a total of only four fish. The beam trawl at Station 1 resulted in the capture of one damaged, partial fish that was unidentifiable. The beam trawl at Station 2 resulted in the capture of two fishes. The first fish was identified as a *Stomiiforme* (dragonfishes and allies) and had a total length of 100 mm and a mass of 2.5 grams. This fish was too damaged to be identified further. The second fish was identified as *Bathypterois longipes* (Tripod fish) and had a total length of 110 mm and a mass of 10.0 grams. The beam trawl at Station 3 resulted in the capture of one fish. The fish was identified as *Cyclothone pallid* (Tan bristlemouth) and had a total length of 53 mm and a mass of 1.0 gram. The Stomiiforme is a mid-water column organism.

The fish traps that were set in the North Study Area were limited to Station 1. A total of two giant hagfish (*Eptatretus carlhubbsi*) were collected.

The stations in the North Study Area had a total of five fish observed by camera, all of which were at Station 1. There were at least three different species observed, including three individual Ophidiform (cuskeel) specimens, one Anguilliform (likely from the family Halosauridae: *Aldovandria* sp., deep sea spiny eel), and one specimen that was possibly a small shark or an Ophidiiform with very large horizontally positioned pectoral fins.

Northwest Study Area

Sampling was done by three methods: Beam Trawling; Fish Traps; and Photo Surveys.

Beam trawl sampling in the Northwest Study Area was conducted over a one-hour period at Station 6 and Station 8 and collected a total of five fish. The trawls collected a total of only five fish. At Station 6, the 12-ft beam trawl was in contact with the bottom for 69 minutes covering an area of 0.007 mi^2 (0.017 km^2) and Station 8 it was in contact with the bottom for 60 minutes covering an area of 0.005 mi^2 (0.012km^2). The beam trawl at Station 6 resulted in the capture of four fishes. Three of the fish were identified as *Cyclothone pallid* (Tan bristlemouth) and had a total length of 66, 60, and 62 mm and each had a mass of 1.0 gram. The Tan bristlemouth lives suspended in the water column, and as such, it is likely that these fish were captured when the net was in transit to or from the bottom. The fourth fish was identified as *Bassogigas gillii* (a type of Cuskeel) and had a total length of 538 mm and a mass of 1,100 grams. The beam trawl at Station 8 resulted in the capture of one fish. The fish was identified as an Ophidiiform and had a total length of 57 mm and a mass of 1.0 gram.

Fish traps in the Northwest Study Area yielded two hagfish. One was identified as a giant hagfish while the other was too immature and damaged to be identified beyond family Myxinidae.

The stations in the Northwest Study Area yielded a total of five fish observed by camera. All specimens were fairly small Ophidiiforms, with one photographed at Station 6, one photographed at Station 7, and three photographed at Station 8.

Inshore/Proposed Reference Site

Sampling was done by three methods: Beam Trawling; Fish Traps; and Photo Surveys.

Beam trawl sampling at the inshore stations and proposed reference station was conducted over a one-hour period at Station 9 and Station 5, respectively. At Station 5, the 12-foot beam trawl was in contact with the bottom for 60 minutes covering an area of 0.005 mi^2 (0.012 km^2)

and at Station 9, it was in contact with the bottom for 75 minutes covering an area of 0.006 mi^2 (0.015 km^2). The beam trawl at Station 9 resulted in the capture of one fish. The fish was identified as *Tauredophidium hextii* (a type of Cuskeel) and had a total length of 57 mm and a mass of 1.0 gram. Two attempts were made to trawl at Station 5, but both times the gear snagged on bottom obstructions, the equipment was damaged, and no fish were collected.

Fish traps were not deployed at either of the inshore or proposed reference stations.

The stations in the inshore and proposed reference area had a total of four fish observed by camera. Station 5 yielded photographs of two relatively large Anguilliforms (likely *Aldovandria* sp.) and one Ophidiiform specimen. One small Ophidiiform specimen was photographed at Station 9.

3.2.3.2 Commercial and Recreational Fishery Species

In Guam, the majority of the commercial fishery is a pelagic trolling fishery operated by small trolling boats less than 33 ft (10 m) long (Allen and Bartram 2008). They are owner–operated, often by fishers who earn the majority of their living by other means than fishing. This creates difficulties when attempting to distinguish between commercial and recreational fishing efforts, however, almost all of the small scale fisherman do sell a portion of their catch.

Large scale commercial fisheries are limited due to the prohibition of longline fishing around the island of Guam (50 CFR 665.26). The small boat fisheries of Guam can be categorized in to five groups based on the biology and harvest method of the species. These groups include pelagic fish, bottomfish, reef-fish, bigeye scad, and marine invertebrates.

The DAWR maintains a network of FADs in the waters surrounding Guam as an aid to the fishing community. The main purpose of the FADs was to enhance fishing and recreational diving and minimize anchor damage to the reef habitats (DAWR 2005b). The FADs create habitat for juvenile fish to aggregate, which in turn attracts larger fish, and thereby enhances the presence and abundance of commercially important species for fisherman. Fish distributions of shallow (0 to 165 ft [0 to 50 m]) schooling fish, intermediate depth (165 to 330 ft [50 to 100 m]), and deep water (330 to 1,650 ft [100 to 500 m]) scattered fish have been documented to increase as far as 0.8 nm (1.5 km) from FADs (Josse et al. 2000). Figure 2-3 displays the locations of FADs offshore of Guam.

<u>Pelagic Fishery</u>

Pelagic fishes are open-ocean migratory species. The most common species in the Guam pelagic fishery are mahimahi (*Coryphaena hippurus*), ono (*Acanthocybium solandri)*, skipjack tuna (*Katsuwonus pelamis)*, yellowfin tuna *(Thunnus albacares),* and Pacific blue marlin (*Makaira mazara)* and make up 90-95% of the trolling catch (Amesbury 2006). Catch data show distinct seasonality in these species abundance offshore of Guam (Pacific Islands Fisheries Science Center [PIFSC] 2009). Harvesting methods include line trolling from a moving boat, longline, and ika-shibi (nighttime fishing that uses lights as a lure; commonly used to catch squid) (Myers 1993). The general EFH for adult and juvenile pelagic fish with Fishery Management Plans (FMPs) is from the shoreline to the outer limit of the Exclusive Economic Zone (EEZ) and the water column to depths of 3,300 ft (1,000 m). The eggs and larvae also have EFH from the shoreline extending to the outer limit of the EEZ, and in the water column extending to depths of 650 ft (200 m), also known as the epipelagic zone (Western Pacific Regional Fishery Management Council [WPRFMC] 2004). Over 27 species or broad groups of fishes (e.g., oilfish family) are included in the Pacific Pelagic Management Unit, including tunas, marlins, and sharks (WPRFMC 2006). The following descriptions are of FMP species known to occur most frequently (in effect, highest fisheries catch) in waters in or near the study region.

Mahimahi are found in tropical and subtropical waters greater than 300 ft (91 m) deep worldwide. They tend to inhabit surface waters, with an optimal vertical distribution in the water column from the surface to 280 ft (85 m). This species feeds mainly on flying fish, crabs, squid, mackerel, zooplankton, and crustaceans. Mahimahi can be found in schools, spawn in the open ocean, and their eggs and larvae are pelagic (Palko et al. 1982). Mahimahi have been documented to travel over 12.5 mi (20 km) in a day (Kingsford 1999). This species is the most sought out species in the pelagic fishery (Meyers 1993). Catch data indicate the seasonal run for mahimahi offshore of Guam begins to increase in October but occurs predominantly December through May (PIFSC 2009).

Ono are found solitary or in small schools in tropical and subtropical waters between 240 and 300 ft (73 and 91 m) deep. Their diet consists primarily of squid and other fish occurring in the pelagic region (Collette et. al 1983). Because the ono is not a large schooling fish, sport-fisherman often regard it as a prize catch. Ono tend to be found in surface waters, with an optimal vertical distribution in the water column from the surface to 40 ft (12 m). Catch data indicate the seasonal run for ono offshore of Guam occurs predominantly November through April, though landings do occur throughout the year (PIFSC 2009).

The skipjack tuna is a very common offshore species residing in deep tropical waters throughout the world. This species travels in large schools in numbers up to 50,000 individuals. Skipjack tuna can travel up to 66 mi (106 km) in a day (Yuen 1970). Skipjack tuna inhabit surface waters, with an optimal vertical distribution in the water column from the surface to 850 ft (260 m). They spawn throughout the year and the eggs and larvae are pelagic. This fish is often caught using purse-seine nets due to the large schooling capability of the species. The skipjack feeds mainly on cephalopods, crustaceans, and molluscs (Collette et. al 1983). Skipjack tuna is the second most sought after fish in the pelagic fishery of Guam (Meyers 1993). Catch data indicate the seasonal run for skipjack tuna offshore of Guam increases in March, peaks in May, then steadily declines with landings occurring throughout the year (PIFSC 2009).

The yellowfin tuna is a highly migratory species found in open tropical and subtropical waters greater than 500 ft (152 m) deep. They are most abundant in surface waters, with an optimal vertical distribution in the water column from 3-656 ft (1-200 m). Individuals are known to school with other species of fish of similar size, as well as with other yellowfin tuna. Yellowfin tuna have been documented to travel up to 48 mi (77 km) in a day (Schaefer 2007). Yellowfin tuna are rarely seen near reefs as they remain most often in open water. Spawning takes place during the summer months and their eggs and larvae are pelagic. The diet of yellowfin tuna consists of squid, crustaceans, and other fish (Collette et. al. 1983). Yellowfin tuna are typically fished using surface and local trollers. They are not as commonly caught in Guam due to the low availability of surface trollers in the area. The yellowfin tuna are the foundation of the Guam-based foreign longline fishery are considered of high importance to the domestic purse seine fishery (Meyers 1993). Catch data indicate the seasonal run for yellowfin tuna offshore of Guam increases in March, peaks during June and July, then steadily declines with landings occurring throughout the year (PIFSC 2009).

Blue marlin inhabit tropical and subtropical waters typically greater than 1,200 ft (366 m) deep. There are some seasonal migratory patterns into temperate waters; however, spawning occur in tropical waters. Blue marlin can be found far out in the open ocean, and are rarely seen near land masses or islands unless there is a steep drop off nearby. They tend to inhabit surface waters, with an optimal vertical distribution in the water column from the surface to 650 ft (198 m). Their diet consists of squid, crustaceans, and cephalopods. This species can be seen in smaller schools or groups, but larger fish are usually solitary (Nakamura 1985). Some smaller individuals are caught in trolls year round, but most blue marlins in Guam are caught by charter fleets (Meyers 1993). Catch data indicate the seasonal run for marlin offshore of Guam increases in April, peaks during July, then steadily declines through November with occasional landings occurring December through March (PIFSC 2009). Blue marlin are most abundant June through September (URS 2001).

The annual total catch of all pelagic fishes is composed primarily of the species mentioned above; however, there are other less frequently or incidentally caught species that contribute to the annual total landing. These species include the rainbow runner (*Elagatis bipinnulatus),* great barracuda (*Sphyraena barracuda*), kawakawa (*Euthynnus affinis*), dogtoothe tuna (*Gymnosarda unicolor*), sailfish (*Istiophorus platypterus*), and shortbill spearfish (*Tetrapturus angustirostris*) (WPRFMC 2007).

Bottomfish Fishery

Bottomfishing is conducted from an anchored or drifting boat by hook and line, excluding the assistance of floodlights. In Guam this is a small scale commercial and recreational fishery with most of the boats measuring less than 25 ft (7.6 m) in length and owned by local residents. Some participants in the bottom fishery may be tourists aboard large charter boats. There are two major areas of bottomfishing in Guam: the shallow water area (less than 490 ft [150 m] of water) and the deep water area (in depths of 490-820 ft [150-250 m]). Typically the shallow water area is the larger fishery due to the ease of fishing closer to shore. In the shallow water area abundant species include the red-gilled emperor (*Lethrinus rubrioperculatus*), snappers (Family *Lutjanidae)*, groupers (Family *Serranidae*), and jacks (Family *Carangidae*). The deep water species that are targeted include groupers and snappers of the genera *Pristipomoides*, *Etelis*, *Aphareus*, *Epinephelus*, and *Cephalopholis*. Bottomfish may also be some of the same species known as reef fishes, occurring farther from the reef in deep coastal waters of approximately 985 ft (300 m) (Myers 1993). Catch for both the shallow and deeper water bottomfish fisheries generally increases in April and declines in October and November (PIFSC 2009). Bottomfish are most commonly harvested by small spin casting reels for very shallow fishing efforts, and electric reels with multiple hooks per line are used in the deeper water areas.

EFH for bottomfish includes the entire water column extending from the shore to depths of 1,310 ft (400 m). EFH is broadly defined because bottomfish inhabit different habitats during various stages of their life history; eggs and larvae of bottomfish tend to be pelagic, while adults settle to a benthic habitat (WPRFMC 2006). Species with FMPs for the Bottomfish and Seamount Groundfish Fisheries include 22 species, primarily in the snapper, jack and grouper families. The following are descriptions of some commonly fished bottomfish species and groups with FMPs in Guam.

The red-gilled emperor is found in tropical waters in the Pacific Ocean. This species is not considered migratory. Red-gilled emperors are most abundant in water depths of 40-525 ft (12-160 m). The defined essential fish habitat is over sand and rubble on the outer rims of reefs. Diet for this species consists of benthic invertebrates, crustaceans, molluscs, and small fishes (Carpenter et. al 1989).

Snappers (Family *Lutjanidae*) are commonly found in tropical and subtropical regions of all oceans. The black-banded snapper (*Lutjanus semicinctus*) and the checkered snapper (*Lutjanus decussates*) are the most commonly found Lutjanids in Guam. The black-banded snapper is most abundant in water depths ranging from 33-98 ft (10-30 m). They feed mainly on smaller fish around coral reefs. This species is commonly found in small groups or as solitary individuals (Allen 1985). The checkered snapper is most abundant depths of in 7-100 ft (2-30 m). They can be found in near-shore and off-shore coral reefs in schools or individually (Allen 1985).

There are many different species of groupers (Family Serranidae) found in tropical waters. A few of the most common grouper species that are found near Guam include the lunartail grouper (*Variola louti)*, one-blotch grouper (*Epinephelus melanostigma*), blacktip grouper

(*Epinephelus fasciatus*). The lunartail, also known as the bueli in Guam, is found in tropical and subtropical waters from 13-656 ft (4-200 m). They commonly occur above coral reefs feeding on crabs, shrimps, reef fish species, and stomatopods (NMFS 2008). The one-blotch grouper can be found in water depths of 0-23 ft (0-7 m), and is common along reef flats and shallow lagoon regions (Heemstra et. al 1993). The blacktip grouper has a similar habitat to that of the lunartail grouper and occurs in water 13-525 ft (4-160 m) deep. This species is most abundant on outer reef slopes in depths of approximately 50 ft (15 m). The preferred diet of the blacktip grouper is crustaceans and other small fish (Heemstra et. al 1993).

Deeper water bottomfish species such as the green jobfish and the black jack can be found in tropical waters as deep as 1,060 ft (324 m). The green jobfish is commonly found either in groups or individually in open waters and is considered a benthopelagic species. Green jobfish feed mainly on other fish, cephalopods, shrimp, and crabs (Allen 1985). Black jack are found in sub-tropical waters including regions around the equator. They are also considered a benthopelagic species and their eggs and larvae are found in the pelagic region of the ocean. The optimal depth range for the black jack is 40-1,060 ft (12-324 m), and they are occasionally seen along the outer boundaries of reefs. The diet of the black jack fish consists primarily of other fish (Paxton et. al 1989).

Coral Reef Fish Fishery

The coral habitats surrounding Guam consist of fringing reefs, patch reefs, submerged reefs, shallow offshore banks, barrier reefs, and lagoon habitats. The combined area of coral reef and lagoon is approximately 69 km^2 in nearshore waters between 0-3 nm, and an additional 110 km^2 in federal waters greater than 3 nm offshore (Hunter 1995). Approximately 270 species of hard corals provide habitat to sustain a coral reef fishery of approximately 1,000 species (Birkeland et al. 2000). Annual Guam coral mass spawning usually take place at night, following a summer full moon in June, July, or August. During this time period, critical life history stages such as fertilization, larval competency, and settlement or metamorphosis occur. Common reef fish include parrotfishes (Family *Scaridae*), surgeonfish (Family *Acanthuridae*), wrasses (Family *Labridae*), and groupers (Family *Serranidae*). Parrotfish are typically found in reef flats, lagoons, and along upper edges of outer channel or seaward reef slopes. Surgeonfish occur along the seaward reef margin, outer reef flats, the upper edge of lagoon reefs, and in areas of shallow clear water that receive some wave action. Juvenile wrasses live in coral-rich areas of shallow lagoon reefs then move off of the reef flats into deeper water along reef slopes as adults. Groupers inhabit a variety of reef habitats ranging from shallow reef flats to deep lagoons and the outer reef slope (Guam Division of Aquatic and Wildlife Resources 2009). Reef fish are harvested by hook and line, spears, and nets. The majority of the fishery in Guam is shore-based, but the portion that includes the use of boats will be considered in this document, as the project area is located offshore.

Most coral reef fish species have large amounts of diversity within the family of fish. One unifying characteristic is that they are all tropical species which can be found in shallow reef areas. Therefore, the essential fish habitat includes the water column and all the benthic substrate to a depth of approximately 295 ft (90 m) from the shoreline to the outer limit of the EEZ (WPRFMC 2004). The following are descriptions of coral reef fish with FMPs that are known to occur in Guam.

Parrotfish are found in tropical waters in depths of 0-165 ft (0-50 m). Adults can be found in larger schools with fish of similar size, but juveniles are usually solitary. Adults prefer the outer regions of reefs for habitat, while the preferred habitat of juveniles is within protected shallow reefs. Parrotfish are herbivorous grazers who eat algae and coral polyps (Parenti and Randall 2000).

Surgeonfish are reef-associated species found in tropical waters. The most common species is the elongate surgeonfish (*Acanthurus mata*). The optimal depth range is from 16-330 ft (5-100 m) and the preferred habitat is around steep slopes or rocky bottoms near reefs. The adults are typically seen in schools. They feed mainly on mid-water column plankton and zooplankton (Randall 1987).

The blue streak cleaner wrasse (*Labroides dimidiatus*) is a common wrasse species found in tropical waters in depths ranging from 0-130 ft (0-40 m). This species is found in coral rich areas. Diet of the blue streak cleaner wrasse consists of crustaceans and parasites found on other fish (Randall et al. 1990).

Many coral reef organisms, including reef fish, corals, other invertebrates and algae tend to have pelagic egg, larval, or juvenile stages (Galarza et al. 2009). The capacity of reef organisms to disperse between reefs is affected by multiple factors including, distance and ocean currents, as well as a wide range of biological factors. The ability for these organisms during their pelagic life stages to disperse and recruit onto coral reefs at some distances from their native reef is called connectivity (The Nature Conservancy 2008). Recent studies have suggested that although an individual organism in its pelagic life stage may travel significant distances, recruitment of these individuals does not have a large ecological effect on a population; rather, most individuals settle in close proximity to their native reef (Almany et al. 2007, Jones et al. 2007, Jones et al. 2005, Palumbi 2003, Barber et al. 2002, and Bradbury and Snelgrove 2001). Both Almany et al. (2007) and Jones et al. (2005) indicate a high percentage (up to 60%) of self-recruitment to native reef habitat occurs on small scales (less than about 1,000 ft [300 m]) for species that have long larval durations. The revelation that coral reef ecosystems rely on self-recruitment from native organisms is substantiated in recent genetic testing of individuals from separate reefs. Genetic analyses have shown connectivity of extreme dispersal distances (hundreds to thousands of kilometers) is atypical and genetic differences may be apparent in populations separated by as little as 0.3 mi (0.5 km) (Palumbi 2003 and Barber et al. 2002). Connectivity is often considered when designing and managing marine reserves effectively. Shanks et al. (2003) suggest that for the effective management of coral reef organisms, marine reserves need to be established approximately 12.4 mi (20 km) apart and be approximately 2.5 – 3.7 mi (4 – 6 km) in size; this would allow for recruitment of individuals with larger dispersal distances or self-recruitment of individuals with shorter dispersal distances, respectively.

<u>Marine Invertebrate Fishery</u>

The marine invertebrates that comprise the fishery in Guam include crustaceans, cephalopods, echinoderms, and shelled molluscs. The major focus of the marine invertebrate fishery around Guam is crustaceans (lobsters and crabs), and thus crustaceans the focus of this section. The most common and sought after species include the green spiny lobster (*Panulirus penicillatus)* and slipper lobster (Family *Scyllaridae)*. Eggs and larvae are dispersed in the water column to depths of 490 ft (150 m) from the shoreline to the outer limit of the EEZ (WPRFMC 2004). The method of collection for the majority of the marine invertebrates is by spears or hand, and is generally done by reef gleaners without the assistance of boats (Myers 1993). At this time there is not a substantial crustacean fishery in waters surrounding Guam, so EFH has not been designated for this region (WPRFMC 1995 [Amendment 9]).

3.2.4 Marine Birds

The ROI for marine birds is the general region of Guam, which includes the ODMDS study areas, the Island of Guam, and the offshore area between them. Birds that live in association with marine habitats fall into three main groups: shorebirds (such as plovers, sandpipers), water birds (such as ducks, cormorants, and loons) and seabirds (such as albatross, petrels, puffins, penguins, frigate birds and boobies). Seabirds are those species that obtain most of their food from the ocean and are found over water for more than half of the year.

All marine birds that occur in the project area are protected under the (MBTA and EO 13186, which directs Federal agencies to avoid or minimize negative effects on migratory birds, protect their habitats, and consider effects on migratory birds in NEPA documents. None of the bird species are federally listed as threatened or endangered, but there is concern that several are declining in number to dangerous levels. A total of 27 seabird species have been recorded in Guam's marine habitats, most of which are visitors migrating to or from more permanent home locations. During the last century, most resident pelagic seabirds have decreased in numbers (e.g., brown noddies and white terns) or have been lost entirely (e.g., brown boobies). Extensive predation by non-native brown tree snakes (*Boiga irregularis*) since the 1950s is one of the major causes of these avifauna population declines (Wiles 2003). In response to predation nesting by brown noddies and white terns, both common residents of Guam, is now largely constrained to offshore locations that are free of snakes, including Cocos Island, smaller islets and rocks. The Brown Treesnake Control Program was established in Guam to work towards eradication of this invasive predator (U.S. Department of Defense 2008).

A comprehensive checklist of birds associated with marine habitats on Guam is presented in Table 3-18 (Wiles 2003). The distribution, abundance, and ecology of ten key species is described in this section as representative of the range of natural history patterns that occur within the ODMDS study region. Because of the importance of Guam to many marine bird species, one or more of the following criteria were used to select key species:

- Species that have offshore waters habitats
- Species that are common residents or common visitors to Guam
- Species that are rare visitors, Guam only

Based on these criteria, the following 10 species were selected: short-tailed shearwater (*Puffinus tenuirostris*), brown noddy (*Anous stolidus*), black noddy (*Anous minutus*), white tern (*Gygis alba*), wedge-tailed shearwater (*Puffinus pacificus*), brown booby (*Sula leucogaster*), red-footed booby (*Sula sula*), great crested tern (*Thalasseus bergii*), streaked shearwater (*Calonectris leucomelas*), and black-naped tern (*Sterna sumatrana*). Additionally, the Matsudaira's storm-petrel (*Oceanodroma matsudaira*) was positively identified during sampling for this study and therefore is highlighted in this section.

Table 3-18. Birds Associated with Marine Habitats on Guam

Common Name	Taxon, Scientific Name	Status, Habitat, Range, Other Notes
	DIOMEDEIDAE	
Albatross	*Phoebastria* sp.	RV, OW
	PROCELLARIIDAE	
Tahiti Petrel	*Pterodroma rostrata* (Peale, 1848)	RV-1, OW, G
Juan Fernandez Petrel	*Pterodroma externa* (Salvin, 1875)	RV-1, OW, G
Streaked Shearwater	*Calonectris leucomelas* (Temminick, 1835)	RV, OW, G
Wedge-tailed Shearwater	*Puffinus pacificus* (Gmelin, 1789)	UV, may have nested on Guam before 1930, OW, SNM
Short-tailed Shearwater	*Puffinus tenuirostris* (Temminick, 1835)	CV, migrates northward past Guam in large numbers during May, OW, SM
Townsend's Shearwater	*Puffinus auricularis* (Townsend, 1890)	RV, OW, SM, all records have been of the subspecies *P. a. newelli* (Henshaw, 1900)
Audubon's Shearwater	*Puffinus lherminieri* (Lesson, 1839)	RV, OW, SM
	HYDROBATIDAE	
Leach's Storm-Petrel	*Oceanodroma leucorhoa* (Vieillot, 1818)	RV-1, OW, SM
Matsudaira's Storm-Petrel	*Oceanodroma matsudaira* (Kuroda, 1922)	RV, all records are from Feb to Sept, OW, SNM
	PHAETHONTIDAE	
White-tailed Tropicbird	*Phaethon lepturus* (Daudin, 1802)	RV, nested on Guam until approximately 1982, OWL, SNM
Red-tailed Tropicbird	*Phaethon rubricauda* (Boddaert, 1783)	RV, OWL, SNM
	SULIDAE	
Masked Booby	*Sula dactylatra* (Lesson, 1831)	RV, OW, SNM
Brown Booby	*Sula leucogaster* (Boddaert, 1783)	UV, nested on Guam until late 1970s, OW and LG, a few birds still regularly roost on Orote Is., SNM
Red-footed Booby	*Sula sula* (Linnaeus, 1766)	UV, OW, SNM
	PHALACROCORACIDAE	
Cormorant	*Phalacrocorax* sp.	RV-1, seen flying over inner Apra Harbor
	FREGATIDAE	
Great Frigatebird	*Fregata minor* (Gmelin, 1789)	RV, OWL and LG, SNM
Lesser Frigatebird	*Fregata ariel* (Gray, 1845)	one possible record only, OW, SNM
	ARDEIDAE	
Yellow Bittern	*Ixobrychus sinensis* (Gmelin, 1789)	CR, most common in IH, but also nests on offshore islets and feeds occasionally on shallow reef flats and in MG, SM
Great Egret	*Ardea alba* (Linnaeus, 1758)	RV, most common in FW, but feeds occasionally on reef flats, SM
Little Egret	*Egretta garzetta* (Linnaeus, 1766)	RV, most common in FW, but feeds occasionally on reef flats, SNM
Pacific Reef-Egret	*Egretta sacra (Gmelin, 1789)*	UR, forages on BRF and in MG, nests on Cocos Is. and offshore islets, SNM
Black-crowned Night-Heron	*Nycticorax nycticorax* (Linnaeus, 1758)	RV-1, MG, SM
	ANATIDAE	
Eurasian Wigeon	*Anas penelope* (Linnaeus, 1758)	RV, most common in FW, but occurs rarely on reef flats, SNM
Northern Shoveler	*Anas clypeata* (Linnaeus, 1758)	RV, most common in FW, but occurs rarely on reef flats, SNM
Northern Pintail	*Anas acuta* (Linnaeus, 1758)	UV, most common in FW, but occurs rarely on reef flats, SNM
Surf Scoter	*Melanitta perspicillata* (Linnaeus, 1758)	RV-1, OW, G

Common Name	Taxon, Scientific Name	Status, Habitat, Range, Other Notes
CHARADRIIDAE		
Black-bellied Plover	*Pluvialis squatarola* (Linnaeus, 1758)	RV, BFR and IH, SM
Pacific Golden-Plover	*Pluvialis fulva* (Gmelin, 1789)	CV, BRF, MG and IH, SNM
Mongolian Plover	*Charadrius mongolus* (Pallas, 1776)	UV, most common on BRF, but also occurs in MG and IH, SNM
Greater Sand-Plover	*Charadrius leschenaultii* (Lesson, 1826)	RV, BRF, SM
Snowy Plover	*Charadrius alexandrinus* (Linnaeus, 1758)	RV, BRF and IH, SM
Common Ringed Plover	*Charadrius hiaticula* (Linnaeus, 1758)	RV, BRF and IH, SM
Little Ringed Plover	*Charadrius dubius* (Scopoli, 1786)	RV, BRF, G
HAEMATOPODIDAE		
Eurasian Oystercatcher	*Haematopus ostralegus* (Linnaeus, 1758)	RV-1, BRF and IH, G
RECURVIROSTRIDAE		
Black-winged Stilt	*Himantopus himantopus* (Linnaeus, 1758)	RV, most common in FW, but occurs rarely in MG, SM
SCOLOPACIDAE		
Common Greenshank	*Tringa nebularia* (Gunnerus, 1767)	RV, most common in FW, but occurs occasionally on BRF, SNM
Nordmann's Greenshank	*Tringa guttifer* (Nordmann, 1835)	one possible record only, BRF, G
Marsh Sandpiper	*Tringa stagnatilis* (Bechstein, 1803)	RV, most common in FW, but occurs occasionally on BRF, SM
Common Redshank	*Tringa totanus* (Linnaeus, 1758)	RV, BRF and FW, SNM
Spotted Redshank	*Tringa erythropus* (Pallas, 1764)	two possible records, BRF, G
Wood Sandpiper	*Tringa glareola* (Linnaeus, 1758)	UV, most common in FW, but occurs rarely on BRF and in MG, SNM
Wandering Tattler	*Heteroscelus incanus* (Gmelin, 1789)	UV, most common on BRF, but also occurs in MG and FW, SNM
Gray-tailed Tattler	*Heteroscelus brevipes* (Vieillot, 1816)	CV, most common on BRF, but also occurs in MG and FW, SNM
Common Sandpiper	*Actitis hypoleucos* (Linnaeus, 1758)	UV, BRF, MG and FW, SNM
Terek Sandpiper	*Xenus cinereus* (Güldenstädt, 1775)	RV, BRF, SNM
Little Curlew	*Numenius minutus* (Gould, 1841)	RV-1, BRF, SM
Whimbrel	*Numenius phaeopus* (Linnaeus, 1758)	CV, BRF, MG and IH, SNM
Bristle-thighed Curlew	*Numenius tahitiensis* (Gmelin, 1789)	RV, BRF, SNM
Far Eastern Curlew	*Numenius madagascariensis* (Linnaeus, 1766)	RV, BRF and MG, SM
Eurasian Curlew	*Numenius arquata* (Linnaeus, 1758)	RV, MG and IH, SM
Black-tailed Godwit	*Limosa limosa* (Linnaeus, 1758)	RV, most common on BRF, but also occurs in IH, SM
Bar-tailed Godwit	*Limosa lapponica* (Linnaeus, 1758)	RV, most common on BRF, but also occurs in MG and IH, SM
Ruddy Turnstone	*Arenaria interpres* (Linnaeus, 1758)	CV, BRF, MG and IH, SNM
Great Knot	*Calidris tenuirostris* (Horsfield, 1821)	RV, BRF, SM
Red Knot	*Calidris canutus* (Linnaeus, 1758)	RV, BRF and FW, G
Sanderling	*Calidris alba* (Pallas, 1764)	RV, most common on BRF, but also occurs in MG and IH, SM
Red-necked Stint	*Calidris ruficollis* (Pallas, 1776)	UV, most common on BRF, but also occurs in IH, SM
Long-toed Stint	*Calidris subminuta* (Middendorff, 1853)	RV, most common in IH, but also occurs occasionally on BRF, SM
Pectoral Sandpiper	*Calidris melanotos* (Vieillot, 1819)	RV, BRF and IH, SM
Sharp-tailed Sandpiper	*Calidris acuminata* (Horsfield, 1821)	RV, BRF and IH, but also occurs occasionally in MG, SNM

Common Name	Taxon, Scientific Name	Status, Habitat, Range, Other Notes
Dunlin	*Calidris alpina* (Linnaeus, 1758)	RV, BRF and FW, SM
Curlew Sandpiper	*Calidris ferruginea* (Pontoppidan, 1763)	RV, BRF and FW, G
Ruff	*Philomachus pugnax* (Linnaeus, 1758)	RV, most common in IH, but also occurs occasionally on BRF, SM
Swinhoe's Snipe	*Gallinago megala* (Swinhoe, 1861)	RV, most common in IH, but also occurs rarely in MG, SM
LARIDAE		
Black-headed Gull	*Larus ridibundus* (Linnaeus, 1766)	RV, most common on BRF, but also occurs occasionally in IH, SM
Slaty-backed Gull	*Larus schistisagus* (Stejneger, 1884)	RV-1, BRF, G
Gull-billed Tern	*Sterna nilotica* (Gmelin, 1789)	RV, BRF and IH, SM
Great Crested Tern	*Thalasseus bergii* (Lichtenstein, 1823)	UV, OW, SM
Common Tern	*Sterna hirundo* (Linnaeus, 1758)	RV, Apra Harbor and OW, SNM
Black-naped Tern	*Sterna sumatrana* (Raffles, 1822)	RV, LG and OW, G
Little Tern	*Sterna albifrons* (Pallas, 1764)	RV, BRF and FW, SM
Sooty Tern	*Sterna fuscata* (Linnaeus, 1766)	RV, OWL, SNM
White-winged Tern	*Chlidonias leucopterus* (Temminck, 1815)	RV, most common in IH, but occurs occasionally on BRF, SM
Brown Noddy	*Anous stolidus* (Linnaeus, 1758)	CR, Apra Harbor, OWL, and offshore islets and rocks, SNM
Black Noddy	*Anous minutus* (Boie, 1844)	CV, OW and Cocos Is., SNM
White Tern	*Gygis alba* (Sparrman, 1786)	CR, OWL and LG, nests on Cocos Is. and at a few inland sites, SNM
COLUMBIDAE		
Island Collared-Dove	*Streptopelia bitorquata* (Temminck, 1810)	CR, I, most common in IH, but occasionally nests in MG and feeds on beaches, SM
Mariana Fruit-Dove	*Ptilinopus roseicapilla* (Lesson, 1831)	EX, was most common in IH, but also occurred in MG, SM
MELIPHAGIDAE		
Micronesian Honeyeater	*Myzomela rubratra* (Lesson, 1827)	EX, was most common in IH, but also occurred in MG, SNM
MONARCHIDAE		
Guam Flycatcher	*Myiagra freycineti* (Oustalet, 1881)	EXT, was most common in IH, but also occurred in MG, G
Rufous Fantail	*Rhipidura rufifrons* (Latham, 1801)	EX, was most common on IH, but also occurred in MG, SM

Table Adapted From Wiles 2003

Status:
RV = rare visitor
RV-1 = rare visitor with only one record from Guam
UV = uncommon visitor
CV = common visitor
UR = uncommon resident
CR = common resident
I = introduced
EX = extirpated
EXT = extinct
Habitat:
BRF = beaches, rocky shorelines, and shallow or exposed reef flats
FW = freshwater habitats
IH = inland habitats
LG = lagoons
MG = mangroves
OW = offshore waters
OWL = offshore waters and over land
Documented distribution in the Marianas Islands:
G = Guam only
SM = southern Marianas (Rota to Faralon de Medinilla)
SNM = southern and northern Marianas

Short-tailed Shearwater

The short-tailed shearwater (*Puffinus tenuirostris*) is a member of a group of medium to large seabirds, which is believed to be one of the few bird families with a well-developed sense of smell. The wedge-tailed and streaked shearwater highlighted in this study are members of the same family. The common name, shearwater, is an apt reference to their graceful shearing flight, moving from centimeters above the water's surface to high in the sky. In Australia, they are known as the mutton bird because it is one of the few native birds that are commercially harvested for meat and oil. Short-tailed shearwaters are trans-equatorial migrants that breed in southeastern Australian and Tasmanian waters and migrate to northern North Pacific latitudes for wintering. Individuals have been known to fly 9,300 mi (15,000 km) in one trip over as small as a six week time period, and as a result, exhausted and starved birds are often washed up on the shores of Japan, the Aleutian Islands, North America and Australia. The Short-tailed shearwater is considered a common visitor of Guam as it migrates northward in large numbers during the months of April and May. It can be found in open water habitats and has been documented in the southern Marianas Islands, Rota to Farallon de Medinilla (Wiles 2003). The total population is presently estimated at approximately 23 million.

The short-tailed shearwater is completely dark brown in plumage, with occasional traces of white in the center of its upper wings. Their body length is 16-17 inches (40-43 cm), and physical features include a dark, short bill, rounded tail and dark grey, webbed feet that trail slightly behind when in flight. With a wing span of approximately 3.3 ft (1 m), the birds can fly up to 40 knots (75 kph). They are pursuit-plungers and feed on krill, squid and fish. The average lifespan is 15-19 years and individual birds have the same breeding partner each season (Spear 2007).

Massive breeding colonies are established annually off the southern and south-eastern coasts of Australia from September to May. Short-tailed shearwaters, like all other petrels, lay only one egg per season in soft sandy burrows. Males take the first incubation shift of 12-14 days while the female leaves to feed. These behaviors continue back and forth between the male and female until the young chick hatches. Incubation periods average 53 days. The adults depart early April, leaving behind the young birds. Two to three weeks later, the young birds begin their migratory flight unassisted by experienced birds (Spear 2007).

Brown Noddy

The brown noddy or common noddy (*Anous stolidus*) is a tropical seabird from the tern family. *Anous* is Greek for "unmindful" while *stolidus* means "impassive" in Latin. To sailors, they were well known for their apparent indifference to hunters or predators. These birds are often unwary and find safety in enormous numbers. It is one of three species of dark noddies worldwide, along with lesser (*Anous tenuirostris*) and black (*Anous minutus*) noddies, all characterized by a dark body with a white cap, the reverse plumage pattern of most terns. The dark noddies are the only marine terns that build substantial nests, and along with the closely related white tern (*Gygis alba*) they are the only tree- and shrub-nesting species in the family Laridae. Noddies exhibit several behaviors that are more characteristic of gulls than of other terns, including feeding chicks by regurgitation. The brown noddy is the largest of the noddies, and is considered a common resident of Guam, particularly Apra Harbor and the southern and northern Marianas Islands (Wiles 2003). Its habitat consists of open water, over land, and offshore islets and rocks. The name noddy comes from the male's habit of bobbing his head at a female when it is time to mate. The brown noddy typically breeds in the Atlantic and Pacific Oceans within 30 degrees of the equator. The non-breeding range includes worldwide distribution, ranging from Hawaii to the Tuamotu Archipelago and Australia in the Pacific Ocean, from the Red Sea to the Seychelles and Australia in the Indian Ocean and in the Caribbean to

Tristan da Cunha in the Atlantic Ocean. An estimate of the worldwide population is 500,000 to 1,000,000 pairs of birds (Enticott 1997).

The brown noddy is a medium-sized seabird with very dark brown plumage, an ashy-white forehead, slender wings, a long, narrow, wedge-shaped tail, dark legs/feet and a dark, slender, pointed bill. Adults are sexually monomorphic, while juvenile noddies have a more restricted white cap on the forehead than adults. Brown noddy body lengths range from 16-18 inches (40-45 cm) with a wingspan of 31-34 inches (79-86 cm) and an average life span of 25 years. Brown noddies vocalize with a low-pitched guttural call at nest and in flight. They feed on surface fish and squid often found in association with tuna or other predatory fish schools, catching them by surface-seizing, dipping or plunge diving. They are often observed feeding in mixed species flocks (Enticott 1997).

The brown noddy utilizes a wide variety of nesting locations, including the ground, trees, shrubs, cliffs and human-made structures. A single egg is laid and incubates for 33-36 days by both parents. Incubation shift lengths vary between geographical locations, and chicks fledge between 40-56 days after hatching (Enticott 1997).

Black Noddy

The black noddy (*Anous minutus*), also known as the Hawaiian or white-capped noddy, is a medium-sized, abundant, and gregarious tern that often nests, roosts, and forages in densely packed groups. It resembles the closely-related brown noddy (*Anous stolidus*), but is smaller with darker plumage, a whiter cap, a longer, straighter beak and shorter tail. The black noddy has a worldwide distribution in tropical and subtropical seas, with colonies widespread in the Pacific Ocean and more scattered across the Caribbean, central Atlantic and in the northeast Indian Ocean. They nest on numerous islands throughout the Pacific Ocean (including the Hawaiian archipelago), on a few additional islands in the Atlantic Ocean and at Ashmore Reef (Australia) in the Indian Ocean. On several islands they are the most numerous seabirds and the copious guano produced by their large populations may alter both the island vegetation structure and the coral reef ecosystem in the surrounding ocean. The black noddy is considered a common visitor of the open water habitats of Guam, particularly Cocos Island, and has documented distribution in the southern and northern Marianas Islands (Wiles 2003). Worldwide population of Black Noddies is estimated at 1 to 1.5 million breeding pairs.

The Black Noddy has black to brown plumage, a white cap, white lower half-eye ring, black legs and feet, and a long, straight, thin, and pointed black bill which is slightly decurved. They measure 14-15 inches (35-39 cm) in length with a wingspan of 26-28 inches (66-72 cm) and an average life span of 16-18 years. Individuals have slender wings and a wedge-shaped tail. Black noddies have a swift flight pattern with rapid wing beats usually placing them direct and low over the ocean, and they rarely soar high. They generally forage in nearshore waters and feed by dipping the surface from the wing or by making shallow dives. Black noddies are often seen feeding in large, mixed species flocks associated with schools of large predatory fishes which drive small fish and invertebrates to the surface.

Established pairs nest in large, dense colonies and return to the same nest site yearly. Breeding is highly variable and egg laying occurs year-round. One speckled egg is laid each season in nests often created in the branches of trees by a series of dried leaves covered with bird droppings. Both the male and the female incubate the egg for 36 days in shifts averaging about one half day. Chicks are brooded for several days after hatching with feedings approximately once every 11 hours. Black noddies are unusual among seabirds in that a pair can raise two broods in the same nesting season. Both parents feed the chick regurgitated fish or whole fish as they get older. Fledging occurs approximately 36 days after hatching and Post-fledging feeding continues for several weeks.

White Tern

The white tern (*Gygis alba*) is a small seabird known for laying its eggs on bare, thin branches in a small fork or depression without a nest. This balancing act is a predator-avoidance behavior, as the branches they choose are too small for rats or even small lizards to climb. The distribution of white terns ranges widely across the Pacific and Indian Oceans, and includes some Atlantic islands. It nests on coral islands, usually on trees with thin branches, but is also known to nest on rocky ledges and man-made structures. The white tern is considered a common resident of the open water and lagoon habitats of Guam, and has documented distribution in the southern and northern Marianas Islands (Wiles 2003). They are known to nest on Cocos Island, located 1.0 mi (1.6 km) off the southern tip of Guam.

The white tern has all white plumage with black eye-rings, creating the appearance of large eyes. The long, pointed, thick bill is mostly black with some blue at the base. They have a shallow, notched tail, slate-blue legs and feet with yellow or white webs. Sexually monomorphic adults measure 11-13 inches (28-33 cm) in length, with a wingspan of 28-34 inches (70-87 cm), and an average lifespan of 16 to 18 years. The White Tern feeds alone or in mixed species flocks, primarily on juvenile or smaller fish which it catches by plunge diving (Gaston 2004).

Peak breeding activity takes place in late spring and summer. Both parents incubate the single speckled egg for 36 days in shifts of 48-72 hours. The newly hatched chicks have well developed feet to hang on to their precarious nesting site in high winds. The brooded chick is fed only whole fish or squid, unlike many other seabird chicks that receive regurgitated food. Chicks average 48 days from hatching to fledging. After fledging, the parents continue to feed the young bird for up to two months (Enticott 1997).

Wedge-tailed Shearwater

The wedge-tailed shearwater (*Puffinus pacificus*) is the largest of the shearwaters and ranges across the tropical Pacific and Indian Ocean roughly between latitudes 35°N and 35°S. The species' common name is derived from its large wedge-shaped tail which aids in gliding. It breeds in islands off Japan, the Islas Revillagigedo, the Hawaiian Islands, the Seychelles and off Western Australia. Because of its unique vocalizations (loud groans, moans and wails), which primarily occur at night in breeding colonies, the wedge-tailed shearwater is sometimes referred to as the "moaning bird". This species is considered an uncommon visitor to Guam and has documented distribution in the southern and northern Marianas Islands (Wiles 2003). Its habitat consists of strictly open water, and it is thought to have nested on Guam before the 1930s. The total population is presently estimated at approximately 5 million (Wiles 2003).

Two color morphs of wedge-tailed shearwaters exist in all populations and bear no relation to sex or breeding conditions. The pale morphs predominate in the North Pacific while the dark morph is found elsewhere. The darker morph has the same dark grey-brown plumage over the whole body, while the pale morph has grey-brown plumage on the back, head and upper wing, and whiter plumage below. Both morphs have a characteristic wedge-shaped tail, and a slender, slate-grey hooked bill. Its flesh colored legs and feet are set far back on the body as an adaptation for swimming. Sexually monomorphic adults measure 16-18 inches (41-46 cm) in length with a wingspan of 38-41 inches (97-104 cm), and an average life span of 10-11 years. Wedge-tailed shearwaters feed on small fish and squid driven to the surface by schools of large predatory fish. They feed during the day singly or in multi-species flocks (Enticott 1997).

Monogamous wedge-tailed shearwaters nest either in burrows or on covered surfaces of small tropical and subtropical islands in the Indian and Pacific Oceans. Bird colonies in the northern hemisphere begin breeding around February, while southern hemisphere birds begin around September. After the single large white egg is laid, the male usually undertakes the first incubation shift that can last up to 13 days. Hatching occurs after a 53 day incubation period followed by a six day brooding period. Parent desertion of the chick typically occurs shortly before fledging, 103-115 days after hatching (Enticott 1997).

Brown Booby

The brown booby (*Sula leucogaster*) is a large seabird of the gannet family, Sulidae. Boobies received their name because they can be easily caught while asleep. This species breeds on islands and coasts in the pantropical areas of the Atlantic and Pacific oceans. It winters at sea over a wider area. The brown booby nested on Guam until the late 1970s and is now considered an uncommon visitor with documented distribution in the southern and northern Marianas Islands (Wiles 2003). Its habitat consists of open water as well as lagoons. A few birds still roost on Orote Island in Guam.

The Brown Booby's head and upper body are covered in dark brown plumage, with the remainder of the body being a contrasting white. Sexes are distinguishable by face, bill, and leg color. These body parts are yellow in females and grayish-green in males, which in addition, have a bluish throat. Juveniles are similar to adults but with paler plumage and a pale, dirty grey undersurface. The beaks of the brown booby are quite sharp and contain many jagged edges. They have short wings and long, tapered tails. Brown boobies reach 28-30 inches (71-76 cm) in length, have a wingspan of 54-57 inches (137-145 cm), and a life span of 16 years. This species feeds by plunging head first into the ocean at high speed. They are strictly solitary, daytime feeders of small fish or squid which gather in groups near the surface and may catch leaping fish while skimming (Lopez-Ortiz 2009).

The brown booby is the only ground-nesting booby that regularly builds a substantial nest during its breeding season, which occurs between March and November. These birds nest in large colonies, laying two chalky blue eggs on a mound of broken shells and vegetation on the ground. They lack a brood patch and instead incubate the eggs for 43 days using their feet. Parents share incubation shifts of 12 hours. The first chick hatches several days before the second, and ejects its sibling from the nest shortly after hatching. Fledging occurs 85-103 days after hatching while parental care and feeding continues for one to two months (Gaston 2004).

Red-footed Booby

The red-footed booby (*Sula sula*) is the smallest of the booby species and the only one that lives in trees (Lopez-Ortiz 2009). Red-footed boobies, also known as white-tailed or Webster's boobies, are large, powerful, and agile fliers that can travel up to 93 mi (150 km) in search of food. In contrast, they are clumsy in takeoffs and landings. This species breeds on islands in most tropical oceans. They do not migrate, but live year-round in tropical and subtropical regions of the Atlantic, Pacific, and Indian Oceans. The red-footed booby is considered an uncommon visitor in the open water habitats of Guam with documented distribution in the southern and northern Marianas Islands (Wiles 2003).

Red-footed boobies are polymorphic and as the name implies, have red legs and feet with a pale blue bill (Enticott 1997). This species has two plumage forms that may occur sympatrically. The white phase is mostly white with black on the flight feathers. The brown form is brown with a white belly, rump, and tail. Adults are sexually monomorphic while juveniles are wholly brown or blackish gray with a black bill. The red-footed booby is 26-30 inches (66-77 cm) in length with a wingspan of 36-40 inches (91-101 cm), and an average life span of 22 years. They are spectacular divers, plunging into the ocean at high speeds to catch prey. They mainly eat small fish or squid which gather in groups near the ocean surface. They hunt singly, in large groups or in flocks of mixed species. Although active during the day, prime feeding time for this species is at night, which is aided by large eyes (Lopez-Ortiz 2009).

These gregarious birds nest in large colonies late January through September, laying one chalky blue egg every 15 months in nests made of twigs and sticks on tops of shrubs or trees. Monogamous adults incubate the egg with their feet, in 24 hour shifts for 42-45 days. Young mature slowly over three month period and fledge 95-101 days after hatching. Post-fledging care and feeding can continue for one to four months.

Great Crested Tern

The great crested tern (*Thalasseus bergii*), was originally described as *Sterna bergii* in 1823, but was recently reclassified to its current genus *Thalasseus* (Bridge et al. 2005). It is considered an uncommon visitor in the open water habitats of Guam with documented distribution in the southern Marianas, Rota to Farallon de Medinilla (Wiles 2003). They are found the tropics and subtropics from South Africa around the Indian Ocean to the western Pacific Ocean and Australia.

The great crested tern is a large tern, 18-19 inches (45-48 cm) long with a 39 in (100 cm) wingspan. Although sexually monomorphic, this species exhibits seasonal variation. The summer adult has a black cap with a long crest, a narrow white forehead band, black legs and a long sharp yellow-orange bill. The back and upper wings are medium grey with a paler rump, while the underparts are white. The primary flight feathers of the great crested tern darken during the summer. In winter, the head becomes more extensively white and the crest is peppered with white. Juvenile birds have heavily marked upperparts and wings, with patterning of brown, white and some grey. The closed wings in particular appear to have dark bars. The head and underparts are similar to the winter adult. Like all terns of the same genus, the greater crested tern feeds by directly plunge diving for fish (Gaston 2004).

The greater crested tern breeds in dense colonies on coasts and protected islands between October and December. One or two eggs are laid in nests constructed as shallow scrapes in bare sand, rock or coral, usually on open flat ground. After a 28-day incubation by both sexes, chicks remain in the nest for about four days, and fledge within two months. Fledglings leave the breeding colony with at least one parent within 19 days (Enticott 1997).

Streaked Shearwater

The streaked shearwater (*Calonectris leucomelas*) also known as the white-faced shearwater, is a pelagic seabird that also occurs in inshore waters. This species is considered a rare visitor in the open water habitats of Guam and has not been documented in any of the other Marianas Islands (Wiles 2003). The streaked shearwater occurs in the Pacific Ocean, with breeding stations in Japan and South Korea. After breeding, it moves south and winters in the Philippine and Indonesian seas and around New Guinea.

The Streaked Shearwater is large with scaled, dark gray-brown upperparts and white underparts. The white head has variable light to heavy pale brown streaks while the uppertail coverts can be white, forming a pale "horseshoe". With a pale bill and pink legs and feet, the streaked shearwater measures 19 in (48 cm) in size with a 48 in (122 cm) wingspan. This species can be found as part of large mixed species feeding aggregations, surface-seizing or shallow plunging for fish and squid (Enticott 1997).

Streaked shearwaters nest in dense breeding colonies on forested islands from March to November. One to two eggs are laid in ground burrows and incubated for 55-64 days. Adults remain with their chick for four days on average after hatching. Chicks fledge 66-80 days after hatching (Enticott 1997).

Black-naped Tern

The black-naped tern (*Sterna sumatrana*) is a small, oceanic tern with a tropical and subtropical distribution, breeding from Aldabra Atoll, Seychelles in the western Indian Ocean to Fiji, Samoa in the Pacific Ocean. This gregarious bird often flocks with other terns along sandy and coral beaches, rarely over mud, and never far inland. The black-naped tern is considered a rare visitor in the open water and lagoon habitats of Guam and has not been documented in any of the other Marianas Islands (Wiles 2003).

The black-naped tern is characterized by very white plumage with a distinctive black nape band and narrow bill. Upperparts are pale gray with a white head and a black spot in front of its eye. This tern is approximately 12 in (30 cm) in length with a wing span of 8-9 in (21-23 cm). Juveniles have a grayish brown nape and rounded unforked tail (Gaston 2004).

The black-naped tern nests in shallow depressions on the rocky surface of small outcrops. They breed during spring and summer, laying one to two eggs. Incubation by both parents lasts for 21 to 23 days. Chicks fledge in slightly less than one month and depart accompanied by both parents (Gaston 2004).

Matsudaira's Storm-Petrel

The Matsudaira's storm-petrel (*Oceanodroma matsudaira*) was positively identified at station 2 during sample collection for this study. This species is considered a rare visitor in the open water habitats of Guam from February to September, and has been documented to occur in the southern and northern Marianas Islands (Wiles 2003). The Matsudaira's storm-petrel is a pelagic species that breeds in subtropical waters of the western Pacific. It leaves these waters in June and migrates through the Indonesian archipelago, passing through northwest Australia and Papua New Guinea, to spend the non-breeding season in the tropical Indian Ocean.

The Matsudaira's storm-petrel is 9.8 inches (25 cm) in height, with sooty-brown plumage and diagnostic white primary shafts. It has a forked tail, black legs/feet/bill and long angular wings characteristic of its genus. This species is known to follow ships and feed on galley scraps (Enticott 1997).

The Matsudaira's Storm-Petrel breeds in colonies in the months between January and July, nesting in burrows on high ground on offshore islands. Breeding is thought to begin in January with most fledging taking place in June (Enticott 1997).

3.2.5 Marine Mammals

The ROI for marine mammals is the general region of Guam, which includes the ODMDS study areas, the Island of Guam, and the offshore area between them. The *Marine Mammal and Sea Turtle Survey and Density Estimates for Guam and the Commonwealth of the Northern Mariana Islands Final Report* (SRS-Parsons JV et al. 2007) was the result of studies conducted to determine marine mammal and sea turtle densities in the Mariana Islands region. This report was used as a reference for marine mammals that may be in the proposed ODMDS vicinity. The Mariana Islands Sea Turtle and Cetacean Survey (MISTCS) was conducted from January 16th to April 12th of 2007 in the area of 10°-18°N Latitude and 142°-148°E Longitude, and encompassed a total of 170,500 square nm (584.800 km^2). The study was comprised of four legs, in which multiple visual survey transects, measuring more than 5,900 nm (11,000 km) in length, were conducted using standard line-transect protocol based on (Buckland et al*.* 2001, 2004).

During the MISTCS there were a total of 149 visual sightings, on and off-effort, of 13 species. One hawksbill sea turtle was sighted, and the remainder of the sightings were of 12 cetacean species. The sperm whale was the species that had the highest frequency of sightings, followed by the Bryde's and sei whales. Survey results indicated that the most frequently sighted delphinids were the pantropical spotted dolphin, followed by the false killer whale and striped dolphin. There were 17 sightings of unidentified dolphins and whales which was included in the total number of sightings. Groups that were sighted ranged from 1 to 115 individuals in size and varied depending upon the species. The range of bottom depth for the sightings was highly variable, ranging from 470 to 32,400 ft (144 to 9,874 m), and was largely species dependent (SRS-Parsons JV et al. 2007). The following descriptions are for species which are not federally listed as threatened or endangered. Descriptions of threatened and endangered marine mammals are included in the Threatened, Endangered and Special Status Species section (Section 3.2.6).

3.2.5.1 Cetaceans

Bryde's Whale (*Balaenoptera edeni*)

The Bryde's whale is very similar in physical description and behavior to the sei whale (described in section 3.2.6). Bryde's whales measure between 40 to 50 ft (12 to 15 m) in length, and weigh around 13 tons (12 metric tons). There is a smaller pygmy species of Bryde's whale that inhabits the Western Pacific and Southeast Asia.

The Bryde's whale inhabits tropical and subtropical waters. They are not known to be migratory, but move between inshore and offshore waters in pursuit of food. Bryde's whales feed almost exclusively on pelagic fish and are known to make deep dives that last up to 20 minutes. Breeding occurs year round.

The International Whaling Commission (IWC) recognizes three management stocks of Bryde's whales in the North Pacific: Western North Pacific, Eastern North Pacific, and East China Sea. Between January 16th and February 2nd 2007, three Bryde's whales were observed by MISTCS in the study area. From March 1st to March 20th 2007, six Bryde's whales were sighted in areas of deep water, ranging from 8,360 to 24,190 ft (2,549 to 7,373 m). During the MISTCS there were several sightings over and around the Mariana Trench. This species is expected to occur in or near the study region.

False Killer Whale (*Pseudorca crassidens*)

Adult false killer whales may reach a length of 19 ft (5.7 m) and can weigh up to 1,540 lbs (700 kg). False killer whales resemble the short-finned pilot whale, but lack the bulbous forehead, and the teeth are nearly twice as large. False killer whales are found in tropical to temperate seas worldwide. Their diet includes a variety of pelagic fish, squid and possibly other cetaceans, such as dolphins. According to NOAA, false killer whales have low reproduction rates of around seven years (NOAA 2008b). They are highly social animals and often travel in large pods. During the 2007 MISTCS, several false killer whales were sighted in deep waters over the Mariana Trench and west of the West Mariana Ridge. Several of these sightings included calves. It is also significant to note that they were sighted relatively close to shore, 12 mi (20 km) off the mouth of Apra Harbor in waters with a bottom depth greater than 3,300 ft (1,000 m) (SRS-Parsons JV et al. 2007). This species is expected to occur in or near the study region.

Killer Whale (*Orcinus orca*)

Adult killer whales reach between 23 to 32 ft (7 to 9.7 m) in length and can weigh up to 6 tons (5.4 metric tons). They are found in all oceans, but killer whales prefer cooler waters or areas of coldwater upwelling. Killer whales were not sighted during the 2007 MISTCS, but historically killer whales have been observed in the study region. In the summer of 1987, two large male and two female killer whales were observed offshore between Orote Point and Facpi Point, Guam (Eldredge 2003). Large concentrations of killer whales have been observed north of the Mariana Islands and near Samoa (Reeves et al. 1999).

Short Finned Pilot Whale (*Globicephala melas*)

Pilot whales range throughout tropical and subtropical waters, traveling in pods of 5 to 43 individuals. Males tend to be much larger than females, reaching approximately 20 ft (6.1 m) in length, whereas females average 16 ft (4.9 m) in length. Adults weigh between 2,200-6,600 lbs (1,000-3,000 kg). Pilot whales feed primarily on squid and fish from moderately deep waters near 1,000 ft (300 m) depth. According to NOAA (2008b), the IWC recognizes four stocks: West Coast, Hawaii, Northern Gulf of Mexico, and Western North Atlantic. This species is one of the most commonly observed cetaceans around Guam (Reeves et al. 1999). According to the 2007 MISTCS, there was an estimated 909 short-finned pilot whales in the MISTCS study area. There was also an offshore sighting of a group of 6 to 10 pilot whales near the mouth of Apra Harbor between legs 3 and 4 of the survey.

Blainville's Beaked Whale (*Mesoplodon densirostris*)

Blainville's beaked whales have been observed in groups of 3 to 7, but are most commonly seen alone or in pairs. Adults may weigh up to 2,250 lbs (1033 kg) and reach 14.5 ft (4.5 m) in length. Dives of up to 45 minutes have also been recorded for this species (NOAA 2008b). Due to their rarity, little is known of the Blainville's reproductive or migratory behavior. Blainville's beaked whales are found throughout tropical and temperate waters. They are thought to feed primarily on pelagic fish. Only two sightings of this species have been recorded in the MISTCS study area, in deep waters ranging from 6,960 to 13,070 ft (2,122 to 3,984 m).

Cuvier's Beaked Whale (*Ziphius cavirostris*)

The Cuvier's beaked whale varies greatly in color, ranging from fawn to dark brown or black. They are highly elusive, and most studies have been done on individuals that were stranded. Adults reach sizes of approximately 24.5 ft (7.5 m) in length and up to 6,600 lbs (3,000 kg) in weight. Cuvier's beaked whales are thought to occur in the deep tropical to subtropical waters of the Pacific. Like Blainville's beaked whale, there is no data on stock structure. Mention of this particular species of beaked whale was omitted from the 2007 MISCTS. However, the species has been reported in the Mariana and Bonin Islands area (Masaki 1972), and therefore may occur in the study region.

Pygmy Killer Whale (*Feresa attenuate*)

As the name suggests, the pygmy killer whale is often confused with killer and false killer whales, but can be distinguished by rounded dorsal fins. Pygmy's weigh up to 375 lbs (170 kg) and reach up to 8.5 ft (2.6 m) in length. According to NOAA, pygmy's become very aggressive in captivity (NOAA 2008b).

Pygmy killer whales can be found deep in sub tropical to tropical waters in all areas of the world. They are thought to follow their prey source, which consists mainly of fish and squid. The reproductive and migratory behaviors of this species are very poorly known. According to the 2007 MISCTS, one sighting of a pygmy killer whale was observed near the Mariana Trench, south of Guam. The bottom depth of this area was 14,560 ft (4,440 m). This is consistent with data that suggest the pygmy prefers deep, tropical waters. Although sightings of pygmy killer whales within the study region are low, the area does fall within their distributional range.

Dwarf Sperm Whale (*Kogia sima)* and Pygmy Sperm Whale *(Kogia breviceps)*

The dwarf sperm whale is a cousin to the larger sperm whale. Dwarf sperm whales are usually 300-600 lbs (135-270 kg) and approximately 9 ft (2.7 m) in length. They have a cosmopolitan distribution in tropical and temperate waters, and are most common in waters along the continental shelf. Their geographical range includes waters off of Australia, New Zealand, Indonesia, and off the western coast of South America. Little is known about the seasonal migration patterns of the dwarf sperm whale (NOAA 2008b). This species of whale is rare in the ODMDS study area. There have been two occurrences in which an individual was washed on shore. The first washed ashore at Asan in 1970 and the second was found at Rizal Beach in 1974 (Eldredge 2003).

The pygmy sperm whale has similar physical characteristics and morphology to the dwarf sperm whale, making it hard to distinguish between the two species in the field. The geographical ranges of the two species overlap in some areas. There is evidence that the dwarf and pygmy sperm whales can dive up to 1,000 ft (300 m) to feed. The main diet of the two species is cephalopods, crustaceans, and fish. The dwarf sperm whale may be found in shallower depths than the pygmy whale based on their preferred prey (NOAA 2008b). There was a dead pygmy sperm whale found at NSD Beach at Naval Station Apra Harbor in Guam in 1989 (Eldredge 2003). However, there were no visual sightings of either the dwarf or pygmy sperm whale during the MISTCS in 2007. Although sightings in the project area are rare, Guam is part of the known distributional range for both the dwarf and pygmy sperm whales, thus occurrence in the study region is possible.

Melon-Headed Whale (*Peponocephala electra*)

The melon- headed whale is a small member of the dolphin family. The average length of this species is around 9 ft (2.7 m), and a typical body weight is 460 lbs (210 kg). They are commonly found in groups of 100-1,000 individuals, and are common in tropical waters from 20°S and 40°N latitudes all over the world. They are frequently found in deep waters extending off the continental shelf. Melon-headed whales are deep divers, and their diet consists of mesopelagic fish, crustaceans, and squid. It is estimated that they will dive as deep as 5,000 ft (1,525 m) to feed (NOAA 2008b). During the 2007 MISTCS there were two visual sightings of a melon-headed whale, one during the time span of January 16, 2007 to February 3, 2007, and one during the March 1, 2007 to March 21, 2007 surveys. There was a live stranding in 1980 in Inarajan Bay of Guam. More recently, in July of 2004 there were approximately 500 individuals spotted off of Rota. This species is expected to occur regularly in the study region.

Rough-toothed Dolphin *(Steno bredanensis)*

The rough-toothed dolphin is one of the smaller members of the Delphinidae family. They are on average 8.5 ft (2.5 m) long and weigh 350 lbs (160 kg). The rough-toothed dolphin is found in tropical and warm waters worldwide. They are generally an offshore species and are rarely found near land or coastal areas. There is not a lot of information on the specific depth range that the dolphin usually feeds in. However, the rough-toothed dolphin has been found off the Gulf of Mexico over waters of the continental shelf with bottom depths of 3,110-3,640 ft (950-1,110 m) (DON 2005). They are usually not found near land except for islands with steep drop-offs (SRS-Parsons JV et al. 2007). The main prey items for the rough-toothed dolphin are squid and fish found in their preferred depth range. They live in groups of 10-20 individuals. The rough-toothed dolphin reaches maturity around 11 years of age, and has a maximum longevity of 32 years (NOAA 2008b). During the MISTCS, rough-toothed dolphins were spotted once during February and once during March, and thus this species is expected to occur in the study region.

Spinner Dolphin (*Stenella longirostris*)

Spinner dolphins are approximately 6.5 ft (2 m) long and weigh on average between 130-170 lbs (60-75 kg). Spinner dolphins mate and calve year round, reaching maturity around seven years old. These dolphins are found in all tropical and sub-tropical oceans, and are very common around the Hawaiian Islands and the American Samoa (URS Corporation 2001). They occur in both oceanic and coastal waters. The oceanic populations are usually found where there is a shallow thermocline, as their prey are more likely to be concentrated in the pelagic waters above the thermocline (DON 2005). They feed primarily at night on deep-mid ocean fish and squid found at depths of 650-1,000 ft (200-300 m) (NOAA 2008b). Their optimal habitat for feeding is in the deep ocean, and during the day they can be found in protected bays and coastal waters while resting (NOAA 2008b). Observations of the spinner dolphin were recorded at Pugua Patch Reef in Guam in April and May 1986, and in June 1988. In the 1990's, groups of spinner dolphins were common around Double Reef and Merizo (Eldredge 2003). During the 2007 MISTCS one spinner dolphin was visually sighted in March. This species is expected to occur regularly in the study region.

Striped Dolphin (*Stenella coeruleoalba*)

The striped dolphin has a distinct stripe down its side from eye to tail with lighter coloring on the belly and darker coloration on the back. They are highly aerobic animals that reach up to 8.5 ft (2.6 m) in length. Striped dolphins occur in tropical and warmer temperate waters. They are commonly found in areas off of the continental slope extending out to oceanic waters. They feed typically in benthic and pelagic waters extending off of the continental shelf. There is evidence that striped dolphins feed at depths 660-2,300 ft (200-700 m) deep and may feed at night (DON 2005). One dead female striped dolphin was found at Dadi Beach in Agat Bay, Guam in 1985 (Eldredge 2003). In the 2007 MISTCS there were visual sightings of striped dolphins in February and March in the Mariana Island region. This species is expected to occur in the study region.

Pantropical Spotted Dolphin (*Stenella attenuate)*

The pantropical spotted dolphin is a relatively small species ranging in size from 6-7 ft (1.8-2.1 m) and 250 lbs (110 kg) as adults. These dolphins are commonly found in all tropical and subtropical oceans. They spend most of their time in water depths ranging from 300-1,000 ft (91-300 m), and deeper depths at night while feeding. This species is typically found 660 ft (200 m) off of the continental shelf (DON 2005). The main prey items are mesopelagic cephalopods and fishes. There is no other distinguishable migratory pattern for the pantropical spotted dolphin other than they seem to move inshore during the fall and winter and move offshore during the spring. They travel in groups of 100-1,000 individuals, and the mating and calving season is year round (NOAA 2008b). In the 2007, MISTCS, the pantropical spotted dolphin, was visually sighted on each leg of the survey between January and April, and the majority of sightings were offshore. This species is expected to occur regularly in the study region.

Risso's Dolphin (*Grampus griseus*)

These dolphins, also known as the grey dolphin, are a medium to larger sized species ranging from 8.5-13 ft (2.6-4.0 m) in length, and weighing around 660-1,000 lbs (300-450 kg). They are typically found in tropical, subtropical, and temperate waters. They can be found in waters extending off the continental shelf and prefer areas in which water depth is greater than 3,300 ft (1,000 m). Risso's dolphins have a cosmopolitan distribution and are common in the Southern hemisphere around Australia, New Zealand, South Africa, and the Western coast of South America. Not much information is available on the migratory patterns of the species besides the idea that food availability and oceanographic conditions may direct their movements (NOAA 2008b). There were no visual sightings during the 2007 MISTCS study; however, this species is expected to occur within the Mariana Island area. Sightings were reported during the winters between 1993-1995 at the Mariana islands and Guam (Eldredge 2003).

Bottlenose Dolphin (*Tursiops truncates*)

Bottlenose dolphins are found in most temperate and tropical waters. They range in size from 8-12.5 ft (2.4 - 3.8 m), and weigh 350-450 lbs (160-200 kg). They are grey in color with lighter tones on their belly. The bottlenose dolphin is common throughout the Indian and Pacific Oceans. This species is generally found in coastal waters ranging from 1,650 ft (500 m) to 0.6 mi (1 km) offshore, but some populations are found farther offshore in oceanic waters. Predation, climate change, and food availability predict the migratory patterns of this dolphin species. There are two calving seasons, one occurring in spring and one in the fall. They feed mainly on fish, squid, and shrimp (DON 2005). During the MISTCS, bottlenose dolphins were visually sighted on three of the four legs of the survey between January and March. This species is expected to occur regularly in the study region.

3.2.6 Threatened, Endangered and Special Status Species

3.2.6.1 Marine Mammals

The Marine Mammal Protection Act (MMPA) of 1972 protects all marine mammals from harvesting within the borders of the U.S., regardless of status. Therefore, all marine mammals encountered in the offshore region of Guam must be given due consideration. The emergence of terms, legislation, and monitoring organizations created after the MMPA, such as the Endangered Species Act (ESA) of 1973, the USFWS Endangered Species Program, and the International Union for the Conservation of Nature (IUCN) require that certain species be given greater protection and consideration (IUCN 2008). These populations are more sensitive and negatively impacted by factors such as habitat loss, pollution, harvesting, and global warming. Therefore, regulation that protects these species from extinction is fundamental. The following descriptions are for all federally listed threatened or endangered marine mammals. Table 3-19 summarizes listing status and likelihood of occurrence in the study region for all marine mammals known to reside in the region of influence.

Blue Whale (*Balaenoptera musculus*)

The blue whale is the largest known living animal. The blue whale is listed as endangered throughout its habitat range mainly due to vessel strikes and fishery activities. Individuals can reach lengths of 100 ft (30 m) and weights of 160 tons (145 metric tons). Blue whales are usually found as single individuals or in groups of two to three. They feed on krill by using a gulping method. The female whales will reach maturity at 5-15 years of age. Blue whales calve within the winter months, and there is usually a 2 year period between calves.

The geographic range of the blue whale includes much of the North Pacific Ocean, and the optimal habitat of the Blue Whale ranges from coastal to oceanic waters in temperate and tropical areas. Feeding grounds have been identified off of the coasts of California, Southern Australia, and coastal upwelling zones in the Eastern tropical and equatorial Pacific. There are acoustic recordings of blue whales off the island of O'ahu, suggesting that there are blue whales somewhere within the EEZ, which is 200 nm (370 km) offshore Hawaii (URS Corporation 2001). Blue whales were not visually sighted during the MISTCS study, but their occurrence in the study region is considered possible.

Sperm Whale (*Physter macrocephalus*)

The sperm whale is listed as an endangered species throughout its geographical range due to historical hunting and whaling practices. The whales are also sensitive to anthropogenic noise caused by shipping and oil and gas activities.

The sperm whale averages 40 to 50 ft (12 to 15 m) in length, with the head accounting for 40% of its body length. This physical attribute, along with its grey body color, make the species very recognizable. The average dive for this species is 35 minutes long and 1,312 ft (400 m) deep; however, they can dive for as long as an hour and dive as deep as 3,280 ft (1,000 m). The optimal depth range for sperm whales is 1,968 ft (600 m) or more, and it is uncommon to find them in waters shallower than 984 ft (300 m). Since these whales are found in deeper water, their prey are typically found in deeper water; they feed mainly on large squid but will also feed on fish, sharks, and skates (NOAA 2008b).

The geographic range of sperm whales is between 60˚N and 60˚ S latitudes, and they were historically found in tropical to polar waters throughout the world. Females may be seen near oceanic islands, but usually far from land. Juvenile males can be found with the females until they mature, at 4-21 years of age. The mature males are generally found near the ice-pack edges at both poles, except for during the breeding winter months when they return to warmer waters. The general migration patterns of the sperm whale is to travel north in the summer. However, in tropical stocks no apparent migratory patterns have been distinguished (NOAA 2008b). In 1980, sightings of sperm whales around Guam were recorded from May to July, and more recently there have been individual sightings (URS Corporation 2001). They are the most common whale in the Micronesian area, and there have been numerous sightings around the Northern Hawaiian Islands (Eldredge 2003). Sperm whales are widely distributed in the tropics; however, their numbers decrease westward towards the middle of the tropical Pacific Ocean (NOAA 2008b). Sperm whales are expected to occur in the study region.

Humpback Whale (*Megaptera novaeangliae*)

Humpback whales are federally endangered throughout their range. Adult humpback whales are large, weighing anywhere from 25 to 40 tons (23 to 46 metric tons) and measuring 36 to 52 ft (11 to 16 m) in length. They typically travel over deep, oceanic waters during migrations (Clapham and Mead 1999). Their feeding and breeding habitats occur mostly in shallow, coastal waters over continental shelves. Humpbacks can be found in all oceans to the edges of polar ice, and follow definite migration paths from their summer feeding grounds to warmer waters in the winter for calving. Recent studies indicate that there are three stocks or populations in the North Pacific: Eastern, Central, and Western North Pacific (Baker et al. 1993).

Individuals near Guam would presumably be associated with the Western North Pacific stock. A group of six or more were photographed at the entrance to Apra Harbor in January 1996 (Eldredge 2003). During the 2007 MISTCS, one humpback was observed between February 6th and February 25th (SRS-Parsons JV et al. 2007). This species is expected to occur in the study region.

North Pacific Right Whale (*Eubalaena japonica*)

The federally endangered North Pacific Right whales are larger than their Atlantic cousins. Approximately 55 ft (17 m) long and weighing up to 11 tons (10 metric tons), North Pacific Right whales feed on small crustaceans (copepods) and shrimp-like animals known as euphausiids. They tend to populate in sub-polar to temperate waters, particularly between 20°N and 60°N latitudes.

In the late 1800s, North Pacific Right whale populations were severely depleted by commercial whaling activities, and stocks have been slow to recover since that time. Consequently, much of their migration and breeding behavior remains unknown. It is thought the whales migrate from high-latitude feeding grounds in summer to more temperate waters during the winter, possibly offshore, and related to where concentrations of prey are at their highest. No calving grounds have been found in the eastern North Pacific.

In April 2008, the NMFS identified two areas within the Southern Bering Sea as areas of critical habitat for the North Pacific right whale. Right whales were not observed during the 2007

MISCTS, and are not known to occur within the study region historically. Although the probability of occurrence of right whales within the study region is low, mention of the species is important due to their highly endangered status and potential for any occurrence.

Sei Whale (*Balaenoptera borealis*)

Sei whales are federally endangered, with low numbers due to hunting and whaling practices that occurred during the 19th and 20th centuries. Sei whales are generally 46 to 49 ft (14 to 15 m) long, and weigh up to 30 tons (27 metric tons). Considered the fastest of the great whales, Sei's have been recorded up to 16 mph (25 kph) when pursued by whalers.

Sei whales seem to prefer more temperate waters and do not venture into the polar ice regions. They keep a seasonal migration pattern and tend to gravitate towards canyons, continental shelf breaks or other areas of steep bathymetric relief (Kenney et al. 1997; Schilling et al. 1992; Gregr and Trites 2001; Best and Lockyer 2002). This species feeds on krill, fish and copepod crustaceans by skimming the water with their mouths open. Sei whales typically do not dive deeper than approximately 1,000 ft (300 m). Winter breeding areas are unknown, but are thought to occur somewhere in deep tropical waters.

It is difficult to estimate population numbers for the sei whale because they are easily confused with Bryde's whales, which are similar in physical appearance and distribution (Reeves et al. 1999). Although the IWC acknowledges only one stock, there is evidence to suggest there may be multiple sei whale stocks (NMFS 1998; Carretta et al. 2004).

According to the MISTCS, there have been several quality sightings to authenticate their presence in the study region. During the survey periods between January 16th to February 2nd and March 1st through March 20th, a total of twelve sei whales were observed in the area. Sei whales were sighted in deep waters, ranging from 10,380 to 30,580 ft (3,164 to 9,322 m). There is evidence that two tagged sei whales from the Northern Mariana Islands were later killed several hundred kilometers south of the Western Aleutian Islands (Horwood 1987). Although difficult to identify, the presence of sei whales in the study region is possible.

Fin Whale (*Balaenoptera physalus*)

The fin whale is federally listed as endangered due to low population numbers. Adult fin whales measure up to 88 ft (27 m) long and weigh between 50 to 70 tons (45 and 64 metric tons). Second only to the blue whale in size and weight, it is also one of the fastest, capable of speeds up to 23 mph (37 kph).

Fin whales are found in continental shelf and oceanic waters all over the world. They may migrate to colder waters in the Arctic and Antarctic for feeding during the summer, and to subtropical waters for mating and calving during the winter. Fin whales feed on krill, euphausiids and small schooling fish by circling and gulping their prey. They are known to dive to depths of up to 1,800 ft (550 m). Peak calving occurs between October and January (Hain et al. 1992).

The IWC recognizes a widespread North Pacific stock and a smaller stock located in the East China Sea (Donovan 1991). There are no known occurrences of Fin whales within the study region, but the location of the study region within the population's distribution range and the species sensitive endangered status warrants recognition of the possibility of occurrences.

Table 3-19. List of Threatened, Endangered and Special Status Marine Mammal Species

Common Name	Taxon	Occurrence	IUCN	ESA
Cetaceans				
Humpback whale	*Megaptera novaeanliae*	Regular	EN	EN
Blue whale	*Balaenoptera musculus*	Rare	EN	EN
Fin whale	*Balaenoptera physalus*	Rare	EN	EN
Sperm whale	*Physeter macrocephalus*	Rare	EN	EN
North pacific right whale	*Eubalaena japonica*	Rare	EN	EN
Sei whale	*Balaenoptera borealis*	Regular	EN	EN
Bryde's whale	*Balaenoptera edeni/brydei**	Regular	DD	NL
Pygmy sperm whale	*Kogia breviceps*	Regular	LR	NL
Dwarf sperm whale	*Kogia sima*	Regular	LR	NL
Cuvier's beaked whale	*Ziphius cavirostris*	Regular	DD	NL
Blainville's beaked whale	*Mesoplodon densirostris*	Regular	DD	NL
Ginkgo-toothed beaked whale	*Mesoplodon ginkgodens*	Rare	DD	NL
Hubbs' beaked whale	*Mesoplodon carlhubbsi*	Extralimital	DD	NL
Longman's beaked whale	*Indopacetus pacificus*	Regular	DD	NL
Rough-toothed dolphin	*Steno bredanensis*	Regular	DD	NL
Common bottlenose dolphin	*Tursiops truncatus*	Regular	DD	NL
Indo-Pacific bottlenose dolphin	*Tursiops aduncus*	Extralimital	DD	NL
Pantropical spotted dolphin	*Stenella attenuata*	Regular	LR	NL
Spinner dolphin	*Stenella longirostris*	Regular	LR	NL
Striped dolphin	*Stenella coeruleoalba*	Regular	LR	NL
Short-beaked common dolphin	*Delphinus delphis*	Rare	LR	NL
Risso's dolphin	*Grampus griseus*	Regular	DD	NL
Melon-headed whale	*Peponocephala electra*	Regular	LR	NL
Fraser's dolphin	*Lagenodelphis hosei*	Regular	DD	NL
Pygmy killer whale	*Feresa attenuata*	Regular	DD	NL
False killer whale	*Pseudorca crassidens*	Regular	LR	NL
Killer whale	*Orcinus orca*	Regular	LR	NL
Short-finned pilot whale	*Globicephala macrorhynchus*	Regular	LR	NL
Other Marine Mammals				
Hawaiian monk seal	*Monachus schauinslandi*	Extralimital	EN	EN
Dugong	*Dugong dugon*	Extralimital	EN	EN

EN= endangered; DD= dangerously depleted; LR= low risk ; NL= not listed

Hawaiian Monk Seal (*Monachus schauinslandi*)

The Hawaiian monk seal is listed as an endangered species under the Endangered Species Act (ESA). The population has been declining for the past 20 years due to habitat loss, entanglement in nets, and low survival rate of the pups. The seals are mainly found in the Northern Hawaiian Islands. They dive to depths of 250-300 ft (75-91 m) to feed. Their diet consists of fish, eels, and crustaceans. Pups are born between February and July, with the peak in April and May (NOAA 2008b). The Hawaiian monk seal was not visually sighted during the 2007 MISTCS. The Marine Resource Assessment from the DON (2005) states that there were no known occurrences of the Monk Seal in the Mariana study area. The likelihood of occurrence of this species in the study region is low.

<u>Dugong (*Dugong dugon*)</u>

The Dugong is listed as an endangered species as of January 16, 2004. Dugongs are similar to manatees, but are more streamlined and have a fluked tail similar to a dolphin's. The average size of a dugong is around 11 ft (3.3 m) in length, and they weigh around 880 lbs (400 kg). The dugong has a large geographical range that spans tropical and subtropical waters from East Africa to the Solomon Islands. The Dugong is an herbivorous mammal, feeding mainly on flowering sea grasses of the Order Potamogetonaceae Family Cymodoceaceae, which are found in the Indo-Pacific region (USFWS 2008 [Marine Mammal - Dugong Section]). They usually reside in coastal waters, protected bays, wide and shallow mangrove channels, and the lees between islands. In the Micronesian area Dugongs have been sighted around Guam and Yap, but occur in highest densities in Palau (FR 2003). A single sighting in the Cocos Lagoon at the southern end of Guam was reported in 1975, and more sightings were reported along the southern coast of Guam in 1985 (Eldredge 2003). It is possible that this species would occur in the study region.

3.2.6.2 Sea Turtles

All sea turtles are listed as either threatened or endangered under the ESA. Five species have distributions that extend in to Guam including the green, hawksbill, leatherback, loggerhead and olive ridley. However, only the green sea turtle is considered common to the area, and the hawksbill is considered extremely rare (DON 2005). The leatherback, loggerhead and olive ridley sea turtles are considered infrequent visitors to the region.

Most species live nearshore except during transit between foraging and nesting areas, when extremely long-distance migrations take place. As the potential ODMDS would be located approximately 11-14 nm (20-26 km) from shore, the site is not likely to be frequented often by any sea turtle species, but those passing through the area may swim over or near the designated ODMDS. The life history characteristics and known occurrence in the region of influence are described for each species.

<u>Green Turtle (*Chelonia mydas*)</u>

The green turtle was protected under the ESA in 1978, with breeding populations in Florida and the Pacific coast of Mexico listed as endangered, and all others as threatened (NMFS and USFWS 2007a). In the central Pacific, green sea turtles occur around most of the islands, including the Hawaiian Island chain, American Samoa and Guam. Adult green turtles that feed throughout the main Hawaiian Islands undergo a long migration to French Frigate Shoals in the Northwest Hawaiian Islands, where the majority of nesting and mating occurs for this region. Relatively limited nesting activity has been documented on the beaches of Guam; in 2007 an estimated 45 females nested (NMFS and USFWS 2007a). Nesting activity on Guam was tracked for 11 years and was reported as stable, and in effect, neither increasing nor decreasing.

Adults feed primarily on seagrass and a variety of algae, and consequently remain primarily nearshore where these preferred food sources are found in great abundance. Some adults have been documented feeding on invertebrates, but the majority of food items consist of plant material (NOAA 2001). Green sea turtle nearshore abundance estimates for Guam made by aerial surveys ranged from 150-250 individuals (NMFS and USFWS 2007a). Although primarily found nearshore, some non-breeding individuals have been sighted 500-800 mi (800-1,300 km) from shore. The occurrence of green sea turtles offshore in deep water is expected during long-distance transits to or from nesting sites.

Hawksbill (*Eretmochelys imbricata*)

The hawksbill sea turtle has a circumtropical distribution, and is endangered throughout its range (NMFS and USFWS 1998a). This species is in danger of extinction in the Pacific, with the primary cause of mortality being illegal subsistence harvesting. Information about Pacific populations is extremely limited due to the rare occurrence of this species. It is known that nesting occurs throughout the insular Pacific, including limited nesting activity on beaches in Guam (NMFS and USFWS 1998a).

Adult hawksbills are found in nearshore and offshore areas, foraging in benthic habitats made up of hard substrates. Diving depths of up to 600 ft (183 m) are not uncommon for adults, while juveniles are typically found diving in shallow reef areas closer to shore. Juveniles are thought to feed on the surface rather than diving to forage in the benthos. The ecology of this species in the Pacific is virtually unknown. In the Caribbean hawksbills specifically forage for sponges. Like other sea turtle species, long migrations are made between foraging and nesting areas (NMFS and USFWS 1998a).

Leatherback (*Dermochelys coriacea*)

The leatherback sea turtle was listed as endangered in 1970 (NMFS and USFWS 1998b). The decline in numbers of leatherback sea turtles is mainly attributed to nesting habitat degradation, illegal harvest of adults and eggs, incidental take, and pollution (Eckert 1995). Leatherback sea turtles are broadly distributed throughout the Atlantic, Pacific, Caribbean and Gulf of Mexico, with a relatively high tolerance for extreme temperatures. This high temperature tolerance allows for long migrations through areas with varying oceanographic conditions. The majority of leatherback nesting in the western Pacific occurs in Papua New Guinea, Indonesia, and the Solomon Islands. Greatly reduced nesting activity in these areas has led to major concerns for leatherback populations (NMFS and USFWS 1998b). Leatherbacks were sighted during aerial surveys of the offshore waters near Guam, although only 2.6% of the total sightings were of leatherbacks (NMFS and USFWS 1998b).

Leatherbacks are known to be deep divers (over 300 ft [91 m]), and spend a large amount of time offshore foraging in deeper waters (Eckert et al. 1989). The hypothesized reason for the offshore preference is that leatherback sea turtles feed on jellyfish and other pelagic animals that are found most commonly offshore (Eckert 1995). Although generally a deep-diving pelagic species, seasonal movement into coastal waters to feed on large jellyfish that are associated with rivers and frontal boundaries has been documented.

Loggerhead (*Caretta caretta*)

The loggerhead sea turtle was listed as threatened in 1978. There are concerns for this species due to numerous human activities that impact nesting areas and can lead to adult mortality. Loggerhead sea turtles have a wide distribution including the Atlantic, Pacific and Indian oceans. Loggerheads nest in the temperate and subtropical regions of their geographic distribution, and in the U.S. the most common nesting areas include the coastal region between North Carolina and Florida, including the Florida Gulf coast. A pelagic existence can last between 7 and 12 years for juveniles before migration back to nearshore coastal areas to mature until adulthood. There are no known nesting beaches for this species in the eastern or central Pacific, including Guam. There have been no reports of adult sightings near Guam (NMFS and USFWS 1998c).

Juvenile and subadult loggerheads are described as opportunistic omnivores, feeding on planktonic prey items such as jellyfish. Juveniles and subadults are therefore concentrated in offshore areas where these prey items are abundant. Evidence of trans-Pacific journeys by young loggerheads exists, and individuals are thought to make long migrations while developing. Adults are found closer to shore, foraging in benthic habitats, although there have been reports of individuals diving in waters deeper than 660 ft (200 m) (NOAA 2001).

Adult mortality can be caused by a number of factors, including, but certainly not limited to coastal development that destroys foraging habitat and numerous types of fisheries that involve bycatch (NMFS and USFWS 1998c). A review conducted by the NMFS in 2007 recommended this species remain listed as threatened until a longer time series of data is available (NMFS and USFWS 2007b).

Olive Ridley (*Lepidochelys olivacea*)

The olive ridley sea turtle is listed as threatened throughout all of its range, with the exception of nesting populations in Mexico that are endangered. This species is one of the smaller-bodied and most abundant sea turtle species. It is found in tropical and warm temperate waters world-wide, with primary nesting areas occurring in the Indian Ocean. No known nesting occurs in any U.S. or U.S. territory waters (NMFS and USFWS 1998d). One nest was discovered in Hawaii, although the progress was tracked and the eggs did not hatch, indicating a possible fluke nesting occurrence. Typical nesting behavior includes aggregates of nests termed arribadas. Although not expected to occur in abundance, it is possible that this species is found in Guam. Sightings in the western Pacific are rare, but are reportedly increasing (NOAA 2001).

Very little information is known about the earliest life stages of olive ridleys, although a pelagic existence is assumed. Adults feed on a variety of benthic and pelagic food items, and the results of feeding studies indicate an omnivorous diet. Adults have been reported foraging at great depths (990 ft [300 m]) for highly prized food items such as crabs. This species is thought to lead a highly pelagic lifestyle (NOAA 2001).

3.2.7 Marine Protected Areas (MPAs)

MPAs are defined as any marine environment that has been reserved by Federal, State, territorial, tribal or local laws or regulations to provide lasting protection for part or all of the natural and cultural resources therein (FR 2000). In Guam, there are numerous ecological reserve areas (ERAs), marine preserves, a territorial seashore reserve and a national historic park.

3.2.7.1 Ecological Reserve Areas (ERAs)

ERAs are regions in which current natural conditions, such as unique biological and physical features, are preserved. In 1984, two ERAs were established by the Navy as a mitigation measure for the construction of Kilo Wharf. These were the Orote Peninsula ERA and the Haputo ERA.

The Orote Peninsula ERA is located along the southwestern shore of Orote Peninsula, extending from Orote Point to Agat Bay. The Orote Peninsula ERA includes terrestrial lands from the 0 mean lower low water (MLLW) line to the upper edge of the cliffs and aquatic lands from the shoreline to a depth of 120 ft (36.5 m) MLLW offshore (Figure 3-33). The submerged portion of the Orote Peninsula ERA contains pristine coral communities (NAVFACPAC 1986). The Orote Peninsula ERA is located approximately 14.2 nm (26.3 km) from the North Study Area (Station 2) and approximately 9.5 nm (17.6 km) from the Northwest Study Area (Station 7). Barge traffic transporting dredged material from Apra Harbor to either of the study areas would transit within 0.4 nm (0.7 km) of the northern portion of the Orote Peninsula ERA.

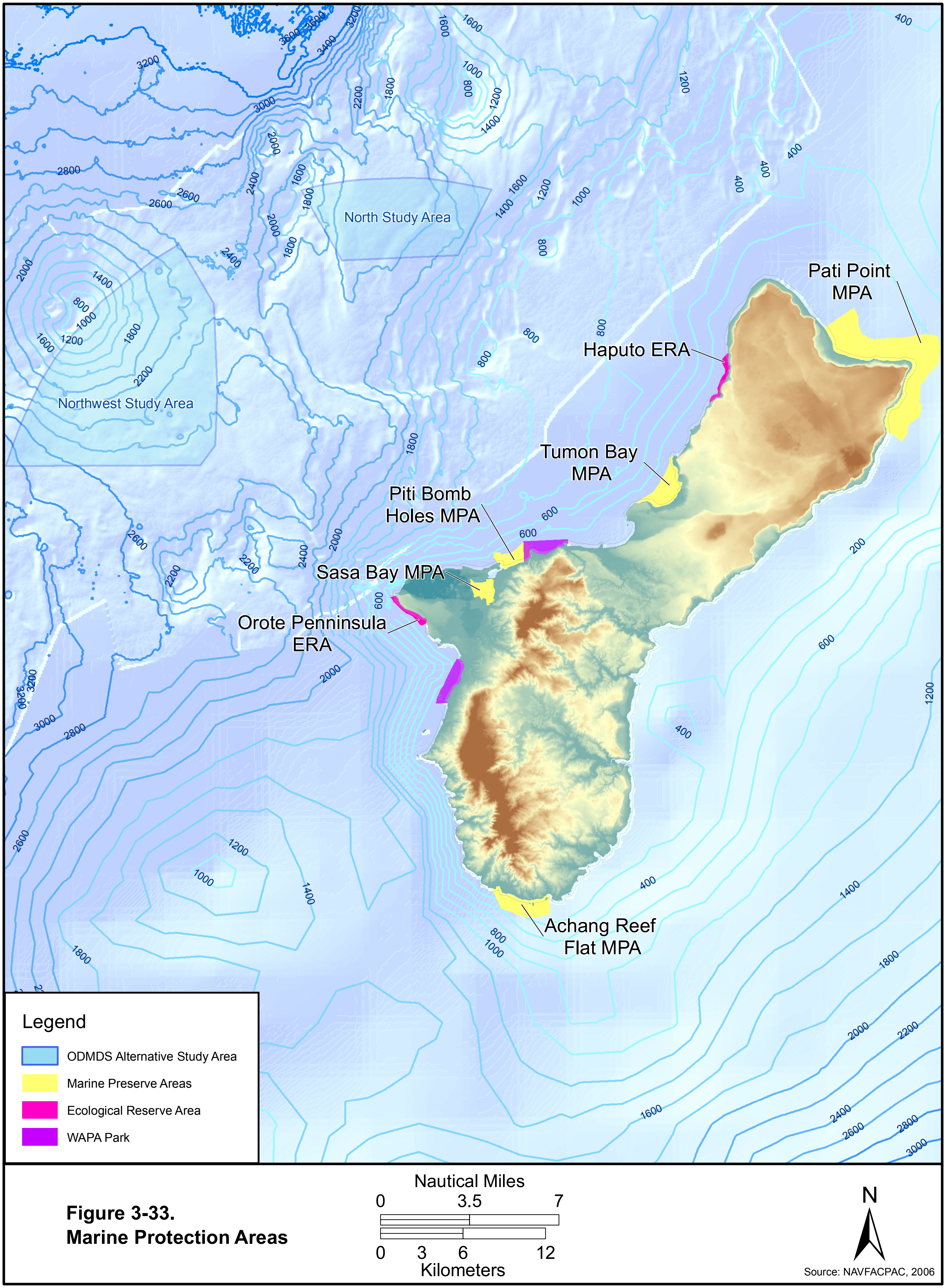

Figure 3-33.
Marine Protection Areas

The Haputo ERA is located along the northwestern shore of Guam on the Naval Computer and Telecommunications Station property, from Haputo Beach north to and including Double Reef (Pugua Patch Reef). The Haputo ERA includes terrestrial lands from the 0 MLLW line to the upper edge of the cliffs and aquatic lands from the shoreline to a depth of 120 ft (36.5 m) MLLW offshore. Double Reef supports highly diversified coral and cryptofauna communities (Amesbury et al.). The Haputo ERA is located approximately 14.5 nm (26.9 km) from the North Study Area (Station 2) and approximately 20.0 nm (37.0 km) from the Northwest Study Area (Station 7). The Haputo ERA is located 13.1 and 15.3 nm (24.3 and 28.3 km) from the planned barge transit routes between Apra Harbor and the North and Northwest Study Areas, respectively.

3.2.7.2 Marine Preserves

Marine preserves are areas in which activities such as fishing or other taking of aquatic animals and habitat are restricted or prohibited altogether in order to restore the reef fish community. In 1997, five marine preserves were designated in Guam. These include Pati Point, Tumon Bay, Piti Bomb Holes, Sasa Bay and Achang Reef Flat (Division of Aquatic and Wildlife Resources [DAWR] 2006). All of the preserves extend offshore to a depth of 600 ft (183 m) MLLW and inshore 33 ft (10 m) from the mean high tide mark or along the nearest public right-of-way, whichever comes first.

Pati Point Marine Preserve contains approximately 4,900 acre (1,980 ha) of reef environment. It is located on the northeastern tip of Guam, extending from Mergagan Point in the north to Anao Point in the south (Figure 3-33). Pati Point Marine Preserve has narrow reef flats and steep fore-reef slopes containing a diverse coral community, and the beaches in the preserve are vital green sea turtle habitat (DAWR 2005). Pati Point Marine Preserve is located on the opposite side of Guam from the two study areas. The shortest over-water distance between Pati Point Marine Preserve and each of the study areas (as well as the planned barge transit routes) is approximately 19.6 nm (36.3 km) for the North Study Area (Station 2) and 25.8 nm (47.8 km) for the Northwest Study Area (Station 7).

Tumon Bay Marine Preserve is centrally located on the western side of Guam and comprises 1,117 acres (450 hectares). It extends from Amantes Point (Two Lovers Point) in the north to Ypao Point (Hospital Point) in the south (Figure 3-33). Tumon Bay Marine Preserve consists of a broad reef flat, gently sloping fore-reef, and a broad bank/shelf habitat (DAWR 2005). Tumon Bay Marine Preserve is located approximately 14.5 nm (26.9 km) from the North Study Area (Station 2) and 17.1 nm (31.7 km) from the Northwestern Study Area. The Tumon Bay Marine Preserve is located 9.8 and 10.9 nm (18.1 and 20.2 km) from the planned barge transit routes between Apra Harbor and the North and Northwest Study Areas, respectively.

Piti Bomb Holes Marine Preserve is also centrally located on the western side of Guam, approximately 6 mi (9 km) south of Tumon Bay Marine Preserve (Figure 3-33). Extending from Asan Point to the outlet channel from the Cabras power plant, Piti Bomb Holes Marine Preserve comprises 896 acre (363 ha) of broad reef flat and fore reef slope. Within the reef flat, “bomb holes”, or sinkholes, extend up to 32 ft (10 m) deep MLLW and are populated with hard and soft corals and unique fish and invertebrate communities (DAWR 2005). Piti Bomb Holes Marine Preserve is located approximately 13.1 nm (24.3 km) from the North Study Area (Station 2) and 12.4 nm (23.0 km) from the Northwest Study Area (Station 7). The Piti Bomb Holes Marine Preserve is located 4.7 and 5.4 nm (8.7 and 10.0 km) from the planned barge transit routes between Apra Harbor and the North and Northwest Study Areas, respectively.

Sasa Bay Marine Preserve is located inside Outer Apra Harbor, on the eastern side between Dry Dock Island to the north and Polaris Point to the south (Figure 3-33). Sasa Bay Marine Preserve comprises 770 acre (312 ha) and includes the largest mangrove stand in the Marianas. Although the coral habitat is degraded due to elevated sedimentation loads from

Sasa and Aguada Rivers, the preserve provides foraging habitat for green and hawksbill sea turtles (DAWR 2005). Depending on project specific dredging locations within Apra Harbor, barge traffic transporting dredged material from Apra Harbor to either of the study areas may transit as close as 0.25 nm (0.5 km) to the western boundary of the Sasa Bay Marine Preserve.

Achang Reef Flat Marine Preserve is located at the southern tip of the Guam and contains approximately 1,200 acre (485 ha) of mangrove, seagrass, coral, sand and channel habitat. Achang Reef Flat Marine Preserve extends from Ajayan Channel in the east to Achang Bay to the west (Figure 3-33). The seagrass beds provide foraging habitat for green sea turtles (DAWR 2005). Achange Reef Marine Preserve is located on the opposite side of Guam from the two study areas. The shortest over-water distance between Achang Reef Marine Preserve and each of the two study areas is approximately 21.1 nm (39.1 km) for the North Study Area (Station 2) and 26.2 nm (48.5 km) for the Northwest Study Area (Station 7). The Achange Reef Marine Preserve is located approximately 13.1 nm (24.3 km) from the planned barge transit routes between Apra Harbor and either study area.

3.2.7.3 Territorial Seashore Reserve

In 1974, the GOVGUAM established the Guam Territorial Seashore Protection Act. This Act established the Guam Territorial Seashore Reserve in order to promote public safety, health and welfare and to protect public and private property, wildlife, marine life, other ocean resources and the natural environment (GOVGUAM 2003). The Guam Territorial Seashore Reserve includes all land and waters of Guam extending seaward to the -60 ft (-18 m) MLLW contour and inshore 33 ft (10 m) from the mean high tide mark or along the nearest public right-of-way, whichever comes first. Cabras Island and villages constructed along the shoreline prior to the establishment of the Act are excluded. The closest distance from the North (Station 2) and Northwest (Station 7) study areas to the Guam Territorial Seashore Reserve is 12.7 nm (23.5 km) and 9.5 nm (17.6 km), respectively.

Barge traffic transporting dredged material from Apra Harbor to either of the study areas would transit within 0.1 nm (0.2 km) the Territorial Seashore Reserve boundary along the northern portion of Orote Point.

3.2.7.4 National Historic Park

The War in the Pacific National Historic Park (WAPA) was established in 1978 as a memorial to those participating in the World War II Pacific theater campaigns. The WAPA is centrally located on the west side of Guam consisting of seven separate sites significant to the 1944 invasion and recapture of Guam. Of these seven sites, two sites, Asan Beach and Agat Beach include waters of the Philippine Sea (see Figure 3-33). The Asan Beach site extends along the shoreline from just west of Asan Point east to Adelup Point. The Agat Beach site extends along the shoreline from Apaca Point in the north to just south of Agat Village. The WAPA boundaries extend approximately 0.5 mi (0.8 km) offshore to water depths of approximately 60 ft (18 m) (National Park Service 2004). The Asan Beach site is located approximately 13.1 nm (24.3 km) from the North Study Area (Station 2) and approximately 13.5 nm (25.0 km) from the Northwest Study Area. The Agat Beach site is located approximately 17.8 nm (33.0 km) from the North Study Area (Station 2) and approximately 13.1 nm (24.3 km) from the Northwest Study Area. The WAPA is located 4.0 and 5.8 nm (7.4 and 10.7 km) from the planned barge transit routes between Apra Harbor and the Northwest and North Study Areas, respectively.

3.3 SOCIOECONOMIC ENVIRONMENT

Unless stated otherwise, the ROI for all aspects of the socioeconomic environment is the general region of Guam, which includes the ODMDS study areas, the Island of Guam, and the offshore area between them.

3.3.1 Commercial Fishing and Mariculture

Commercial fishing contributes less than $1 million (commercial landings value) annually on average to the total economy of Guam, which was $3.4 billion in 2002 (Allen and Bartram 2008). However, if other factors are considered (related economic contributions beyond landings value), the value of commercial fishing may be closer to $3 million (GFCA 2009). The military and tourism sectors are the major economic generators. Nonetheless, fishing is an important social and cultural activity for the people of Guam.

Guam is categorized as a “fishing community” by the WPRFMC. This designation is given based on the number of the population who are dependent upon fishing for subsistence, the economic importance of fishery resources to the islands, and the geographic, demographic, and cultural attributes of the communities. Fishing is a strong cultural tradition in Guam, particularly for the indigenous Chamorro people. Chamorro place a high value on sharing their catch with family and friends (Allen and Bartram 2008).

Most fishers rely on fishing for only a minor portion of their income. It is often difficult to distinguish among commercial, recreational, and subsistence fishermen in Guam. Most of the commercial operators use small boats similar to recreational fishing boats and many recreational fishers also sell part of their catch.

Most small-scale commercial fishing on the western side of Guam takes place in shallower waters, near reefs and near FADs, all located within 6 nm (11.1 km) of the shore. FADs, which were described in Section 3.2.3, have been widely used in the Pacific region since the end of the 1970s. Their use is based on the known fact that tuna schools and other pelagic species congregate or aggregate around floating objects in the water (Chapman 2004). Most of the time, anchored FADs located around a remote island archipelago act as single aggregation devices, with only modest levels of exchange of fish between adjacent FADs (4 nm [7.3 km] to 16.8 nm [31.1 km] apart) (Dagorn et al. 2007). Some tuna have been known to move frequently between two FADs separated by 5.4 nm (10 km) (Ohta & Kakuma, 2005). The locations of these are shown in Chapter 2 (see Figure 2-3) as a siting feasibility constraint for the ODMDS alternatives. In the event a FAD is lost, it is typically replaced within two weeks time (Chapman 2004).[1]

The 200 nm EEZ around Guam prohibits commercial fishing by foreign boats and ships. In addition, there is a prohibition on longline fishing in the waters 50 nm around Guam; this area is shown in Figure 3-34 (National Marine Fisheries Service 2007).

The major fisheries species in the waters of Guam are described in Section 3.2.3. The management of Guam nearshore fisheries is provided by the WPRFMC. The council has implemented two fisheries plans, one for deep-water snapper and the other for pelagic species (Chapman 2004).

[1] According to GFCA, a private FAD was once placed somewhere near Perez Bank and operated for approximately 18 months until it broke-off in the late 90’s (GFCA 2009).

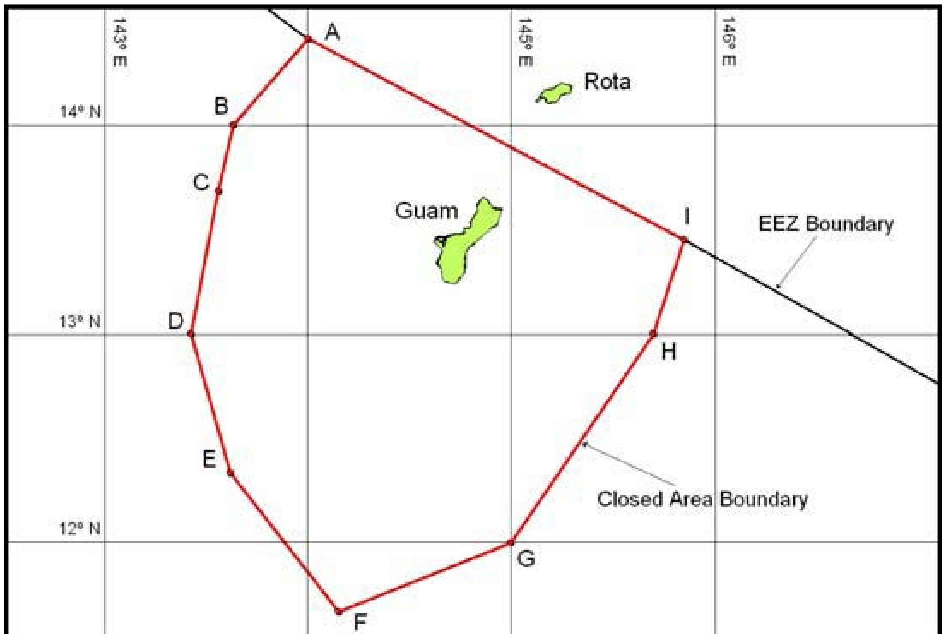

Figure 3-34.
Guam Prohibited Longline Fishing Area

Source: NMFS 2007

Deep-water snapper and tuna fishing are conducted in the waters around Guam by approximately 20 small scale full time operations. Another 180 small scale vessels operate part time or occasionally. Typically, there are 20 small scale fishing vessels operating in deeper water when weather permits (Chapman 2004).

There are no public sector tuna fishing companies in Guam. Nor are there any medium-scale fishing operations, partially due to the 50 nm longline exclusion zone around Guam. There is no export of domestically caught tuna. Foreign vessels do transship some of their fish through Guam; however, none of these fish were caught in the EEZ (Chapman 2004). Regional transshipment of tuna and other fish through the Jose D. Leon Guerrero Commercial Port in Apra Harbor is an important $150 million a year industry (Allen and Bartram 2008). The Commercial Port provides fuel, marine supplies, and maintenance services for vessels.

No registered mariculture operations were identified offshore of Guam.

3.3.2 Military Use

The ROI for military use is the vicinity of the ODMDS Alternative study areas. There are in-water military training areas established around Guam and ship traffic shares the shipping lanes with all other ocean going traffic. The only training areas in the vicinity of the ODMDS Alternative study areas are two drop zones as shown on Figure 3-35 (Marianas Training Range Complex Draft EIS[2], pending). These sites are used for the air-to-surface insertion of personnel and equipment. The majority of in-water training sites are located within or south of Apra Harbor, more than 9 nm distance from the ODMDS alternatives.

[2] Document being prepared for Commander, U.S. Pacific Fleet, Executive Agent. Final EIS anticipated in 2010.

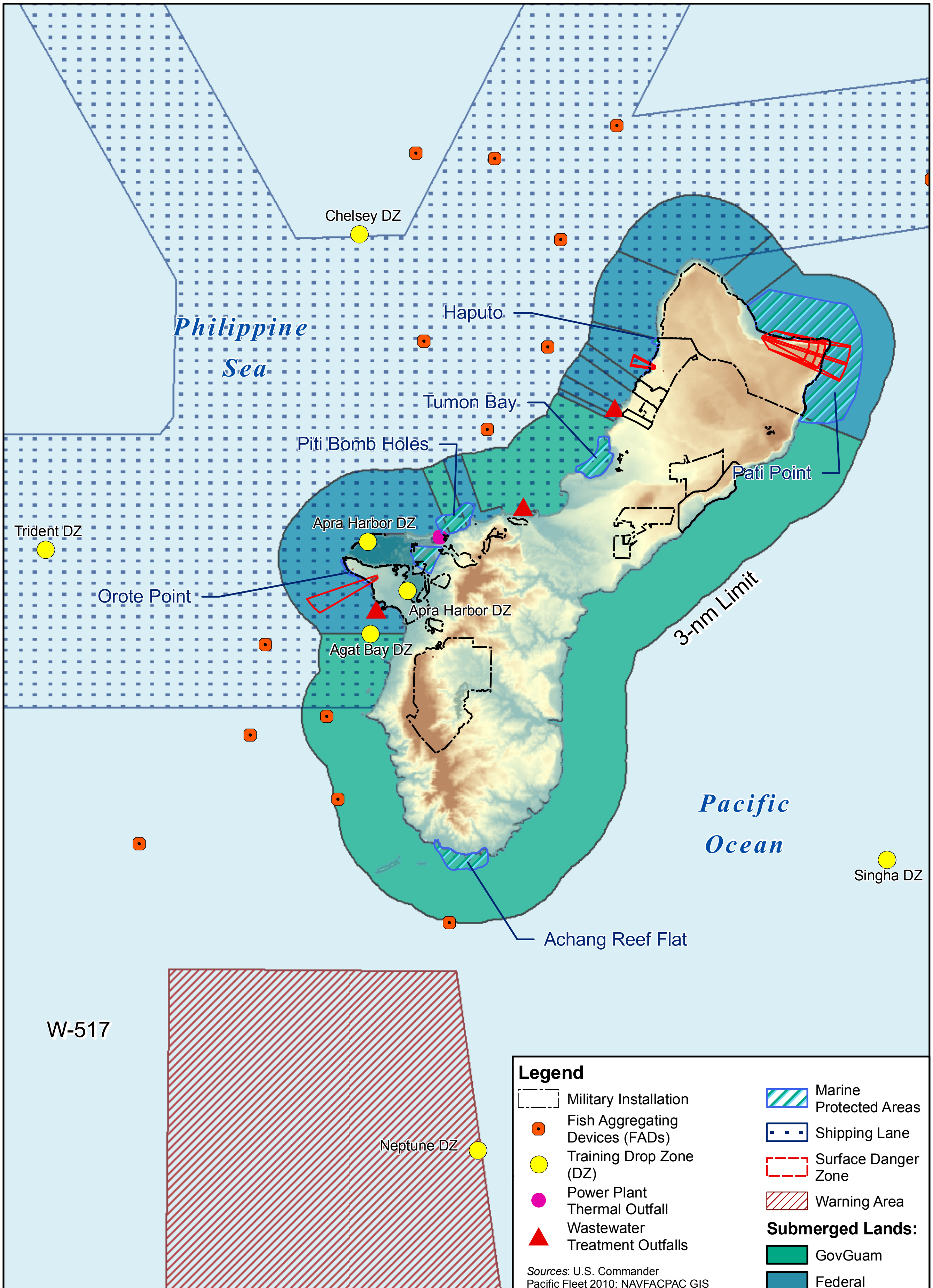

Figure 3-35.
Military Training Areas in the Vicinity of ODMDS Alternative Study Areas

3.3.3 Recreational Use

Tourism has become a $1.3 billion industry and is Guam's largest source of income after US military spending (Guam Visitors Bureau [GVB] 2007; CIA 2008). Guam tourism generates 60% of gross revenues and provides 20,000 jobs, approximately 35% of the island's employment. Japan and Korea comprise 90% of Guam's visitors. The U.S. contributes 4%, Taiwan 2%, and CNMI and Micronesia 3% (GVB 2007). Retail shopping and beautiful beaches are the major draws bringing tourists to Guam. Recreational fishing and water sports are also important draws for tourists as well as residents and military personnel. These activities occur within the region of influence of the study areas.

<u>Recreational Fishing</u>

Recreational fishing has been growing in Guam over the years. Popular fishing sites are characterized by relative ease of access, ability to anchor or secure the boat, and abundant presence of target fishes. Fishermen focusing on areas of bottom relief not only catch reef-associated fishes but also coastal pelagic species that may be attracted to the habitat.

Charter operations began in the 1970s with approximately five charter boats. By 1996, this had increased to 43 boats (Chapman 2004). Today there are about 25 charter boats with an additional 100 private sportfishing boats in Guam. There are numerous gamefishing tournaments each year (Chapman 2004). Charter fishing has accounted for 15-20% of all bottomfishing trips between 1995 through 2004. These trips generally 2 to 4 hours, with the majority of the catch released back to the ocean.

The majority of vessels used around Guam are less than 25 ft (8 m) long and operate in shallow waters (<500 ft [150 m]). There are five boat launch sites on the west coast of Guam:

- Agana Boat Basin – is centrally located on the western leeward coast and is used for fishing areas off the central and northern leeward coasts and the northern banks.
- Merizo Boat Ramp – provides access to the southern coasts, Apra Harbor, Cocos Lagoon, and the southern banks.
- Seaplane Ramp in Apra Harbor - provides access to the southern coasts, Apra Harbor, Cocos Lagoon, and the southern banks.
- Umatacneatac Boat Ramp - provides access to the southern coasts, Apra Harbor, Cocos Lagoon, and the southern banks.
- Agat Marina - provides access to the southern coasts, Apra Harbor, Cocos Lagoon, and the southern banks.

Rough seas limit small boats during most of the year and limit subsistence and recreational bottomfish fisheries to summer months when the sea conditions are calm. Galvez Bank, located off the southeastern shore outside the military restricted area, is fished the most often due to accessibility and distance. White Tuna Bank and Santa Rosa Bank off the southern coast, and Rota Bank north of Guam are remote and only fished during good weather conditions. Guam's system of 16 moored FADs that are used by commercial fishermen are also used by recreational fisherman.

Fishing for the crustaceans, mainly crabs and lobster, occurs for subsistence and recreation in inshore territorial waters. Shore-based fishing accounts for most of the fish and invertebrates harvested from coral reefs.

Water Sports

With its warm, turquoise waters and coral reefs, water attractions are popular in Guam and include diving, jet skiing, wind surfing, sea kayaking, water tours, dolphin watching, and submarine rides (GVB 2008). Much of the water sports activity takes place in the bays of Guam's west coast and around Cocos Island off the southern shore.

Diving is a major draw for tourists and includes photography, spear fishing, wreck and reef diving, and snorkeling (GVB 2008). Reef and shipwreck dive sites are found all along Guam's shores. Eighteen of the 20 most popular dive sites are located along the west coast and in Apra Harbor in depths ranging from 2 to 300 ft (0.6 to 91.4 m) (GVB 2008). These sites are located well inshore of the study areas.

3.3.4 Commercial Shipping

Five surface ship safety lanes (shipping lanes) are used by commercial ship traffic approaching Guam and Apra Harbor (see Figure 2-3). All ship traffic is restricted to these lanes. The study areas were located to avoid the shipping lanes and have been placed between those that approach from the north and west. Existing shipping lanes will be used to transport dredged material to either of the study areas that would contain a designated ODMDS. Barges transporting dredged material are subject to the same navigation rules and regulations that govern all other ship traffic including requirements for a notice to mariners, and respecting rights-of-way.

Apra Harbor lies on the western side of Guam's central section. It is a natural harbor, protected by Orote Peninsula on the south and Cabras Island and the Glass Breakwater on the north. The Glass Breakwater provides wind and wave protection from the Philippine Sea. The harbor is comprised of two main areas: Apra Outer Harbor and Apra Inner Harbor. The Inner Harbor is located to the southeast of the Outer Harbor; it is separated from Outer Apra Harbor by the Guam Shipyard and Polaris Point.

The west-facing entrance to Apra Outer Harbor is 1,500 ft (457 m) wide and over 100 ft (30.5 m) deep. Although the Outer Harbor has many areas where depths exceed 100 ft (30.5 m), it also contains several shoal and reef areas in the eastern portion of the harbor, close to the entrance to the Inner Harbor. While these shallow areas pose only a limited threat to normal operations, they are a significant hazard to navigation during periods of high winds. Vessels entering Apra Inner Harbor are limited to a maximum draft of 32 ft (9.8 m). Apra Outer Harbor contains several mooring buoys and anchorages used by military and commercial vessels.

The port handles both containerized and conventional cargo from the United States and other countries. It handles approximately two million tons of cargo a year (PAG 2008). The type and number of vessel calls between FY2000 and FY2007 are tabulated in Tables 3-20 and 3-21. Apra Harbor is the main berthing facility on the island, consisting of a commercial harbor, a naval complex, and a repair facility. Most of the outer harbor and the entire inner harbor are under the jurisdiction of the U.S. Navy; use of these waters is restricted because they are adjacent to Naval Base Guam facilities.

Table 3-20. Vessel Calls by Type to Apra Harbor for FY2000 to FY2007

Fiscal Year (FY)	Container Ships	Breakbulk RoRo Bulk	Barges	Fishing	Total
FY00	114	295	112	1906	2529
FY01	111	311	111	1960	2693
FY02	105	310	102	1481	2139
FY03	106	339	94	1332	1983
FY04	109	280	97	1044	1648
FY05	103	245	60	800	1327
FY06	109	299	17	771	1289
FY07	127	165	19	670	1281

Source: PAG

Table 3-21. Containers Handled at Apra Harbor FY2000 to FY2007

Fiscal Year	Number of Containers Handled
FY00	77,728
FY01	80,635
FY02	78,328
FY03	82,310
FY04	78,224
FY05	83,867
FY06	84,321
FY07	99,630

Source: PAG

3.3.5 Oil and Natural Gas Development

No oil or other mineral extraction platforms were identified offshore of Guam.

3.3.6 Archaeological, Historical, and Cultural Resources

Cultural resources are defined as any prehistoric or historic 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 prehistoric and historic archaeological resources, architectural resources, and traditional cultural resources.

Archaeological and architectural resources determined to be significant under cultural resource legislation are subject to protection or consideration by a federal agency. Significant cultural resources are those that are eligible or potentially eligible to the National Register of Historic Places (NRHP). The criteria for significance are contained in 36 CFR 60.4 and include association with significant historic events; association with significant people; embodiment of distinctive characteristics; and ability to yield information important in prehistory or history. The determination of significance is made in consultation with the State Historic Preservation Officer (SHPO). Significant historic resources usually must be at least 50 years old; however, certain structures at technical or scientific facilities associated with important historic periods (e.g., the Cold War, the Space age, the Nuclear Age) may be considered to be eligible to the National Register.

The War in the Pacific National Historic Park (WAPA) was established in 1978 as a memorial to those participating in the World War II Pacific theater campaigns. The WAPA is centrally located on the west side of Guam consisting of seven separate sites significant to the 1944 invasion and recapture of Guam. Of these seven sites, two sites, Asan Beach and Agat Beach include waters of the Philippine Sea. The Asan Beach site extends along the shoreline from just west of Asan Point east to Adelup Point. The Agat Beach site extends along the shoreline from Apaca Point in the north to just south of Agat Village. The WAPA boundaries extend approximately 0.5 mi (0.8 km) offshore to water depths of approximately 60 ft (18 m) (National Park Service 2004). The WAPA includes several submerged cultural resources, including: treads from amphibious tractors, two amphibious tractors, an ammunition dump, a pontoon barge, a tank turret, and a World War II equipment dump.

The Asan Beach site is located approximately 13.1 nm (24.3 km) from the North Study Area (Station 2) and approximately 13.5 nm (25.0 km) from the Northwest Study Area. The Agat Beach site is located approximately 17.8 nm (33.0 km) from the North Study Area (Station 2) and approximately 13.1 nm (24.3 km) from the Northwest Study Area. The WAPA is located 4.0 and 5.8 nm (7.4 and 10.7 km) from the planned barge transit routes between Apra Harbor and the Northwest and North Study Areas, respectively.

Underwater historical resources (e.g., shipwrecks, plane crashes) on the ocean floor between the west coast of Guam and the study areas are unlikely to be impacted by this action. Sixty-three shipwrecks have been documented in the vicinity of the island of Guam (Carrell 1991), although 31 of these are in Apra Harbor alone. Although no underwater archaeological surveys have specifically been conducted for this study region, underwater archaeological sites are unlikely to be located within the project area given its distance from land and reefs and the depth of the ocean bottom.

3.3.7 Public Health and Welfare

Health and welfare concerns for the population of Guam relative to the proposed designation of an ODMDS near Guam involve the potential for release of toxic substances, increases in ciguatoxin outbreaks, hazards to navigation, conflicts between marine traffic and disposal operations equipment, and visual effects.

Potential health hazards may result if dredged material disposed in the ocean releases toxic substances that are bioaccumulated in marine organisms, including fish and shellfish, which are then consumed by humans. As discussed in Chapter 1, ocean disposal is only allowed when USEPA and USACE determine, on a case-by-case basis, that the dredged material is environmentally suitable (e.g., non-toxic) according to testing criteria (40 CFR Parts 225 and 227), as determined from physical, chemical, and bioassay/bioaccumulation testing. All material to be dredged would be tested for the presence of contaminants as well as the potential for toxicity and bioaccumulation prior to dredging in accordance with national testing guidance.

Ciguatera is a disease typically attributed to the ingestion of tropical reef fishes that contain a toxin originating from the benthic dinoflagellate, Gambierdiscus toxicus (Withers 1982). G. toxicus tends to grow as an epiphyte (a plant that grows attached to the surface of another plant), attaching itself to various macroalgae found in coral reef environments. This was confirmed by a study conducted by Yasumoto et al. (1979) that determined that G. toxicus is generally not found free-swimming; rather it occurs in close association and in greater abundance with algae located on coral reef.

There has been no specific environmental parameter shown to directly cause an increase in G. toxicus. Instead, it appears that stressors to the environment which may lead to macroalgae growth (for example, increased nutrients and freshly denuded surfaces for macroalgae attachment) subsequently lead to opportunistic G. toxicus growth (Lehane and Lewis 2000, Anderson and Lobel 1987, Withers 1982, Yasumoto et al. 1980). However, in a review conducted by Anderson and Lobel (1987), they indicated G. toxicus did not occur in extremely shallow waters (<0.5 m) or in areas with high light intensity. A review by Lehane and Lewis (2000) confirmed this fact, indicating G. toxicus preferred water depths of one to four meters with 11% full sunlight.

Ciguatoxic fish tend to be herbivorous fish which feed on benthic algae, coral or detritus in and around tropical coral reefs. Ciguatoxin can be accumulated into fish that prey on herbivorous fish (Withers 1982; Lehane and Lewis 2000). Pelagic, or open ocean, fish (e.g., marlin, mahimahi) have not been shown to contain the ciguatoxin (Withers 1982).

The disposal of dredged material has the potential to raise the elevation of the seafloor and create a navigation hazard in the vicinity of the disposal site. Siting criteria defined in Chapter 1 provide that disposal will only be permitted at sites or in areas selected to minimize the interference of disposal activities with areas of heavy commercial or recreational navigation because the depths at the study areas range from approximately 2,625 ft (800 m) to 8,860 ft (2,700 m), the deposition of dredged material, estimated to be a maximum of 0.4 in (1 cm) per year, is not expected to result in a navigation hazard.

There is a potential for disposal barges to interfere with shipping traffic as they travel to and from the disposal sites. Five shipping lanes are present west of Guam (see Figure 2.3). Active shipping lanes were eliminated from consideration for siting of the preferred ODMDS; however, disposal barges will use shipping lanes to travel to the ODMDS.

Dredged material that is deposited at a disposal site would affect the visual aesthetics of an area if it became visible above the surface of the ocean or at depths visible to boaters or divers below the surface. Because of the depths of the study areas, disposed material would not be visible above or below the water surface.

Visual impacts would more likely be imposed by disposal barges transiting to and from the disposal site. One of Guam’s most important qualities is the scenic beauty of its white-sand beaches and ocean vistas. Scenic beauty is often cited by tourists as a reason for visiting Guam. The most popular tourist destination on Guam’s west coast is Tumon Bay, located north of Apra Harbor. North of Tumon Bay is Two Lovers Point, another major tourist attraction that provides a viewpoint 400 ft (122 m) above the sea.

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4.0 ENVIRONMENTAL CONSEQUENCES

4.1 PHYSICAL ENVIRONMENT

4.1.1 Climate and Air Quality

4.1.1.1 Significance Criteria

Air quality impacts would be significant if emissions directly related to the use of the proposed ODMDS would: 1) increase ambient air pollution concentrations above the National Ambient Air Quality Standards (NAAQS); 2) contribute to an existing violation of the NAAQS; 3) interfere with, or delay timely attainment of the NAAQS; or 4) impair visibility within federally-mandated Prevention of Significant Deterioration Class I areas.

4.1.1.2 Impact Analysis

Potential impacts, if any, to air quality are expected to occur from the emissions of tug vessels transiting to and from the proposed ODMDS. Air quality impacts at dredging sites associated with the dredge plant during dredge operations were not assessed herein, and would be assessed on a project-specific basis. Emissions from the tug vessels include particulate matter, nitrogen oxides (NO_x), sulfur dioxide (SO_2), CO and hydrocarbons.

Ambient air quality impacts were estimated using an USEPA derived model, SCREEN3. This model is constrained to estimating only volume sources (stationary source); it does not incorporate line sources (moving sources such as a tug in transit). However, these screening results are considered a maximum possible scenario, since the model assumes two tugs continuously operating side-by-side, rather than one tug operating within Apra Harbor and the other periodically in transit to and from the ODMDS. Results from the modeling effort were compared to Guam ambient air quality standards.

Emissions factors were derived from the Analysis of Commercial Marine Vessels Emissions and Fuel Consumption Data (USEPA 2000). Other factors were derived from the specification sheet for a tug vessel (M/T Chamorro) based in Apra Harbor, Guam. The tug's main engine was assumed to generate 3,183 kW of power, and the two auxiliary generators were assumed to each produce 99 kW of power. Sulfur content of fuel oil was assumed to be 0.5% by weight. The vessel was assumed to stand 26 ft (8 m) off the water line, have a beam width of 30 ft (9.1 m), and maximum draft of 12 ft (3.7 m).

For air quality impact analysis, dredging operations were assumed to be comprised of two tugs, one tending in Apra Harbor while one transits to and from the ODMDS. The tender in Apra Harbor was assumed to be in operation for 12 hours/day. For a tug transiting to the North Alternative ODMDS, operations were assumed to take place for 7.5 hours/day (15 nm one-way distance, one trip per day, 4 knots underway). For a tug transiting to the Northwest Alternative ODMDS, operations were assumed to take place for 5.5 hrs/day (11 nm one-way distance, one trip per day, 4 knots underway). The maximum number of trips per year was estimated at 333, with only one trip per day.

<u>North Alternative</u>

Table 4-1 presents the total calculated annual emissions (tons/yr) for a tug tending in Apra Harbor and a tug transiting to the North Alternative ODMDS. Table 4-2 uses these values (converted to g/sec) to determine the maximum possible ambient air quality impacts (measured at 21 m downwind). The annual average emissions of NO_x (593 µg/m^3) and SO_2 (159 µg/m^3) were estimated to exceed the Guam ambient air quality standards (100 µg/m^3 and 80 µg/m^3, respectively). As mentioned previously, this is assumed to be a conservative approach and any potential air quality impacts would likely be temporary. What is not taken in to account in this model of air quality impact is that Guam ambient air quality standards would be met through mixing and dilution within 1,310 ft (400 m) downwind of the source location (Table 4-3). All residential use areas within the Apra Harbor Naval Complex are located greater than 1,310 ft (400 m) downwind of the western boundary of Inner Apra Harbor.

Overall, potential impacts on air quality from dredged material disposal operations are expected to be transient and localized, therefore insignificant.

<u>Northwest Alternative</u>

The potential impacts of dredging operations on the air quality in the Northwest ODMDS Alternative area are expected to be slightly less than those outlined above for the North ODMDS Alternative area because the distance travelled from Apra Harbor to the Northwest Alternative ODMDS would be less. Modeling of potential air quality impacts resulted in minor differences in the annual average emissions of NO_x and SO_2 as compared impacts associated with the North Alternative (Tables 4-2 and 4-3). Therefore, impacts from the Northwest Alternative would be similarly negative, as levels above acceptable air quality standards would be reached, but mixing and dilution within 1,310 ft (400 m) downwind of the source location would occur, leading to acceptable levels reaching residential areas.

<u>No Action Alternative</u>

Under the No Action Alternative the ODMDS would not be designated, and therefore conditions at the sites would not change. The No Action Alternative would not affect climate and air quality. However, if an ODMDS is not designated, the planned volume of material to be dredged from Apra Harbor would still need to be managed. Under this scenario, material would likely be managed in an upland placement site (e.g., confined disposal facility or beneficial use project). Managing material in an upland setting would likely result in air quality impacts associated with the use of heavy equipment for rehandling and placement of the dredged material and would need to be assessed on a project-by-project basis.

4.1.2 Physical Oceanography

4.1.2.1 Significance Criteria

Physical oceanographic impacts would be significant if the disposal of dredged material would alter the regional and site-specific wave and current patterns. Changes to the wave and current patterns may adversely impact coastal processes or increase the erosion rate of sediments deposited on the seafloor.

Table 4-1. Emission Estimates for Guam ODMDS Alternate Sites

Operating Scenario	Size of Engine(s), kW[a]	Emission Factor, g/kW-hr[b]	Short-term Emissions		Operating Hours, hr/day or hr/trip[c]	Annual Operation, days/yr or trips/yr[d]	Annual Emissions, tons/yr[e]
			lb/hr	g/sec			
Tug tending in Apra Harbor							
Main engine	3183				12	333	
PM		0.321	2.25	0.28			4.5
NO_x		11.853	83.16	10.48			166.2
SO_2		3.279	23.01	2.90			46.0
CO		4.189	29.39	3.70			58.7
HC		0.746	5.23	0.66			10.5
Auxiliary generators	198				12	333	
PM		0.261	0.11	0.01			0.2
NO_x		10.575	4.62	0.58			9.2
SO_2		2.609	1.14	0.14			2.3
CO		0.838	0.37	0.05			0.7
HC		0.067	0.03	0.00			0.1
Tug to North Alternative Site							
Main engine	3183				15	333	
PM		0.278	1.95	0.25			4.9
NO_x		10.946	76.80	9.68			191.8
SO_2		2.860	20.07	2.53			50.1
CO		2.095	14.70	1.85			36.7
HC		0.264	1.85	0.23			4.6
Auxiliary generators	198				15	333	
PM		0.261	0.11	0.01			0.3
NO_x		10.575	4.62	0.58			11.5
SO_2		2.609	1.14	0.14			2.8
CO		0.838	0.37	0.05			0.9
HC		0.067	0.03	0.00			0.1
Tug to Northwest Alternative Site							
Main engine	3183				11	333	
PM		0.278	1.95	0.25			3.6
NO_x		10.946	76.80	9.68			140.7
SO_2		2.860	20.07	2.53			36.8
CO		2.095	14.70	1.85			26.9
HC		0.264	1.85	0.23			3.4
Auxiliary generators	198				11	333	
PM		0.261	0.11	0.01			0.2
NO_x		10.575	4.62	0.58			8.5
SO_2		2.609	1.14	0.14			2.1
CO		0.838	0.37	0.05			0.7
HC		0.067	0.03	0.00			0.1
Total Emissions							
North Alternative Site							
PM			4.43	0.56			9.9
NO_x			169.20	21.32			378.7
SO_2			45.35	5.71			101.2
CO			44.82	5.65			97.1
HC			7.14	0.90			15.2
Northwest Alternative Site							
PM			4.43	0.56			8.5
NO_x			169.20	21.32			324.5
SO_2			45.35	5.71			87.1
CO			44.82	5.65			87.0
HC			7.14	0.90			14.0

a Per EPA 420-R-00-002, Analysis of Commercial Marine Vessels Emissions and Fuel Consumption Data (February 2000), typical tug horsepower = 4268 hp = 3183 kW.
From data sheet on the Cabras Marine Corporation M/T "Chamorro", the two auxiliary generators are each 99 kW.

b Emission factor algorithms from EPA 420-R-00-002, Analysis of Commercial Marine Vessels Emissions and Fuel Consumption Data (February 2000), Table 5-1. Load factors from Table 5-2 for non-oceangoing vessels of 40% for slow cruise and 20% for maneuvering (in harbor) for main engine and from page 5-5 of 100% for auxiliary engines.
Sulfur content of fuel oil assumed to be 0.5% by weight.

c Operating hours of tug tending in harbor assumed to be 12 hr/day.
North alternative tug transits 15 nm one-way distance 2 times/day at 4 knots.
Northwest alternative tug transits 11 nm one-way distance 2 times/day at 4 knots.

d Maximum number of trips per year is 333. (Average number is 100 trips per year.) Maximum number of days per year assumes maximum number of trips and one trip per day.

Table 4-2. Ambient Air Quality Impacts at Maximum Impact Location

	Short-term Emissions, g/sec	Annual Average Emissions, g/sec	Worst Case Ambient Impacts, µg/m³				Guam Ambient Air Quality Standards, µg/m³ [d]			
			1-hour Average[a]	8-hour Average[b]	24-hour Average[b]	Annual Average[b,c]	1-hour Average	8-hour Average	24-hour Average	Annual Average
Total Emissions										
North Alternative Site										
PM	0.56	0.28	380	266	152	15	NA	NA	150	50
NO_x	21.32	10.89	14,509	10,157	5,804	593	NA	NA	NA	100
SO_2	5.71	2.91	3,889	2,723	1,556	159	NA	NA	365	80
CO	5.65	2.79	3,843	2,690	1,537	152	40,000	10,000	NA	NA
HC	0.90	0.44	612	429	245	24	NA	NA	NA	NA
Northwest Alternative Site										
PM	0.56	0.24	380	266	152	13	NA	NA	150	50
NO_x	21.32	9.33	14,509	10,157	5,804	508	NA	NA	NA	100
SO_2	5.71	2.51	3,889	2,723	1,556	136	NA	NA	365	80
CO	5.65	2.50	3,843	2,690	1,537	136	40,000	10,000	NA	NA
HC	0.90	0.40	612	429	245	22	NA	NA	NA	NA

a Worst case ambient impact of a volume source of 10 m vertical extent (8 m vessel height plus 2 m estimated plume rise), 5 m release height and 9 m vessel width as the worst case horizontal dimension using EPA SCREEN3 Dispersion Model for maximum impact location = 680.6 µg/m³/(g/sec)
SCREEN3 Model was run assuming average stability class of D and mean wind speed on Guam of 8.2 mph based on hourly averages by month from a 30-year dataset given at http://www.microclimates.org/diurnal/index.html.
Assuming as a worst case the brief time that both tugs are together in the harbor. Maximum impact occurs at 21 m downwind.

b Assuming meteorological scaling factors suggested by EPA for SCREEN3 model of:
8-hour/1-hour = 0.7
24-hour/1-hour = 0.4
annual/1-hour = 0.08

c Using scaling factor and annual average emissions.

d From Guam Air Pollution Control Standards and Regulations, Section 1103.2.

Table 4-3. Ambient Air Quality Impacts at Downwind Distance Below Guam Ambient Air Quality Standards

	Short-term Emissions, g/sec	Annual Average Emissions, g/sec	Worst Case Ambient Impacts, µg/m³				Guam Ambient Air Quality Standards, µg/m³ [d]			
			1-hour Average[a]	8-hour Average[b]	24-hour Average[b]	Annual Average[b,c]	1-hour Average	8-hour Average	24-hour Average	Annual Average
Total Emissions										
North Alternative Site										
PM	0.56	0.28	57	40	23	2	NA	NA	150	50
NO_x	21.32	10.89	2,181	1,527	872	89	NA	NA	NA	100
SO_2	5.71	2.91	585	409	234	24	NA	NA	365	80
CO	5.65	2.79	578	404	231	23	40,000	10,000	NA	NA
HC	0.90	0.44	92	64	37	4	NA	NA	NA	NA
Northwest Alternative Site										
PM	0.56	0.24	57	40	23	2	NA	NA	150	50
NO_x	21.32	9.33	2,181	1,527	872	76	NA	NA	NA	100
SO_2	5.71	2.51	585	409	234	21	NA	NA	365	80
CO	5.65	2.50	578	404	231	20	40,000	10,000	NA	NA
HC	0.90	0.40	92	64	37	3	NA	NA	NA	NA

a ambient impact of a volume source of 10 m vertical extent (8 m vessel height plus 2 m estimated plume rise), 5 m release height and 9 m vessel width as the worst case horizontal dimension using EPA SCREEN3 Dispersion Model for 400 meters downwind = 102.3 µg/m³/(g/sec)
SCREEN3 Model was run assuming average stability class of D and mean wind speed on Guam of 8.2 mph based on hourly averages by month from a 30-year dataset given at http://www.microclimates.org/diurnal/index.html.
Assuming as a worst case the brief time that both tugs are together in the harbor.

b Assuming meteorological scaling factors suggested by EPA for SCREEN3 model of:
8-hour/1-hour = 0.7
24-hour/1-hour = 0.4
annual/1-hour = 0.08

c Using scaling factor and annual average emissions.

d From Guam Air Pollution Control Standards and Regulations, Section 1103.2.

4.1.2.2 Impact Analysis

The disposal of dredged material at an ODMDS is not expected to have any measurable effect on the regional or site-specific physical oceanographic conditions. In general, physical oceanographic conditions are driven ultimately by energy from the sun and the rotation of the earth. Atmospheric circulation (e.g., wind) generates friction on the ocean surface, in effect creating waves and surface currents. Temperature and salinity changes in ocean water due to processes such as heating, evaporation, precipitation, and the freezing and melting of ice create density differences between surface and underlying water which drives vertical circulation, (e.g., thermohaline circulation) (Brown et al. 1989b).

Conversely, the regional and site-specific physical oceanographic conditions will influence the fate and transport of dredged material disposed at an ODMDS. The predominant wind-driven, tidal and thermohaline currents will affect the dispersion, settling and deposition of dredged material through the water column to the seafloor. Dredged material disposed at the proposed ODMDS will initially fall vertically through the water column under the influence of gravity. Once the dredged material reaches a point of neutral buoyancy through the entrainment of water, vertical transport is replaced with horizontal spreading. Subsequently, site-specific oceanographic currents and turbulence dominate the movement of dredged material until the material is deposited on the seafloor (USEPA and USACE 1998). The impacts associated with the dispersion of dredged material into the water column and the deposition of dredged material onto the seafloor are discussed in subsequent sections specific to the water quality (Section 4.1.3), regional geology (Section 4.1.4), sediment quality (Section 4.1.5) and biological resources (Section 4.2).

<u>North Alternative</u>

Based on *in situ* measurements near the North Alternative Area, oceanographic currents are characterized by a strong wind-driven westerly surface current extending to a depth of approximately 98 ft (30 m) with maximum speeds of approximately 3.8 ft/s (1.16 m/s, 2.25 kt). Below the surface currents, intermediate layer currents, driven by thermohaline circulation and influenced by tidal circulation, are variable. To the south, currents in the intermediate layer have a net current velocity of 0.1 ft/s (0.03 m/s, 0.06 kt) to the southwest while to the west, intermediate layer currents have a net current velocity of 0.13 ft/s (0.04 m/s, 0.08 kt) to the north. Near the seafloor, bottom currents are likely influenced by bathymetric features such as the ridge of seamounts on the western edge of the Alternative Area and a slope rising towards the east. Bottom currents measured south of the North Alternative Area trend toward the northeast at 0.07 ft/s (0.02 m/s, 0.04 kt) while bottom currents measured to the west of the North Alternative Area trend to the northwest at 0.07 ft/s (0.02 m/s, 0.04 kt). Disposal of dredged material at the North Alternative Area is not expected to have any negative effect on site-specific oceanographic current patterns.

<u>Northwest Alternative</u>

Similar to the North Alternative Area, oceanographic currents in the Northwest Alternative Area are characterized by a strong wind-driven westerly surface current extending to a depth of approximately 98 ft (30 m) with maximum speeds of approximately 3.8 ft/s (1.16 m/s, 2.25 kt). Below, intermediate layer currents, driven by thermohaline circulation and influenced by tidal circulation, are variable. To the east, currents in the intermediate layer have a net current velocity of 0.1 ft/s (0.03 m/s, 0.06 kt) to the northeast while to the north, intermediate layer currents have a net current velocity of 0.13 ft/s (0.04 m/s, 0.08 kt) to the north direction. Near the seafloor, bottom currents are likely influenced by a seamount (Perez Bank) northwest of the proposed ODMDS and rising to approximately 2,625 ft (800 m). Bottom currents measured in the northern portion of the Northwest Alternative Area trend northwest between two seamounts towards the deeper waters of the East Marianas Basin at a rate of 0.07 ft/s (0.02 m/s, 0.04 kt).

Results from scientific studies at a similar, isolated deep seamount can be applied to the Perez Bank seamount. Oceanographic data, collected over the Fieberling Guyot, was the target area of a multidisciplinary program to study the impact of seamounts on tides, internal waves, turbulent mixing, and upwelling of oceanic waters near steep and isolated topography. It is the largest isolated feature in a group of seamounts in the northeast Pacific and is an almost axis-symmetric seamount (like Perez Bank seamount) extending from bottom depths of approximately 13,125 ft (4,000 m) up to a summit at approximately 1,640-2,300 ft (500-700 m) below the surface (closer to the surface than Perez Bank). Water column profiles show seamount-influenced currents up to 655 ft (200 m) above the seamount summit below a distinct surface layer of weak currents (Kunze and Toole 1997). Similar findings were found in a detailed numerical simulation study by Beckmann and Hadivogel (1997) of the flow regime of Fieberling Guyot. The horizontal structure of the seamount trapped wave is clearly visible at the upper flanks of the seamount, while there is only a weak indication of the trapped wave at a height of 328-655 ft (100-200 m) above the seamount's summit (Beckmann and Hadivogel 1997). These studies found that the seamount effects driven by tidal and oceanic currents occur within a limited area above the seamount summit and diminish with height. Therefore, the variability in the physical flow field associated with the Perez and Spoon Banks, including upwelling of nutrients or other organic materials is likely limited to 328-655 ft (100-200 m) above the seamount summit (e.g., approximately 1,970 ft [600 m] below the sea surface), well below the euphotic zone, thermocline, and vertical migration pattern of most pelagic fish species in the area of these seamounts in both study areas.

Disposal of dredged material at the Northwest Alternative Area is not expected to have any significant effect on site-specific oceanographic current patterns.

<u>No Action Alternative</u>

Under the No Action Alternative the ODMDS would not be created, and therefore conditions at the sites would not change. There would be no effect of the No Action Alternative on regional oceanographic current patterns.

4.1.3 Water Column Characteristics and Chemical Analysis

4.1.3.1 Significance Criteria

Sediment impacts would be significant if actions directly related to disposal of dredged material at the proposed ODMDS would exceed the water quality criteria for the ocean disposal of dredged material are specified in 40 CFR 227 or did not meet criteria set out in the USEPA's Green Book (USEPA and USACE 1991).

The USEPA's Green Book (USEPA and USACE 1991) specifies two criteria related to dilution of dredged material:

- Criterion I – The maximum concentration of a constituent outside the disposal site boundary at any time after discharge must satisfy applicable water quality standards.
- Criterion II – The maximum concentration of a constituent within the disposal site four hours after discharge must satisfy the water quality standards. The final concentration of a conservative constituent after mixing is expressed as the initial concentration divided by the dilution factor, assuming an ambient concentration of the constituent of zero.

4.1.3.2 Impact Analysis

Dredged material disposal is expected to produce temporary and localized impacts at the proposed ODMDS, including increased turbidity and decreased light transmittance due to the suspension of sediments (finer-grained silts and clays). The degree of suspension of sediments from dredged material disposal depends on four main variables; size, density and quality of the dredged material; method of disposal; hydrodynamic regime of disposal area; and ambient water quality and characteristics of the disposal site (Pennekamp and Quaak 1990). STFATE was used to model suspended sediment plumes in the upper water column (see Section 4.1.4.2 for a description of STFATE). The STFATE model was used to ascertain *in situ* changes in background suspended sediment concentration (e.g., turbidity) after disposal of a typical barge load of 3,000 cy (2,294 m^3) of both predominantly coarse and fine-grained material under various atmospheric and oceanographic conditions, including those representing La Niña (surface currents increased by a factor of four resulting from stronger than normal tradewinds) and El Niño (surface currents reversed and increased by a factor of four resulting from weaker and/or reversed tradewinds) conditions. No changes were made to the bottom current layers as these currents are driven by thermohaline circulation rather than atmospheric conditions. It is assumed that the entrained mass of suspended sediment would not be radially distributed about the point of disposal, but instead would be concentrated within a narrower arc emanating from the point of disposal and expanding under the influence of winds and currents. Figures 4-1 and 4-2 illustrate the additional STFATE modeling results and assume a current direction under normal or La Niña conditions. Under other atmospheric and oceanographic conditions, the surface plume would maintain the same geometry but would be oriented in the direction of the prevailing current.

STFATE model results under any of the observed conditions suggest that the largest surface plume geometry having a suspended sediment concentration of at least 1 mg/L, would have a radius of approximately 292 ft (89 m) and a penetration depth of 458 ft (140 m). After four hours from the disposal event, the surface plume will have expanded to have a radius of approximately 4,737 ft (1,444 m) and would penetrate the upper water column to a maximum depth of approximately 2,590 ft (789 m). With this expansion, the concentration of the suspended sediments would decrease approximately three orders of magnitude to approximately 0.005 mg/L which is less than ambient concentrations, is far below concentrations shown to cause adverse impacts, and is even below laboratory detection limits.

Figure 4-1 and 4-2 show the surface plume after a period of four hours. The origin of the surface plume appears offset from the surface disposal zone in these figures due to the influence of prevailing currents after the initial disposal event has terminated.

During suspension and settling, changes in physical and chemical conditions may lead to the desorption of particulate-bound contaminants into the water column. Potential toxicity and bioaccumulation may result from biologically available, desorbed heavy metals and anthropogenic organics. Dissolved contaminants may in turn be sequestered from the water column by mechanisms such as the re-adsorption (onto sediment particles which eventually settle out of the water column), precipitation processes, redox transformations, uptake by aquatic life, degradation, and volatilization. The release of organic-rich sediments during disposal into environments adapted to low nutrient conditions can also result in eutrophication effects such as the localized confiscation of oxygen in the surrounding water column.

All material will be tested for the presence of contaminants as well as the potential for toxicity and bioaccumulation prior to dredging using national testing guidance (USEPA and USACE 1991). Numerical modeling using STFATE may be conducted using chemistry concentrations of proposed dredged material to determine the diluted concentration of potential contaminants in the water column. These modeled results will be compared to water quality criteria to determine suitability for ocean disposal. Only dredged material deemed suitable under these protocols would be permitted for disposal at an ODMDS. Screening of the dredged material will ensure that no significant effects to water quality would result from the ocean disposal of the dredged material at the ODMDS.

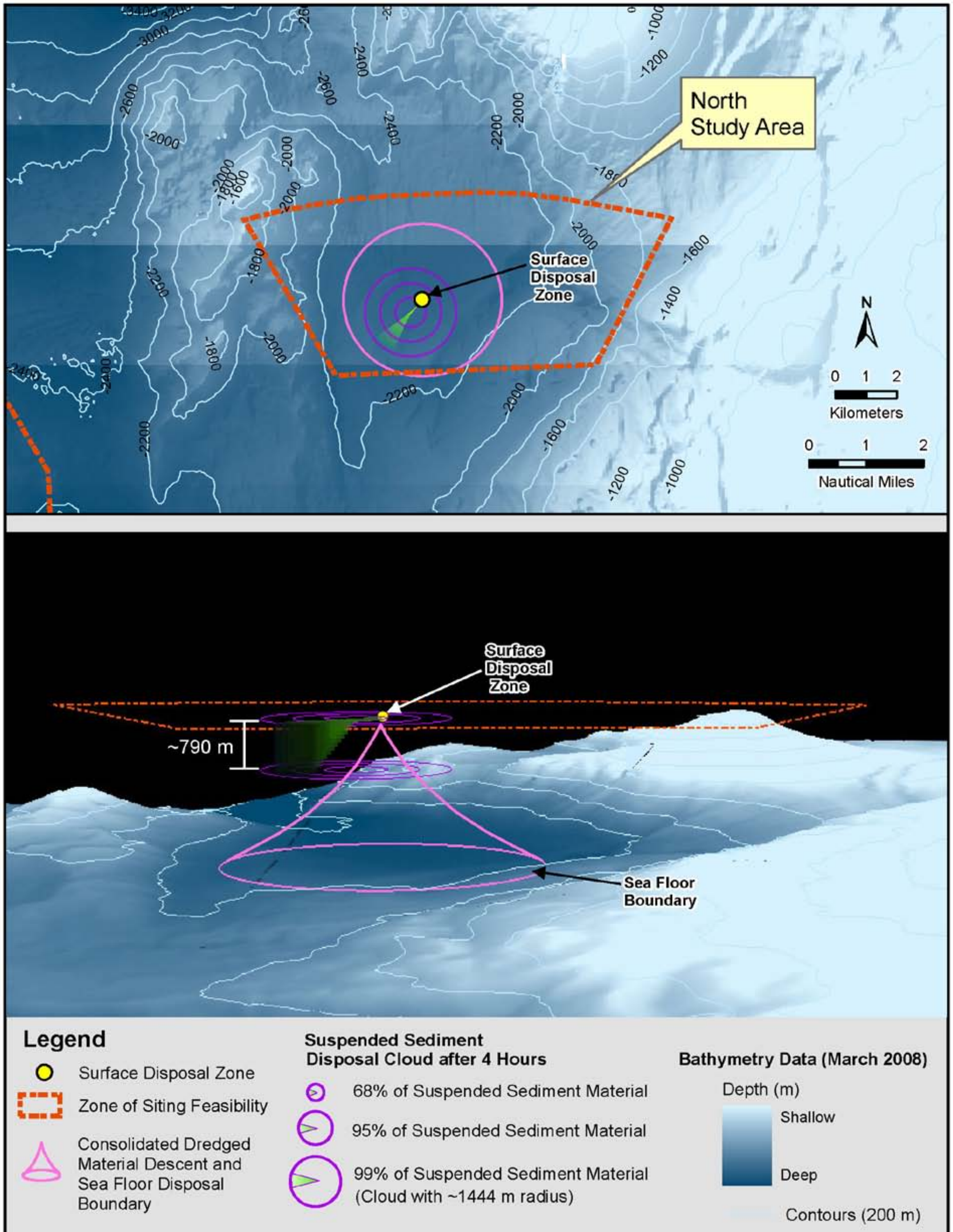

Figure 4-1.
Prospective View of Upper Water Column Sediment Dispersion in the North Study Area During La Niña Conditions

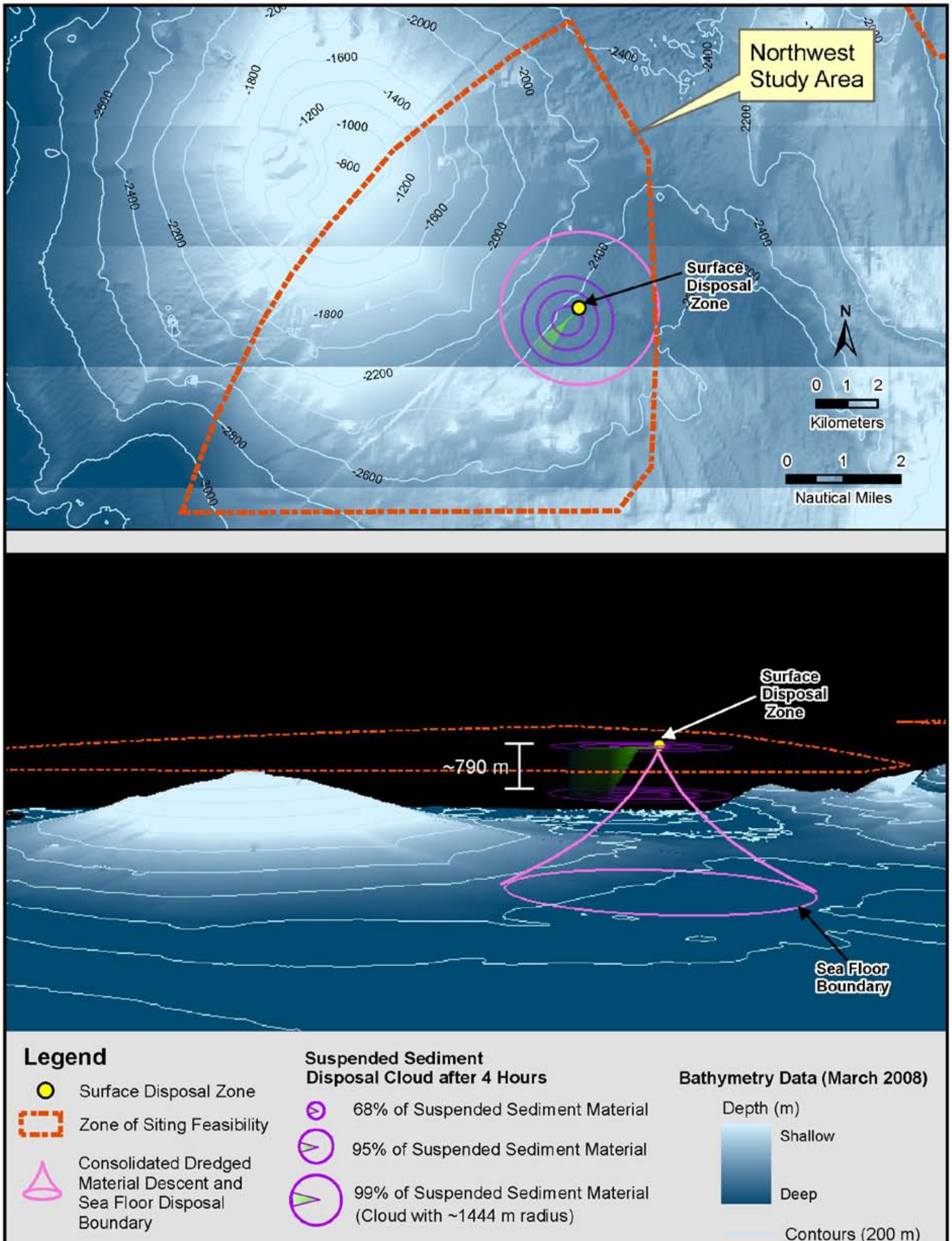

Figure 4-2.
Prospective View of Upper Water Column Sediment Dispersion in the Northwest Study Area During La Niña Conditions

Recent Tier III analysis and evaluation was performed for three construction dredging projects within the Apra Harbor Naval Complex which are expected to support new, deeper draft vessels based in Apra Harbor as well as larger vessels transiting through Guam. Two Inner Apra Harbor projects, P-436 and P-518 and an Outer Apra Harbor project, P-502, will ensure sufficient water depth to meet the Navy's operational requirements for future berthing and ship loading activities in these areas. Tier III analysis of the P-436 and P-518 area indicated that sediment from this area deemed suitable for ocean disposal was fine-grained (68.7% and 70.8%, respectively). Conversely, sediment from the P-502 area deemed suitable for ocean disposal was predominantly coarse-grained (95.1%). The Tier III assessment found that proposed dredged material from the entire P-518 and P-502 area was suitable for ocean disposal. Three of the five delineated areas within the P-436 project site were found suitable for ocean disposal. The remaining two areas showed toxicity in a SP tests and were deemed unsuitable for ocean disposal (Weston Solutions and Belt Collins 2007c). Because dredged material from Apra Harbor will likely be the primary source of materials disposed at the proposed ODMDS, environmental consequences caused by sediments from the P-436, P-518 and P-502 projects are considered throughout this section.

Sediment from the aforementioned projects was deemed appropriate for use in this evaluation because the material from these projects contained a range of grain size characteristics, from predominantly fine-grained to predominantly coarse-grained material. Finer-grained material (primarily silts and clays) tend to carry higher contaminant loads whereas coarser-grained material (primarily sands and gravels) tend to carry significantly less contaminant loads. Additionally, the majority of the sediment from these projects was collected along wharf faces where contaminant loads are expected to accumulate from industrial activities. The majority of the material evaluated for the three Navy projects was predominantly fine-grained. In the absence of chemical or fuel spills, future maintenance dredged material is expected to contain fewer contaminants, unlike those measured from sediment within the proposed P-436, P-518 and P-502 dredge footprints. The material proposed for dredging still need to pass Tier III testing to be determined suitable for ocean disposal and it is unlikely that the impact analysis would be significantly altered.

North Alternative

The discharge of dredged material could result in a temporary localized turbidity plume that would dissipate with distance from the disposal site. The increased turbidity may attenuate light within the plume causing a temporary decrease in transmissivity in the photic zone relative to ambient levels. Heavier sediments, such as coarse-grained particles characteristic of P-502 project sediments, would descend more rapidly than fine-grained sediments and therefore be expected to have an insignificant effect on water column characteristics in the North Alternative area. Finer sediments, such as silt and clay particles characteristic of P-436 and P-518 project sediments, would descend more slowly causing potentially significant impacts that would be attenuated by dispersal and dilution. Discontinuous disposal activity at the ODMDS can minimize these acute effects on water column characteristics. Chemical contaminants present within the plume may also result in temporary elevated levels of desorbed heavy metals and anthropogenic organics in the affected water column. The low TOC content of sediments from Areas P-436, P-518 and P-502 would avert eutrophication effects including the sequestering of dissolved oxygen in the surrounding water column.

Overall, potential impacts on water quality from suitable dredged material permitted for ocean disposal at the North Study Area are expected to be transient and localized (e.g., contained within the overall boundary of the disposal site) within four hours of the initial disposal activity. Significant dilution is expected to mitigate any potential impacts caused by sediments remaining in suspension beyond the boundary of the disposal site for longer than four hours. Therefore, there will be no unacceptable adverse impacts to water quality.

Northwest Alternative

Due to the homogeneity of water quality between the Northwest and North ODMDS Alternative areas, the potential impacts of dredged material disposal on the water column characteristics in the Northwest study area are expected to be similar to those outlined in the North Alternative area.

No Action Alternative

Under the No Action Alternative the ODMDS would not be designated, and therefore conditions at the sites would not change. There would be no effect of the No Action Alternative on the water column.

4.1.4 Regional Geology

4.1.4.1 Significance Criteria

Geological impacts would be significant if the disposal of dredged material would: 1) alter the regional and site-specific bathymetry; 2) interfere with or change sediment transport processes; or 3) alter the existing characteristics of the seafloor (e.g., change the substrate from predominantly silty sand to gravel).

4.1.4.2 Impact Analysis

The disposal of dredged material at an ODMDS is not expected to have any measurable effect on the regional or site-specific bathymetric conditions or sediment transport processes, particularly outside of the site boundaries; however, dredged material is expected to accumulate within the proposed ODMDS boundary causing potential temporary impacts to substrate characteristics and benthic organisms. At the center of the disposal area, the maximum thickness of dredged material deposits was modeled to be approximately 2 ft (0.6 m) per year assuming a maximum possible disposal scenario of 1,000,000 cy (764,554 m^3) of coarse-grained material. STFATE, a model designed to assess the fate and transport of dredged material disposed in open ocean waters, was used to predict the horizontal and vertical extents of these dredged material accumulations on the seafloor. The potential for impacts to the benthic community are discussed in subsequent sections specific to biological resources (Section 4.2).

Results of monitoring conducted at the SF-DODS offshore of San Francisco, California indicates no evidence of major long-term physical changes [to the seafloor characteristics] and suggest no widespread or long-term impairments to the deep ocean biological communities (Germano & Associates 2008). The SF-DODS is similar to either of the proposed alternative ODMDS offshore of Guam in its location in extremely deep water (>8,200 ft [2,500 m]). Dredged material will disperse over a large spatial area during its descent through the water column and ultimately be deposited on the seafloor in relatively thin layers. Since its designation in 1994 as an ODMDS, the SF-DODS has received an annual average of approximately 1,000,000 cy (764,554 m^3) of dredged material. Over this almost 15 year period, the accumulated thickness of dredged material outside the site boundary is less than 4 in (10 cm). At the SF-DODS site, evidence suggests dredged material deposited on the seafloor is constantly being assimilated (e.g., mixed) into the underlying sediments by biological processes such as burrowing and foraging of benthic organisms.

Potential impacts to the regional geology, specifically the existing characteristics of the seafloor, are expected to be negligible.

Description of STFATE

The STFATE model was evaluated for its efficacy in modeling dredged material disposal events at a deep sea ODMDS, similar to the environment offshore of Guam. STFATE predicts the transport of disposed dredged material through the water column and ultimately the area and thickness of material deposition. STFATE is a module of the Automated Dredging and Disposal Alternatives Management System and was developed by the USACE. A detailed discussion of the model's capabilities and assumptions can be found in the Inland Testing Manual (USEPA and USACE 1998).

In general, STFATE models the transport of dredged material based on three phases of movement: convective descent, dynamic collapse and passive transport-dispersion. During convective descent, the consolidated dredged material falls vertically through the water column under the influence of gravity. Once the dredged material reaches a point of neutral buoyancy (dynamic collapse), vertical transport is replaced with horizontal spreading. Passive transport-dispersion occurs when ambient currents and turbulence dominates the movement of unconsolidated dredged material until the material is deposited (in a normal distribution) on the seafloor. The model assumes deposited material remains in place and is not transported due to erosion or bedload transport.

Model input and output is provided for a gridded area, scaled to represent the area of expected transport and deposition. The grid has cells of a user-specified size. Current velocity in the east-west (x) and north-south (y) direction for each of two vertical layers is applied to each cell. The model cannot account for site-specific bathymetry, and instead uses either a single disposal depth for each cell over the entire gridded area or a uniform slope.

Input parameters to the model include ambient environmental parameters such as time-invariant current velocity, density stratification and water depths, operational parameters such as barge position, speed, dimensions, draft and volume of dredged material to be disposed. Values representing entrainment, settling, drag, dissipation, apparent mass and density gradient differences can also be defined.

The primary limitation in using STFATE for this project is its inability to model multiple current patterns in both the horizontal as well as vertical directions. The model is restricted to only two discrete current patterns in the vertical direction. This constrains the model from accurate predictions in a deep sea environment which typically has a surface current attenuating with depth and multiple intermediate layer and bottom layer currents. Further, the model can only evaluate a maximum of 12 time-steps and is restricted in the lengths of each time-step. Due to the extreme depths of the disposal site and slow settling velocities of unconsolidated fine-grained material, the model would not run to completion (e.g., predict the deposition of all silts and clays).

STFATE model output provides results for a single disposal event of the total volume and associated deposit thickness for each particle size, as well as cumulative results for all disposed material, in each model grid cell. In addition, it provides results predicting the physical characteristics of the sediment cloud remaining in suspension at model termination. In the Ocean Current Study (Weston Solutions and Belt Collins 2007b), STFATE was used to model a single disposal event (3,000 cy [2,294 m^3]) and results were extrapolated to 333 disposal events over the course of year (1,000,000 cy [764,555 m^3]). Based on findings in the ZSF study (Weston Solutions and Belt Collins 2006), 1,000,000 cy (764,555 m^3) was chosen to represent a maximum dredged material volume for a given year associated with any specific construction dredge project. To be conservative, this assessment will focus on the disposal of 1,000,000 cy (764,555 m^3) to determine the maximum extent of the ODMDS boundary.

To extrapolate the deposit thickness for the dredged material volume scenarios of 1,000,000 cy (764,555 m^3), the deposit thickness from a single disposal event was multiplied by the total number of trips expected during each season (dry and wet), assuming a consistent, regular pattern of disposal throughout the year. For example, to dispose 1,000,000 cy (764,555 m^3) of dredged material using a scow having a capacity of 3,000 cy (2,294 m^3), would require 333 trips, 166.5 trips during each season. Two separate current structures were evaluated using *in situ* current data: dry season and wet season. For the purposes of the extrapolation, it was assumed that dredged material disposed at the potential ODMDS alternative sites would be exposed to dry season currents 50% of the time (50 trips) and wet season currents the remaining 50% of the time (50 trips). These calculations were input into a GIS and isopachs were developed for deposit thicknesses greater than 0.4 in (1 cm), 3.9 in (10 cm), 7.9 in (20 cm) and 19.7 in (50 cm), as appropriate.

This additive method is conservative in some aspects as it does not account for compaction of material over time or redistribution of sediment deposits due to physical processes such as bedload transport or biological processes such as bioturbation; therefore this method provides the greatest potential deposit thickness. This additive method is not conservative in other aspects as it assumes that each disposal event occurs at the same location within the target surface disposal area, rather than at multiple locations distributed throughout the target surface disposal area; therefore, the overall footprint on the seafloor is reduced. However, since the model grid cell size is only slightly smaller than the target surface disposal area and assuming a normal distribution of disposal events about the center of the target surface disposal area, variations in the predicted footprints are not anticipated to be significant.

As expected, coarser-grained material deposited more quickly than finer-grained material and the coarser-grained material did not disperse as far relative to finer-grained material. For example, gravel material settled within 16 hours of the disposal event and was not transported beyond the boundaries of the model grid cell in which the disposal event occurred (an area of approximately 0.11 sq. nm [0.37 km^2]). In contrast, only a small percentage of the silts and clays settled to the seafloor within the time limits of the model (192 hours) and these materials were transported over a much greater area with nearly all model grid cells within the bounds of the model limits (an area of approximately 219 sq. nm [752 km^2]) predicting some deposition, however minute, of these materials.

Table 4-4 lists the area of deposits for accumulations greater than 0.4 in (1 cm), 3.9 in (10 cm), 7.9 in (20 cm) and 19.7 in (50 cm) for each of the two scenarios (disposal of 1,000,000 cy [764,555 m^3] of coarse-grained material vs. fine-grained material) under the influence of currents measured from both the CM1 and CM2 moorings. Figures 4-3 through 4-10 illustrate these results. The largest footprint is associated with the disposal of 1,000,000 cy (764,555 m^3) of predominantly fine-grained material. Using current velocities from CM1 or CM2 did not influence the results. The deposit areas predicted using current velocities from CM1 or CM2 were similar to results obtained during the Ocean Current Study (Weston Solutions and Belt Collins 2007b).

The total thickness of new material deposited on the seafloor was much greater in the model grid cell directly below the disposal site than in all adjacent model grid cells. After 333 disposal events (the assumed maximum number of trips per year), new material in the grid cell directly below the disposal site was approximately 9.6 in (24.3 cm) for the disposal of predominantly fine-grained material and was approximately 25.6 in (64.9 cm) for the disposal of predominantly coarse-grained material at the North Alternative Area. For the disposal of material at the Northwest Alternative Area, new material in the grid cell directly below the disposal site was approximately 7.9 in (20.1 cm) for the disposal of predominantly fine-grained material and was approximately 24.2 in (61.4 cm) for the disposal of predominantly coarse-grained material.

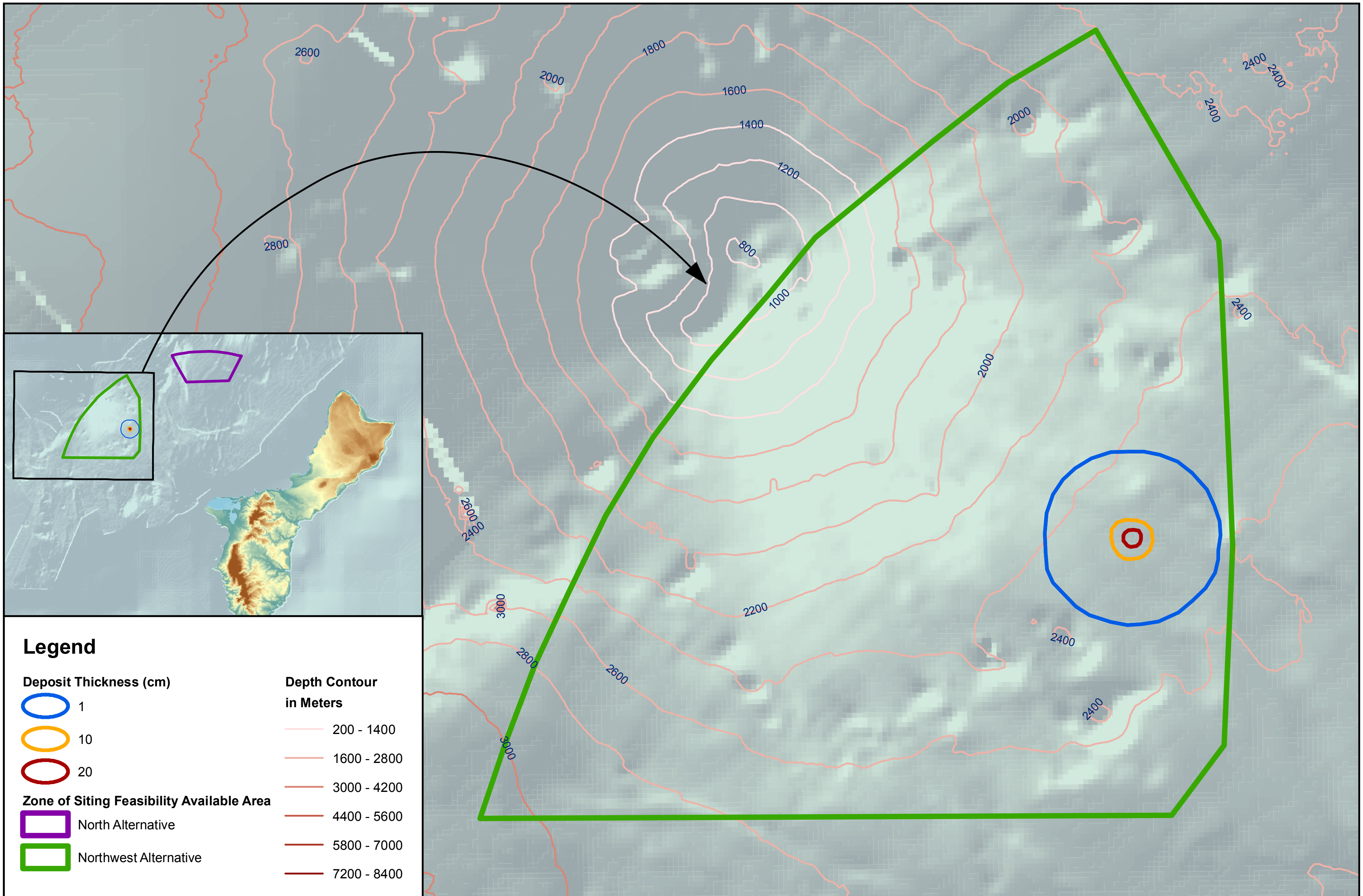

Figure 4-3. Isopachs Showing Increasing Deposit Thicknesses in the Northwest Study Area for the Disposal of 1,000,000 cy of Predominantly Fine-Grained Material Using In Situ Current Measurements from Station CM1

Nautical Miles 0 0.5 1 1.5

0 1 2 3 Kilometers

N

Source: NAVFACPAC, 2006

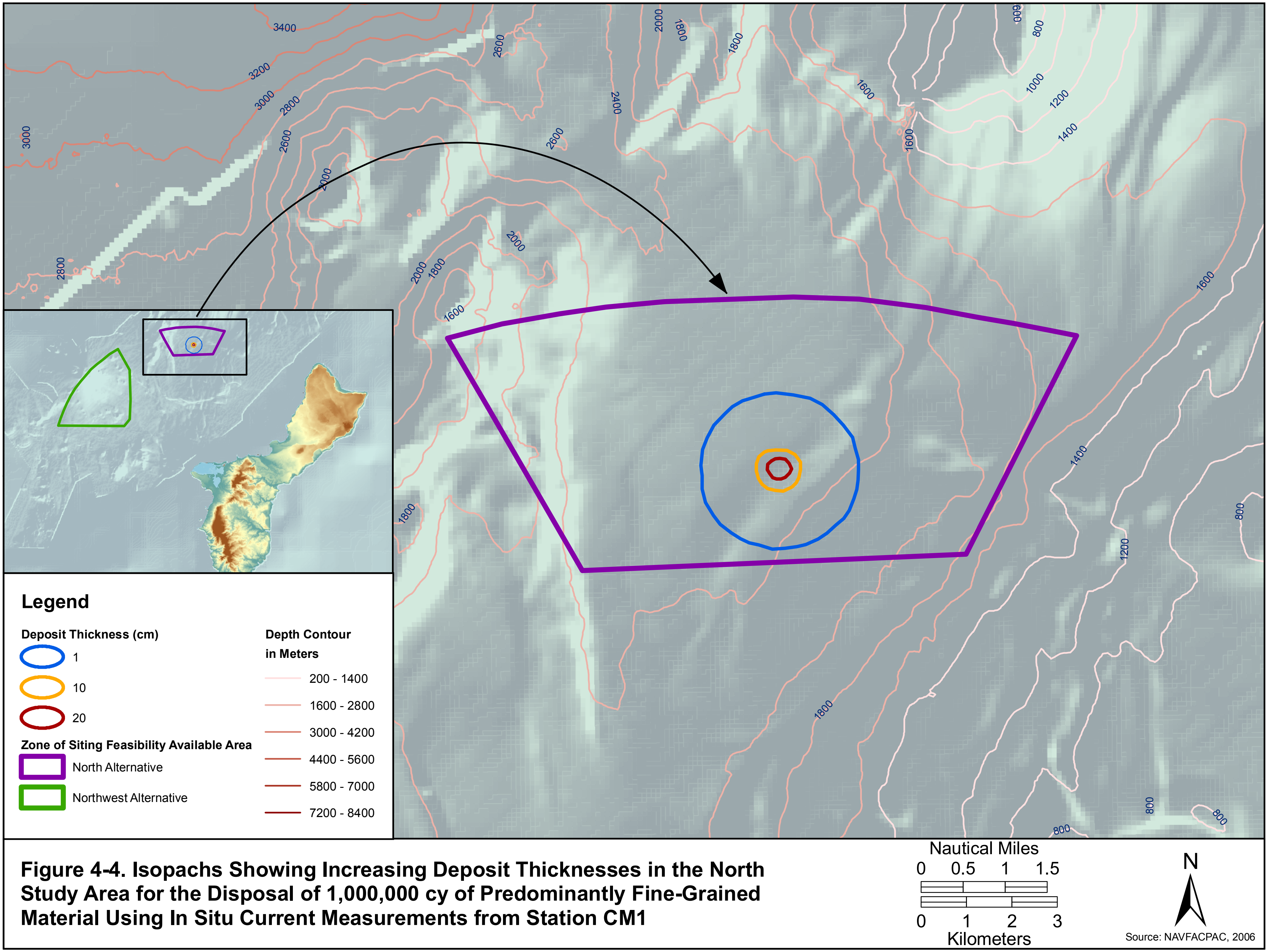

Figure 4-4. Isopachs Showing Increasing Deposit Thicknesses in the North Study Area for the Disposal of 1,000,000 cy of Predominantly Fine-Grained Material Using In Situ Current Measurements from Station CM1

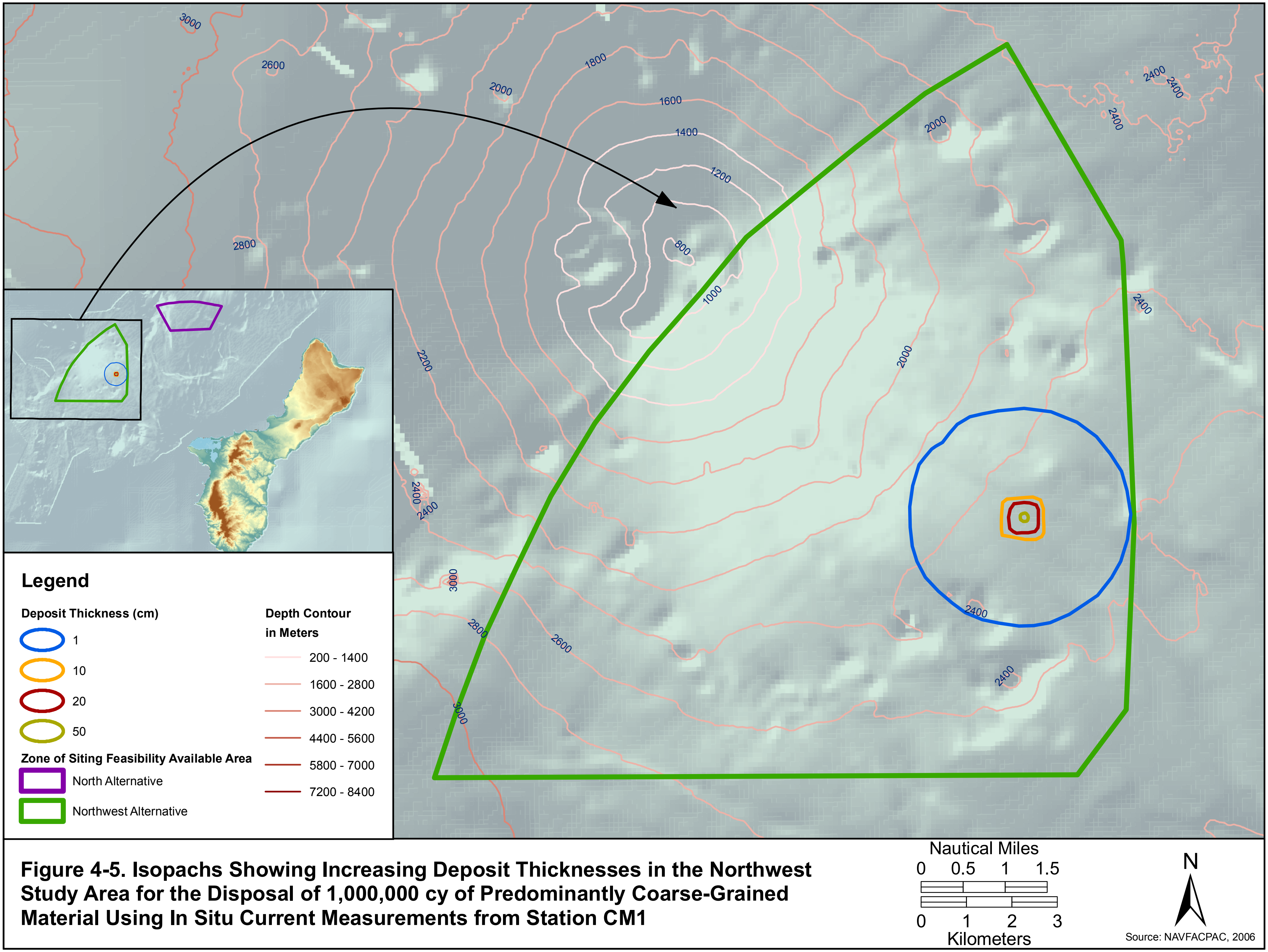

Figure 4-5. Isopachs Showing Increasing Deposit Thicknesses in the Northwest Study Area for the Disposal of 1,000,000 cy of Predominantly Coarse-Grained Material Using In Situ Current Measurements from Station CM1

Source: NAVFACPAC, 2006

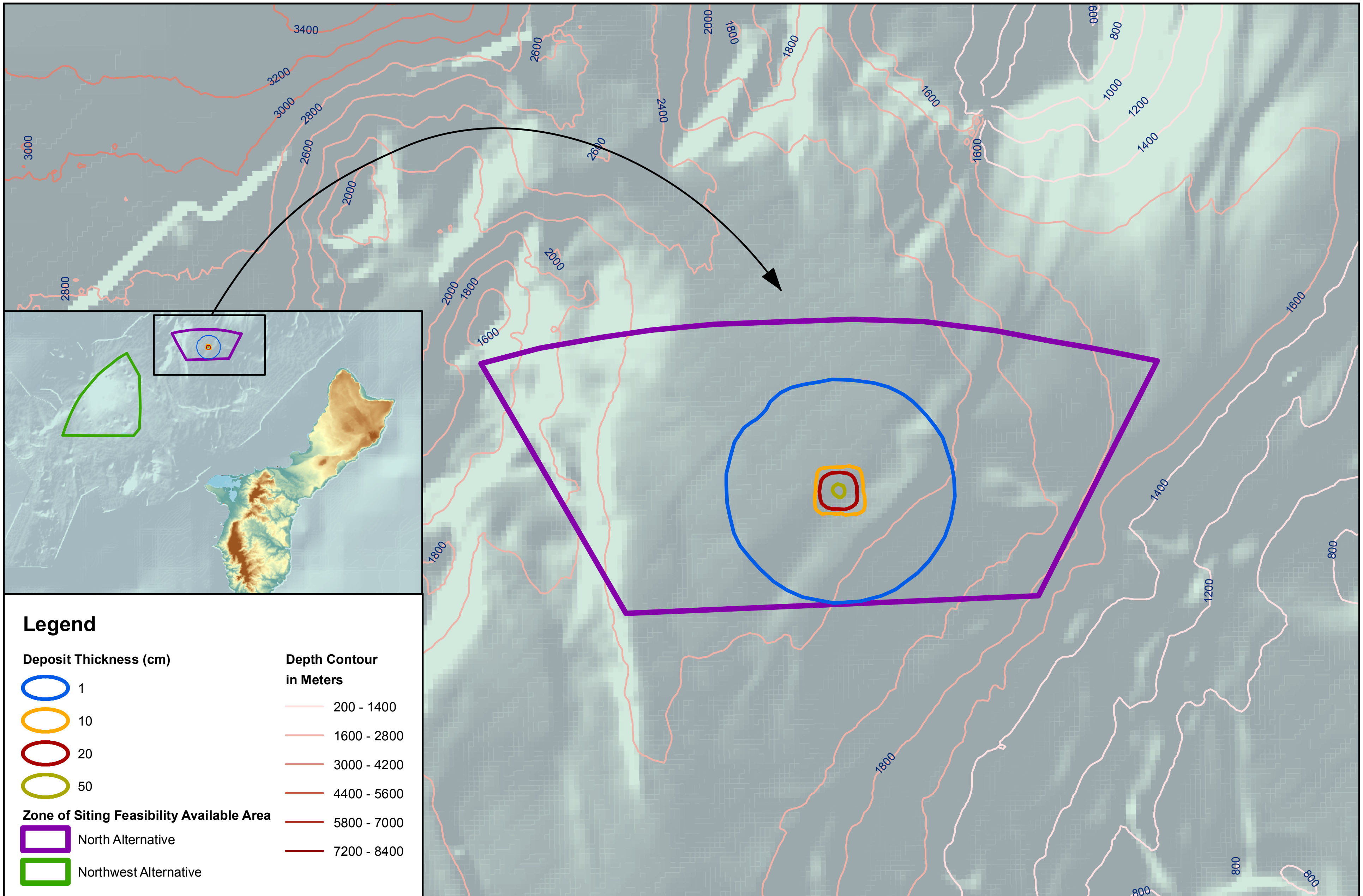

Figure 4-6. Isopachs Showing Increasing Deposit Thicknesses in the North Study Area for the Disposal of 1,000,000 cy of Predominantly Coarse-Grained Material Using In Situ Current Measurements from Station CM1

Nautical Miles
0 0.5 1 1.5
0 1 2 3
Kilometers

N

Source: NAVFACPAC, 2006

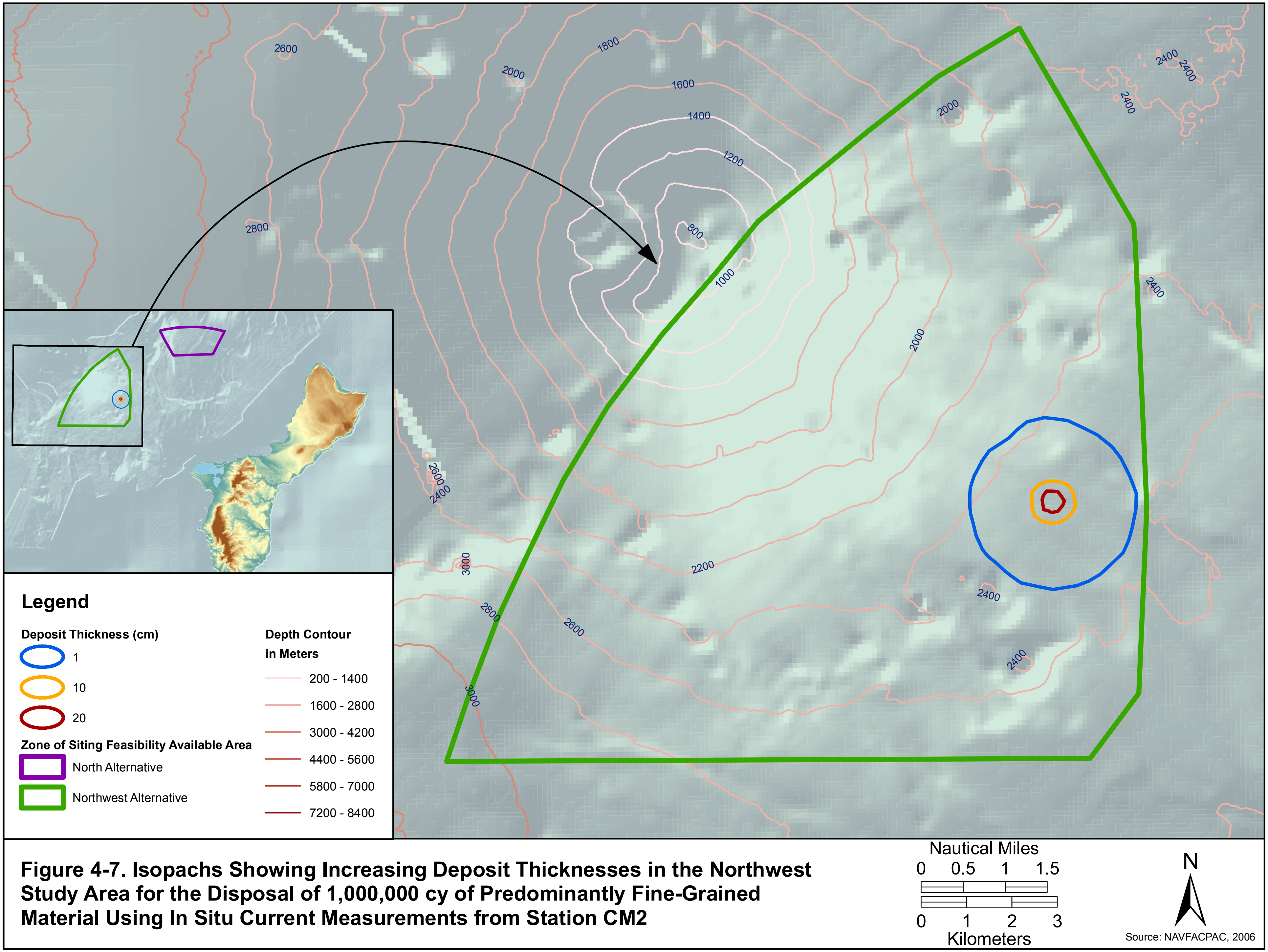

Figure 4-7. Isopachs Showing Increasing Deposit Thicknesses in the Northwest Study Area for the Disposal of 1,000,000 cy of Predominantly Fine-Grained Material Using In Situ Current Measurements from Station CM2

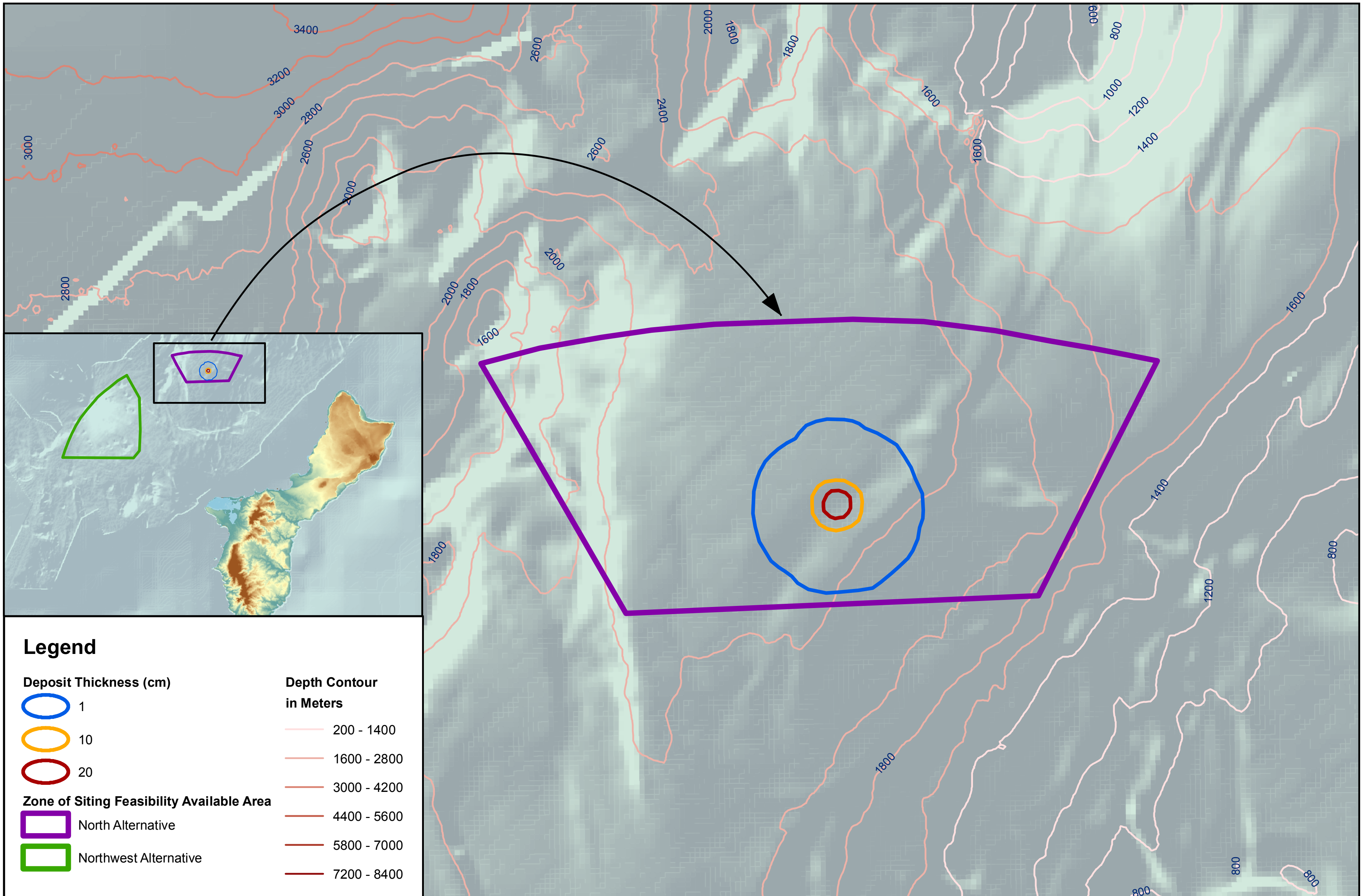

Figure 4-8. Isopachs Showing Increasing Deposit Thicknesses in the North Study Area for the Disposal of 1,000,000 cy of Predominantly Fine-Grained Material Using In Situ Current Measurements from Station CM2

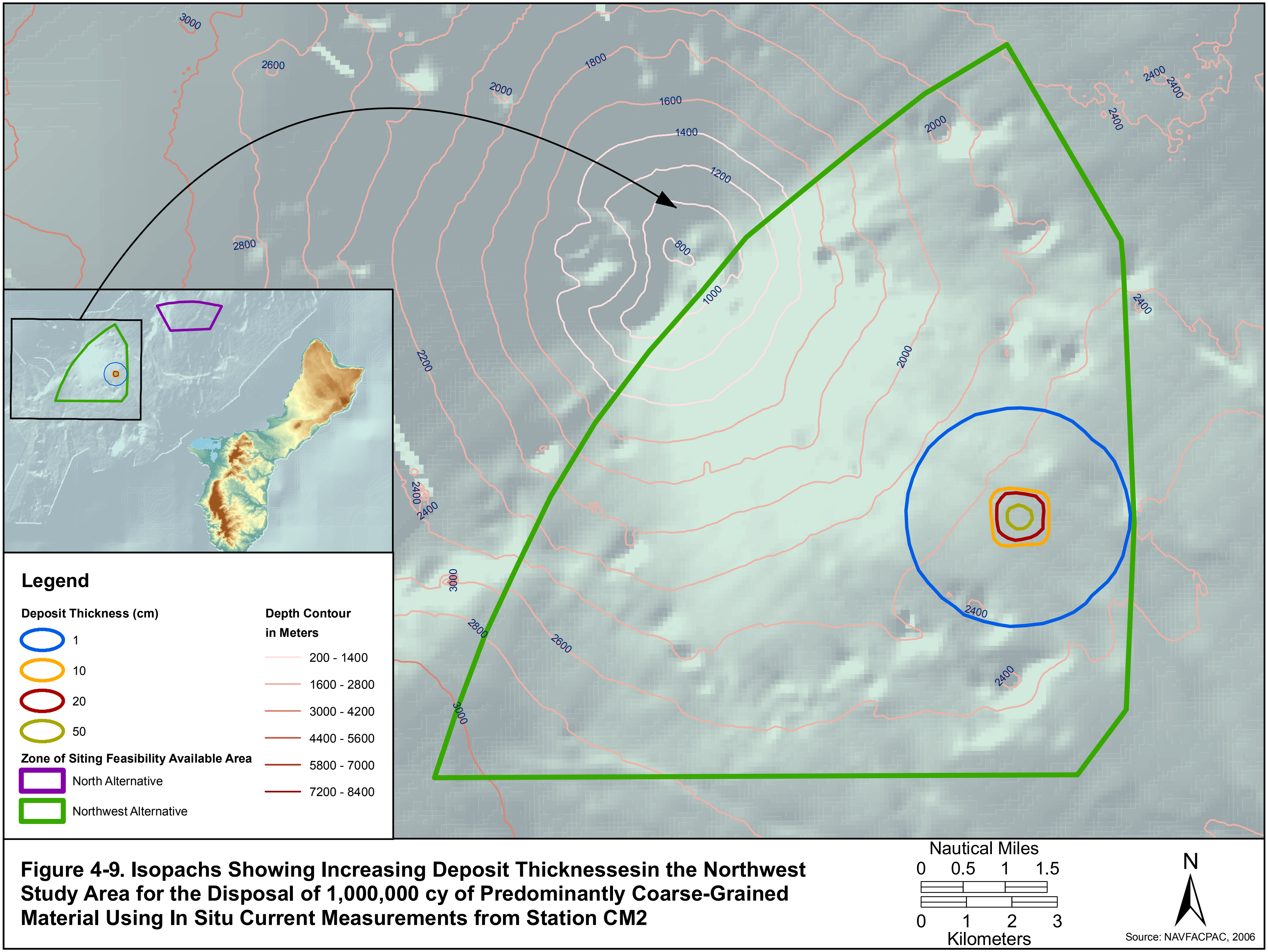

Figure 4-9. Isopachs Showing Increasing Deposit Thicknessesin the Northwest Study Area for the Disposal of 1,000,000 cy of Predominantly Coarse-Grained Material Using In Situ Current Measurements from Station CM2

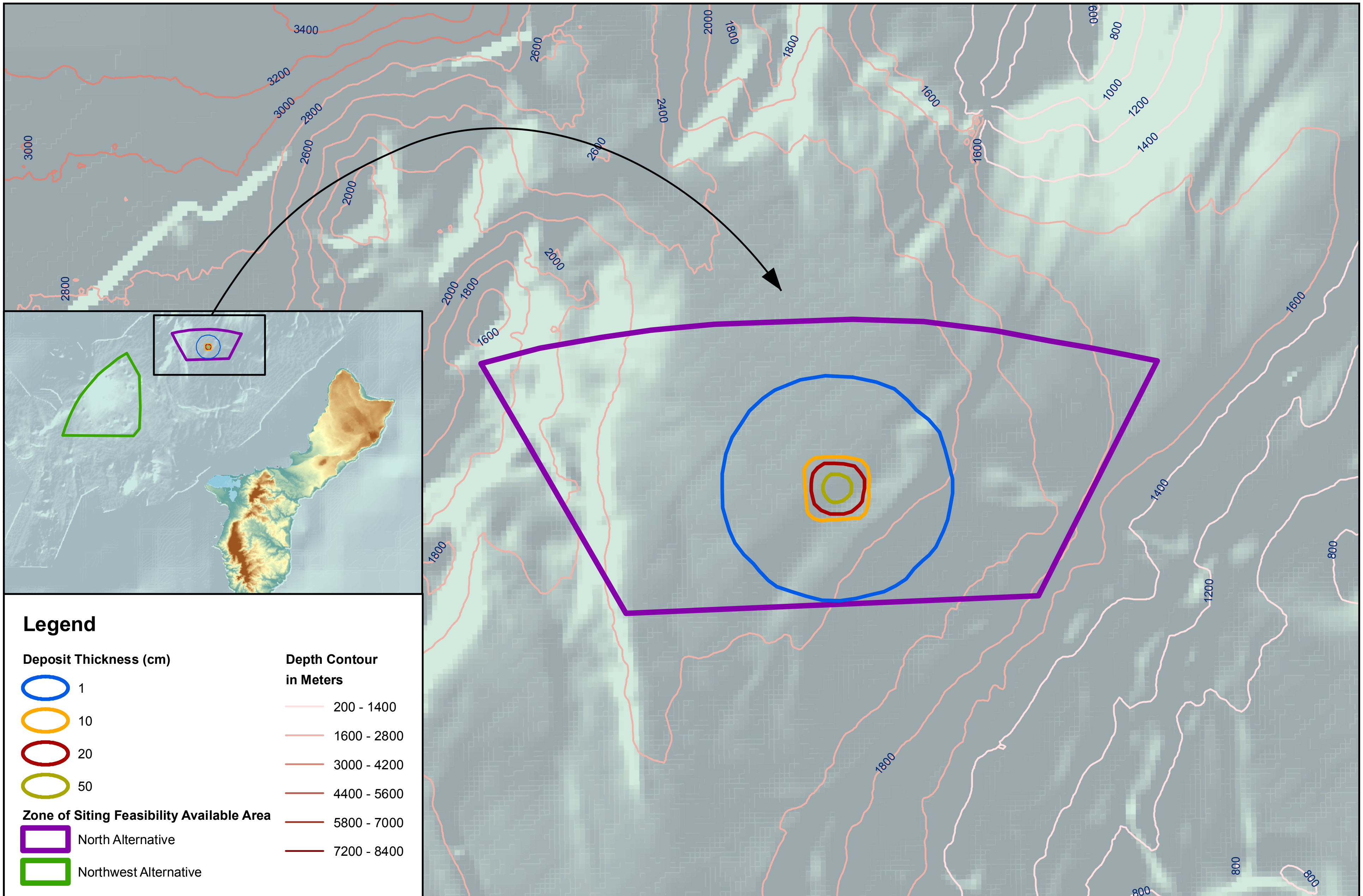

Figure 4-10. Isopachs Showing Increasing Deposit Thicknesses in the North Study Area for the Disposal of 1,000,000 cy of Predominantly Coarse-Grained Material Using In Situ Current Measurements from Station CM2

Nautical Miles
0 0.5 1 1.5
0 1 2 3
Kilometers

N

Source: NAVFACPAC, 2006

Table 4-4. Modeled Thickness and Area of Deposits for Disposal of 1,000,000 cy of Fine or Coarse-Grained Dredged Material

Scenario	Deposit Thickness (in [cm])	Diameter (mi [km])	Area of Deposits (mi^2 [km^2])	Maximum Deposit Thickness (in [cm])
North Alternative Fine-grained Material 1,000,000 cy CM1	>0.4 (>1.0)	2.13 (3.42)	3.55 (9.20)	9.6 (24.3)
	>3.9 (>10)	0.59 (0.94)	0.27 (0.70)	
	>7.9 (>20)	0.29 (0.47)	0.07 (0.18)	
	>19.7 (>50)			
North Alternative Coarse-grained Material 1,000,000 cy CM1	>0.4 (>1.0)	2.84 (4.57)	6.34 (16.4)	25.6 (64.9)
	>3.9 (>10)	0.66 (1.07)	0.35 (0.89)	
	>7.9 (>20)	0.49 (0.79)	0.19 (0.49)	
	>19.7 (>50)	0.16 (0.26)	0.02 (0.05)	
Northwest Alternative Fine-grained Material 1,000,000 cy CM1	>0.4 (>1.0)	2.21 (3.56)	3.85 (9.98)	7.9 (20.1)
	>3.9 (>10)	0.52 (0.84)	0.21 (0.56)	
	>7.9 (>20)	0.23 (0.37)	0.04 (0.11)	
	>19.7 (>50)			
Northwest Alternative Coarse-grained Material 1,000,000 cy CM1	>0.4 (>1.0)	2.97 (4.79)	6.95 (18.0)	24.2 (61.4)
	>3.9 (>10)	0.62 (0.99)	0.30 (0.77)	
	>7.9 (>20)	0.45 (0.72)	0.16 (0.40)	
	>19.7 (>50)	0.12 (0.19)	0.01 (0.03)	
North Alternative Fine-grained Material 1,000,000 cy CM2	>0.4 (>1.0)	2.14 (3.44)	3.58 (9.28)	9.6 (24.3)
	>3.9 (>10)	0.64 (1.03)	0.32 (0.83)	
	>7.9 (>20)	0.35 (0.56)	0.10 (0.25)	
	>19.7 (>50)			
North Alternative Coarse-grained Material 1,000,000 cy CM2	>0.4 (>1.0)	2.86 (4.61)	6.43 (16.7)	25.6 (64.9)
	>3.9 (>10)	0.86 (1.39)	0.58 (1.51)	
	>7.9 (>20)	0.68 (1.09)	0.36 (0.93)	
	>19.7 (>50)	0.36 (0.57)	0.10 (0.26)	
Northwest Alternative Fine-grained Material 1,000,000 cy CM2	>0.4 (>1.0)	2.25 (3.61)	3.96 (10.3)	7.9 (20.1)
	>3.9 (>10)	0.59 (0.94)	0.27 (0.70)	
	>7.9 (>20)	0.29 (0.46)	0.07 (0.17)	
	>19.7 (>50)			
Northwest Alternative Coarse-grained Material 1,000,000 cy CM2	>0.4 (>1.0)	2.98 (4.79)	6.96 (18.0)	24.2 (61.4)
	>3.9 (>10)	0.84 (1.36)	0.56 (1.45)	
	>7.9 (>20)	0.66 (1.06)	0.34 (0.89)	
	>19.7 (>50)	0.34 (0.55)	0.09 (0.24)	

The total thickness decreases at the Northwest Alternative Area due to its deeper depth (approximately 8,200 ft [2,500 m]) compared to the North Alternative Area (approximately 7,400 ft [2,255 m]) due to the greater horizontal transport of finer-grained material from the center of the disposal site. In all cases, the maximum deposit thickness in any of the immediately adjacent cells (a distance of approximately 3,000 ft (914 m) from the center of the disposal site) decreased by a factor of six. Therefore, within 3,000 ft (914 m) from the center of the disposal site, deposit thicknesses were reduced to approximately 1.6 in (4.1 cm) and 4.3 in (10.8 cm) for fine and coarse-grained material, respectively in the North Alternative Area and approximately 1.3 in (3.3 cm) and 4.0 in (10.2 cm) for fine and coarse-grained material, respectively in the Northwest Alternative Area.

The deposit thicknesses predicted using current velocities from CM1 or CM2 were similar to results obtained during the Ocean Current Study (Weston Solutions and Belt Collins 2007b).

Additional STFATE Modeling Simulating El Nino/La Nina Conditions

The STFATE model input parameters were modified to simulate likely changes in oceanographic conditions in response to atmospheric anomalies such as El Niño or La Niña.

Two separate scenarios were evaluated. In the first scenario surface current speeds were increased by a factor of four while the surface current directions remained normal, thereby simulating La Niña conditions (stronger than normal tradewinds). In the second scenario surface current speeds were increased by a factor of four and the surface current directions were reversed (e.g., towards Guam), thereby simulating a strong El Niño condition (weakening or reversal of tradewinds). In both scenarios no changes were made to the bottom current layers as these currents are driven by thermohaline circulation rather than atmospheric conditions. To satisfy constraints of the STFATE model the surface current layer is assumed to be uniform and extend down to a depth of 1,000 ft (328 m). This assumption is conservative as the effects of atmospheric conditions on the water column diminish with depth, and are typically much less significant below 656 ft (200 m). It should also be noted that on-shore current reversals towards Guam and stronger than normal current speeds were modeled for an entire year, but in reality would not be expected to last an entire year. These conservative input parameters were used to demonstrate the deposition pattern of disposed material during El Niño or La Niña events.

STFATE model results indicated minimal change to the deposition of material, even during maximum El Niño or La Niña conditions. Table 4-5 lists the area of deposits for accumulations greater than 0.4 in (1 cm), 3.9 in (10 cm), and 7.9 in (20 cm) under stronger than normal tradewinds (La Niña) and stronger than normal reversed tradewinds (El Niño) for the disposal of both coarse- and fine-grained material (Figures 4-11 through 4-14). The largest fine-grained material dispersal footprint is associated with disposal during El Niño conditions in the Northwest Alternative Area, where a 400% increase of surface current speed and reversal of tradewinds toward Guam only resulted in an approximately 4% increase in the area of dispersal. The largest coarse-grained material disposal footprint is associated with disposal during La Niña conditions also in the Northwest Alternative Area, where a 400% increase of surface current speed only resulted in an approximately 3% increase in the area of deposits.

The maximum deposit thicknesses of both predominantly fine-grained material and predominantly coarse-grained material were greatest in the North Alternative Area under stronger than normal reversed tradewinds (El Niño) at 1.7 in (4.3 cm) and 3.7 in (9.3 cm), respectively. Likewise, stronger than normal tradewind (La Niña) conditions in the North Alternative Area resulted in comparable maximum deposit thicknesses of 1.4 in (3.5 cm) for predominantly fine-grained material and 3.2 in (8.0 cm) for predominantly coarse-grained material. Conversely, the maximum deposit thicknesses were less in the Northwest Alternative Area under La Niña and El Niño conditions for both predominantly fine-grained material and predominantly coarse-grained material.

Table 4-5. Modeled Coarse- and Fine-Grained Material Accumulations Greater Than 0.4 in (1 cm), 3.9 in (10 cm), and 7.9 in (20 cm) Under Stronger Than Normal Tradewinds (La Niña) and Stronger Than Normal Reversed Tradewinds (El Niño)

Scenario	Deposit Thickness (in [cm])	Diameter (mi [km])	Area of Deposits (mi^2 [km^2])	Maximum Deposit Thickness (in [cm])
North Alternative Fine-grained Material La Niña Conditions	>0.4 (>1.0)	2.1 (3.41)	3.53 (9.13)	1.4 (3.5)
	>3.9 (>10)			
	>7.9 (>20)			
North Alternative Coarse-grained Material La Niña Conditions	>0.4 (>1.0)	2.85 (4.59)	6.39 (16.54)	3.2 (8.0)
	>3.9 (>10)			
	>7.9 (>20)			
North Alternative Fine-grained Material El Niño Conditions	>0.4 (>1.0)	2.15 (3.47)	3.66 (9.48)	1.7 (4.3)
	>3.9 (>10)			
	>7.9 (>20)			
North Alternative Coarse-grained Material El Niño Conditions	>0.4 (>1.0)	2.85 (4.58)	6.36 (16.47)	3.7 (9.3)
	>3.9 (>10)			
	>7.9 (>20)			
Northwest Alternative Fine-grained Material La Niña Conditions	>0.4 (>1.0)	2.22 (3.57)	3.87 (10.01)	0.6 (1.5)
	>3.9 (>10)			
	>7.9 (>20)			
Northwest Alternative Coarse-grained Material La Niña Conditions	>0.4 (>1.0)	3.02 (4.86)	7.17 (18.58)	1.4 (3.6)
	>3.9 (>10)			
	>7.9 (>20)			
Northwest Alternative Fine-grained Material El Niño Conditions	>0.4 (>1.0)	2.26 (3.64)	4.01 (10.39)	0.9 (2.3)
	>3.9 (>10)			
	>7.9 (>20)			
Northwest Alternative Coarse-grained Material El Niño Conditions	>0.4 (>1.0)	3.01 (4.85)	7.13 (18.47)	2.0 (5.0)
	>3.9 (>10)			
	>7.9 (>20)			

Note: Data are for 1,000,000 cy in a year, based on the assumption that the El Niño or La Niña conditions persist over the entire year.

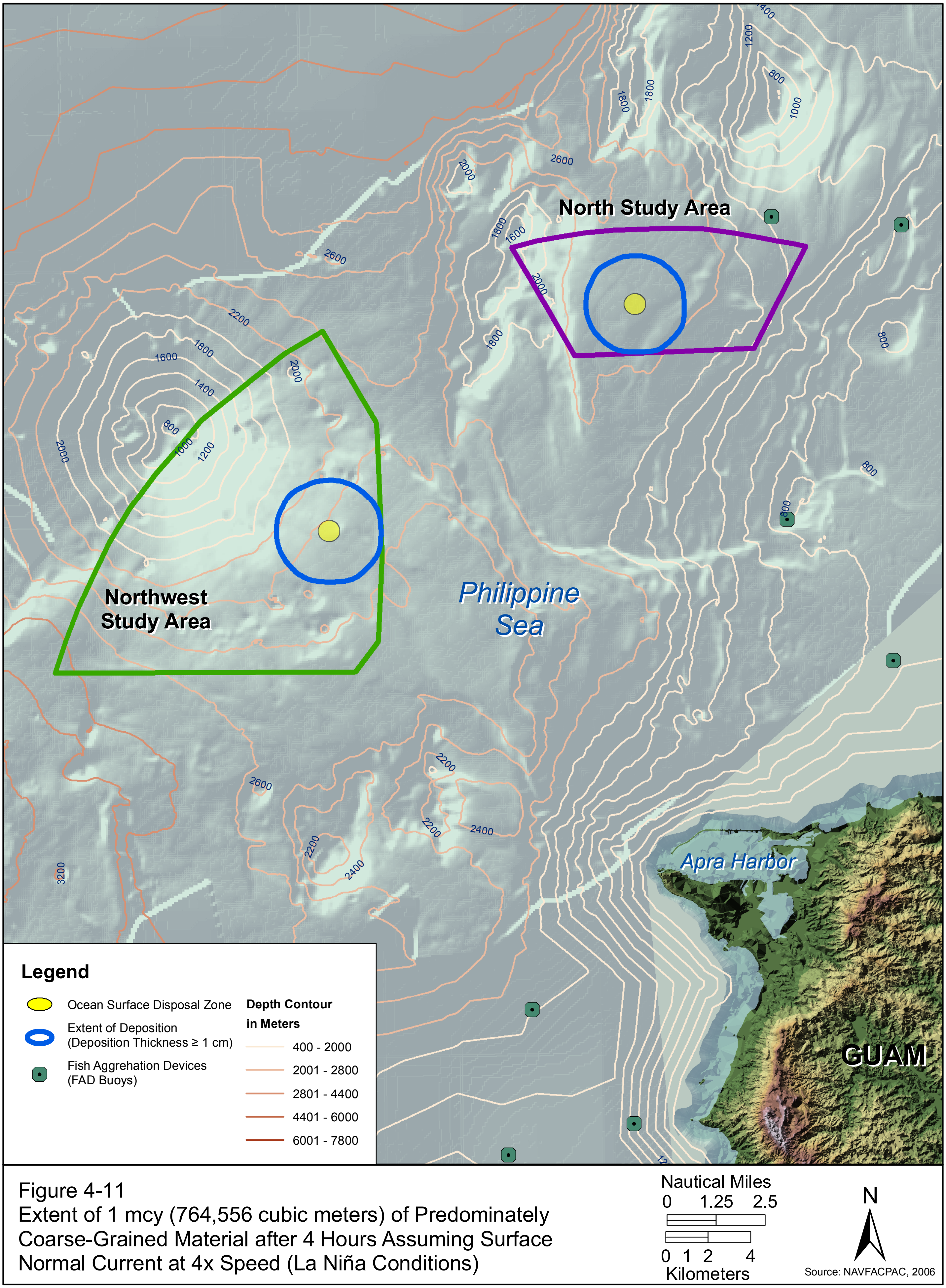

Figure 4-11
Extent of 1 mcy (764,556 cubic meters) of Predominately Coarse-Grained Material after 4 Hours Assuming Surface Normal Current at 4x Speed (La Niña Conditions)

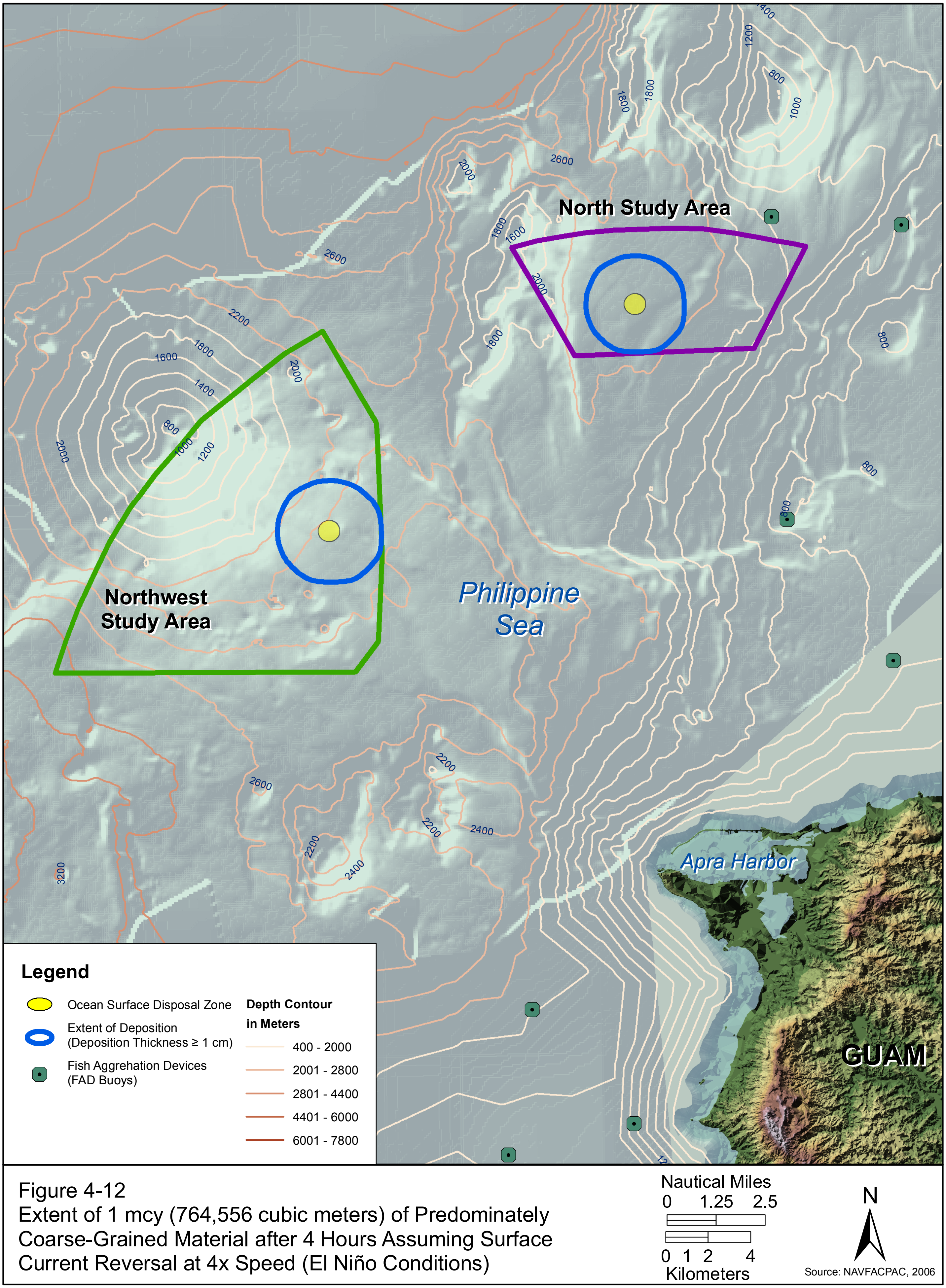

Figure 4-12
Extent of 1 mcy (764,556 cubic meters) of Predominately Coarse-Grained Material after 4 Hours Assuming Surface Current Reversal at 4x Speed (El Niño Conditions)

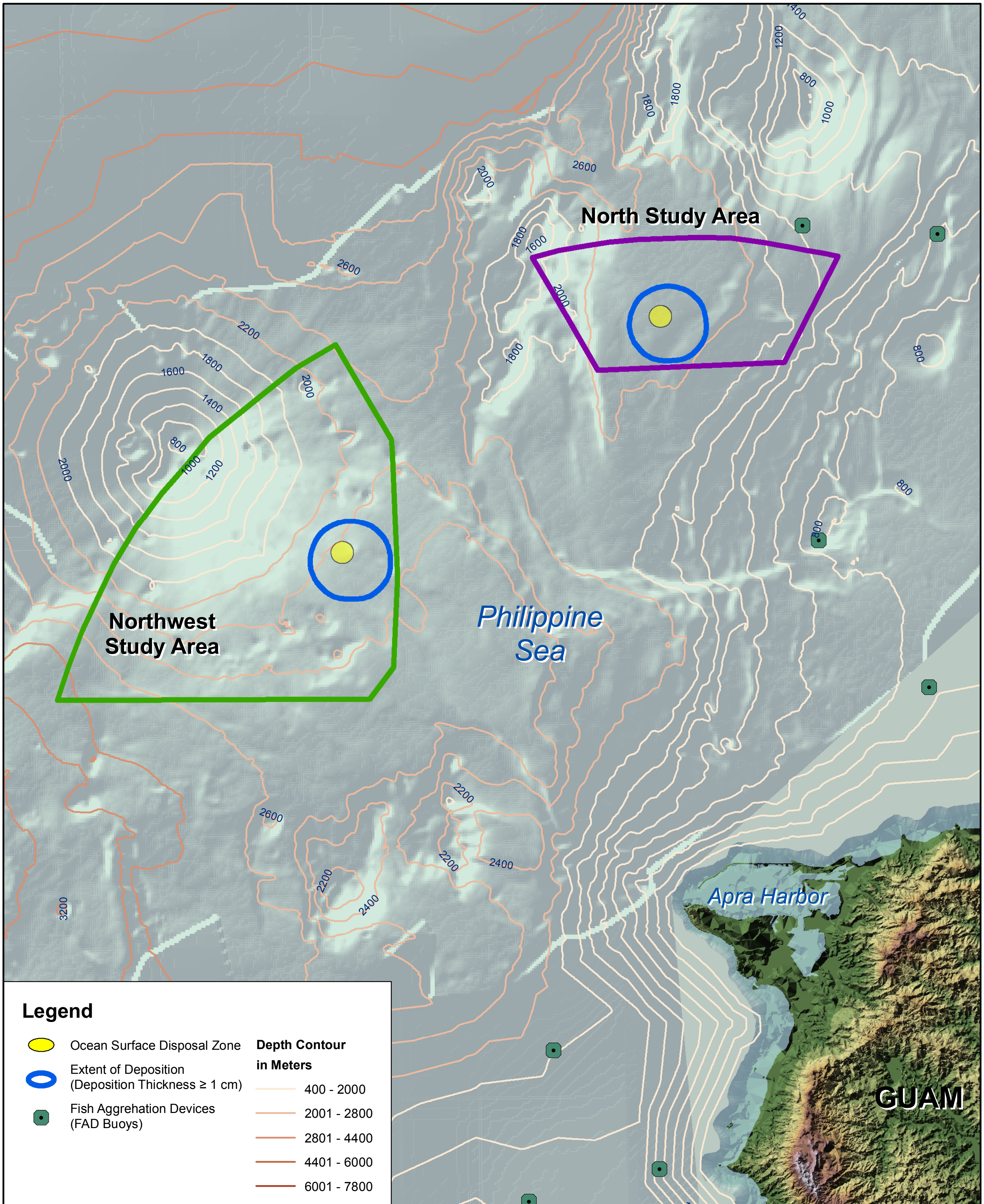

Figure 4-13
Extent of 1 mcy (764,556 cubic meters) of Predominately Fine-Grained Material after 4 Hours Assuming Surface Normal Current at 4x Speed (La Niña Conditions)

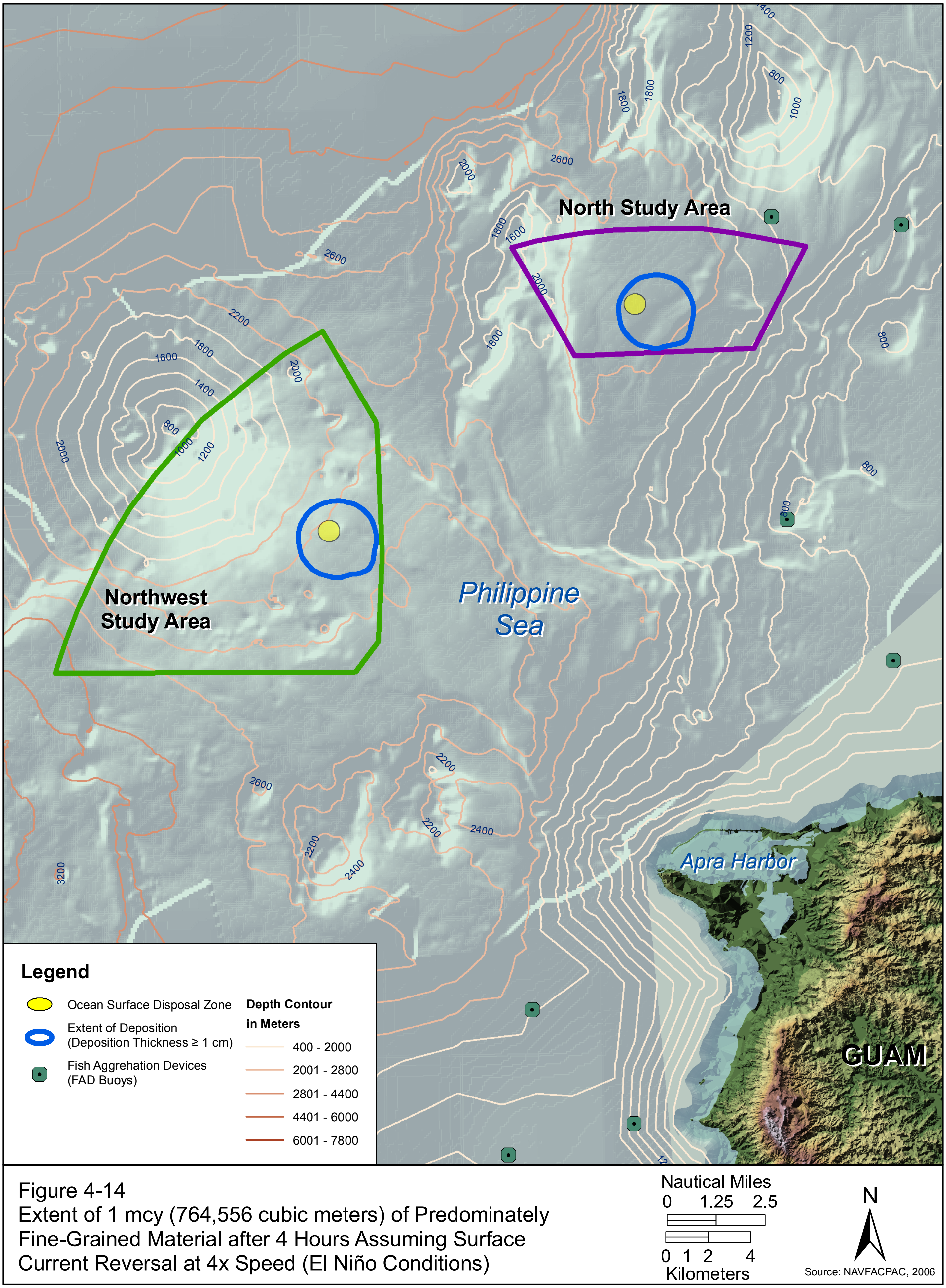

Figure 4-14
Extent of 1 mcy (764,556 cubic meters) of Predominately Fine-Grained Material after 4 Hours Assuming Surface Current Reversal at 4x Speed (El Niño Conditions)

4.1.5 Sediment Characteristics and Chemical Constituents

4.1.5.1 Significance Criteria

Sediment quality impacts would be significant if the sediments proposed for disposal at the proposed ODMDS were determined to not be suitable for ocean disposal (e.g., not meet the limiting permissible concentration [LPC] for the ocean disposal of dredged material as specified in 40 CFR 227). National testing guidance (USEPA and USACE 1991) sets forth procedures for comparative testing of sediments collected from proposed dredging areas and reference sites to ensure suitability for offshore disposal.

4.1.5.2 Impact Analysis

In general, the physical, conventional, chemical and radiological characteristics of sediments collected from stations located in the North and Northwest ODMDS study areas are similar with the exception of grain size and few trace metals. Sediment samples from stations located in the Northwest Study Area had greater proportion of fine-grained material with slightly higher mean concentrations of silver, arsenic, copper and lead than those from stations located in the North Study Area. Most persistent organic pollutants were non-detectable in all sampling locations.

Prior to dredging and ocean disposal, sediments must be evaluated and screened using national testing guidance (USEPA and USACE 1991) to ensure that chemical constituents are below biologically significant concentrations that have adverse ecologic effects on marine organisms. In addition to toxicity assessment using acute and chronic bioassays, material should be physically and chemically consistent with an ODMDS. Only dredged material deemed acceptable under these protocols would be approved for disposal at an ODMDS.

Recent Tier III analysis and evaluation was performed for three construction dredging projects within the Apra Harbor Naval Complex to support new, deeper draft vessels based in Apra Harbor as well as larger vessels transiting through Guam (Weston Solutions and Belt Collins 2007c). Two Inner Apra Harbor projects P-436 and P-518 and an Outer Apra Harbor project, P-502, are proposed to provide sufficient water depth to meet the Navy's operational requirements for future berthing and ship loading activities in these areas. Tier III assessment findings showed that proposed dredged material from the entire P-518 and P-502 project areas and three of the five P-436 project areas suggest this material would be considered suitable for ocean disposal based on the national testing guidance (e.g., Ocean Testing Manual [USEPA and USACE 1991). Because dredged material from Apra Harbor will likely be the main source of material disposed at the proposed ODMDS (e.g., sediment typical of the three aforementioned study areas), an evaluation of the potential environmental consequences caused by these typical sediment characteristics were considered throughout Section 4.1.5. A complete summary of sediment quality in Apra Harbor is provided in Volume 2, Chapter 4, of the Draft Guam and CNMI Military Relocation EIS/OEIS (NAVFACPAC 2009).

Sediment from the aforementioned projects was deemed appropriate for use in this evaluation because the material from these projects contained a range of grain size characteristics, from predominantly fine-grained to predominantly coarse-grained material. Finer-grained material (primarily silts and clays) tend to carry higher contaminant loads whereas coarser-grained material (primarily sands and gravels) tend to carry significantly less contaminant loads. Additionally, the majority of the sediment from these projects was collected along wharf faces where contaminant loads are expected to accumulate from industrial activities. The majority of the material evaluated for the three Navy projects was predominantly fine-grained. In the absence of chemical or fuel spills, future maintenance dredged material is expected to contain fewer contaminants, unlike those measured from sediment within the proposed P-436, P-518 and P-502 dredge footprints. The material proposed for dredging still need to pass Tier III testing to be determined suitable for ocean disposal and it is unlikely that the impact analysis would be significantly altered.

North Alternative

Grain size effects of disposal of dredged material from Apra Harbor within a disposal site located in the North Study Area represent significant or insignificant adverse impacts depending on the dredge area. This impact is expected to be localized and persist for the duration of disposal operations. Area P-436 and P-518 sediments are mostly fine-grained material, 68.7% and 70.8% respectively while the North Study Area averaged only 30.2%. Disposal of Area P-436 and P-518 sediments would result in a significant physical impact within disposal site boundaries. The largest footprint of sediment deposits greater than 0.4 in (1 cm) associated with the modeled disposal of 1 (million cubic yard (mcy) [764,556 m^3] of fine-grained material at Station 2, located in the North Study Area resulted in a 2.1 mi (3.4 km) diameter extended impact zone covering an area of 3.6 mi^2 (9.3 km^2) that is centered within a bathymetric depression with a dynamic periphery occurring in shallower areas of seamounts including Spoon Bank to the northwest and northeast and the island slope to the southeast. Sediment deposits less than 0.4 in (1 cm) would occur outside the site boundary of the disposal site. Sediment deposits less than 0.4 in (1 cm) occurring beyond the overall site boundary of the disposal site would be integrated (e.g., mixed) through physical and biological reworking processes thereby making any potential physical grain size changes indistinguishable from the existing substrate.

Unlike Area P-436 and P518, the 92,800 cy of material from Area P-502 is primarily sand (74.11%) with some gravel (20.97%) that can be considered relatively more homogenous to the North Study Area (69.82% sand, 0% gravel). Disposal of Area P-502 sediments would result in a locally insignificant physical impact. The largest footprint of sediment deposits greater than 0.4 in (1 cm) associated with the modeled disposal of 1 mcy (764,556 m^3) of coarse-grained material at Station 2, located in the North Study Area resulted in a 2.9 mi (4.6 km) diameter extended impact zone covering an area of 6.4 mi^2 (16.7 km^2) that is centered within a bathymetric depression with a dynamic periphery occurring in shallower areas of seamounts including Spoon Bank to the northwest and northeast and the island slope to the southeast. Sediment deposits less than 0.4 in (1 cm) would occur outside the site boundary of the disposal site. Sediment deposits less than 0.4 in (1 cm) occurring beyond the overall site boundary of the disposal site would be integrated (e.g., mixed) through physical and biological reworking processes thereby making any potential physical grain size changes indistinguishable from the existing substrate.

Only material that has been evaluated in accordance with USEPA and USACE protocols will be deemed suitable for ocean disposal (e.g., non-toxic); therefore, there would be no unacceptable adverse chemical or biological impacts outside the disposal site boundary (2.9 nm [4.6 km] in diameter).

Northwest Alternative

Grain size effects of disposal of dredged material from Apra Harbor within a disposal site located in the Northwest Study Area represent significant or insignificant impacts depending on the dredge area. The impacts are expected to be localized and would persist for the duration of disposal operations. Area P-502 sediments are primarily sand (74.11%) with some gravel (20.97%), while the Northwest Study Area averaged only 52.05 % sand and 0% gravel. Disposal of material from Area P-502 would result in a significant physical impact within the disposal site boundaries. The largest footprint of sediment deposits greater than 0.4 in (1 cm) associated with the modeled disposal of 1 mcy (764,556 m^3) of coarse-grained material at

Station 7, located in the Northwest Study Area resulted in a 3.0 mi (4.8 km) diameter extended impact zone covering an area of 7.0 mi^2 (18.0 km^2) that is centered on the flanks of a seamount with relatively gentle slopes. Sediment deposits less than 0.4 in (1 cm) would occur outside the site boundary of the disposal site. Sediment deposits less than 0.4 in (1 cm) occurring beyond the overall site boundary of the disposal site would be integrated (e.g., mixed) through physical and biological reworking processes thereby making any potential physical grain size changes indistinguishable from the existing substrate.

Unlike P-502, the material from Area P-436 and P518 are fine-grained, 68.7% and 70.8% respectively, and can be considered relatively more homogenous to the Northwest Study Area (47.95% fines). Disposal of dredged material from Areas P-436 and P518 would result in a locally insignificant physical impact. The largest footprint of sediment deposits greater than 0.4 in (1 cm) associated with the modeled disposal of 1 mcy (764,556 m^3) of fine-grained material at Station 7, located in the Northwest Study Area resulted in a 2.3 mi (3.6 km) diameter extended impact zone covering an area of 4.0 mi^2 (10.3 km^2) that is centered on the flanks of a seamount with relatively gentle slopes. Sediment deposits less than 0.4 in (1 cm) would occur outside the site boundary of the disposal site. Sediment deposits less than 0.4 in (1 cm) occurring beyond the overall site boundary of the disposal site would be integrated (e.g., mixed) through physical and biological reworking processes thereby making any potential physical grain size changes indistinguishable from the existing substrate.

Only material that has been evaluated in accordance with USEPA and USACE protocols will be deemed suitable for ocean disposal (e.g., non-toxic); therefore, there would be no unacceptable adverse chemical or biological impacts outside the disposal site boundary (3.0 nm [4.8 km] in diameter).

No Action Alternative

Under the No Action Alternative the ODMDS would not be designated, and therefore conditions at the sites would not change. There would be no effect of the No Action Alternative on sediment characteristics.

4.2 BIOLOGICAL ENVIRONMENT

4.2.1 Significance Criteria

The proposed designation of a Guam ODMDS would be considered to have a significant impact on biological resources if they were to result in long-term or otherwise extensive adverse impacts to aquatic species or their habitats. Relevant statutory and regulatory protections include the ESA (protects listed species and their critical habitats); MMPA (protects all marine mammals); CWA (protects the Nation's waters, and in particular, Special Aquatic Sites such as wetlands, mudflats and vegetated shallows (including eelgrass); MSFCMA (protects Essential Fish Habitat); and the MBTA and EO 13186 (protect migratory birds and their habitats). Temporary impacts of limited extent would not normally be considered significant, provided applicable regulatory requirements are satisfied.

4.2.2 Impact Analysis

The following is an analysis of potential impacts to biological resources from the construction necessary within the project area, grouped by resource type.

4.2.2.1 Plankton Communities

Model analyses using USACE STFATE of a dredged material disposal event offshore of Guam indicated that coarse-grained material tend to settle more quickly within site boundaries and generally closer to the disposal site than fine-grained material which tended to stay in suspension longer and be deposited farther from the alternative disposal site (Weston Solutions and Belt Collins 2007b). Impacts of suspended particles from dredged material disposal on planktonic organisms are therefore expected to be minimal for the rapidly settling coarse-grained size fractions. Any potentially significant impacts would most likely involve contact with slower-settling silt and clay particles in the disposal plume and extended impact zone. Contact would be most probable in pycnocline regions where neutral buoyancy of fine-grained particles is caused by changes in water temperature and/or salinity. Dredged material disposal impacts could include the direct loss of entrained organisms in the discharge plume, temporary inhibition of phytoplankton photosynthesis due to the increased turbidity, physical interference of food ingestion by filter feeding organisms, and the uptake and potential bioaccumulation of particulate-bound contaminants (e.g., ingestion or filter feeding).

Turbid plumes associated with dredged material disposal can provisionally attenuate light penetration in the photic zone, thereby reducing primary production by as much as 50% prior to plume dissipation (Chan and Anderson 1981). Toxicity investigations have suggested that suspended red bauxite mud (clay-sized particles of Fe_2O_3) at concentrations above 6 mg/L reduced survival, reproductive success and development of the marine calanoid copepod, *Calanus helgolandicus* (Paffenhöfer 1972). Zooplankton often ingest clay and mineral particles that in turn take up space in the gut that might otherwise be occupied by food particles. Because suspended sediments impede the ingestion and assimilation of food particles, events that increase suspended sediment concentrations for even short periods of time, without otherwise altering food concentrations, could reduce growth or reproduction. Increased proportions of sediment in fecal pellets as measured in sediment concentrations greater than 1,000 mg/L have been correlated with decreased egg production by the copepod *Acartia tonsa* (White and Dagg 1989).

North Alternative

Disposal of mostly coarse-grained material, such as those from Area P-502, is expected to have an insignificant effect on plankton communities within a disposal site located in the North Study Area. Slower-settling silt and clay particles, such as those from Area P-436 and P-518, may have potentially significant temporary localized impacts on plankton communities. Potential adverse effects on planktonic organisms will likely occur during the first few hours following disposal, before mixing processes dilute the discharge. Discontinuous disposal activity at the ODMDS can minimize effects, since plankton communities are subject to high turnover rates. Even the complete loss of the plankton community within the disposal mixing zone would likely only produce a temporary impact, as populations can be rapidly reinstated. The major concern would be for mero- or holoplantonic egg and larval stages of benthic or nektonic marine species which can be affected during their presence in the plankton community. Even this potential impact can be considered minimal if the disposal site was significantly small relative to the size of the regional spawning grounds and larval transport routes; or if the time allocated to disposal operations represented only a short period in the entire breeding season (Alden and Young 1982). Rapid dilution of the suspended sediment plume with increasing time and distance from the point of discharge make it unlikely that there would be any unacceptable adverse impacts to the plankton communities outside of the disposal site boundaries. Due to these spatial and temporal impact constraints coupled with the rapid reproductive life history of zoo- and phytoplankton and its patchy distribution in pelagic environments, losses of entrained organisms due to contact with fine-grained material associated with the disposal plume of sediments from dredged areas like P-436 and P-518 would be less than significant.

Northwest Alternative

Due to the homogeneity of water quality between the Northwest and North ODMDS study areas, impact of ocean dredged material disposal on the planktonic community within a disposal site located in the Northwest Study Area is expected to be similar to those outlined in the North Study Area; therefore, less than significant.

No Action Alternative

Under the No Action Alternative the ODMDS would not be designated, and therefore conditions at the sites would not change. The No Action Alternative would not have any effects on the planktonic communities at the ODMDS site. However, if an ODMDS is not designated, the planned volume of material to be dredged from Apra Harbor would still need to be managed. Under the no-action alternative scenario, material would likely be managed in an upland disposal site or beneficial use project. Managing material in an upland setting would likely result in biological impacts. These impacts may include loss of habitat (e.g., conversion of native forests or wetlands to confined disposal facilities), the potential loss of terrestrial flora and fauna intolerant to elevated dissolved salt concentrations in surface water or leachate runoff and other associated impacts. These impacts would need to be assessed and mitigated on a project-by-project basis, separate from this EIS.

4.2.2.2 Benthic Communities

Impacts of dredged material disposal to benthic organisms, including those that reside within the sediments (infauna) and on or directly above the bottom sediments (epifauna), are dependent on the species of organisms that comprise the community, the thickness of deposited material, frequency of burial events, the types of materials being disposed, and the physical parameters at the disposal site. Highly mobile epifaunal species have the potential to avoid areas subject to burial, while infaunal species are unlikely to avoid material as it is deposited. However, infaunal species tend to be more resistant to burial than epifaunal species, since the infauna have a greater ability to burrow through the sediments once buried.

For infauna, impacts from deposition can be negligible or may result in high levels of mortality, depending on the volume, and more importantly, the rate of deposition and subsequent deposit thickness. Additionally, the ability of benthic infauna, including both the macrofauna and the meiofauna, to recolonize a disposal site is dependent on the habitat suitability of the deposited materials (e.g., grain size and chemical composition and contamination) and the frequency of disposal events. When disturbances occur frequently, such as annually or more frequently, and with high enough volumes of dredged material, the infaunal community is likely to be dominated by disturbance-adapted species that have the potential to rapidly colonize. If disturbances tend to occur at intervals of at least a year or greater, and with low volumes of dredged material, then more mature communities have the potential to develop, including species that have longer life spans and are competitively dominant.

Estimates of critical burial depths are highly variable, ranging from 2.0 to 19.7 inches (50 to 500 mm), as determined by the depth of material from which infauna cannot burrow or excavate to reach the surface. For the purposes of this analysis, the critical burial depth above which impacts are considered to occur to the benthic community is 3.9 inches (100 mm). Therefore, areas of the potential disposal sites that receive materials that accumulate at depths greater than this threshold have the potential to be adversely impacted by dredged material disposal. Deposition depths used in this impact analysis are based on modeled deposit thicknesses as determined by the STFATE model outputs for the North and Northwest Study Areas presented in the *Ocean Current Study, Ocean Dredged Material Disposal Site, Apra Harbor, Guam* (Weston Solutions and Belt Collins 2007b). Deposition depths were modeled for fine- and coarse-grained materials assuming a disposal volume of 1 mcy (764,555 m^3).

North Alternative

Within the North Alternative area, deposited fine-grain material is modeled to accumulate to thicknesses in excess of 3.9 inches (100 mm) within a 0.1 mi^2 (0.3 km^2) area with a diameter of 0.3 nm (0.6 km). Coarse-grained material is anticipated to accumulate to a thickness greater than 3.9 inches (100 mm) over a larger area from the center of the disposal site, comprising a 1.0 mi^2 (2.6 km^2) area with a diameter of 1.9 km. Therefore, benthic infaunal and epifaunal species are expected to experience higher levels of mortality within a 0.5 nm (0.95 km) radius from the center of the disposal site. As stated in Section 2.3.4 (Identification of a Specific ODMDS Alternative Within Each ZSF Study Area), the overall boundary of the disposal site is approximately 3.1 nm (5.0 km) in diameter. This was defined as the area with a maximum sediment deposition of 0.4 in (1 cm) after 1,000,000 cy (760,555 m^3) is deposited over the course of one year. Deposit thicknesses greater than 3.9 in (10 cm) (e.g., those expected to potentially cause impacts to the benthic community) will be contained within the disposal site boundary. Deposit thickness beyond the site boundary (e.g., further than 1.55 nm [2.5 km) from the disposal point are expected to be less than 0.4 in (1 cm) (e.g., an order of magnitude less than what is expected to potentially cause unacceptable adverse impacts to the benthic community). This level of burial is considered to produce negligible impacts to the benthic community, since dredged material disposal is largely confined to a relatively small area that contains a benthic community that is largely similar to those of the surrounding area, as determined by the results of grab and trawl sampling within two alternative areas and reference area and are therefore expected to be less than significant.

Northwest Alternative

Due to the homogeneity of the invertebrate communities between the Northwest and North ODMDS study areas, impact of ocean dredged material disposal on the invertebrate community in the Northwest Study Area is expected to be similar to those outlined in the North Study Area, therefore less than significant.

No Action Alternative

Under the No Action Alternative the ODMDS would not be designated, and therefore conditions at the sites would not change. The No Action Alternative would not have any effects on the invertebrate communities at the ODMDS site. However, if an ODMDS is not designated, the planned volume of material to be dredged from Apra Harbor would still need to be managed. Under this no-action alternative scenario, material would likely be managed in an upland disposal site or beneficial use project. Managing material in an upland setting would likely result in biological impacts. These impacts may include loss of habitat (e.g., conversion of native forests or wetlands to confined disposal facilities), the potential loss of terrestrial flora and fauna intolerant to elevated dissolved salt concentrations in surface water or leachate runoff and other associated impacts. These impacts would need to be assessed and mitigated on a project-by-project basis, separate from this EIS.

4.2.2.3 Fish Communities and Essential Fish Habitat (EFH)

The disposal of dredged material may have a variety of impacts to the demersal and pelagic fish communities and EFH. Burial of existing substrate may alter floral and faunal communities on which demersal fish rely for foraging. Changes in the water column may include increased turbidity and suspended solids, decreased light transmittance, and alterations to water quality variables such as DO, nutrients, salinity, temperature, pH and chemical contaminants (USEPA and USACE 2004). Potential impacts to the pelagic fish community and their prey due to changes in the water column are considered less than significant due to large dilution factors (USEPA and USACE 2004). Suspended sediment plumes having concentrations greater than 1 mg/L will be limited in size to a radius of 292 ft (89 m) and a duration of <4 hrs. The pelagic fishery is temporally and spatially dynamic with individual species having greater ranges than the area of the proposed disposal site, such that the relative percentage of the potentially impacted area in relation to the entire fishery (within an 18 nm [33 km] arc from Apra Harbor) is small (e.g., less than 1%). Furthermore, there were no uniquely distinguishable characteristics of the upper water column (e.g., shallower than 656 ft [200 m]) within or near the proposed disposal sites that would concentrate the pelagic fishery or their prey in these areas. Similarly, potential impacts to the pelagic life stages of coral reef organisms due to changes in the water column are considered less than significant. Both ODMDS alternatives are located in deep water and far from the shore that supports coral reef habitat. Any impact would likely be temporary and transitory, with the habitat returning to predisposal conditions within short periods. It should be noted that the addition of nutrients to the water column and substrate as a result of dredged material disposal may provide beneficial foraging opportunities to demersal and pelagic fish communities. Further, demersal and pelagic fishes would likely practice avoidance behavior as a result of dredged material disposal operations.

North Alternative

The pelagic fishery offshore of Guam consists of highly migratory species, including mahimahi, ono, tuna and marlin. These species are highly mobile and would likely avoid any suspended sediment plumes associated with dredged material disposal. Results of a laboratory investigation (Jokiel 1989) suggested that eggs and larvae of the pelagic fish, mahimahi (C. hippurus), were not sensitive to the increases in suspended sediment concentrations typical of ocean disposal activities. Matsumoto (1984) suggested similar results on other tuna and billfish species, indicating detrimental impacts of suspended sediments only occurred after prolonged exposure at high suspended sediment concentrations. Rapid embryonic and larval development in tuna, combined with the temporary and transitory nature of the suspended sediment plume associated with disposal at the Guam ODMDS suggest potential impacts to the pelagic fishery would be designated as insignificant.

The bottom fishery offshore of Guam is confined to water depths much shallower than the proposed alternative; therefore, these fisheries would not be impacted by dredged material disposal at the proposed alternative. Reef fishery habitat, including reef flats, reef slopes, and lagoons, are not located in the deep water environment near the North Alternative area; therefore, the coral reef fishery would not be impacted by dredged material disposal at the proposed alternative. Barges transporting dredged material to the proposed alternative may transit in close proximity to coral reef habitat while in Guam’s harbors and nearshore waters. The SMMP specifies BMPs for the safe transport of dredged material to the ODMDS. The potential for accidental spillage, discharges, or groundings associated with barges are no greater than for any other vessels entering or leaving Apra Harbor. If considered necessary by local resource agencies, the potential for impacts to coral reefs by barges or other vessels passing in close proximity to the coral reef fishery could be evaluated on a project specific and case-by-case basis, separate from this EIS. The abundance and diversity of deep-sea fish species collected within the North Alternative area was very low. Suspended sediment plumes associated with an individual disposal event would likely be greatly diluted once reaching the substrate; nonetheless, it is likely the demersal fish species would practice avoidance behaviors. The highly mobile and migratory nature of many of the demersal and pelagic fishes, coupled with the temporary and transitory nature of suspended sediment plumes and other associated water quality impacts suggest potential impacts to the fish community in the North Alternative area would be expected to be insignificant. Impacts to fish communities outside of a disposal site located in the North Alternative area would also be expected to be insignificant. The impact of dredged material disposal barge traffic on pelagic and demersal fish EFH en route to the North Alternative would likely be insignificant relative to the vast majority of existing commercial and Navy ship traffic in Apra Harbor. This can be attributed to the constant roving behavior of pelagic fishes and the ability of both pelagic and demersal fish groups to employ avoidance behavior in response to an approaching dredged material vessel within EFH.

Connectivity between coral reefs is dependent on the dispersal of the pelagic life stage of many coral organisms. Although several studies have shown suspended sediments to negatively impact the survival and development of the early life stages of these organisms (Fabricius 2005, Gilmour 1999, and Te 1992), the distance between Guam's coral reefs and the ODMDS suggest the effects of dredged material disposal activities on connectivity mechanisms would be insignificant. The ODMDS is located greater than 13 nm (24 km) offshore of Guam, which is greater than recommended distances for the management of marine reserves with respect to connectivity concerns (Shanks et al. 2003).

Northwest Alternative

Due to the homogeneity of the pelagic and demersal fish communities between the Northwest and North ODMDS study areas, the impact of dredged material disposal on the fish communities in the Northwest Study Area is expected to be similar to those outlined in the North Study Area. Impacts would be temporary and minimal, and therefore less than significant. Impacts to fish communities outside of a disposal site located in the North Alternative area would also be expected to be insignificant. The impact of dredged material disposal barge traffic on pelagic and demersal fish EFH en route to the Northwest Alternative would also likely be insignificant.

No Action Alternative

Under the No Action Alternative the ODMDS would not be designated, and therefore conditions at the sites would not change. The No Action Alternative would not have any effects on the fish communities and EFH at the ODMDS. However, if an ODMDS is not designated, the planned volume of material to be dredged from Apra Harbor would still need to be managed. Under this no-action alternative scenario, material would likely be managed in an upland disposal site or beneficial use project. Managing material in an upland setting would likely result in biological impacts. These impacts may include loss of habitat (e.g., conversion of native forests or wetlands to confined disposal facilities), the potential loss of terrestrial flora and fauna intolerant to elevated dissolved salt concentrations in surface water or leachate runoff and other associated impacts. These impacts would need to be assessed and mitigated on a project by project basis, separate from this EIS.

4.2.2.4 Marine Birds

Currently there is inadequate information on the potential influences of ocean dredged material disposal on local and transient bird populations, as no directed studies of impacts have been conducted. Potential impacts may include ship-following behavior, reductions in availability or accessibility of prey species, as well as decreased foraging behavior in the locality of the disposal plume. In addition, marine birds lured to positively buoyant fragments lingering at the surface subsequent to disposal may lead to an exhaustion of a considerable amount of energy with inadequate prey acquisition. These prospective effects are constrained to the duration of discrete disposal operations.

Many species of birds are known to frequently track ships, usually with the anticipation of feeding on galley scraps, bait or propeller chum. Others are known to exploit ships as a place to ground along their migratory crossing and rest before continuing their transit or migration. Species commonly known to pursue ships include frigate birds, boobies, tropicbirds, albatrosses, gulls, jaegers, procellarid petrels, and some storm-petrels (Spear and Ainley 1997). Of the eleven seabird species highlighted in Section 3.2.4, the brown booby (*Sula leucogaster*), red-footed booby (*Sula sula*) and Matsudaira's storm-petrel (*Oceanodroma matsudaira*) can be expected to follow dredged material disposal vessels. Following a disposal event, populations of important seabird prey species including krill, squid and tuna or other predatory fish schools may provisionally be reduced in the immediate locality. This can be attributed to the ability of many pelagic prey organisms to employ avoidance behavior in response to an approaching dredged material vessel and subsequent disposal of material. In response, the foraging success of marine birds may, in the interim, be reduced due to prey unavailability or inaccessibility following disposal activities.

The distribution of marine birds is thought to be affected by water clarity as a consequence of the potential effects on prey accessibility (Ainley 1977). Birds such as the short-tailed shearwater that dive from the water surface and follow submerged prey, known as pursuit divers, are considered to be attracted to turbid waters where prey are less apt to detect on-coming avian predators (Abrahams and Kattenfeld 1997). Birds such as the white tern, greater crested tern and brown noddy that swiftly thrust from the air into the water, known as plunge-divers, are considered to be attracted to clear waters where victims can be visually positioned from a distance. Recent studies show that most associations between the distribution of marine birds and water clarity were inconsistent, implying that the observed associations of some species with clearer or more turbid water may not be static. This weak effect of water clarity on distribution suggests that although some significant associations were observed, most species employ flexible foraging strategies (Henkel 2006).

North Alternative

The elicited ship-following behavior of marine birds by dredged material disposal vessels can be considered minor relative to the vast majority of existing commercial and Navy ship traffic in Apra Harbor. Model analyses using USACE STFATE of dredged material disposal offshore of Guam indicated gravel material settled within 16 hours of the disposal event. Conversely, only a small percentage of unconsolidated silts and clays settled to the seafloor within the time limits (192 hours) of the model (Weston Solutions and Belt Collins 2007b). Disposal of fine material characteristic of Areas P-436 and P-518 would therefore result in a greater temporary localized increase of water column turbidity relative to disposal of coarse grained material characteristic of Area P-502. This would consequently reduce the availability and/or accessibility of prey, along with potentially limiting the foraging efficiency of plunge- and pursuit-diving seabirds. Owing to the patchy allocation of these prey species near the ocean surface and the profusion of similar open-ocean foraging habitat, this effect on marine birds is considered localized as well as temporary.

Expended foraging energy with inadequate prey acquisition caused by the lure of some marine birds to floating material should be localized and of relatively short duration due to ocean dredged material disposal permit stipulations that suitable material contain negligible quantities of buoyant debris. Due to these spatial and temporal impact constraints coupled with the ability of marine birds and their prey to employ assorted escape behaviors, dredged material disposal impacts to marine birds would be less than significant in the North Study Area.

Northwest Alternative

As a result of the homogeneity of water quality and prey distribution between the Northwest and North ODMDS study areas, impact of ocean dredged material disposal on the marine birds in the Northwest Study Area is expected to be similar to those outlined in the North Study Area, and therefore less than significant. Any observed differences in disposal consequences to marine birds should be related primarily to differences in the relative abundance and diversity of these species within each site.

No Action Alternative

Under the No Action Alternative the ODMDS would not be designated, and therefore conditions at the sites would not change. The No Action Alternative would not have any effects on marine birds at the ODMDS site. However, if an ODMDS is not designated, the planned volume of material to be dredged from Apra Harbor would still need to be managed. Under this no-action alternative scenario, material would likely be managed in an upland disposal site or beneficial use project. Managing material in an upland setting would likely result in biological impacts. These impacts may include loss of habitat (e.g., conversion of native forests or wetlands to confined disposal facilities), the potential loss of terrestrial flora and fauna intolerant to elevated dissolved salt concentrations in surface water or leachate runoff and other associated impacts. These impacts would need to be assessed and mitigated on a project-by-project basis, separate from this EIS.

4.2.2.5 Marine Mammals

The 2007 MISTCS report was used as a reference for marine mammals that potentially could be in the locality of a proposed ODMDS located in the North or Northwest Study Area. Between mid-January to mid-April, a total of 149 visual sightings of 13 species within 170,500 square nm surrounding the Marianas archipelago were reported. 148 of 149 sightings were of 12 cetacean species. The endangered sperm whale (*Physeter macrocephalus*) had the highest sighting, followed by the Bryde's whale (*Balaenoptera edeni/brydei*), and the endangered sei whale (*Balaenoptera borealis*). The survey revealed that the most frequently sighted delphinids were the Pantropical spotted dolphin (*Stenella attenuate),* followed by the false killer whale (*Pseudorca crassidens*) and striped dolphin (*Stenella coeruleoalba*). Potential ocean dredged material disposal impacts on marine mammals are expected to be analogous to those of marine birds. These potential impacts may include provisional impairment of foraging behavior as well as alteration of migratory passage routes ascribable to disposal noise disturbances, reductions in water clarity caused by the subsequent disposal plume, and the possible reduction in prey items. These prospective effects are constrained to the duration of discrete disposal operations.

As outlined by the MMPA, the term “harassment” in the case of a military readiness or scientific research activity conducted by or on behalf of the Federal Government, is defined as any act that disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns, including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering, to a point where such behavioral patterns are abandoned or significantly altered.

Pollution can refer to chemical, physical, biological, thermal or noise contaminants with anthropogenic origin. Noise from commercial vessel traffic is considered the most dominant, continuous and ubiquitous source of anthropogenic noise in the ocean (Payne and Webb 1971). Most marine mammals are either attracted to or repelled by the occurrence of a ship, and many seek to avoid vessels at distances on the order of kilometers. Responses usually consist of moving toward the ship (some dolphins and porpoises), away from the ship (some dolphins, porpoise, and whales), or submerging (all marine mammals). Acoustic pollution is of special concern for cetaceans, which is known to be a very vocal taxonomic group dependent on sound for communicating, navigating, and foraging. Increased stress levels, abandonment of important habitat and the obscuring or interference of natural sounds, known as masking, are some of the ways populations may be threatened by noise (Weilgart 2007). Such population-level effects are, however, particularly difficult to detect in cetaceans because of a deficiency of accurate basal population estimates. Cetaceans have also exhibited short-term responses to human-produced reverberations including longer dive times, shorter surface intervals, evasive movements away from the sound source, attempts to shield young, increased swimming speed, changes in song note durations and departure from the area (Croll et al. 2001). Detection and avoidance of oil patches by bottlenose dolphins (*Tursiops truncates*) suggests that they are able to using echolocation, especially in the presence of air bubbles (Gerachi and St. Aubin 1987). This illustrates the possibility for cetaceans capable of detecting differences in water turbidity by echolocation to alter their route in avoidance of a disposal area. Disturbances from tugs towing the disposal barges would be limited in comparison to the overall vessel traffic in the area around Guam.

North Alternative

The contribution of acoustic pollution by dredged material disposal vessels can be considered minor in relation to the vast majority of existing commercial and Navy ship traffic in Apra Harbor. Impairment of foraging behavior as well as alteration of migratory passage routes ascribable to disposal noise disturbances can be considered provisional to the duration of disposal operations and constrained within the vicinity of the disposal plume. Model analyses using USACE STFATE of dredged material disposal offshore of Guam indicated gravel material settled within 16 hrs of the disposal event. Conversely, only a small percentage of unconsolidated silts and clays settled to the seafloor within the time limits (192 hrs) of the model (Weston Solutions and Belt Collins 2007b). Disposal of fine material characteristic of Areas P-436 and P-518 will therefore result in a greater temporary localized increase of water column turbidity relative to disposal of coarse grained material characteristic of Area P-502. This will consequently reduce the availability and accessibility of marine mammal prey such as krill, squid, small school fish, pelagic fish, and sharks. Owing to the patchy allocation of these prey species, this effect on marine mammals is considered localized as well as temporary. Due to these spatial and temporal impact constraints coupled with the ability of marine mammals to employ assorted avoidance behaviors, dredged material disposal impacts are designated as less than significant in the North Study Area. There would also be less than significant impacts to marine mammals as defined by the MMPA.

Northwest Alternative

As a result of the homogeneity of water quality and prey distribution between the Northwest and North ODMDS study areas, impact of ocean dredged disposal on the marine mammals in the Northwest Study Area is expected to be similar to those outlined in the North Study Area, and therefore less than significant. Any observed differences in disposal consequences to marine mammals should be related primarily to differences in the relative abundance and diversity of mammal species within each site.

No Action Alternative

Under the No Action Alternative the ODMDS would not be designated, and therefore conditions at the sites would not change. The No Action Alternative would not have any effects on marine mammals at the ODMDS. However, if an ODMDS is not designated, the planned volume of material to be dredged from Apra Harbor would still need to be managed. Under this scenario, material would likely be managed in an upland disposal site or beneficial use project. Managing material in an upland setting would likely result in biological impacts. These impacts may include loss of habitat (e.g., conversion of native forests or wetlands to confined disposal facilities), the potential loss of terrestrial flora and fauna intolerant to elevated dissolved salt concentrations in surface water or leachate runoff and other associated impacts. These impacts would need to be assessed and mitigated on a project-by-project basis, separate from this EIS.

4.2.2.6 Threatened, Endangered and Special Status Species

Chapter 3, Table 3-11 presents Endangered, Threatened, and Special Status Marine Mammal Species and their prospective occurrence in the habitats of the general ODMDS study region. Three endangered species are known to occur frequently within the deep waters of the general study region. These endangered whales (humpback, sperm, and sei) are most likely to be observed during the winter months when they journey to warmer, tropical latitudes for breeding and calving. All three whale species were documented in the MISTCS occurring with calves, while the humpback and sperm whales additionally exhibited social behaviors allied with breeding grounds including tail-slapping, breaching, and chin-slapping. Three other endangered cetaceans (North Pacific Right Whale, Fin Whale and Blue Whale) are known to intermittently frequent the Guam study area. Three seabird species (brown noddy, black noddy, and white tern) that are most apt to be sighted in the study area are listed on the CNMI Species of Special Concern. Three other uncommon or irregular seabird visitors to the Guam study area, the wedge-tailed shearwater, brown booby, and red-footed booby, are also listed on the CNMI Species of Special Concern. These six special status seabirds are further protected by the MBTA. Five additional seabirds, the common visitor short-tailed shearwater and common or rare visitors black-naped tern, great crested tern, streaked shearwater and Matsudaira's storm-petrel are presently or will soon be protected by the MBTA.

Potential impacts of dredged material disposal on endangered marine mammals described in Section 3.2.6 may include provisional impairment of foraging behavior as well as alteration of migratory passage routes ascribable to disposal noise disturbances, reductions in water clarity caused by the subsequent disposal plume, and the possible reduction in prey items. Disturbances to special status seabirds may include ship-following behavior, reductions in availability and/or accessibility of prey species, decreased foraging behavior and exhausted foraging energy with inadequate prey acquisition caused by positively buoyant fragments in the locality of the disposal plume.

North Alternative

Due to the spatially localized and temporally limited nature of dredged material disposal activates, potential impacts on endangered cetacean and special status seabird species are designated as less than significant in the North Study Area.

Northwest Alternative

As a result of the homogeneity of water quality and prey distribution between the Northwest and North ODMDS study areas, impact of ocean dredged material disposal on endangered cetacean and special status seabird species in the Northwest Study Area is expected to be similar to those outlined in the North Study Area, and therefore less than significant. Any observed differences in disposal consequences to endangered and special status species should be related primarily to differences in the relative abundance and diversity of these species within each site.

No Action Alternative

Under the No Action Alternative the ODMDS would not be designated, and therefore conditions at the sites would not change. The No Action Alternative would not have any effects on endangered, threatened and special status species at the ODMDS. However, if an ODMDS is not designated, the planned volume of material to be dredged from Apra Harbor would still need to be managed. Under this no-action alternative scenario, material would likely be managed in an upland disposal site or beneficial use project. Managing material in an upland setting would likely result in biological impacts. These impacts may include loss of habitat (e.g., conversion of native forests or wetlands to confined disposal facilities), the potential loss of terrestrial flora and fauna intolerant to elevated dissolved salt concentrations in surface water or leachate runoff and other associated impacts. These impacts would need to be assessed and mitigated on a project-by-project basis, separate from this EIS.

4.2.2.7 Marine Protected Areas (MPA)

According to the 2000 FR, MPAs are designated as any marine environment reserved by Federal, State, territorial, tribal or local laws/regulations with the intention of fortifying part or all of the natural and cultural resources therein. MPAs offer an effective means to conserve marine organisms and their habitat and serve as a unique approach to safeguard these organisms from the collective and synergistic impacts of anthropogenic stressors. In Guam, MPAs include a territorial seashore reserve, a national historic park and numerous ecological reserves and marine preserves that contain a variety of susceptible habitats and biological resources including endangered and special status species. A total of eight MPAs are 20 nm or less in proximity to the North or Northwest ODMDS study areas. Table 4-6 presents these eight MPAs located in Guam and their distance to each ODMDS study area. Proximity of the proposed barge transit route to each MPA is also outlined in Table 4-6.

Table 4-6. Relative Distance of Marine Protected Areas to North and Northwest Alternative Areas and Likely Planned Barge Transit Routes

Marine Protected Area	North ODMDS Study Area Distance to:		Northwest ODMDS Study Area Distance to:	
	Station 2 (nm)	Planned Barge Transit Route (nm)	Station 7 (nm)	Planned Barge Transit Route (nm)
Ecological Reserve Areas				
Orote Peninsula ERA	14.2	0.4	9.5	0.4
Haputo ERA	14.5	13.1	20	15.3
Marine Preserves				
Tumon Bay	14.5	9.8	17.1	10.9
Piti Bomb Holes	13.1	4.7	12.4	5.4
Sasa Bay	16.4	0.25	12.5	0.25
Territorial Seashore Reserve				
Guam Territorial Seashore	12.7	0.1	9.5	0.1
National Historic Park				
WAPA, Asan Beach	13.1	4	13.5	5.8
WAPA, Agat Beach	17.8	4	13.1	5.8

Although disposal of dredged material will not occur directly within MPA boundaries, proximity of transit to one or more MPAs is necessary in order to reach the designated ODMDS. Accidental spillage or overflow from disposal barges could result in the unintended release of dredged material within MPA boundaries. Volumes of inadvertently released dredged material during transport would likely be small relative to each barge load of approximately 3,000 cy (2,294 m^3). Dredged material unintentionally released within or immediately adjacent to a sensitive habitat and repeated discharges over time could result in more significant environmental impacts. These consequences would depend on immediacy of discharge to an MPA, velocity and course of plume dispersion and specific resources in the path of dispersing material.

North Alternative

Planned barge transit routes to the North ODMDS study area currently occur within 1 nm of three MPAs, including the Orote Peninsula ecological reserve, Sasa Bay marine preserve and Guam Territorial Seashore reserve. Significant environmental impacts related to the inadvertent release of dredged material immediately adjacent to these three MPAs, as well as cumulative discharges over time could be reduced or mitigated by specifying transit routes that maximize avoidance of these sensitive habitats, and would therefore lead to less than significant impacts.

Planned barge transit routes to the North Study Area would occur at least 4 nm from five other MPAs including Haputo ecological reserve, Tumon Bay- and Piti Bomb Holes marine preserve and WAPA National Historic Parks at Asan- and Agat Beach. Potential impacts to these five MPAs attributable to the isolated and/or cumulative release of dredged material en route to the North Study Area would therefore be considered less than significant.

<u>Northwest Alternative</u>

Due to similarities in planned barge transit proximity to MPAs, ecological impact of isolated and/or cumulative dredged material release en route to the Northwest Study Area is expected to be similar to those outlined in the North Study Area, and therefore less than significant.

<u>No Action Alternative</u>

Under the No Action Alternative the ODMDS would not be designated, and therefore conditions at the sites would not change. There would be no effect of the No Action Alternative on marine reserves.

4.3 SOCIOECONOMIC ENVIRONMENT

Direct and indirect impacts of the ODMDS alternatives on the socioeconomic environment of the region of influence would be significant if they adversely impacted commercial and recreational fishing, military uses, recreation and tourism, commercial shipping, historic resources or public health.

Significant impacts would include effects on fisheries or commercial fishing operations that resulted in a measurable loss of revenues to the Guam economy or resulted in failures of commercial fishing businesses. Significant impacts would be disruptions in the use of recreational fishing and water sports areas resulting in a loss in tourism participation and revenues related to these activities, or a measurable loss in traditional fishing practices of the local population.

The disruption of or interference with military operations or commercial shipping on a frequent basis would be a significant impact. Impacts to archaeological, historical or cultural resources would be significant if they resulted in damage to the resources or qualities that make a resource eligible for the NRHP. Significant impacts to the socioeconomic environment would include adverse effects on public health and welfare that might be caused by disposal of contaminated material, the creation of hazards to navigation, or impairment of important visual qualities.

Under the No Action Alternative, an ODMDS would not be designated and multiple upland disposal sites would be required to accommodate the dredging needs of projects anticipated in the reasonably foreseeable future (Figure 4-15). The potential impacts of this scenario on the socioeconomic environment were evaluated in Weston Solutions and TEC (2008a). Potential impacts associated with upland disposal include impacts to air quality, odor, noise, visual resources, loss of developable land, traffic and energy use.

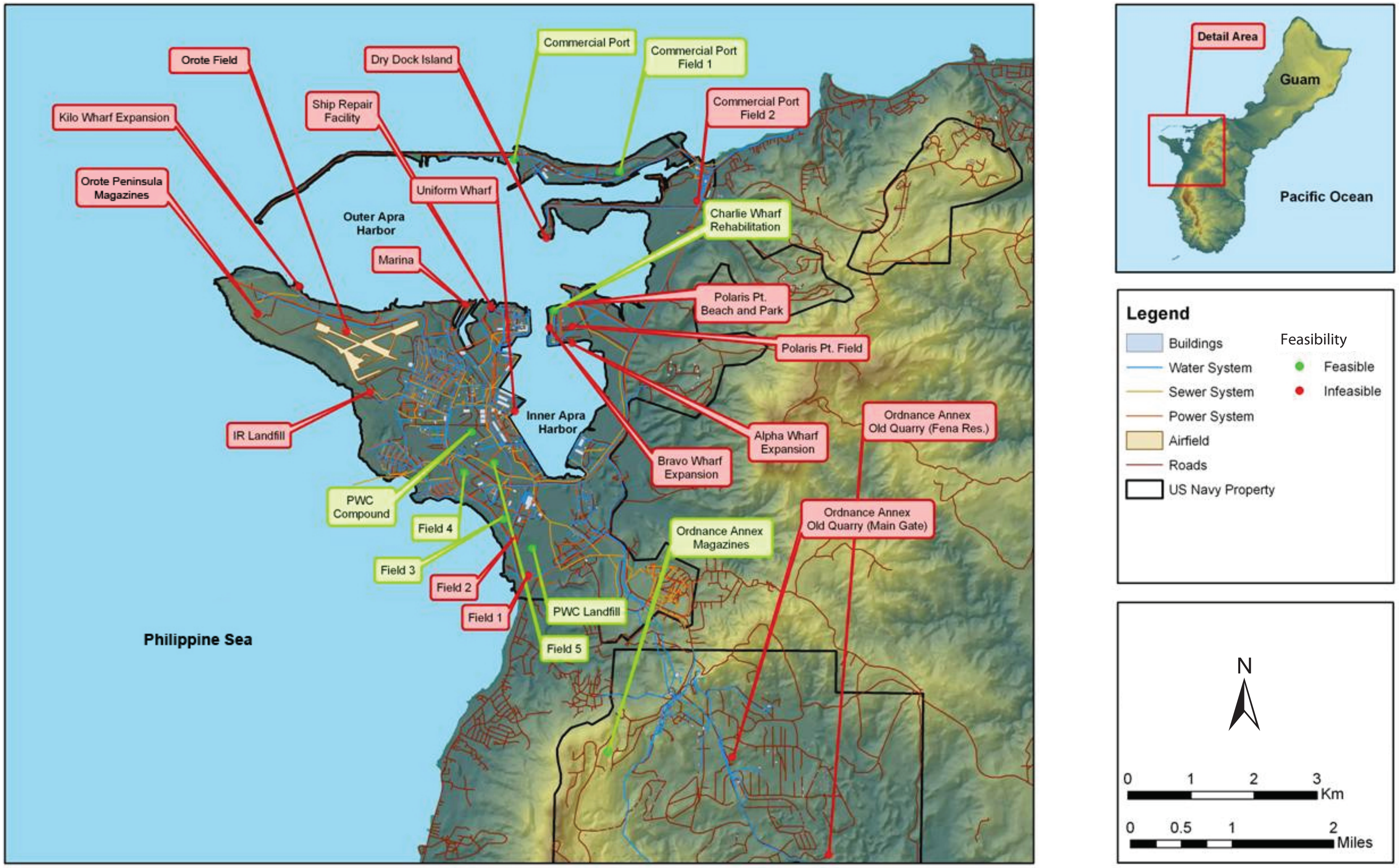

Figure 4-15. Overview Map of Potential Dewatering Facilities and Beneficial Use Alternatives, Apra Harbor Naval Complex, Guam

4.3.1 Commercial Fishing and Mariculture

4.3.1.1 North Alternative

The North Alternative site is located outside primary commercial fishing areas. Most commercial fishing takes place within 6 nm (11.1 km) of the shore in shallower water, near reefs and near FADs. The closest fishing area is a FAD located approximately 5 nm (9.2 km) from the site. Because of the restriction on longline fishing, there is relatively little commercial fishing occurring in deeper waters (>650 ft [200 m]). Although the pelagic fishery occurs throughout the waters offshore of Guam, it is not concentrated to the proposed disposal site. Furthermore, the pelagic fishery is temporally and spatially dynamic with individual species having greater ranges than the area of the disposal site, such that the relative percentage of the potentially impacted area in relation to the entire fishery (within an 18 nm [33 km] arc from Apra Harbor) is small (e.g., less than 1%). Suspended sediment plumes having concentrations greater than 1 mg/L will be limited in size to a radius of 292 ft (89 m) and a duration of <4 hrs.

Routes taken by tugboats pulling barges transporting dredged material to the site may come within 5 nm (9.2 km) of a FAD, which would not affect fishing in that area. Although it is possible that commercial fishing boats may occasionally encounter transiting barges leaving from or returning to Outer Apra Harbor, it would be similar to encounters with other ocean going vessel traffic and both vessels would be required to adhere to the navigation regulations.

The impact of the disposal of dredged material at the North Alternative ODMDS on the commercial fishing industry would be less than significant.

4.3.1.2 Northwest Alternative

The Northwest Alternative site is located outside primary commercial fishing areas and thus would have no effect on commercial fishing. There are no FADs or other fishing areas in proximity to the Northwest Alternative or the proposed transit routes of dredged material barges. Similar to the North Alternative, although the pelagic fishery occurs throughout the waters offshore of Guam, it is not concentrated to the proposed disposal site. Furthermore, the pelagic fishery is temporally and spatially dynamic with individual species having greater ranges than the area of the disposal site, such that the relative percentage of the potentially impacted area in relation to the entire fishery (within an 18 nm [33 km] arc from Apra Harbor) is small (e.g., less than 1%). Suspended sediment plumes having concentrations greater than 1 mg/L will be limited in size to a radius of 292 ft (89 m) and a duration of <4 hrs. Commercial fishing boats may occasionally encounter transiting barges leaving from or returning to Outer Apra Harbor. The Northwest Alternative would have a less than significant on the commercial fishing industry.

4.3.1.3 No Action Alternative

The No Action Alternative would not affect fishing areas and thus would not impact commercial fishing.

4.3.2 Military Use

4.3.2.1 North Alternative

The North Alternative ODMDS is located outside areas of military use; therefore, disposal operations would have no affect on military operations. Military vessels may occasionally encounter barges transporting dredged material between Apra Harbor and the ODMDS. These encounters would be similar to those with other ship traffic operating in accordance with navigation regulations and are not expected to impact military operations. The North Alternative would have no impacts on military uses.

4.3.2.2 Northwest Alternative

Because of a similar location relative to military use areas, the impacts of the Northwest Alternative would be the same as those described for the North Alternative.

4.3.2.3 No Action Alternative

The No Action Alternative would have adverse impacts on military uses if dredging projects needed to facilitate those operations are delayed or become infeasible, either if an upland site with adequate capacity is not available, or if a dredged material disposal site is not available.

4.3.3 Recreational Use

4.3.3.1 North Alternative

The North Alternative site is located outside of primary recreational fishing areas. Similar to commercial fishing, recreational fishing off the western coast of Guam takes place within 6 nm (11.1 km) of the shore in shallower water, near reefs and near FADs and also at the offshore banks. The closest fishing area to the ODMDS alternative site is a FAD located approximately 5 nm (9.2 km) from the site; therefore, disposal operations at the North Alternative ODMDS would have no effect on recreational fishing.

Routes taken by tugboats pulling barges transporting dredged material to the site may come within 5 nm (9.2 km) of a FAD, which would affect fishing in that area. Although it is possible that recreational fishing boats may occasionally encounter transiting barges leaving from or returning to Outer Apra Harbor, it would be similar to encounters with other ocean going vessel traffic and both vessels would be required to adhere to the navigation regulations. The impact of transiting barges is therefore expected to be negligible. The impact of the disposal of dredged material at the North Alternative ODMDS on the recreational fishing industry would be insignificant.

Because water sports and diving activities occur near the shore they would not be affected by disposal at the ODMDS alternative site. However, routes taken by barges through Apra Harbor may come within less than 1 nm of dive sites in the harbor. Inadvertent release of dredged material from a transiting barge immediately adjacent to these dive sites may result in temporary impacts to visibility at the dive sites. Because these impacts would be temporary and may be reduced or mitigated by the use of transit routes that maximize avoidance of dive sites, impacts of the North Alternative on recreational water sports and diving would be less than significant.

4.3.3.2 Northwest Alternative

The Northwest Alternative site is also located outside primary recreational fishing areas. There are no FADs or other fishing areas in proximity to the Northwest Alternative or the proposed transit routes of dredged material barges. Similar to the North Alternative, recreational fishing boats may occasionally encounter transiting barges leaving from or returning to Outer Apra Harbor, similar to encounters with other ocean going vessel traffic and both vessels would be required to adhere to the navigation regulations. The Northwest Alternative would have no effect on the recreational fishing industry.

Impacts to recreational water sports and diving under the Northwest Alternative would be the same as described for the North Alternative and would result in a less than significant impact.

4.3.3.3 No Action Alternative

The No Action Alternative would have no effect on water-based recreational uses in the region of influence.

4.3.4 Commercial Shipping

4.3.4.1 North Alternative

The North Alternative ODMDS is situated between but outside two shipping lanes and thus disposal of dredged material would have no effect on commercial shipping. The shipping lanes would be used by tugboats pulled barges transporting dredged material to the ODMDS; therefore, commercial vessels would encounter transiting barges. Based on the maximum dredged material volume of 1,000,000 million cy per year, and 24-hour operations, it is estimated that barges would be transiting for an average total of 30 days per year. Because of the relatively limited period of time transiting barges would be present and given that tugboats pulling barges would be required to operate in accordance with navigation regulations, a less than significant impacts to commercial vessels is anticipated.

4.3.4.2 Northwest Alternative

Similar to the North Alternative, the Northwest Alternative ODMDS is also located between but outside two shipping lanes. The impacts of the Northwest Alternative would be the same as described for the North Alternative, resulting in a less than significant impact.

4.3.4.3 No Action Alternative

The No Action Alternative would have significant impacts on commercial shipping if dredging projects needed to facilitate those operations are delayed or become infeasible if a dredged material disposal site is not available.

4.3.5 Oil and Natural Gas Development

No oil or other mineral extraction platforms were identified offshore of Guam; therefore, none of the alternatives would affect oil and gas development.

4.3.6 Archaeological, Historical, and Cultural Resources

4.3.6.1 North Alternative

Planned barge transit routes to the North Study Area would occur at least 4 nm from the WAPA National Historic Parks at Asan and Agat Beach. Potential impacts to this cultural resource attributable to the isolated and/or cumulative release of dredged material en route to the North Study Area could therefore be considered less than significant.

If cultural resources are identified in the study area during the examination of the high resolution images produced for this site designation, they will be avoided by adjusting barge transit routes and/or selecting and ODMDS within the North Alternative. Therefore there will be no adverse impact to cultural resources.

4.3.6.2 Northwest Alternative

Due to similarities in planned barge transit proximity to the WAPA National Historic Parks, environmental impact of isolated and/or cumulative dredged material release en route to the Northwest Study Area is expected to be similar to those outlined in the North Study Area.

If cultural resources are identified in the study area during the examination of the high resolution images produced for this site designation, they will be avoided by adjusting barge transit routes and/or selecting and ODMDS within the North Alternative. Therefore, there will be no adverse impact to cultural resources.

4.3.6.3 No Action Alternative

The No Action Alternative would have no effect on archaeological, historical or cultural resources in the region of influence; however, the need for new upland disposal sites would increase the potential for adverse impacts to resources on the shoreline or on land.

4.3.7 Public Health and Welfare

4.3.7.1 North Alternative

Health and welfare concerns for the population of Guam relative to the proposed designation of an ODMDS near Guam involve the potential release of toxic substances, increases in ciguatoxin outbreaks, hazards to navigation, conflicts between marine traffic and disposal operations equipment, and visual effects. The potential impacts of the North Alternative on public health and welfare were determined to be less than significant.

All material to be dredged would be tested according to testing criteria (40 CFR Parts 225 and 227) for the presence of contaminants as well as the potential for toxicity and bioaccumulation prior to dredging using federally regulated procedures of USEPA and USACE. Should the testing indicate that the accumulation of contaminants in the disposal area(s) represents an unacceptable risk to the marine environment or to human health, management actions would be taken to reduce or mitigate these impacts. This could include determining that dredged material is unsuitable for ocean disposal.

Ciguatoxin is closely associated with microalgae in coral reef environments and may affect tropical reef fish. Ciguateric fish have been collected from Guam's nearshore waters. Coral reefs located around Guam occur within 1 nm (1.9 km) of shore. Although the disposal of dredged material at the North Alternative (approximately 13.7 nm [25.4 km] offshore) will not occur directly within or adjacent to coral reef habitat, barges destined for the designated ODMDS would transit through coastal areas suitable as coral reef habitat. Accidental spillage or overflow from disposal barges could result in the unintended release of dredged material within coral reef habitat. Volumes of inadvertently released dredged material during transport would likely be small relative to each barge load of approximately 3,000 cy (2,294 m^3). Dredged material unintentionally released to coral reef habitat and repeated discharges over time could degrade the coral reef habitat and subsequently provide opportunistic growth of ciguatoxin. Significant environmental impacts related to the inadvertent release of dredged material in coral reef habitats could be reduced or mitigated by specifying transit routes that maximize avoidance of these sensitive habitats. Therefore, impacts of the North Alternative on the public health due to ingestion of ciguateric fish would be less than significant.

The disposal of dredged material would not result in a navigation hazard, although there is a potential for tugboats pulling disposal barges within the shipping lanes to encounter other marine traffic during transit to and from the disposal site. Because transiting barges are only expected to be present an average of 30 days each year, and given that tugboats pulling barges would be required to operate in accordance with navigation regulations, less than significant impacts to other marine vessels would be expected.

Visual impacts would be considered adverse if the quality of important scenic vistas were to be impaired by the dredged material disposal operations. Line of sight evaluations were performed during the site constraint analysis and critical view areas were avoided (see Figure 2-3). However, persons standing at Two Lovers Point would be able to see a tugboat and barge 28.6 nm (53.0 km) away. Although barges transiting to the North Alternative ODMDS may be visible in the distance from viewpoints at higher elevations, they would look the same as other ship traffic and the impact would be less than significant.

4.3.7.2 Northwest Alternative

Potential impacts of the Northwest Alternative would be the same as those described for the North Alternative, except that barges transiting to this ODMDS would not be visible from Two Lovers Point on the north side of Guam's west coast.

4.3.7.3 No Action Alternative

The need for new upland disposal sites would create the potential for significant impacts on public health and welfare if the only available upland disposal sites are in proximity to neighborhoods or areas of scenic quality.

4.4 CUMULATIVE IMPACTS

Federal regulations implementing NEPA (42 U.S.C. 4321 et seq.) and DON procedures for Implementing NEPA (32 CFR 775) require that the cumulative impacts of a Proposed Action be assessed. CEQ regulations implementing the procedural provisions of NEPA define cumulative impacts as:

> *The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions (40 CFR 1508.7).*

A cumulative impact may be additive or interactive. Interactive effects may be either countervailing (where the net adverse cumulative effect is less than the sum of individual effects) or synergistic (where the net adverse cumulative effect is greater than the sum of the individual effects). Cumulative impacts can result from individually minor but collectively significant actions that take place over time. Accordingly, a cumulative impact analysis identifies and defines the scope of other actions and their interrelationship with the alternatives if there is an overlap in space and time. Cumulative impacts are most likely to occur when there is an overlapping geographic location and a coincident or sequential timing of events. Because the environmental analysis required under NEPA is forward-looking, the aggregate effect of past actions is analyzed to the extent relevant and useful in analyzing whether the reasonably foreseeable effects of a proposed action may have a continuing, additive and significant relationship to those effects.

In order to analyze cumulative impacts, a cumulative impacts geographic region must be identified for which impacts of the Proposed Action and other past, present, and reasonably foreseeable future actions would be cumulatively recorded or experienced. The true geographic range of an action's effect may not be limited to an arbitrary political or administrative boundary. Within the geographic study area for each resource area, no past, present, or future actions having the potential for additive and/or interactive effects were identified.

4.4.1 Physical

Impacts from an ODMDS that occur at the disposal area itself are unique in that sediments are released in to the water column far offshore. No other projects in the study region result in a disposal of sediments to the seafloor at great depths. As no other ODMDS occurs in waters surrounding Guam, impacts from the designation of an ODMDS would be confined to the proposed action (e.g., ocean disposal of suitable dredged material) on the physical ocean properties located directly at an ODMDS designated at either the North or Northwest Study Area. No other actions impact the physical resource areas offshore of Guam in a similar fashion to the proposed ocean disposal of dredged material; therefore, there would be no cumulative impacts from the proposed action.

4.4.2 Biological

As no other active ODMDS exists in the waters surrounding Guam, impacts from the designation of an ODMDS would be confined to a location within with the North or Northwest study area for organisms residing in, migrating through, or foraging in the area. This would include the following groups of organisms: plankton, marine invertebrates, demersal fishes, and marine birds. For organisms residing near to or en route from land to the ODMDS, vessel traffic associated with ODMDS operations may contribute to disturbances from other actions occurring in waters surrounding Guam. As directed in USACE permits and the SMMP (Appendix C), peak coral spawning period avoidance can be practiced by dredge and vessel operators in compliance with determinations made by local agencies during each project-specific permit application, which will be evaluated separately from this EIS. Vessel traffic may contribute to disturbances of the following resources: fisheries and EFH, marine birds, marine mammals, sea turtles, and marine reserves. Other commercial and recreational vessels may operate without restrictions along the same route as the tugs and barges operating during a disposal project. No other projects or actions occur along the same route as the ODMDS vessels would operate.

4.4.3 Socioeconomic

Socioeconomic resources analyzed in this EIS that have the potential to be affected by the cumulative effects of the proposed site designation of an ODMDS and dredged material disposal include: commercial fishing, military and recreational uses, commercial shipping, submerged cultural resources, and public health and welfare. The geographic region considered in the analysis of cumulative impacts includes Apra Harbor and the waters of the Philippine Sea between the western shore of Guam and the ODMDS site designation study areas.

The alternative disposal sites would not directly impact socioeconomic resources and thus would not contribute to cumulative socioeconomic impacts. However, the transport of dredged material through Apra Harbor to the ODMDS alternative locations may result in minor navigation-related impacts to vessels engaged in commercial fishing, military transport, recreation, and commercial shipping. Future foreseeable dredging projects, undertaken by the Port of Guam and the military in Apra Harbor that would be facilitated by the designation of an ODMDS, may enable the arrival of larger ships and/or a greater number of ships that would travel in the shipping lanes and through Apra Harbor. The cumulative impact of the proposed action and this foreseeable action on commercial fishing, military transport, recreation, and commercial shipping would be the potential for an increase in navigation-related conflicts in or near the harbor. However, because marine traffic is expected to operate in accordance with navigation regulations and transit through and near Apra Harbor is only a minor part of each activity, the cumulative impacts on existing vessel traffic would not be expected to adversely impact these socioeconomic resources.

These cumulative impacts should have no effect on commercial and recreational fishing activities. Although the pelagic fishery occurs throughout the waters offshore of Guam, the primary commercial and recreational fishing areas are located nearer to shore or at offshore banks located in shallower water (e.g., less than 650 ft [200 m]). Furthermore, the pelagic fishery is temporally and spatially dynamic with individual species having greater ranges than the area of the proposed disposal site, such that the relative percentage of the potentially impacted area in relation to the entire fishery (within an 18 nm [33 km] arc from Apra Harbor) is small (e.g., less than 1%).

It is reasonably foreseeable that the designation of an ODMDS would be beneficial for future dredging projects at military facilities and the Port of Guam in Apra Harbor. Future dredging projects may enable the arrival of larger ships and/or a greater number of ships that would utilize military facilities and the commercial port in Apra Harbor. The cumulative economic impact of this scenario would be beneficial to the island's economy.

There is also the potential for transiting barges to inadvertently release small amounts of dredged material during transport that could cause temporary water turbidity impacts at reef dive sites and cultural resources sites in Apra Harbor. The cumulative effect of this impact may be minor compared to the cumulative impact of any increase in the amount of ship traffic transiting through the harbor on the quality of diving at reefs or submerged cultural resources in Apra Harbor.

The effect of dredged material transport barges transiting to the ODMDS alternatives combined with a potential increase in large vessel traffic has the potential for cumulative visual impacts. The shipping lanes used for the North Alternative are visible from scenic overlooks on the northwest shore of Guam, which is an important tourist destination. It is likely; however, that the increase would not be discernible or objectionable to the casual observer and the impact would be minor.

No significant cumulative impacts to socioeconomic resources are identified.

4.5 RELATIONSHIP BETWEEN SHORT-TERM AND LONG-TERM RESOURCE USES

NEPA requires consideration of the relationship between short-term use of the environment and the impacts that such use could have on the maintenance and enhancement of long-term productivity of the affected environment. Impacts that narrow the range of beneficial uses of the environment are of particular concern. Such impacts include the possibility that choosing an alternative could reduce future flexibility to pursue other alternatives, or that choosing a certain use could eliminate the possibility of other uses at the site.

The proposed site designation is not expected to produce significant, long-term adverse impacts to resources including the physical, biological, and socioeconomic environments within the study region. Localized physical impacts are expected to persist as long as the sites continue to be used for dredged material disposal; however, impacts outside of the site boundaries are expected to be minimal and insignificant. If disposal operations were discontinued at these sites, there would be a gradual recovery of the benthic communities over time within site boundaries.

Use of either of the two proposed sites areas as ODMDSs is not expected to interfere with the long-term use of any resource in the area. No significant effects to commercial fishing or sportfishing are expected to occur because the sites represent a small percentage of total fishing grounds around the island of Guam. In addition, new oil and gas developments are not expected in the area and if they do occur it is feasible that recovery of these resources can be realized without significantly interfering with disposal activities. Therefore, no adverse impact to utilization of these resources is expected.

The only effect to resources on-site expected as a result of the dredged material disposal operations is a minor reduction in biological productivity at the disposal site due to physical impacts from deposition of suitable sediments on the ambient seabed. The benefits of dredging include maintaining and expanding the channels and waterways in the area for recreational, commercial and military traffic.

4.6 IRREVERSIBLE OR IRRETRIEVABLE COMMITMENT OF RESOURCES

NEPA (42 USC § 4332 Section 102(2)(C)(v) as implemented by CEQ regulation 40 CFR 1502.16) requires an analysis of significant, irreversible effects resulting from implementation of a Proposed Action. Resources that are irreversibly or irretrievably committed to a project are those that are typically used on a long-term or permanent basis; however, those used on a short-term basis that cannot be recovered (e.g., non-renewable resources such as metal, wood, fuel, paper, and other natural or cultural resources) also are irretrievable. Human labor is also considered an irretrievable resource. All such resources are irretrievable in that they are used for a project and thus become unavailable for other purposes. An impact that falls under the category of the irreversible or irretrievable commitment of resources is the destruction of natural resources that could limit the range of potential uses of that resource.

Implementation of the Proposed Action would result in an irreversible commitment of energy and resources used to dredge, transport, and dispose of the material; economic costs associated with ocean disposal activities; temporarily limited physical benthic resource within the disposal site associated with the deposition of dredged material on the ambient seabed; and human labor associated with these dredging and disposal activities. Energy (electricity and natural gas) and water consumption, as well as demand for services, would not increase significantly as a result of the implementation of the proposed dredging activities. The commitment of these resources is undertaken in a regular and authorized manner, and does not present significant impacts within this EIS.

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5.0 MANAGEMENT OF THE DISPOSAL SITE

5.1 MANAGEMENT OF DISPOSAL SITES

As discussed previously, verification that significant impacts do not occur outside of the site boundaries will be demonstrated through implementation of the Site Management and Monitoring Plan (SMMP) developed as part of the proposed action. The SMMP includes physical monitoring to confirm that the material that is deposited is landing where it is supposed to land as well as monitoring to confirm that the deposited sediment quality appears consistent with results of the pre-disposal testing. An appropriately developed SMMP will be implemented regardless of which alternative is selected for implementation.

The main purpose of the SMMP is to provide a structured framework for resource agencies to ensure that dredged material disposal activities will not unreasonably degrade or endanger human health, welfare, the marine environment, or economic potentialities as stated in Section 103(a) of the MPRSA. Three main objectives for management of either of the two proposed Guam ODMDS sites are:

- Protection of the marine environment.
- Beneficial use of dredged material whenever practical.
- Documentation of disposal activities at the ODMDS.

The USEPA and USACE Honolulu District personnel will achieve these objectives by jointly administering the following activities:

- Regulation and administration of ocean disposal permits.
- Development and maintenance of a site monitoring program.
- Evaluation of permit compliance and monitoring results.
- Maintenance of an active database for dredged material testing and site monitoring results to document non-degradation goal and compliance with annual disposal volume targets in order to facilitate future revisions to the SMMP.

Other activities implemented through the SMMP to achieve these objectives include:

- Regulating quantities and types of material to be disposed of, and the time, rates, and methods of disposal.
- Recommending changes for site use, disposal amounts, or designation for a limited time based on periodic evaluation of site monitoring results.

5.1.1 Ocean Disposal Permits

Dredging projects that propose disposal at an ODMDS require permits. Disposal of materials into the ocean is only permitted if there are no practical alternatives. Environmental risks, impacts, and costs of ocean disposal are some factors evaluated in this process. As such, information required for permit applications must be consistent with USACE's Regulatory Program requirements (33 CFR 320-330), NEPA regulations (33 CFR 230 and 325), and

USEPA's Ocean Dumping Regulations (40 CFR Parts 220, 225, 227, and 228), and may include the following:

- Written documentation of the need to dispose of dredged material in the ocean.
- Description of historical dredging and activities at or adjacent to the proposed dredging site that may represent sources of contamination to the site.
- Type and quantity of the dredged material proposed for disposal at the site.
- Existing conditions of the proposed dredging area including the proposed dredging depths, overdredge depths, and depths adjacent to the boundary of the proposed dredging area.
- Composition and characteristics of the proposed dredged material including the results from physical, chemical, and biological testing. These data are used to determine whether the proposed dredged material is suitable for ocean disposal at the site.
- Estimate of the planned start and completion dates for the dredging operation; this information is needed to avoid potential resource conflicts and may be used to schedule inspections at the dredging site and/or the disposal site.
- Development of a debris management plan that addresses the disposal of materials other than the dredged sediment (e.g., pilings or metal debris) to ensure that these other materials are not discharged at the disposal site.

In accordance with the requirements and procedures defined in the USEPA's Ocean Dumping Regulations (40 CFR Parts 220, 225, 227, and 228), the suitability of dredged material proposed for disposal at the ODMDS must be demonstrated through appropriate physical, chemical, and biological testing. Ocean Dumping Regulation Section 227.6 prohibits the disposal of certain contaminants other than trace chemical constituents of dredged material. Further, regulatory decisions rely on assessments of the potential for unacceptable adverse impacts based on persistence, toxicity, and bioaccumulation of the constituents instead of specific numerical limits (USEPA and USACE 1991).

Determining the suitability of dredged material involves a multi-tiered testing procedure. Lower tiers apply existing or easily obtained information and limited chemical testing to predict effects. If it is predicted that the dredged material has any potential for significant adverse effects, higher tiers are activated. Water column and benthic bioassay and bioaccumulation tests are utilized in higher tiers to determine effects on representative marine organisms.

The USEPA Green Book (USEPA and USACE 1991) protocols will be used when testing the bioaccumulation potential of dredged material proposed for ocean disposal. The Green Book protocols state that if testing results indicate that the bioaccumulation of contaminants statistically exceeds that of reference material tests, the following eight factors will be assessed to evaluate Limited Permissible Concentrations (LPC) compliance (USEPA and USACE 1991):

- Number of species in which bioaccumulation from the dredged material is statistically greater than bioaccumulation from the reference material.
- Number of contaminants for which bioaccumulation from the dredged material is statistically greater than the bioaccumulation from the reference material.

- Magnitude by which bioaccumulation from the dredged material exceeds bioaccumulation from the reference material.
- Toxicological importance of the contaminants whose bioaccumulation from the dredged material statistically exceeds bioaccumulation from the reference material.
- Phylogenetic diversity of the species in which bioaccumulation from the dredged material statistically exceeds bioaccumulation from the reference material.
- Tendency for contaminants with statistically significant bioaccumulation to biomagnify within aquatic food webs (Biddinger and Gloss 1984; Kay 1984).
- Magnitude of toxicity and number of phylogenetic diversity of species exhibiting greater mortality in the dredged material than in the reference material.
- Magnitude by which contaminants whose bioaccumulation from the dredged material exceeds that from the reference material also exceeds the concentrations found in comparable species living in the vicinity of the proposed disposal site.

Decisions regarding the suitability of dredged material to be disposed of in the ocean will be guided by the criteria contained in the MPRSA and USEPA's Ocean Dumping Criteria. The USACE is authorized by the MPRSA to issue permits for dredged material disposal. The USACE, Honolulu District will prepare the Public Notice concerning the proposed disposal operation. USEPA Region 9, as well as other Federal and state agencies, will participate in the review of the application. USEPA Region 9, in accordance with 40 CFR 220.4(c), will approve, disapprove, or propose conditions on the MPRSA Section 103 permit before USACE can issue a permit. USEPA Region 9 will not approve disposal of material into the ocean that has the potential for significant adverse biological impacts.

Additional conditions on the disposal operations may be imposed for disposal permits subsequently issued for individual projects in order to preclude or minimize potential interference with other activities and/or uses of the ocean. There are several management options for the permitting process including but not limited to: disposal volume limits, seasonal restrictions, full or partial approval of dredged material proposed for disposal, disposal within a spatially-limited portion of the disposal site, or other requirements such as dredged material barge operators to stay within a specified transit path, utilize navigation equipment for specified accuracy, and maintain appropriate ship logs.

USEPA Region 9 will work with the USACE Honolulu District and the USCG to monitor, inspect, and conduct surveillance of disposal operations in the Guam area. As authorized under MPRSA Section 105(a), USEPA Region 9 may take appropriate enforcement actions if violations of the permit(s) are detected.

5.1.2 Site Management and Monitoring

In accordance with 40 CFR 228.3, the EPA is responsible for management of ocean disposal sites, including the Guam ODMDS. Additionally, in accordance with 40 CFR 228.9(c) the EPA requires full participation of the permittees and encourages participation by state, federal, and local agencies in the development and implementation of monitoring programs for disposal sites.

In concert with the implementation of this action, a detailed SMMP has been developed by the USEPA and USACE. The main purpose of the SMMP is to provide a structured framework for resource agencies to ensure that dredged material disposal activities will not unreasonably degrade or endanger human health, welfare, the marine environment, or economic potentialities

(Section 103(a) of the MPRSA). It is the next step in the continuum of effective resource management that starts with the site designation process.

The SMMP provides a framework for evaluating the performance of the site by tracking all disposal activities for compliance and comparing the observed disposed material footprint to model predictions. Another key aspect of the SMMP is its inherent flexibility to accommodate unforeseen needs and the associated ability to revise the plan, if necessary, as changes arise or needs are identified in the future. While the basic management and monitoring plan has been structured based on the experience to date at other dredging disposal sites, there is always the possibility that an unanticipated event or problem will arise that will require accommodations to this current framework. To this end, USEPA Region 9 and the USACE Honolulu District will periodically review the SMMP to discuss potential problems or address concerns of other state and federal regulatory agencies or the public regarding disposal activities.

The SMMP, which is included as Appendix C of this EIS, will undergo final public review as part of the proposed rule package for this action required by NEPA

5.2 CHARACTERISTICS COMMON TO BOTH ODMDS "ACTION" ALTERNATIVES

There are physical and management characteristics common to all designated ODMDS. These are not site-specific and are discussed in this section. The short-term conceptual fate of the dredged material once it is released at the ODMDS and the management of the ODMDS is the same for both alternatives.

5.2.1 Physical Characteristics of ODMDS Use

The goal is to minimize significant changes to the topography of the ocean floor outside of the ODMDS boundaries; temporary physical changes are expected inside site boundaries. The material will not be solidified or compacted prior to disposal. The characteristics of the dredged materials to be disposed at the ODMDS are modeled as described in the *Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. - Testing Manual* (USEPA and USACE 1998).

Barges are designed with bottom doors or with a split-hull, and the contents are emptied within seconds, essentially as an instantaneous discharge. Often sediments dredged by clamshell remain in fairly large consolidated clumps and reach the bottom in this form. Whatever its form, the dredged material descends rapidly through the water column to the bottom, and only a small amount of the material remains suspended (USEPA and USACE 1998). Figure 5-1 is a conceptual representation of the short-term phases of dredged material disposal at either ODMDS alternative. In general, the behavior of the material during disposal is assumed to be separated into three phases: 1) convective descent, during which the disposal cloud falls under the influence of gravity and its initial momentum is imparted by gravity; 2) dynamic collapse, occurring when the descending cloud either impacts the bottom or arrives at a level of neutral buoyancy where descent is retarded and horizontal spreading dominates; and 3) passive bottom transport dispersion, commencing when the material transport and spreading are determined more by ambient currents and turbulence than by the dynamics of the disposal operation (USEPA and USACE 1998).

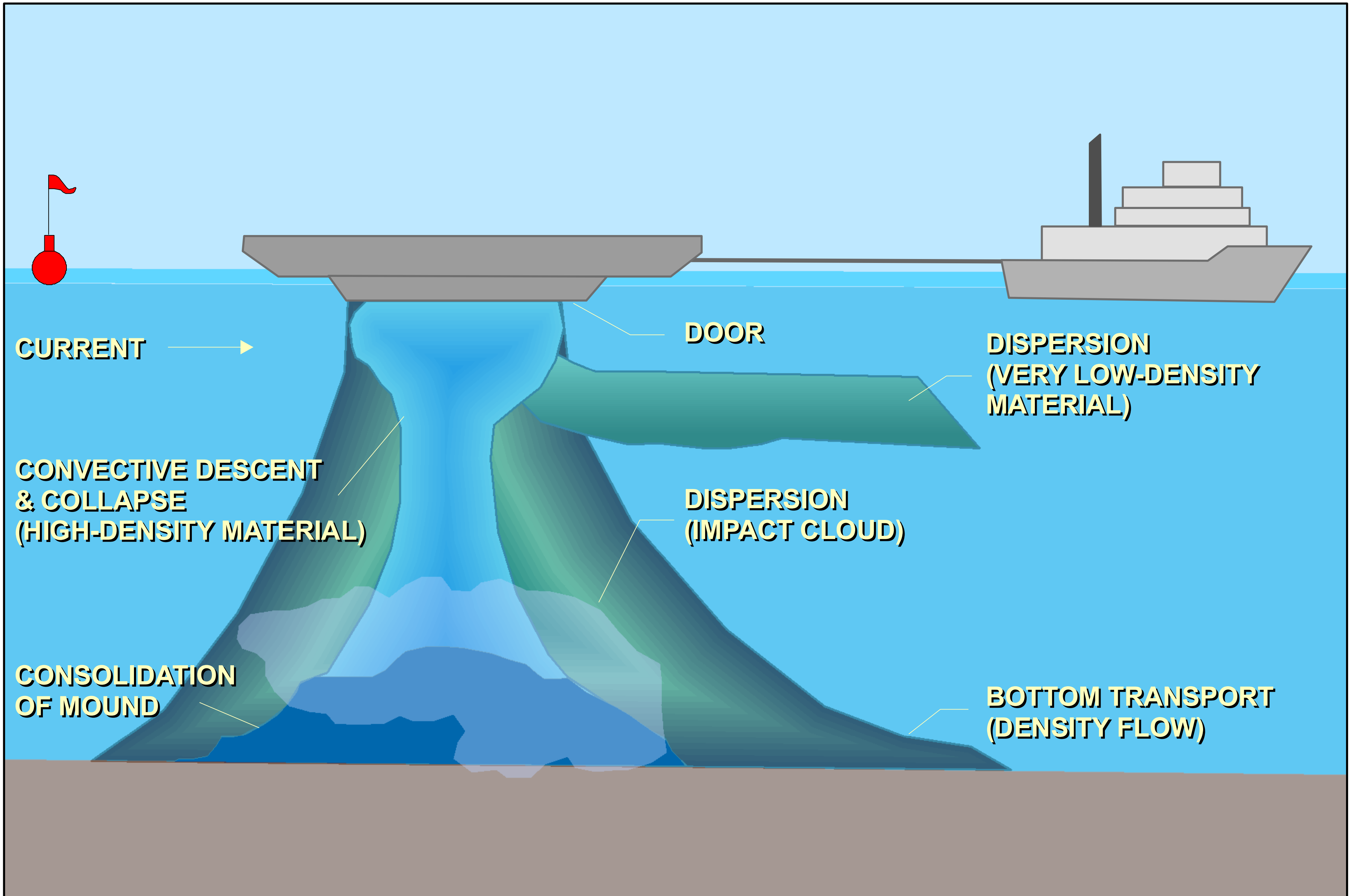

Figure 5-1.
Short-term Fate of
Dredged Material Disposal

Source: USACE, 2005

5.3 ODMDS MANAGEMENT

5.3.1 Dredging Permits

Formal designation of an ODMDS in the FR does not constitute approval of dredged material for ocean disposal. Designation of an ODMDS provides an ocean disposal option for consideration in the review of each proposed dredging project. Ocean disposal is only allowed when: 1) USEPA and USACE determine that the dredged material is environmentally suitable according to specified criteria (40 CFR Parts 225 and 227), as determined through physical, chemical, and bioassay/bioaccumulation testing (USEPA and USACE 1991), and 2) beneficial reuse is not practical for reasons described in Section1.3.1.

USACE may issue ocean disposal permits for dredged material if USEPA concurs with the decision (MPRSA Section 103). The permitting regulations promulgated by the USACE, under the MPRSA, appear at 33 CFR Parts 320 to 330 and 335 to 338. Roles and responsibilities associated with the ODMDS are as follows:

- USEPA (and USACE for federal projects in consultation with USEPA) would conduct surveillance, monitoring, and site management at the ODMDS.
- USACE issues the permits for specific dredging activities with USEPA concurrence.
- USCG is responsible for vessel traffic-related tracking and monitoring.
- Permittee is responsible for implementing and financing all permit conditions, including any site monitoring.

Dredged material proposed for ocean disposal undergoes a multi-tier evaluation to demonstrate compliance with the requirements of 40 CFR Part 227. USEPA follows the procedures described in the *Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. - Testing Manual* (USEPA and USACE 1991), which is summarized in Section 2.7 and in the text of this section. At each tier, there is an assessment of potential impacts to the water column and the benthic habitat. The intent of the tiered approach is to use resources efficiently by testing only as intensely as is necessary to provide sufficient information for making decisions. The initial tiers use existing information and relatively simple, rapid procedures for determining potential environmental impact of the dredged material in question. In some cases, these alone are sufficient to characterize the potential impact or lack of impact of the dredged material on the water column and the benthic community. However, additional tests may be needed for other dredged materials with less clear potential for impact or for which the existing information is inadequate. Each successive tier incorporates more procedures that provide increasingly detailed information for assessing the potential environmental impacts of the dredged material.

Bioaccumulation of chemicals of concern (COCs) from the material remaining in the water column is generally of minor concern because of the short exposure time as described under the Fate of the Dredged Material section of this EIS and rapid dilution. The LPC is the concentration of any dissolved dredged material constituent that, after making allowance for initial mixing, will not exceed applicable marine water-quality criteria (WQC) in the water column. Chemical analyses of dredged material dissolved in water are performed for a range of chemicals that may be released, and the results are compared to the WQC for these contaminants. This provides an indirect evaluation of the potential biological impact because the WQC were derived from toxicity tests of solutions of the various contaminants. Water column/suspended phase bioassays are conducted to directly evaluate the potential for adverse impact on the water column (USEPA and USACE 1991).

The greatest potential for environmental impact from dredged material is in the benthic environment. The impact of the dredged material on bottom-dwelling animals that live and feed in and on deposited material for extended periods is of greater concern than the impact on the water column. The testing guidance prescribes whole-sediment bioassays to evaluate potential impact of the solid phase of the dredged material. Chemical analyses of dredged material determine the presence and concentration of COCs. However, direct chemical analysis of sediment does not reflect the bioavailability of the chemicals, so living organisms are exposed to the dredged material to assess potential impacts to the benthic environment (USEPA and USACE 1991).

All dredging permits require compliance with a Dredge Operation Plan that addresses all phases of a specific dredging project, including reporting and monitoring requirements, environmental protection measures, safety precautions, and requirements for dredged material screening (e.g., unexploded ordnance, size), if necessary. During dredging activities, agencies would have remote access to data collected from a real-time Global Positioning System (GPS) automated vessel location logging system. The system allows agencies to monitor the location and draft of the vessel transporting the dredged material. If the vessel draft decreases (e.g., dredged material is leaked or accidentally released (disposed)) prior to reaching the ODMDS, it is readily apparent in the graphical representation viewed on a computer screen. Alarms can be set through the remote system to notify supervising agencies when conditions are not met for draft loss or travel route. Agencies can respond quickly to halt the disposal operators and investigate the situation. The remote tracking software available under various names and vendors (e.g., eTrac™ or ADISS™) has been successfully used to monitor dredging operations at various USEPA designated ODMDS for more than 10 years.

5.3.2 ODMDS Management: Enforcement of Dredging Permit Conditions

The MPRSA authorizes USEPA to assess civil penalties up to $50,000 for each violation of a permit or permit requirement, taking into account such factors as gravity of the violation, prior violations, and demonstrations of good faith. Criminal penalties (including seizure and forfeiture of vessels) for knowing violations of the MPRSA also are authorized. The USCG is also directed to conduct surveillance and other appropriate enforcement activities to prevent unlawful transportation of material for dumping, or unlawful dumping.

In conjunction with the MPRSA, the CWA regulates all discharges into navigable waters including the territorial seas. Although these two laws overlap in their geographic coverage of discharges from vessels within the territorial jurisdiction (3 nm [5.6 km]), USEPA takes the lead in enforcement of transportation for the purpose of ocean disposal.

5.3.3 ODMDS Management: Long-term

The designation of the Guam ODMDS is anticipated in 2010 and expected to be effective for 50 years; therefore, examination for continued use is anticipated in 2060. USEPA can shorten the life-cycle or interrupt the use of the ODMDS at its discretion.

The maximum allowable annual capacity would be 1,000,000 cy (760,555 m^3), which results in a maximum of 50,000,000 cy (38,227,800 m^3) over 50 years. Subsequent decisions to increase capacity would be subject to a NEPA EIS evaluation.

Section 228.3 of the MPRSA (40 CFR 220-229) states:

> *Management of a site consists of regulating times, rates, and methods of disposal and quantities and types of materials disposed of; developing and maintaining effective ambient monitoring programs for the site; conducting disposal site evaluation studies; and recommending modifications in site use and/or designation.*

No ODMDS shall receive a final designation unless a management plan has been developed pursuant to Section 102(c) of MPRSA. A SMMP was drafted for the Guam ODMDS and is included as Appendix C. The SMMP outlines requirements for monitoring specific disposal operations and long-term site conditions. Should the monitoring reveal unanticipated adverse environmental impacts, management actions would include modification of the site use/disposal procedures, additional site monitoring or site closure. The SMMP is updated every 10 years and public notice is required for each SMMP update.

6.0 LIST OF PREPARERS

This DEIS was prepared for the U.S. Environmental Protection Agency (USEPA) Region 9 and Naval Facilities Engineering Command, Pacific (NAVFACPAC). A list of primary organizations and individuals who contributed to the preparation and review of this document include:

USEPA Region 9
Dredging and Sediment Management Team
Water Division (WTR-8)
75 Hawthorne Street
San Francisco, CA. 94105

Allan Ota, Project Manager

Brian Ross, Team Leader

The Navy technical representative for the preparation of this document is:

Naval Facilities Engineering Command Pacific
258 Makalapa Drive, Suite 100
Pearl Harbor, HI 96860-3134

John Sato, Navy Representative

The consulting firms responsible for the preparation of this document are:

TEC Inc.
514 Via de la Valle, Suite 308
Solana Beach, CA 92075

Dan Muslin, Project Director and Quality Assurance
B.S.C.E., Civil Engineering
Years of Experience: 38

Faith Caplan, Project Manager
M.S., Public Health – Environmental Health
Years of Experience: 18

Richard Stolpe, Deputy Project Manager
M.A., Geography – Coastal Geomorphology
Years of Experience: 8

Deanna Meier, Analyst
M.S., Marine Biology
Years of Experience: 10

Susan Leary, Analyst
M.A., Anthropology
Years of Experience: 12

Jason Taylor, Analyst
B.S., Environmental Sciences
Years of Experience: 11

Kathy Hall, Analyst
B.A., Earth and Environmental Science
Years of Experience: 11

Angie Buyayo, Analyst
B.A., Environmental Analysis and Design
Years of Experience: 2

Erica Mignone, GIS Specialist
B.S., Environmental Science
B.A., Biology
Years of Experience: 7

Kerry Halford, GIS Specialist
B.S., Physics
Years of Experience: 7

Jackie Brownlow, Editor
B.A., Business
Years of Experience: 4

Claudia Tan, Editor
A.A., Liberal Arts and Sciences
Years of Experience: 7

Subconsultant:

Weston Solutions Inc.
2433 Impala Drive
Carlsbad, CA 92008

David Moore, Project Manager and Quality Assurance
Ph.D., Environmental Science
Years of Experience: 23

Andrew Martin, Deputy Project Manager
B.S., Oceanography
Years of Experience: 15

Maurice Duke, Analyst
Ph.D., Toxicology and Ecotoxicology
Years of Experience: 7

Wendy Hovel, Analyst
Ph.D., Pharmacology and Toxicology
Years of Experience: 13

Meredith Baker, Analyst
B.A., Environmental Studies – Marine Ecology
Years of Experience: 3

Sheila Holt, Analyst
B.A., Aquatic Biology
Years of Experience: 14

Misty Mercier, Analyst
B.S., Marine Biology and Chemistry
Years of Experience: 8

Bill Isham, Analyst
B.S., Biological Sciences
Years of Experience: 17

Melanie McConathy, Analyst
B.A., Environmental Policy
Years of Experience: 4

Samantha Leskie, GIS Specialist
B.S., Environmental Sciences
Years of Experience: 10

Satomi Yonemasu, Data Processor and QA/QC
B.S., Biochemistry and Cell Biology
Years of Experience: 12

Matt Wartian, Editor
Ph.D., Biology
Years of Experience: 9

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APPENDIX A
PUBLIC INVOLVEMENT

- Notice of Intent to Prepare EIS and Public Notice of Scoping Meeting
- NOI Scoping Meeting Transcript
- Agency Correspondence
- DEIS Distribution List

- Notice of Availability of EIS and Public Notice of Scoping Meeting
- NOA Scoping Meeting Transcript
- Agency Correspondence and Public Officials
- Public Comments and USEPA Responses
- EIS Distribution List

Notice of Intent to Prepare EIS
and
Public Notice of Scoping Meeting

Pennsylvania Ave., NW., Washington, DC 20460; telephone number: 202–343–9027; fax number: 202–343–2801; e-mail address: *Solar.Jose@epa.gov.*

SUPPLEMENTARY INFORMATION: EPA has submitted the following ICR to OMB for review and approval according to the procedures prescribed in 5 CFR 1320.12. On Tuesday, July 31, 2007 (72 FR 41747), EPA sought comments on this ICR pursuant to 5 CFR 1320.8(d). EPA received no comments. Any additional comments on this ICR should be submitted to EPA and OMB within 30 days of this notice.

EPA has established a public docket for this ICR under Docket ID No. EPA–HQ–OAR–2007–0176, which is available for online viewing at *www.regulations.gov,* or in person viewing at the Office of Air and Radiation Docket in the EPA Docket Center (EPA/DC), EPA West, Room 3334, 1301 Constitution Ave., NW., Washington, DC. The EPA/DC Public Reading Room is open from 8 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Reading Room is 202–566–1744, and the telephone number for the Office of Air and Radiation Docket is 202–566–1742.

Use EPA's electronic docket and comment system at *www.regulations.gov,* to submit or view public comments, access the index listing of the contents of the docket, and to access those documents in the docket that are available electronically. Once in the system, select ''docket search,'' then key in the docket ID number identified above. Please note that EPA's policy is that public comments, whether submitted electronically or in paper, will be made available for public viewing at *www.regulations.gov* as EPA receives them and without change, unless the comment contains copyrighted material, confidential business information (CBI), or other information whose public disclosure is restricted by statute. For further information about the electronic docket, go to *www.regulations.gov.*

Title: Reformulated Gasoline and Conventional Gasoline: Requirements for Refiners, Oxygenated Blenders, and Importers of Gasoline and Requirements for Parties in the Gasoline Distribution Network (Renewal).

ICR numbers: EPA ICR No. 1591.24, OMB Control No. 2060–0277.

ICR Status: This ICR is scheduled to expire on November 30, 2007. Under OMB regulations, the Agency may continue to conduct or sponsor the collection of information while this submission is pending at OMB. An Agency may not conduct or sponsor, and a person is not required to respond to, a collection of information, unless it displays a currently valid OMB control number. The OMB control numbers for EPA's regulations in title 40 of the CFR, after appearing in the **Federal Register** when approved, are listed in 40 CFR part 9, are displayed either by publication in the **Federal Register** or by other appropriate means, such as on the related collection instrument or form, if applicable. The display of OMB control numbers in certain EPA regulations is consolidated in 40 CFR part 9.

Abstract: Gasoline combustion is the major source of air pollution in most urban areas. In the 1990 Amendments to the Clean Air Act (Act), section 211(k), Congress required that gasoline dispensed in nine areas with severe air quality problems, and areas that opt-in, be reformulated to reduce toxic and ozone-forming emissions. (Ozone is also known as smog.) Congress also required that, in the process of producing reformulated gasoline (RFG), dirty components removed in the reformulation process not be ''dumped'' into the remainder of the country's gasoline, known as conventional gasoline (CG). The Environmental Protection Agency (EPA) promulgated regulations at 40 CFR part 80, Subpart D—Reformulated Gasoline, Subpart E—Anti-Dumping, and Subpart F—Attest Engagements, implementing the statutory requirements, which include standards for RFG (§ 80.41) and CG (§ 80.101). The regulations also contain reporting and recordkeeping requirements for the production, importation, transport and storage of gasoline, in order to demonstrate compliance and facilitate compliance and enforcement.

The program is run by the Transportation and Regional Programs Division, Office of Transportation and Air Quality, Office of Air and Radiation. Enforcement is done by the Air Enforcement Division, Office of Regulatory Enforcement, Office of Enforcement and Compliance Assurance. This program excludes California, which has separate requirements for gasoline.

Burden Statement: The annual public reporting and recordkeeping burden for this collection of information is estimated to average 2.4 hours per response. Burden means the total time, effort, or financial resources expended by persons to generate, maintain, retain, or disclose or provide information to or for a Federal agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements which have subsequently changed; train personnel to be able to respond to a collection of information; search data sources; complete and review the collection of information; and transmit or otherwise disclose the information.

Respondents/Affected Entities: Refiners, Oxygenate Blenders, and Importers of Gasoline; Requirements for Parties in the Gasoline Distribution Network.

Estimated Number of Respondents: 4,068.

Frequency of Response: Once, Quarterly, Annually, On Occasion.

Estimated Total Annual Hour Burden: 127,041.

Estimated Total Annual Cost: $35,255,669, which includes $25,092,389 in annualized capital or O&M costs.

Changes in the Estimates: There is an increase of 5,351 hours in the total estimated burden currently identified in the OMB Inventory of Approved ICR Burdens. This increase is due to new requirements.

Dated: November 20, 2007.

Sara Hisel-McCoy,

Director, Collection Strategies Division.

[FR Doc. E7–23074 Filed 11–26–07; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

[ER–FRL–6693–4]

Intent To Prepare an Environmental Impact Statement; Apra Harbor, GU

AGENCY: U.S. Environmental Protection Agency (EPA).

ACTION: Notice of Intent to prepare an Environmental Impact Statement (EIS) to designate a permanent ocean dredged material disposal site (ODMDS) off Apra Harbor, Guam.

Purpose: EPA has the authority to designate ODMDSs under section 102 of the Marine Protection, Research and Sanctuaries Act (MPRSA) of 1972 (33 USC 1401 *et. seq.*). It is EPA's policy to publish an EIS for all ODMDS designations (39 FR 37119, October 1974). Comments on the scope of the EIS evaluation will be accepted for 45 days from the date of this notice.

FOR FURTHER INFORMATION, TO SUBMIT COMMENTS, AND TO BE PLACED ON A

PROJECT MAILING LIST, CONTACT: Mr. Allan Ota, U.S. Environmental Protection Agency, Region 9, Dredging and Sediment Management Team (WTR–8), 75 Hawthorne Street, San Francisco, California 94105–3901, Telephone: (415) 972–3476 or Fax: (415) 947–3537 or E-mail: *R9Guam_ODMDS_Scoping@epa.gov*.

SUMMARY: EPA intends to conduct public meetings and collect public comments in advance of preparing an EIS to designate a permanent ODMDS off Apra Harbor, Guam. This EIS will be prepared in cooperation with the U.S. Department of the Navy (Navy). An EIS is needed to provide the environmental information necessary to evaluate the potential environmental impacts associated with ODMDS alternatives and select a preferred alternative that meets EPA's site selection criteria at 40 CFR 228.5 and 228.6.

Need for Action: Both the Navy and the Port Authority of Guam (PAG) have plans to expand their operations in Apra Harbor, Guam. Expansion of the Apra Harbor Naval Complex and Commercial Port is proposed to accommodate projected increases in vessel and cargo traffic, newer classes of vessels and dockside maintenance and support operations. Expansion plans would require dredging to increase water depths for the safe navigation of military and commercial vessels. In addition, ongoing navigation activities also require periodic maintenance dredging. It should be noted that designation of an ODMDS does not constitute approval of ocean disposal. The Corps, with EPA concurrence, must first determine on a case by case basis that the proposed dredged material is suitable and that all beneficial reuse or other alternatives to ocean disposal have been considered. However, not all of the anticipated dredged materials can be accommodated in existing landfills and these sediments may not all be suitable for beneficial re-use (e.g., construction fills, wetlands restoration). Therefore, it is necessary to establish a permanent ODMDS to accommodate dredged material generated from anticipated new work and maintenance dredging in Apra Harbor.

Alternatives: The following proposed alternatives have been tentatively defined.

—''No Action''—Do not designate a permanent ODMDS, and continue to manage dredged material generated from new work and maintenance dredging with existing landfill and construction fill options subject to disposal volume limits. Future expansion of the naval and commercial port facilities will be limited significantly.

—''North Alternative ODMDS''—Designate a permanent ODMDS north of Apra Harbor, Guam, in a study area approximately 12–15 nautical miles offshore and in depths ranging from 6,000 to 6,600 feet.

—''Northwest Alternative ODMDS''—Designate a permanent ODMDS northwest of Apra Harbor, Guam, in a study area approximately 9–15 nautical miles offshore and in depths ranging from 6,600 to 8,400 feet.

The North and Northwest study areas were identified in the Zone of Siting Feasibility (ZSF) Study, Ocean Dredged Material Disposal Site, Apra Harbor, Guam, Final Report (September 2006). This ZSF study excluded areas from further consideration, such as: shipping lanes, navigational hazards, military operating areas (i.e., for submarines), marine protected areas (i.e., marine preserves), and important fishing areas (commercial and recreational).

Scoping: EPA is requesting written comments from federal, state, and local governments, industry, non-governmental organizations, and the general public on the range of alternatives considered, specific environmental issues to be evaluated in the EIS, and the potential impacts of the alternatives for an ODMDS designated offshore of Apra Harbor, Guam. Scoping comments will be accepted for 45 days, beginning with the date of this Notice. A public scoping meeting is scheduled on the following date: December 6, 2007, from 6–8 p.m., at The Weston Resort Guam, 105 Gun Beach Road, Tumon, Guam. The EPA presentation will be followed by public comments and questions.

Estimated Date of Draft EIS Release: March 2009.

Dated: November 9, 2007.

Laura Yoshii,

Deputy Regional Administrator, Environmental Protection Agency, Region 9.

Dated: November 20, 2007.

Anne Norton-Miller,

Director, OFA.

[FR Doc. E7–23043 Filed 11–26–07; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

[EPA–HQ–OAR–2006–0340; FRL–8499–5]

Renewable Fuel Standard Under Section 211(o) of the Clean Air Act as Amended by the Energy Policy Act of 2005

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice.

SUMMARY: Section 211(o) of the Clean Air Act (the Act), as amended by the Energy Policy Act of 2005, requires the Administrator of the Environmental Protection Agency (EPA) to annually determine a renewable fuel standard (RFS) which is applicable to refiners, importers and certain blenders of gasoline, and publish the standard in the **Federal Register** by November 30 of each year. On the basis of this standard, each obligated party determines the volume of renewable fuel that it must ensure is consumed as motor vehicle fuel. This standard is calculated as a percentage, by dividing the amount of renewable fuel that the Act requires to be blended into gasoline for a given year by the amount of gasoline expected to be used during that year, including certain adjustments specified by the Act. In this notice we are publishing an RFS of 4.66% for 2008.

FOR FURTHER INFORMATION CONTACT: Chris McKenna, Environmental Protection Agency, MC 6406J, 1200 Pennsylvania Ave., NW., Washington, DC 20460; *telephone number:* 202–343–9037; *fax number:* 202–343–2801; *e-mail address: mckenna.chris@epa.gov*.

SUPPLEMENTARY INFORMATION:

I. Calculation of the 2008 RFS

A. Background

The preamble to the final rulemaking for the Renewable Fuel Standard Program included a projected RFS for 2008 of 4.63%. 72 FR 23912 (May 1, 2007). In today's notice we are again using the calculational procedure from the final rulemaking to calculate the 2008 RFS. However, since some projections and assumptions used in the final rulemaking to calculate the projected 2008 RFS have changed, today's notice includes a recalculated and final 2008 RFS using the most recently available information. Since the RFS rule established clear legal criteria for deriving the standard (including specification of the formula used in today's notice, and all data sources), EPA is simply applying facts to pre-established law in issuing the final 2008 RFS standard. EPA is advising the ssee falls title tilt

Associated Press TOP 25

Indiana's super freshman Eric scored 20 points, just his second game with fewer than 30, while hitting 4 of 12 shots.

▲ **No. 9 Washington State 71, MVSU 26:** Caleb Forrest scored a career-high 13 points and Washington State beat Mississippi Valley State in the Cougar Hispanic College Fund Challenge.

▲ **No. 10 Michigan St. 75, Oakland 71:** Goran Suton had a career-high 20 rebounds and scored 15 points and Raymar Morgan added 20 points to help Michigan State beat Oakland.

▲ **No. 12 Oregon 110, San Francisco 79:** Maarty Leunen had 18 points and 10 rebounds, seven players scored in double digits and Oregon beat San Francisco.

▲ **No. 14 Gonzaga 82, Virginia Tech 64:** Abdullahi Kuso had 19 points and 10 rebounds and Gonzaga defeated Virginia Tech for third place in the Great Alaska Shootout.

▲ **Seton Hall 74, No. 23 Virginia 60:** Brian Laing scored 25 points and Seton Hall knocked off Virginia to match their best start in seven seasons and win a share of the Philly Hoop Group Classic.

▲ **No. 24 Clemson 96, Gardner-Webb 67:** Cliff Hammonds had 16 points and seven rebounds and Clemson handed Gardner-Webb its worst loss of the young season.

▲ **No. 22 Butler 81, Texas Tech 71:** Mike Green scored 23 points and No. 22 Butler relied on its 3-point shooting to advance to the championship game of the Carrs/Safeway Great Alaska Shootout.

points for the Bulldogs (6-0), who rallied from a six-point halftime deficit and found themselves trailing again with 7½ minutes remaining.

▲ **No. 11 Texas A&M** shots from the field, including five of eight 3-pointers. Star Allen added 13 points and Jantel Lavender 10 for Ohio State (5-0), which will face No. 24 Auburn (5-0) in the (5-1), who have won two straight since losing 67-42 to No. 7 Rutgers.

▲ **No. 21 Texas 72, Kentucky 60:** Brittainey Raven scored 17 points to lead Texas

▲ **No. 24 Auburn ..., Winston-Salem 37:** Whitney Boddie, Sherell Hobbs and Alli Smalley combined to outscore Winston-Salem in Auburn's victory at the Buckeye Classic.

PUBLIC NOTICE

Public Input Requested on the Proposed Site Designation of the Guam Ocean Dredged Material Disposal Site off Apra Harbor, Guam, Mariana Islands

AGENCY: U.S. Environmental Protection Agency (EPA)

SCOPING: EPA is requesting written comments from federal, state, and local governments, industry, non-governmental organizations, and the general public on the range of alternatives considered, specific environmental issues to be evaluated in the EIS, and the potential impacts of the alternatives for an ODMDS designated offshore of Apra Harbor, Guam. Scoping comments will be accepted for 45 days, beginning with the date of this Notice. A public scoping meeting is scheduled on the following date: December 6, 2007, from 6:00-8:00 pm, at The Weston Resort Guam, 105 Gun Beach Road, Tumon, Guam. The EPA presentation will be followed by public comments and questions.

ACTION: Notice of Intent to prepare an Environmental Impact Statement (EIS) to designate a permanent ocean dredged material disposal site (ODMDS) off Apra Harbor, Guam.

PURPOSE: EPA has the authority to designate ODMDSs under Section 102 of the Marine Protection, Research and Sanctuaries Act (MPRSA) of 1972 (33USC 1401 et seq.). It is EPA's policy to publish an EIS for all ODMDS designations (39 FR 37119, October 1974). Comments on the scope of the EIS evaluation will be accepted for 45 days from the date of this notice.

FOR FURTHER INFORMATION, TO SUBMIT COMMENTS, AND TO BE PLACED ON A PROJECT MAILING LIST, CONTACT: Mr. Allan Ota, U.S. Environmental Protection Agency, Region 9, Dredging and Sediment Management Team (WTR-8), 75 Hawthorne Street, San Francisco, California 94105-3901, Telephone: (415) 972-3476 or FAX: (415) 947-3537 or E-mail: R9Guam_ODMDS_Scoping@epa.gov.

SUMMARY: EPA intends to conduct public meetings and collect public comments in advance of preparing an EIS to designate a permanent ODMDS off Apra Harbor, Guam. This EIS will be prepared in cooperation with the U.S. Department of the Navy (Navy). An EIS is needed to provide the environmental information necessary to evaluate the potential environmental impacts associated with ODMDS alternatives and select a preferred alternative that meets EPA's site selection criteria at 40 CFR 228.5 and 228.6.

NEED FOR ACTION: Both the Navy and the Port Authority of Guam (PAG) have plans to expand their operations in Apra Harbor, Guam. Expansion of the Apra Harbor Naval Complex and Commercial Port is proposed to accommodate projected increases in vessel and cargo traffic, newer classes of vessels and dockside maintenance and support operations. Expansion plans would require dredging to increase water depths for the safe navigation of military and commercial vessels. In addition, ongoing navigation activities also require periodic maintenance dredging. It should be noted that designation of an ODMDS does not constitute approval of ocean disposal. The US Army Corps of Engineers, with EPA concurrence, must first determine on a case by case basis that the proposed dredged material is suitable and that all beneficial reuse or other alternatives to ocean disposal have been considered. However, not all of the anticipated dredged materials can be accommodated in existing landfills and these sediments may not all be suitable for beneficial re-use (e.g., construction fills, wetlands restoration). Therefore, it is necessary to establish a permanent ODMDS to accommodate dredged material generated from anticipated new work and maintenance dredging in Apra Harbor.

ALTERNATIVES: The following proposed alternatives have been tentatively defined.

- "No Action" - Do not designate a permanent ODMDS, and continue to manage dredged material generated from new work and maintenance dredging with existing landfill and construction fill options subject to disposal volume limits. Future expansion of the naval and commercial port facilities will be limited significantly.
- "North Alternative ODMDS" – Designate a permanent ODMDS north of Apra Harbor, Guam, in a study area approximately 12-15 nautical miles offshore and in depths ranging from 6,000 to 6,600 feet.
- "Northwest Alternative ODMDS" – Designate a permanent ODMDS northwest of Apra Harbor, Guam, in a study area approximately 9-15 nautical miles offshore and in depths ranging from 6,600 to 8,400 feet.

The North and Northwest study areas were identified in the Zone of Siting Feasibility (ZSF) Study, Ocean Dredged Material Disposal Site, Apra Harbor, Guam, Final Report (September 2006). This ZSF study excluded areas from further consideration, such as: shipping lanes, navigational hazards, military operating areas (i.e., for submarines), marine protected areas (i.e., marine preserves), and important fishing areas (commercial and recreational).

ESTIMATED DATE OF DRAFT EIS RELEASE: March 2009

NOI Scoping Meeting Transcript

PUBLIC SCOPING MEETING FOR THE PROPOSED DESIGNATION OF AN OCEAN DREDGED MATERIAL DISPOSAL SITE FOR GUAM

December 6, 2007

PREPARED BY: GEORGE B. CASTRO
DEPO RESOURCES
#49 Anacoco Lane, Nimitz Hill Estates
Piti, Guam 96915
Tel: (671)688-DEPO * Fax: (671)472-3094

PUBLIC SCOPING MEETING FOR THE PROPOSED DESIGNATION OF AN OCEAN DREDGED MATERIAL DISPOSAL SITE FOR GUAM

Public Scoping Meeting for the Proposed Designation of an Ocean Dredged Material Disposal Site for Guam, was taken on Thursday, December 6, 2007 at the hour of 6:33 p.m., at The Guam Westin Hotel, Tumon Bay, Guam, before George B. Castro of Depo Resources. That at said time and place there transpired the following:

PRESENTERS

Ms. Faith Caplan,
AICP Senior Planner, TEC Inc.

Mr. Brian Ross

Mr. Allan Ota

ATTENDEES:

Celestino Aguon	Department of Agriculture
Ed Aranza	Guam Environment Protection Agency
Rick Reins	Environmental Engineer
Chip Brown	EA Engineering
Amelia Deleon	GCMP/BSP
Jay Gutierrez	Department of Agriculture
Cole Herndan	Recycling Association of Guam
Jesse Rosario	GFCO
John McCarrall	US EPA
Bob Okoniewski	AAFB
Robert Shambach	EA Science and Technology
Michael Wolfram	US EPA

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TUMON, GUAM, THURSDAY, DECEMBER 6, 2007; 6:33 P.M.

OPENING REMARKS BY
FAITH CAPLAN

MS. CAPLAN: Okay. Hafa Adai. Welcome. Thank you for joining us this evening. We know that this is a busy time of the year and we really appreciate you taking the time out of your schedule to come to this meeting.

The purpose of the meeting is U.S. EPA's proposal to establish an ocean disposal site for dredged materials. There had been a lot of other meetings in Guam lately. In fact, there's one tonight that we're conflicting with, that's a Civilian Military Task Force Meeting.

I just want to emphasize at the beginning that this project and this presentation has nothing to do with the military in any respect. It has nothing to do with a project that Government of Guam might be coming up with. It has nothing to do with Ordot Landfill, anything. This is all about

EPA's proposal to designate an ocean disposal site.

So the format for tonight's meeting, I know it sounds a little formal, there are so few of us here, but the only way we're capturing this meeting is through the microphones. So, that's why otherwise we could just all sit around the table and chat.

So what we're going to do is have a 20-minute presentation by the EPA representatives. And then we're going to take a 10-minute break and reconvene and at that time, you'll have an opportunity to use the microphone and present your comments.

Besides giving us oral comments this evening, you can also turn in a comment sheet. You can drop it in the box by the back door. You can -- if it's only one sheet, you can fold it, put a stamp on it, stick it in the mailbox. You can also e-mail your comments, and all the addresses are on this form. The due date, the end of the scoping period is January 11th, 2008.

There are a couple of minor things I want to mention before we start. We ask that you please hold your questions until the second part of the meeting. This door is shut but only so that nobody comes in and interrupts the presentation. If there's an emergency, please do use that door.

And now, I'd like to introduce Mr. Brian Ross who will begin the presentation followed by Allan Ota.

PRESENTATION BY BRIAN ROSS

U.S. ENVIRONMENTAL PROTECTION AGENCY

MR. ROSS: Okay. Thank you, Faith. And once again thank you all for coming. I know it's a busy time of year and apparently the traffic has been quite bad at this time of night. So thanks again for coming.

Again, we're here, Allan Ota and I, from the U.S. Environmental Protection Agency in San Francisco. We are in what's called the Dredging and Sediment Management Team at the EPA Office, part of the Water Division. And we, our team, manages ocean dredged material disposal sites all around the Pacific and the West Coast of California. But Guam doesn't have one and we'll tell you a little bit about why.

Aand how we're going to divide this up briefly.

I'm going to go through a few slides to talk just generically about dredging, what it is, and most of you probably know a little bit about dredging and disposal. Aand then about what it takes to designate an ocean disposal site, all the things we make sure we avoid in terms of impacts, how we go about the process., Aand then Allan is going to come up and tell you in more detail specifically about how that process will be applied here in Guam and the kinds of specific things we've already been doing to look for the environmentally best places to manage dredged material in Guam. So, Allan?

The other thing we're going to do is end up by showing you the alternatives that we've tentatively identified to evaluate in the Environmental Impact Statement we're about to start on. And this is, of course, the scoping phase of the process.

So, we're here specifically to give you an initial idea of what the proposal is and how we're going to go about looking into it and evaluating it. And what we especially want is your feedback on what we're doing; are we looking on the right kinds of things and are there data sources or information that we may not know about already from our initial look that we need to consider in the EIS that we're about to start?

So, next. Dredging, is some, you know, the act of removing sediments from the bottom, is necessary for safe navigation and it's necessary just for the maintenance of existing approved facilities in and the water depths that are approved for those facilities. Once again, this is, the idea of dredging is, happening now anyway. It has really nothing to do specifically with any port expansions or Navy expansions or anything else.

You may need to dredge even existing facilities. When there is a need and it does get approved to expand a facility, then dredging is needed for that too. In general, those kinds of dredging projects can generate much larger volumes of material that have to be managed somehow.

Again, dredging, you've probably seen

it go on around the Island at sometime. These are some pictures from San Francisco that are very large equipment. But dredging is basically, in the Islands, usually a mechanical operation., craneCrane-mounted buckets that drop down, scoop up mud from the bottom, raise it up and swing it over into a barge and dispose it or place it into the barge. And in this particular photo in the background, you see them starting to fill the barge on the left which is rising. Iding, i, it’s basically empty, that’s why it’s riding so high up in the water.

And the barge on the right, has already been filled, and it’s waiting to be towed out to a disposal site. And it’s many feet deeper, it’s even deeper in the water because of the load of dredged material it’s carrying.

Once dredging happens, where does the material go? Sometimes sediments that get dredged up are contaminated and when the sediment is contaminated it typically has to be handled at specialized facilities that can handle the contaminants associated with that material.

I want to really emphasize that's not ocean disposal. Ocean disposal can only be an option even, for material that's clean. It passes a variety of tests that we'll talk about.

The good news is that most sediments really, nationally and probably most sediments that will be dredged in Guam are clean, clean enough to have several options. And under our regulations and Federal Regulations and also the policies of most states and certainly the policies of Guam, whenever possible we want to see that material, even when it's clean, be recycled in some way that we call beneficial reuse. We want to see it used in some productive way rather than disposed as a waste anywhere. But often beneficial reuse projects aren't available at the time a dredging project has to happen. And when that's the case then some other kind of disposal has to be sort of the next choice. And land or ocean disposal options are those next choices.

In Guam, and in a lot of Pacific Islands, the land option is very limited. There are a lot of concerns and impacts that happen if you're starting to fill other lands and some of the other impacts associated we'll talk about. And when that's the case, having an ocean disposal option is quite important. It may be even more important than it is for mainland projects. It is only an option though. It's one of the options in your toolbox to make sure you have the ability to manage dredged material as best you can.

So this is just a very brief flowchart. It starts with when you have a need for dredging, you have a project. One of the first steps is the sediments have to be tested to determine whether they're clean or contaminated. And again, most sediments are not contaminated, but when they are, there are still some options for beneficial reuse but it's much more limited. The sediments have to be managed very carefully, usually in some kind of a contained manner and a specialized facility and in extreme cases you may be looking at the need for treatment.

On the other hand, when the sediments are clean, and again most of the volume of dredged material does end up being clean, then a lot more options are available. And, again, beneficial reuse is the first choice for various kinds of projects if you can get them to line up properly with the dredging need.

Habitat creation, we do a lot of that in California. And we do a lot of beach nourishment with clean sand that comes from dredging projects. Dredged material is, depending on the physical characteristics of it, can be great for construction fill. If it's very silty, wet material, it's often not very good for construction fill but it might be good for habitat creation if you have such a need.

If beneficial reuse isn't available, land disposal is another option and as is ocean disposal. But, again, Guam currently has no ocean disposal option, so the toolbox for Guam is not complete. And that's really what we're here to start working on.

Once you do have an ocean disposal site, and probably you guys have seen these kinds of things before, the dredged material is placed in the barge. In this case, this is a picture of a scow filled with dredged material being pushed out to an ocean disposal site. And so, the material is physically pushed out.

An important thing to note here is that this barge is not a huge barge from ocean-going scow standards, but that probably is still holding about a thousand yards or more. And the equivalent of this, if it was being handled on land and having to be re-handled from one piece of equipment to another, that would be roughly 100 truck loads. And so, environmentally, if you don’t have to do that, you’re handling it once rather than 100 times to move the same volume of material.

Well, when it gets out to the disposal site, these barges are split hull barges that are typically used. split Split hull barges like this, where the entire barge is hinged and the bottom just opens up, the entire hull opens up and the dredge material in the barge will fall out literally in a matter of seconds. So, it’s sort of like a big dump truck used on land. But much more material being handled and the disposal is very fast. We’ve got a hundred trucks in that case worth of material in one minute probably being dumped. So, that’s how you get it there.

But when can dredge material go to the ocean, an ocean disposal site? Well, under the Marine Protection, Research and Sanctuaries Act, that's our governing Federal Law and the EPA regulations for ocean disposal that are under that act. Again, as we said first, only projects beneficial use or something like that is the first choice. You have to look to those kinds of options first. And in fact, we cannot allow an ocean disposal permit to be issued if there is an alternative that would have less environmental impact and that would be available and practical for that dredging project.

I want to emphasize that for just a second. There are lots of kinds of beneficial use, but in reality when it comes to matching up a dredging project with a beneficial use project, it can be quite challenging. So logistics; it's not just a matter of cost, it's not just a matter of chemistry, it's also a matter of logistics.

So if, for example, the Port of Guam has a new berth that they'd like to build, the

Navy has some dredging that they're doing, I'm just making this up entirely, in the past but there might be an opportunity to put those kinds of uses together, b. But if the dredging, the navigation need for the dredging project has to happen, you know, this year and the permits for the fill, the new site to place that material aren't going to be ready for five years, those don't match up.

So, the lesson is that we encourage and the law encourages beneficial use first but it's simply not possible all the time. So again we need something like an ocean disposal site to be able to manage dredge material and dredging projects when they have to happen in an environmentally appropriate way.

So if, again, there are no alternatives, then the materials still has to be cleaned. And this chemical testing and biological testing step is quite important. EPA directs and has to approve all that testing, all the sampling that happens. Aand there's not only the chemical testing to show that the material isn't contaminated to a degree that would be a problem in the environment, but also there's actually seven separate biological tests that get run.

So, the ocean dumping regulations are actually some of the most stringent we have in terms of sediment quality and where thea material can go.

So, finally, where can the dredge material be placed? It's critical to understand that dredge material can only be disposed in the ocean at designated sites that EPA designates and that's, in fact, what this process is about. And we have very strict standards in our regulations for the kinds of things that we have to do to make sure we're picking the environmentally best location to place even clean material. It still has to go in a location that's not too sensitive.

So specifically, these sites must be located in places that avoid interference with other important uses of the ocean and specially things like fishing. Fishing, navigation lanes, military areas, areas that, either for safety purposes or otherwise, have to just be off limits to us disposing of dredge material.

Also, the sites have to avoid

significant environmental impacts as well. So beaches, shore lines, important habitats like coral reefs, the coastal zone in general, all these things are things that are important areas that we try to avoid when we're looking for where we can place a new disposal site.

And then finally, the regs actually also require that we try to use sites that were used in the past if possible just so that we're not having cumulative effects of mud being placed on the bottom in more than one place, unless those old sites really were not environmentally appropriate.

Okay. With that, that kind of brings us to Guam. We have this general approach for the kinds of things we do and avoid. Well, how does this all fit together for Guam? Allan Ota is going to walk you through a little bit of that and we'll get into more details. Thank you.

PRESENTATION BY ALLAN OTA

U.S. ENVIRONMENTAL PROTECTION AGENCY

MR. OTA: Thank you, Brian. Guam did have an interim ocean disposal site, however it expired in 1997. And beginning in today's or this year's site designation process, it would not meet the screening criteria.

There's an existing need for dredging and the need covers a variety of facilities, existing portcourt, Navy and private facilities. And, you know, these facilities need periodic maintenance dredging, as already described earlier. But also the need expands further with possible expansions. So that would generate material during the construction phase as well as generate even more volume for maintenance dredging. And under the current management scheme, all of this material will have to go to land. So the need for an ocean disposal site, I think, is very prominent and kind of obvious for this island.

We've talked about this already, beneficial reuse is preferred in general but it's not possible for all dredge material from all projects, and I think we've already touched on this, you know, logistics and timing for specific projects, may not allow this to happen.

Existing land options are limited and

the land sites have their own environmental impacts. So, again, ocean disposal would be an important additional option for managing clean dredge material for Guam. And, again, the whole idea of, you know, let's complete the management toolbox for Guam.

A site designation typically begins with something called a Zone of Siting Feasibility Study. And this study requires collecting existing information which allows us to do a few things here, including identify an economic disposal distance within this zone, identify areas to avoid including fishing areas, sanctuaries, important habitats like coral reefs, we've already talked about that, shipping lanes, military operating areas, to name a few. And then once we've gone through that process of identifying those areas to avoid, then you're left with areas that have not been eliminated, and these are the areas that would be further evaluated in an environmental impact statement.

So here are the results of the Zone Siting Feasibility Study that's been conducted this year in 2007, and I'll just run through a series of slides that show a succession of layers.

And here's the first layer. It shows the navigation and coastal zone. And the next slide shows the military operating areas and safety zones. And the next slide shows the fishing resources and sensitive habitat areas. And the dots you see scattered about the Island on the west, south and north are fish attraction device locations.

And then, finally, we've added the economic disposal distance layer. And once we've completed this, you'll see that there are two white areas on the map and these are the areas that have not been eliminated by this initial feasibility study. And, you know, these are the areas that we will be proposing to conduct further studies in and make our evaluation and hopefully identify an ideal disposal site within either of those areas.

This is a zoomed-in view of those two white areas. And I want to emphasize that any ocean disposal site that ends up being located would not encompass the entire area of either these alternative study areas. In fact, the disposal area would actually occupy a much smaller portion of either of those study areas.

And the yellow circle depicts what we expect to be the disposal site location. In this case, in the lower site, lower area there, if that turns out to be the right spot.

And then we've done -- we've conducted preliminary oceanographic computer modeling. And the modeling has basically indicated to us that the sediments would fall to the bottom and occupy an area the approximate size, which is depicted by the gray circle. So just imagine that this disposal site would occupy a much smaller area within either of these alternative study areas.

It's also important to note that the dredged material that ends up falling and occupying the seabed within one of these designated areas would remain far off the coast of the Island of Guam. Again, we're addressing some of those impacts that have been already described as far as avoiding impacts to the coastal zone et cetera.

The next step that we would be embarking on soon will be to conduct field studies within the alternative study areas. And these are going to be including a year-long oceanographic program that would be collecting data to characterize ocean currents and water properties. In addition, there would be chemical and biological baseline surveys to characterize the sediment chemistry and also the biology including bottom-dwelling organisms and the fish in the water.

At the completion of the baseline studies, the idea is to analyze the data, and in consultation with the agencies and with public review, identify the best site within either of the alternative study areas. And the information will be incorporated into an environmental impact statement.

Tentatively, we've identified three alternatives and these have also been identified in the Federal Register Notice and Public Notice. And they includinclude:e, designate one site in either of the study areas, the northwest or the north, and then the third alternative is a no action alternative, which is to continue under the current management scheme with only land disposal.

So, in summary, what's next? We expect to embark on field studies of a year-long altogether, beginning in January 2008 and concluding in January 2009. Then the next step is to analyze all of the data, the existing data, as well as the data collected from field studies, and do a detailed evaluation of the alternatives and then compile these this information, incorporate it into a draft EIS, and the target is Spring 2009.

We want to remind everyone that there are ample opportunities for comment during the site designation process. The yellow box indicates where we are right now. We are, you know, accepting comments during this public scoping meeting and during the scoping comment period.

After that, when the draft EIS is issued, there'll be two more opportunities there, public meeting and as well as the comment period. We're also going to be conducting our consultation with all the agencies indicated there. And when the final EIS is published, there will be a concurrent publication of proposed rule, and that will be another comment opportunity.

The estimated end completion date for this site designation is the end of 2009. And we'll be hoping to receive comments from you in a variety of ways. Give us verbal comments tonight, give us written comments. We've got the comment sheets that you've been told about already and we have an e-mail box that you can send messages and comments electronically as well as the mailing address indicated there for regular mail. And, again, I just want to remind everyone that the scoping comment period deadline is January 11th, 2008.

MS. CAPLAN: Thank you, Brian and Allan. We were planning now to take a 10-minute break. There's so few of us here, maybe we can make it a 5-minute break. Is that okay? No reason to drag this out. One of the values of having the 10-minute break was so that -- yeah, so just five minutes. We'll see you in five. Thank you.

(Off the record from 7:00 p.m. to 7:12 p.m.)

MS. CAPLAN: Okay. Thank you, everybody. We're going to reconvene here. If you could please take your seats, we'd appreciate it. So the way this is going to work is we're going to have Allan and Brian up in the front of the room to answer your questions.

We have John Sato (phonetic) in the corner there. He'll be recording key themes or issues that we hear about tonight. And then we have David -- there he is. David MorrisMoore, the man with the microphone. Since this is being recorded tonight and it will be transcribed later by somebody who's not even here, we do need to capture everything on the microphone.

So, before you speak, David will call on you to speak. I understand that there's a gentleman who has another engagement and would like to speak first. So can we start with this gentleman, please?

PUBLIC COMMENT BY ED ARANZA

GUAM ENVIRONMENTAL PROTECTION AGENCY

MR. ARANZA: All right. Good evening, my name is Ed Aranza from Guam EPA. I was wondering what type of training the Feds can provide the state employees regarding dredging and monitoring of dredge material and that type of activity.

MR. ROSS: Sure. I can’t tell if you can hear me but -- okay. Thanks. Yes. Actually, we don’t have a formal program set up, but I can tell you that, yes, we can help with that. Actually, the Corps of Engineers andin EPA nationally, do put on a training program called the Dredged Material Assessment and Management Seminar.

Usually every couple of years, somewhere in the country -- and actually I think in April, there will be another one, that’s a four or five-day course in Sacramento. So that’s a national course. In addition, I can’t commit to particular times or dates because of our travel dollar situation, but I can tell you that a few years ago we came out and helped put on some training for agencies about 404 and wetlands.

We could certainly look for an opportunity to do even a more personalized kind of training, more focused on the islands than this national seminar would do at some point with you all. And the types of issues that are covered in this training is basically a little bit about dredging itself, but it's mainly about how to sample sediments and the testing we do to determine whether the sediment is suitable to be used for different uses like ocean disposal or landfill or whatever like that.

So, yeah, April -- and I can make sure, if you leave us your e-mail address, I'll make sure that as soon as the actual details come out, I'll send you information about the April training in Sacramento. But also we could start a dialogue about whether we can get some more specific training out here, certainly by the time we have an ocean disposal site to start using, which would be, you know, 2010 before we're actually using one here.

MS. CAPLAN: Before we go on to our next speaker, I would like everyone to please announce their names to everyone, so we can all know each other. And also, if you're representing someone other than yourself, an organization, if you could mention that organization as well, we'd appreciate it.

Thank you.

PUBLIC COMMENT BY RICK REINS,
ENVIRONMENTAL ENGINEER

MR. RAINS: My name is Rick Reins Rains(phonetic), I'm an Environmental Engineer. I'm here representing myself. I have a question. If you could bring back up the map that shows the two -- where you had the dots in the areas that you're going to study. You made a comment that says that you're going to avoid impacts to important habitats within these two areas. And, what is found -- number 1, what is found at the bottom of the ocean in these areas at 6,000 feet and what studies are you going to do to find out what is down there and the potential impacts?

MR. OTA: The deep ocean environment typically is pretty nondescript. I mean, with the exception of, for instance, in the northwest alternative study area, there is this pinnacle located in the northwest part of the northwest alternative study area. You know, it's a feature where we might expect to find something, you know -- yeah.

But, in general, in most flat deep areas, fine grains, sediments, it's, you know, you'll find typically not a whole lot in terms of, you know, large communities because of the overall nature of the deep sea. There isn't a lot of organic matter in general relative to, you know, closer into shore and shallower environments which may be, you know, may have sources of organic matter that would, you know, supply a larger more robust community of organisms.

So, we're not really expecting to see as much in comparison to what you'd find closer to the island. The type of studies that we'd be doing, as we've described earlier in the presentation, we'll be doing, you know, a sediment sampling to assess the chemical nature of the deep sea sediments. We'll be collecting samples of the sediments in the upper layers of the sea bed to determine, you know, what kind of organism we do find.

We basically expect to find mainly smaller organisms and not necessarily in large or high concentrations, but in any case, you know, the idea is to see what we could find out there. There might be features that you can't see on these generalized maps and we want to be able to make sure that we're not missing anything.

MR. ROSS: Perhaps, I'd like to add just a little bit to that too. We will be doing these studies and looking at the benthic community, the animals that live in the mud, and figuring out exactly what they're like down there, but we'll also be doing fish trolls trawls at depth, to see what kinds of the larger organisms are living down there as well.

And, as Allan said, we don't really expect to find too much in these particular areas that's really unique, but that's actually the whole point of doing these studies. We're looking to make sure that, you know, we really don't know right now other than in general from literature what we expect at 7,000 feet deep in the mud. But we really don't know right out here, is that going to be the case? Are we going to find some hydrothermal vent, you know, on the site of this pinnacle? This area is a little more featureless. But in the north --

but that's the whole idea, is to make sure within these areas, is there anything that we don't know from existing information that we need to avoid? And if we do, since the disposal sites themselves would only take up about that much space, we have a lot of latitude to move them around and avoid things. And so, that's the whole point, is to do all these studies and find the best place to avoid any kind of unique or sensitive habitats or communities.

PUBLIC COMMENT BY CHIP BROWN
EA ENGINEERING

MR. BROWN: Yeah, my name is Chip Brown. I'm with EA Engineering. And if you go back to the previous map, please.

MR. ROSS: The overall?

MR. BROWN: Yeah, the overall. I see the two areas there, but it looks like there might have been a possibility for another area on the -- yeah, that area right there. Can you tell me why that was eliminated?

MR. OTA: Yeah. That's a good question

and we've had a few other people who pointed that out to us. The main reason that that area was not eliminated from further study is because while as a crow flies, it would seem to fall in, you know, obviously falls within the economic disposal distance radius there.

From an economic standpoint, for any dredging projects taking dredge material -- how do you operate? Okay, here we go. There are these other exclusionary areas here previously identified for military operating areas and safety zones and so forth. By the time a dredge scow would be towed out and make a dog leg to the south southwest to avoid these areas, the tow distance actually ends up exceeding the economic disposal distance.

MR. ROSS: And to us it goes without saying, but it may not go without saying to you all that, "Well, hey, you know, this is the open ocean, you know, a barge could go straight and that would be less than 20 miles." When we do site designations like this, we'll actually set up rules. It's a rule making that we do, it, comes from a rule in law, and we would actually make them stay outside of the military operating area and not be going through the official fish attraction device areas, and the safety zones.

We've actually had scows and tugs caught by submarines. It happened in Southern California several years ago. A sub caught, the tower of a sub caught the cable that was towing between, behind the tug up to the scow, caught it and pulled them right down and I think a couple of people died. It's a matter of safety, we would specify that the route that barges have to take to get to the disposal site. We would not let them go straight to that site for safety purposes. So, then yes, then it becomes outside the economic distance at that point.

MR. BROWN: Okay. Thanks. I think I just have one more question. On one of the slides when it says, "When can dredge material be disposed of in the ocean?" It says, "Biological testing sediments are subject to seven separate tests for toxicity and bioaccumulation." Can you explain a little bit what those seven tests are?

MR. OTA: Yeah, sure. The tests are

divided into two different types of media. There is a suspended phase, it's basically a water column exposure test and there're three of those tests. And then the other tests are related to solid phase exposures, animals that are exposed directly to the sediments. And two other tests involved or two of the test organisms are designed to assess the acute toxicity and then the remaining tests are to evaluate the potential for chronic or bioaccumulation exposures.

So altogether, you know, the tests actually assess the potential impacts from different niches and also different feeding types and it's basically a testing scheme that is designed to evaluate the potential for all these various pathways basically.

MR. ROSS: And one small bit of elaboration on that as well. Not just the pathways but also the timeframes. The water column tests are specifically short term exposure test. So this is when the sediment, you know, we're talking 6,000 feet of water here, right? You're going to dump from the bottom of these barges and it's going to fall down and the heavier stuff’s going to fall faster and closer and the finer stuff’s going to spread out farther and stay in the water column longer.

So, the suspended phase tests are designed specifically to look at whether there’s any toxicity or any problem to a sensitive, usually planktonic type or organisms like that, might be exposed for shorter periods of time in a water column. Whereas the solid phase test, as we call them, the benthic toxicity and the bioaccumulation tests are much longer exposures and are looking for what happens, you know. B, because, frankly, most of the exposure is going to be to animals that are exposed to it for a long period of time on the bottom. So, we cover acute and chronic, we cover short-term and long-term and then we cover various, as Allan said, various different feeding types.

PUBLIC COMMENT BY COLE HERNDAN

PACIFIC DIVERS CLUB

MR. HERNDAN: I’m Cole Herndan from the Pacific Divers Club. Yes, I was wondering a number of things. Back in 1975 August, the tugboat Hamburg was towing out the 715-foot luxury liner, the Caribia, and Tropical Storm Mary spun up and they had to cut the cable and the thing slammed into the breakwater. And they had to get a salvage team out here and cut that 715-foot luxury liner into 400-ton sections and lift it out with floating cranes. I was just wondering, well, what kind of preparations do you have, say, how far into a Typhoon Condition, say, 3 or so, that are you going to be operating and is there any possibility that you would get caught up and not know what to do with your load because you got such a tight work schedule? that That -- one of the lessons they learned from Super Typhoon Pamela, which end up destroying a lot of the water craft, a lot of the ships, there's a couple of ships sunk up over there by Gabgab reef. One called the Slidrey (phonetic), the other called the Peace Ocean. Because they found out after Super Typhoon Pamela hit in May 1976, that the harbor was not a good place to store your boats because the entrance is like 500 yards across and there's really no good place to put those, that equipment. So what's your plan for all that equipment? And, surely we're not going to have another situation like the tugboat Hamburg that cuts its cable loose and you got the ship slamming into the breakwater and when --

MR. ROSS: Yeah.

MR. HERNAN: -- obstructing, they had to get a salvage team out there because they were afraid that thing was going to obstruct. That's navigation.

MR. ROSS: That's a really, really good question. One of the things that's a big issue, for us, and it's the kind of thing we do talk about in the EISs for designating an ocean site, is, we're talking about ocean going equipment, going out into uncertain and rough conditions and accidents can happen and negligence can happen. And believe it or not we actually do put a lot of thought into that sort of thing in the way our regulations work.

I put this slide up as a little illustration of that. Off San Francisco -- and what does that have to do with you guys, right? Well, it actually does a little bit. Off San

Francisco, we have a deep ocean disposal site that’s actually 55 miles offshore in almost 10,000 feet of water. One of the big public concerns going to that EIS was just what you’re mentioning. It’s wait a minute, how or -- well, there are a lot of concerns that I can talk about, but you’re going out on into the open ocean conditions. “We, the public, we’re worried about a couple of things. We’re worried that you’re going to go out in these big waves -- and this is, by the way, all the way out to here (indicating). This is National Marine Sanctuary they’ve got to transit through. ”

“And so, we’re afraid you’re going to be leaking or spilling the mud on the way. We’re afraid that you’re going to be, since you’re going through the traffic lanes with these fairly slow moving tugs and it’s a busy port, that we’re going to have concerns about collisions and accidents especially in bad weather. We’re concerned that you’re going to have somebody cut a drift out here because they lose power. That’s about a 20-hour transit out there.”

MR. HERNAN: Wow.

MR. ROSS: And those are very real world questions that you brought up. And what we have done on this particular site, we've put a lot of thought into it so it is just sort of operational safety kinds of things. It's not just safety for the operators, that's very important, but safety for the environment as well. And so one of the things that we worked out in San Francisco for this site is that they can't even begin a trip out to the disposal site if the sea state is above a certain site wave size.

MR. HERNDAN: Right.

MR. ROSS: And if they -- literally every -- in fact, let me show you one other slide real quick. Every tug, every single trip that goes out to the disposal site has to go through a checklist before they can even leave. In that case, part of it is, it happens that in San Francisco it's a 16-foot sea with, I think, a 9-second or less period because then the seas are too big and too steep and you're going to start spilling material. And we don't want spilling through the sanctuary. They can't even start. Their tracking systems have to be working. They have to have checked a certain weather buoys offshore to look at the sea state predicted over the next 24 hours.

So, we work out a lot of that stuff and we end up having some fairly conservative requirements so that they don't even go out when it gets, when it's knowingknown, you know, we know that it could be dangerous. But, you know, I won't sugarcoat this, accidents still happen at sea. We've had a tug go down and the good news is (no one died) and we've had some barges leak through the sanctuary. Some of that's negligence. And when it's negligence, EPA takes enforcement actions. And we've issued some big fines to people who are not doing everything they should do to avoid these kinds of problems.

But, occasionally there are accidents that really are accidents. And the good news is, going back to all the sediment testing stuff, if there is a barge that's lost or for safety reasons has to cut its load or something like that, we know it's going to be clean material chemically. It's going to have some physical impact perhaps, depending on where it lands and somebody's going to be responsible for that if it's significant but it's at least going to be clean material.

So, when you add all these things up we've actually had a pretty good track record of being able to manage this kind of thing. But part of it is just that it's avoiding the things that you can avoid, and that tug that got clipped by the sub down in Southern California taught everybody some lessons about that kind of thing.

So, those are really good questions. Now, I think, if I can say one more thing. You also asked about equipment. Anytime you have a disposal site that's well offshore in open ocean conditions, Guam or San Francisco, little, tiny, mom and pop marina-type barges are often not what's going to be safe to go there. So it's going to be, tend to be larger equipment, larger tugs and again we require the vessels to be certified and that sort of thing.

But, it's a -- so it's not the answer for everybody. You know you can't just go out there in a little boat on a Saturday and do this. But it should be helpful for managing dredged material for a lot of larger projects.

MR. HERNAN: The thing was that most ships if they came they get out of port because Apra Harbor is not a good place to keep your boat in during typhoons. That was the lesson from Pamela. Many ships, in fact there's a USS Topoa --

MR. ROSS: You've got one on the reef right now. You've got a barge in your area --

MR. HERNAN: You got USS Topoa, the US Navy tugboat, the YTB 419, that sunk right off Reserve Craft beach during Pamela.

MR. ROSS: Yeah.

MR. HERNAN: And I was just wondering if they try to get that equipment out to sea away from the typhoon or exactly what do they do with that?

MR. ROSS: Well, when its dredging equipment -- it's probably pretty questionable where the safest place to put it.

MR. HERNAN: Yeah. Right.

MR. ROSS: I don't know whether offshore, on a flat barge with a derrick that's 200 feet high is the place to go, but --

MR. MOORE: Thanks. The type of dredging that's going to happen most likely for some of the -- particularly for some of these larger projects, is going to be mechanical dredging. So, it's going to consist of basically a crane on a barge.

If weather predicted like a typhoon is coming in, they can actually demobilize that equipment off the barge. And so, basically, you're ending up with a flat barge that you're going to have to find a place to tie that up during the storm. But as far as the actual equipment that is used to excavate and everything else, they can get that off the barge and it's towed away some place.

MR. ROSS: This is a pretty good size equipment, I'm showing the picture here; a flat barge and a large crane that can be rolled off. But a smaller, you know, a smaller equipment is often used on smaller projects as well, but I think that's -- yeah, like anything else in terms of maritime safety that, you know, that the operator needs to be on the boat too.

MR. HERNAN: There's an excellent documentary done on the salvage of the Caribia done by the Army Corps of Engineers. And if you go on the internet, you can pull up Caribia. Excellent information on that. It’s just fascinating, the salvage work they did on that. I’ve seen that documentary many times that that’s how I remember all these names and facts and dates.

MR. ROSS: That’s great and we’ve got it. We’ll make sure we take a look at that stuff. Thank you.

MR. HERNAN: And, let’s see, one other thing. Some of those areas, I’ve dove out there in the harbor, I’ve come across World War II ordnance. Any chance you -- you’ll be a -- and even found a nice big huge Japanese anchor, which unfortunately was right at the end of the dive. We were diving deep about 130 feet down and didn’t have the time to put a float on it or anything like that, just saw it in the distance. But, you know, not too far off there -- out there, out from hotel warfare (sic) is where I’ve seen two, what look like two depth charges. They had like tie points for like a wing or something and a wheel. I think -- and I looked at a book on ordnance and it looked very similar to that.

MR. ROSS: Well, in general, things like unexploded ordnance and frankly just any other kinds of debris when we're working around ports and frankly when we we're working around Navy bases anywhere, it's an issue in Pearl, it's an issue in Long Beach. It's not unusual that in the act of dredging and especially if it's an expansion project that you're deepening an area, deeper than it's been, you know, maintained to. Maintenance projects usually where every year or every two years whatever they go in and they just skim it off down to the same authorized depth every time. You usually don't see a whole lot of debris unless it's something they just dropped.

But debris in general is something that is an issue especially on these new construction deeper work projects and in certain areas. UXO is an issue. We've dealt with this quite a bit in San Diego and in Pearl and -- you know, there's no one answer other than, you know, when we do the upfront surveys and things, we're looking for that kind of thing. But even then, occasionally, something unexpected comes up and so debris management plan, every project has to follow what's called a dredge operation plan. And to the extent there's any concerns in general about the area, we'll make sure that -- and the Corps of Engineers make sure that there're provisions for what you do if you come across anything like that in the bucket when you're bringing it up. It can be a real safety issue and it's a real world thing.

MR. HERNDAN: Not only that, but part --

MS. CAPLAN: Excuse me, sir. These are great questions, and they're wonderful, they're educational for everybody, but it would be kind of nice, would you mind if we shared the microphone with someone else, to give everybody a chance to speak. Thank you.

MR. HERNDAN: Okay.

MR. ROSS: We can make the rounds a few times.

PUBLIC COMMENT BY BOB SHAMBACH
ENVIRONMENTAL CONSULTANT,
EA SCIENCE & TENCHOLOGY

MR. SHAMBACH: I'm Bob Shambach. I'm with the EA Science and Technology here on Guam, Environmental Consultant. Just a quick, I do have a couple of questions, hopefully they'll be quick though. I noticed that there's a zone of siting feasibility study that was done in September '06. I was wondering if that's posted on your website or is that available electronically or is that even of interest for something like this?

MR. OTA: All right. You're referring to a zone of siting feasibility study --

MR. SHAMBACH: Study. It say's that the final report was done September '06. Is that right?

MR. OTA: Was that the date?

MR. ROSS: Yeah.

MR. OTA: Okay. Okay. I was just momentarily confused. Yeah, okay. Yeah, it is available. It's a final document and we, you know, we hope to have it up on a website, which we haven't created the link yet, on our EPA web page. But we do have copies available that we could supply on CD.

MR. SHAMBACH: Okay. Thanks. Next

question. How long would this disposal site be permitted or is it a permitted site? What's the length of use that you foresee?

MR. OTA: Typically these site designations are good for 50 years.

MR. SHAMBACH: Okay. And then a follow up to that then. As part of the ZSF or that siting feasibility study or the EIS, are there going to be estimates on your usage, say over a 10, 20, 30, 50-year plan, as far as volumes that, worst case scenario, volumes that you would be dumping out here?

MR. OTA: Yes, there is. In fact, the zone siting feasibility study incorporated what we think were worst case scenario volumes for projects that could potentially be using the site, you know, should beneficial reuse, you know, options not be available because of logistics or timing or whatever. So those were considered.

MR. ROSS: Let's just add to this a little bit. The modeling that was done for the initial information that we gave here and showing the size of the disposal site, was actually based on the numbers we were assuming in this zone of siting feasibility study report. And that was, in this case, this depth position model that showed, in this case, it’s the gray circle is where you have 1 centimeter of depth position, 1 centimeter or more, less than that, you really aren’t seeing it, but -- so that’s the 1-centimeter circle after a million cubic yards being dumped in one year.

And so, that San Francisco site I showed you for example, because of the needs in San Francisco Bay, we designated that for about a 6 million cubic yard per year maximum. So the EIS we did, that was our worst case, worst reasonable case. And so we evaluated the impacts of that worst case volume and modeled the depth position on the sea floor and all that kind of thing.

So that’s the same approach we take here. Whatever we see as the worst case volume becomes what we evaluate for and make sure there’s no significant impacts of that volume or where the best place to put that much volume is and then anything less than that is going to have even less impact.

MR. SHAMBACH: Mr. Ross, so what you're saying is, whenever you get the -- you're going to choose only one area; you're not going to be dumping everywhere within that boundary? You're going to choose one area that is the area?

MR. ROSS: Absolutely. Thank you for having me clarify that. We have two different study areas to look within and -- you know, as we're kind of showing here, it might be in one, it might be in the other, it might be in a different corner of one or the other, but we are only designating one site in the overall best place environmentally within these study areas.

So the places that we have, the circles here on the graph aren't actual, they're, you know, conceptual, but that's the idea. There would be one somewhere in one of those sites. That's the best place.

PUBLIC COMMENT BY JESSE ROSARIO

FISHERMAN AND RESIDENT OF GUAM

MR. ROSARIO: Hi, good evening. My name is Jesse Rosario. I'm a fisherman and I'm a resident of this island for many, many years. I guess one of the things is -- this is still a scoping meeting so you're looking at alternatives to try and identify sites for a staging area. Have you ever considered the Mariana's Trench?

MR. ROSS: Thank you. That's a very good question. And we've actually have heard people before say that kind of thing. And as you all know better than me, the trench off here (indicating) on the Pacific side is the deepest spot we've got in the world. The reason we're looking on the west side of the island, and we're sort of constraining our look just to the west side of the island here inside this circle, has to do first with economics, of how expensive it is for people to tow. You add more and more miles and it gets expensive for the project whether it's a port or a marina.

And -- but, I will say this, if there ended up being, through our studies and all your comments and working with you all, if it turned out that there were significant impacts in using either of these areas, these are already six or seven thousand feet deep, and we're thinking there won't be any big impacts, we're going to find when we do our studies, but if there were, if we found, you know, completely unique habitats there, I can tell you we'd be having to start from scratch and we'd be having to look at a bigger circle. And that bigger circle would, in fact, have impacts on other projects that would be, you know, some people simply wouldn't be able to afford to use it and then you're stuck back on land again and with land impacts of those.

So, we're going to take our first look and in our experience we think environmentally we probably, we think we can find environmentally acceptable spots within this distance. But if not, if the EIS evaluations, and it's got to be an honest evaluation, and we're looking to you, all of you, to help us review that and tell us if we've missed anything big, but if there were just horrible impacts that we don't know about that we find in those areas, we have to look farther.

MR. ROSARIO: I got another question, basically on the same topic. The issue of, you know, when you start to collect all these dredging, this material, obviously Guam doesn't have the land mass to store this extra soil. What about, you know, every year we get shipping, large ships coming in from foreign country -- Korea and all that, bringing in sands that are used for our golf courses. Obviously, this is not going to be very cost-effective for the government, but environmentally it'll be safe and that's who you are as the EPA, and having it shipped to somewhere like in the dessert of Nevada, out of this island. Because it's, you know, there's some soils that are contaminated caused by the military. I think it's only fair that we don't have to add to the problem but try and rectify, you know, don't compound the problem that we have now because Guam obviously has a lot of problems especially with the dumping sites. And if we create an additional dumping sites it's just going to compound the situation, so.

MR. ROSS: Yeah, I appreciate that comment. I think we're going to make sure we catch it there and we've got it on here too.

The idea that we have is that material that is contaminated, if it's too contaminated to put back in the water, something else has to happen, and I'm not going to sit here and tell you that that something else couldn't be Nevada in some cases. In our earlier slides, when it gets to really extreme levels of contamination, something serious has to happen with that stuff. It could be treatment or something else.

But, the ocean sites here would not be dumpsites for just anything or just anybody. They would only be for clean material and only when that clean material can't be used for something good on the island for some other thing. So, you know, the one thing I would say is I hope you would find when you read our reports that you don't have to worry that we're dumping contaminated material there.

But it still leaves the real serious question: When you do find contamination material, contaminated material, how do you best handle it when you're on an island that's already got a lot of other problems? That's still a real serious question that's still out there. And, having these disposal sites will not solve that problem, you're right.

MR. MOORE: I think we have some more back here.

CONTINUED PUBLIC COMMENT
BY CHIP BROWN
EA ENGINEERING

MR. BROWN: I'm looking at the beneficial reuse priority slide. When can dredged material be disposed of in the ocean?

MR. ROSS: Plan. You said plan, right?

MR. BROWN: Yes, correct. I'm sorry. Chip Brown with EA again.

MR. OTA: (attempts to look for slide)

MR. ROSS: There we go.

MR. BROWN: It says, "Ocean disposal is not allowed if an alternative less environmental impact is available." What organization makes the determination whether less environmental impact is? And, you know, assuming that everything is clean and everything like that, I can't imagine much environmental impact with dumping in the ocean the clean materials. I'm assuming that running a hundred dump trucks across the Island would definitely have a higher environmental impact.

So, I'm just kind of wondering who makes that determination.

MR. ROSS: Every project needs to, before it gets allowed to go anywhere, needs to go through an alternative analysis. And those kinds of things are exactly the kinds of questions to ask.

What this really means is, if there is something that's better to do that's available and affordable, something beneficial. Let's say, for a moment, let's imagine that you're dredging an entrance channel and you're getting clean sand out of it, no contamination and it's just sand, EPA's rules and regulations, and CZMA I'm sure, and every, all the agencies on Guam would say, "We need that on the beaches. That's a resource. That should not be dumped at sea." We're going to make sure we do everything to find an opportunity to reuse that sediment. Okay? That's kind of an easy one.

Rarely do we end up dumping clean sand anymore anywhere in the country, anymore, offshore, because there's almost always some beach nourishment use or something like that or aggregate for making concrete, whatever.

It gets a little more complicated when the sediment is more mixed, if it's siltier, if it's got, you know, maybe a little bit of contamination and it might not be good for this but it might be okay for that or the salt content's too high.

But more important, or not more important, but more often the driving factor is what alternatives are available. In other words, is there a site to take this stuff to that's already got a permit? Otherwise, if you're -- I think I just broke this mic. Is it still working? Otherwise, the idea here is that if you're, generically a particular beneficial use, yeah, it's available. It might be practical, you might have people who know how to do it, you know, on the island. But if the site isn't permitted, if it doesn't match up in the timing that the dredging need has to happen, then it may not be actually available. It might not be practicable.

If you're familiar with the Clean Water Act Wetland Regulations, it's the same term "practicable." It means in the law, available and capable of being done after taking into account cost logistics and technology in light of overall project purposes. There's the quote. But what it really means is, can you really do it for this project? Is it affordable? Is it doable technologically? And sometimes, even then, sometimes it would have greater impact. If you're taking 500 trucks pass past a school, if the infrastructure is going to be ripped up by the trucks, if there's -- on the other hand, there are sometimes places where you can barge the material and put it on a beach too. But, it's all case-by-case is what I'm saying.

And so, every project, when it goes through the permitting project process, before it can be dumped in the ocean, we make them go through and look for whether some of these reuse alternatives are available before they get approved.

So, they typically have their own NEPA process. They certainly have their own Corps of Engineers and EPA permitting process and as well as, you know, GovGuam. If it's going to go upland, they've got theat solid waste process to go through. So, it's not just up to the person who wants to do it. There's a lot of controls on what they get to do.

MR. BROWN: It sounds like something that would be pretty cost intensive then. If someone actually decided they wanted some of this material, they would have to go through all these process. I'm envisioning like a golf course or something like that that wanted to be started in Guam. They would have to go through all these permitting process to be allowed to begin with. But if there was a conflict where maybe the dredger, the Navy, or the Port wanted to dispose the material in one certain way, the other person went through all their permitting and got the permit and they couldn't come to terms, maybe -- who makes that determination if a situation like that comes about where someone wants the material?

MR. ROSS: Uh --

MR. BROWN: Do you see where I'm going with that?

MR. ROSS: I know exactly where you're going, and we do run into those circumstances at times and it's difficult. There isn't a straight answer to that. Sometimes it comes down to money and whose money and who’s being reasonable. Part of the -- one of the tenets of the law though, is that if you’re going to place material at somebody’s property it has to be a willing landowner, right? Unless the government’s going to come in and condemn that land and take it over, and in which case we’d have to pay you, right? We don’t do that, you know. So, you’re right, there’s got to be a meeting of the minds.

Now, one thing that can be done if people in a region and maybe people on the island were to get together and start, you know, all the agencies and the public and everybody start a process, a dredge material management plan-type process where you all work together upfront, not on a project by project basis, but in a planning basis to do just that. To get some sites established.

San Francisco Bay, we’ve -- for the last 15 years, we’ve been doing just that. And so, we have regional sites setup. We’ve been dealing with just some of those issues, because if you don’t deal with those issues for the whole community, then you’re down to what you just said is, you know, this landowner and this dredger and if they can't make an agreement on how much it's going to cost and what day it's going to be there and all that stuff, it doesn't matter twhat the permit say, it can happen.

So, getting together and getting a big plan in place to maximize beneficial reuse is a fantastic thing for communities to get together and do. And it gets the fishermen involved, it gets the dredgers involved, it gets the local politicians involved. When you get everybody in agreement, here's the magic, then you go to Congress. Okay? I mean that's what happened in San Francisco. When Congress saw that we had the environmental groups, and the fishing groups, and the labor groups all backing the same alternatives, the same plan, we got the money to do it. But in the short run, before you get all that set up, we still have this process where we're still going to not let people dump anything in the ocean if there's a use that we can make them get the material to that everybody can agree inon.

CONTINUED PUBLIC COMMENT
BY JESSE ROSARIO
FISHERMAN AND RESIDENT OF GUAM

MR. ROSARIO: You know, you're doing a great job in trying to promote the awareness of this proposed site in our area.

The problem, I mean, my question is, you know, you're looking at finalizing the EIS statement in 2009, looking at your slides this afternoon. I was wondering, are you going to continue to do more of these meetings, like having different sides, different villages, getting a lot of the, you know, maximizing the amount of people to participate and submit their ideas or comments or suggestions or opposing what you're doing? Because obviously you look around here, we have less than a dozen people, unfortunately. But, if it weren't for that evening that we had down at the Guam Fisherman's Coop, I would have never have known about this meeting. So, my concern is, how much effort are you going to place in having this awareness program?

MR. ROSS: Thanks very much. That's a really good and important and very fair thing to say. We didn’t do as good a job as we should have done and needed to do to get the word out before we even came here, even for scoping. The only good news I’ll say about this is that this is the very beginning of the process. So, there wasn’t a whole lot to hear before this anyway.

But as far as getting the word out and getting people to be able to come and I think the idea of us going more actively around, we saw more people like when we met you the other night, by going around a few places, and by far than have come here tonight when we put a newspaper ad out, right? For people to come tonight.

So, when we come back through in early ‘09, when we actually know -- then we’ll have a document for you to look at and chew on and yell at us about, about whether it’s good enough. We will come back out and we’ll certainly look into -- well, first off, we’re going to do a better job of making sure you all know way earlier when it’s going to happen. But I think what we’ll certainly, we’ll look into weather whether and how we should have, you know, a series of meetings and where, and when. And maybe we can work with you on that when we're getting close. And -- I'm not -- thank you.

Exactly, and we'd love to -- it is hard as you know, there are so many meetings going on out here with so many different issues and so many different agencies to find the time that works for everybody. But I can tell you, we will definitely make a much more concerted effort when we come back out here with the document. You'll already have the document and you'll be able to hopefully have already, you know, be kind of primed and we'll make sure we get to you better next time.

MR. HERNDAN: Are you talking --

MR. ROSS: I'm sorry?

MR. HERNDAN: I thought KUAM did a very good job in getting the word out.

MR. ROSS: They did? Good. And I was, yeah, we didn't know if any press was going to be here, but I'm just glad that those of you who heard about it and came. We do, really do appreciate it. And we have been able to meet with several other people in separate meetings, but really, we need to hear from the community and we need to hear more.

So, I really hope you'll all comment to us more, maybe think about this a little more. Give us ideas about, you know, take the handout so you can kind of think about it when you go home. Play with the poster in the back, you know, with the magnets, but write to us and or e-mail us or call us and let us know any thoughts you have.

But, we will be starting here this next year doing the actual studies of collecting information about the actual areas we're talking about here. We're going to go down 6,000 feet and start figuring out what's actually there and then we'll really have something more to talk to you about when we come back in the next year.

MR. OTA: Just to elaborate on what Brian just talked about. What I would encourage you to do is to spread the word. You know, we've got -- if you can, you know, take copies of the yellow sheet with you, there's a mailing address, there's an e-mail address, there's a project e-mail address that you could be -- you could use. You could tell people to send us an e-mail message to, you know, asking us to get on a mailing list and, you know, it's much better if we get as many people involved to make sure we're not missing anything.

So, you know, by all means take advantage of the sheets we have here and spread the word and make sure people contact us. And we're more than willing to, we're more than happy to, you know, include people in the mailing list and involve them in the process.

MS. CAPLAN: It's beginning to look like we don't have any more questions. Is that true? Well --

MR. ROSS: Well, why don't we say this, I mean it's 8:00 now, which is how late we said we would go. Why don't we go ahead and sort of make it informal.

(Public Scoping Meeting concluded at 8:00 p.m.)

TUMON, GUAM, THURSDAY, DECEMBER 6, 2007.

REPORTER'S CERTIFICATE

I, **George B. Castro**, Court Reporter, do hereby certify the foregoing 66 pages, as corrected, to be a true and correct transcript of the audio recording made by me.

I do hereby certify that thereafter the transcript was prepared by me or under my supervision.

I further certify that I am not a direct relative, employee, attorney or counsel of any of the parties, nor a direct relative or employee of such attorney or counsel, and that I am not directly or indirectly interested in the matters in controversy.

In testimony whereof, I have hereunto set my hand and seal of Court this 27th day of December, 2007.

____

George B. Castro

CHANGES TO TRANSCRIPTION

Page	Line	Change	Reason	Initial

Agency Correspondence

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

JAN 0 8 2009

Lt. Colonel Jon J. Chytka, Commanding Officer
Department of the Army
U.S. Army Engineering District, Honolulu
Regulatory Branch, Building 230
Fort Shafter, Hawaii 96858-5440

Dear Col. Chytka:

The United States Environmental Protection Agency (USEPA) Region 9 requests your formal participation in preparation of an environmental impact statement (EIS) for the designation of an ocean dredged material disposal site (ODMDS) offshore of Guam, in accordance with the National Environmental Policy Act (NEPA) Regulations for Cooperating Agencies at 40 CFR 1501.6. We expect to prepare the first working draft of the EIS by April, 2009 and hope to conclude preparation of the final EIS by January, 2010. Your participation will be critical to ensure a successful NEPA process and ODMDS designation decision.

As a cooperating agency, the USEPA requests your participation in various portions of the EIS development as may be required. Specifically, we ask for your support as a cooperating agency by:

- Responding, in writing, to this request within 30 days indicating your point of contact;
- Providing comments on working drafts of the EIS within 30 calendar days;
- Responding to USEPA requests for information as timely input will be critical to ensure a successful NEPA process; and
- Participating, as necessary, in meetings hosted by the USEPA for discussion of EIS related issues.

Should you have questions, please call me at (415) 972-3572 or your staff may contact Allan Ota, Regional Ocean Dumping Coordinator, at (415) 972-3476, email: ota.allan@epa.gov.

Sincerely,

Alexis Strauss 8 Jan. 2009
Alexis Strauss, Director
Water Division

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, HONOLULU DISTRICT
FORT SHAFTER, HAWAII 96858-5440

REPLY TO
ATTENTION OF:

MAR 04 2009

Regulatory Branch
Engineering and Construction Division

Ms. Alexis Strauss
Director, Water Division
U.S. Environmental Protection Agency, Region IX
75 Hawthorne Street
San Francisco, CA 94105-3901

Dear Ms. Strauss:

This letter is in response to your January 8, 2009 invitation for the U.S. Army Corps of Engineers to serve as a cooperating agency in the U.S Environmental Protection Agency's (USEPA) preparation of an Environmental Impact Statement (EIS) for the designation of an ocean dredged material disposal site (ODMDS) offshore of Guam. As a Federal agency with jurisdiction by law, the U.S. Army Corps of Engineers (Corps) appreciates your efforts to seek our early involvement and obtain our technical input regarding the Corps' regulatory responsibilities pursuant to Section 10 of the Rivers and Harbors Act of 1899, Section 404 of the Clean Water Act, and Section 103 of the Marine Protection, Research, and Sanctuaries Act. Accordingly, the Corps is pleased to serve the USEPA as a cooperating agency in the EIS process.

My point of contact for this project is Mr. George Young, Chief, Regulatory Branch, (808) 438-9258. My liaison on Guam will be Mr. Francis Dayton, (671) 339-2108. A copy of this letter will be sent to Mr. Frank Dayton, Guam Regulatory Field Office, PSC 455, Box 188, FPO, AP 96540-1088.

Sincerely,

Jon J. Chytka

Jon J. Chytka
Lieutenant Colonel, U.S. Army
District Engineer

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

January 9, 2009

Bill Robinson
Pacific Islands Regional Administrator
NOAA Pacific Islands Regional Office
1601 Kapiolani Boulevard, Suite 1110
Honolulu, HI 96814

Dear Mr. Robinson:

The U.S. Environmental Protection Agency (EPA) Region IX is preparing an Environmental Impact Statement (EIS) for the designation of an ocean dredged material disposal site (ODMDS) offshore of Guam. The site will be selected as part of a long term management strategy for Guam and will provide an additional option for management of suitable (clean or nontoxic) sediments dredged from Apra Harbor as well as other coastal areas in Guam that may need to be dredged. The proposed action will involve only the designation of the site itself; before disposal is permitted, dredged material must be evaluated in accordance with the Marine Protection, Research and Sanctuaries Act of 1972 and its implementing regulations and guidance. Historically, all dredged material generated by Navy and Port Authority of Guam (PAG) projects has been managed on island, either stockpiled in upland dewatering sites or beneficially used. There is an expected shortage of capacity on island to accommodate the anticipated volumes of dredged material over the next 50 years. An ODMDS provides an important management option for dredged material that is suitable and non-toxic, but for which other management options are not practical.

The proposed alternative ODMDS's are outside of the coastal zone of Guam, located approximately 9 to 12 nautical miles north or northwest of Guam, in water depths ranging from 2,000 to 2,700 meters. The two study areas (Northwest and North) are delineated on the enclosed map. In the draft EIS, which is scheduled for release in Summer 2009, EPA will identify candidate site within these study areas and will choose a preferred alternative site. Dredged material disposal operations at these offshore locations are expected to result in temporary localized perturbations; these impacts are expected to be insignificant over the long term. Dredged material disposal operations at these locations offshore of Guam are not expected to result in significant adverse impacts to the coastal zone of Guam, including any shore areas. Compliance monitoring will be implemented in accordance with a site management and monitoring plan to ensure compliance of dredged material disposal operations with site use requirements, including proper disposal at the ODMDS and no leaking of dredged material through the coastal zone in transit to the ODMDS.

In accordance with Section 7(c) of the Endangered Species Act, please advise EPA of the presence of any listed, or candidate, threatened or endangered species in the vicinity of the two study areas identified above. In addition, please advise EPA of any critical habitat for these species which may be impacted by the proposed action. Similar requests have been forwarded to the U.S. Fish and Wildlife Service. EPA would appreciate your response prior to March 31, 2009. Please direct your species advisory information as well as any questions or requests for further information to Allan Ota (ota.allan@epa.gov; phone: 415-972-3476).

Sincerely,

David W. Smith

David W. Smith, Chief
Wetlands Regulatory Office (WTR-8)

Enclosure

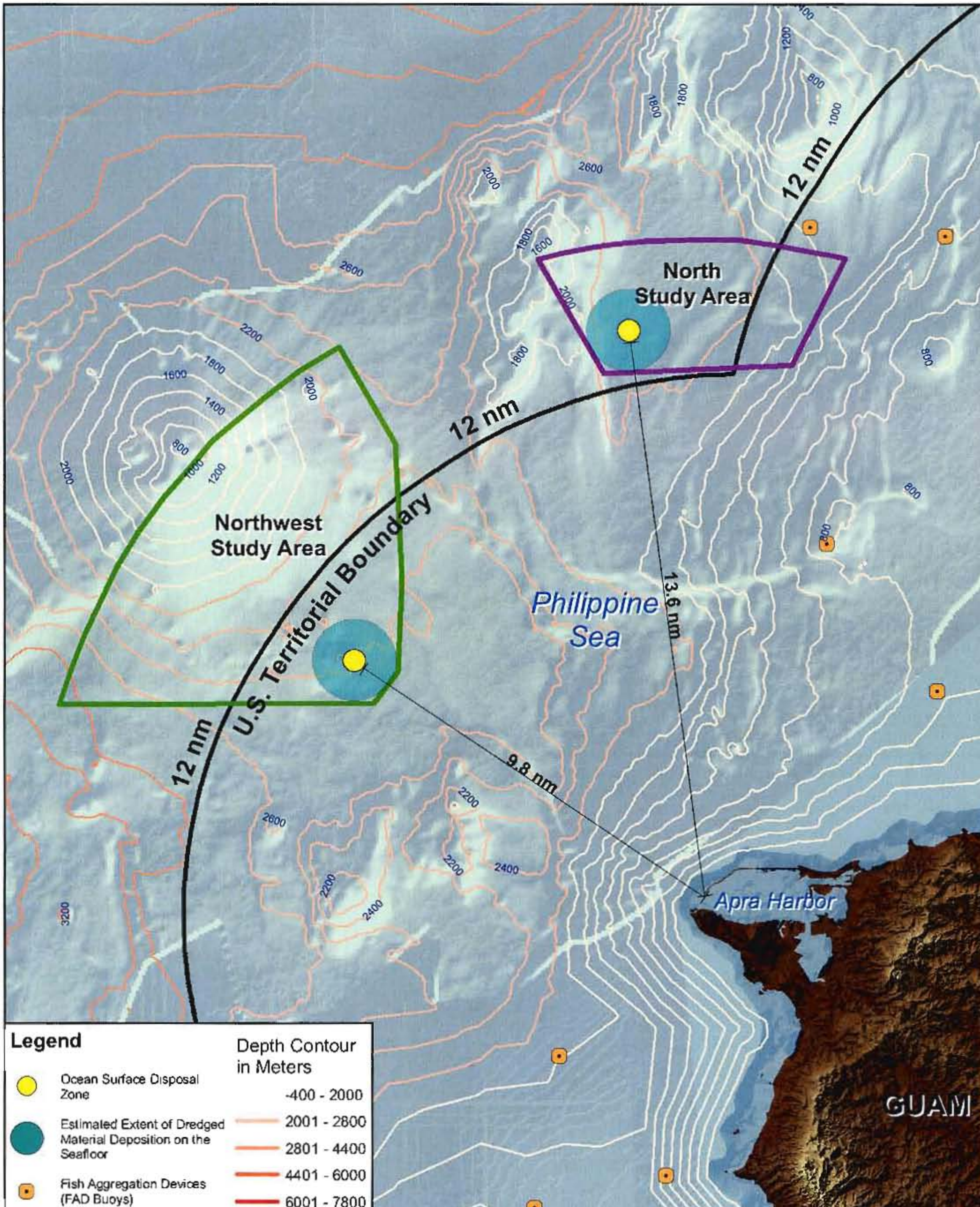

Figure 2-4
ODMDS
Alternatives
Note: To Be Modified in January 2009

Nautical Miles
0 2.5 5
0 2.5 5 10
Kilometers

N

Source: NAVFACPAC, 2006

Donald Hubner
<Donald.Hubner@n
oaa.gov> To
Allan Ota/R9/USEPA/US@EPA
03/20/2009 03:01 cc
PM Jayne LeFors
<Jayne.LeFors@noaa.gov>, Danielle
Jayewardene
<Danielle.Jayewardene@noaa.gov>
Subject
Guam ODMDS NMFS ESA-listed Marine
Species and Critical Habitat

Aloha Allan,

This e-mail is in response to Mr David W. Smith's January 9, 2009, letter requesting a species list for the proposed Guam ODMDS, and announcing the EPA's intent to conduct and EIS. My response covers 3 topics: the species list, ESA consultation, and the EIS.

Species List: For a list of marine species protected under the ESA in the Mariana Islands, please go to our ESA Consultation webpage at http://www.fpir.noaa.gov/PRD/prd_esa_consultation.html. and scroll down to the species list section, where you can download a pdf of the Marianas species list. Whales and pelagic turtles such as leatherbacks are the ESA-listed marine species most likely to be impacted at either of the two sites proposed for the new ODMDS. Unfortunately, I have no specific information about animal distribution or habitat use in those areas. It seems reasonable that sperm whales may forage in or near these

areas, and that other whale species and turtles likely migrate through the near-surface waters.

ESA Consultation: I notice within the first paragraph of David's letter that the EPA's proposed action is limited to the designation of the site, implying that the use of the site is not considered part of the proposed action. ESA consultation on any proposed action must consider the effects of interrelated and interdependent actions (i.e., those actions that would not occur but for the proposed action). In the case of your proposed ODMDS, the transport of material to the site for disposal, and the disposal of the material, are both actions that would not occur but for EPA's proposed action of permitting the designation of

the site. Thus the effects of transport and disposal on ESA-listed species must be considered in the ESA consultation that we will be doing on this proposed action. Dredging would occur whether the ODMDS is established or not, so the effects of dredging need not be considered in the ESA consultation. Information on the ESA Consultation process can be found at the webpage mentioned above.

The EIS: The EIS should describe/quantify the expected effects of ocean disposal of dredge spoils: amount and composition of dumped material; expected size (spatial volume) and duration of plume in the water column. These descriptions should be based on a typical barge load. Give estimates of total expected annual use (number or barges/total volume of material). Discuss expected seasonality and periodicity of use as appropriate. Describe/quantify expected use over the planned life of the ODMDS. Describe the physical impact (force) the falling material could have on animals that might be below the barge.

Potential impacts dumping could have on ESA-listed marine species include, but are not limited to, behavioral disturbance due to vessel traffic and the dump plume (startle reaction/avoidance of the area), the falling spoils could injure or kill animals that are under the vessel when the
load is dropped, and dumping may disrupt foraging for deep-diving sperm whales within the footprint of the ODMDS. These impacts should be addressed in the EIS. I would be happy to discuss this and to provide you with BMPs that may help reduce potential impacts.

Please include Jayne and Daniel in all future correspondences for the Guam ODMDS, including the promulgation of the DEIS. Jayne is NMFS/PRD's NEPA specialist, and Daniel works with Alan Everson in the NMFS Habitat Conservation Division. We are all interested to know the date(s) for the rescheduled Honolulu meeting to discuss this project. Alternately, are meetings scheduled for Guam any time soon?

Thank you, Don

--
Donald M. Hubner
Endangered Species Biologist
NOAA/NMFS Pacific Islands Regional Office
1601 Kapiolani Blvd. Ste 1110
Honolulu, HI 96814
(808) 944-2233

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

January 9, 2008

Patrick Leonard, Field Supervisor
U.S. Fish and Wildlife Service
Pacific Islands Office
300 Ala Moana Boulevard
Room 3-122, box 50088
Honolulu, HI 96850

Dear Mr. Leonard:

The U.S. Environmental Protection Agency (EPA) Region IX is preparing an Environmental Impact Statement (EIS) for the designation of an ocean dredged material disposal site (ODMDS) offshore of Guam. The site will be selected as part of a long term management strategy for Guam and will provide an additional option for management of suitable (clean or nontoxic) sediments dredged from Apra Harbor as well as other coastal areas in Guam that may need to be dredged. The proposed action will involve only the designation of the site itself; before disposal is permitted, dredged material must be evaluated in accordance with the Marine Protection, Research and Sanctuaries Act of 1972 and its implementing regulations and guidance. Historically, all dredged material generated by Navy and Port Authority of Guam (PAG) projects has been managed on island, either stockpiled in upland dewatering sites or beneficially used. There is an expected shortage of capacity on island to accommodate the anticipated volumes of dredged material over the next 50 years. An ODMDS provides an important management option for dredged material that is suitable and non-toxic, but for which other management options are not practical.

The proposed alternative ODMDS's are outside of the coastal zone of Guam, located approximately 9 to 12 nautical miles north or northwest of Guam, in water depths ranging from 2,000 to 2,700 meters. The two study areas (Northwest and North) are delineated on the enclosed map. In the draft EIS, which is scheduled for release in Summer 2009, EPA will identify candidate site within these study areas and will choose a preferred alternative site. Dredged material disposal operations at these offshore locations are expected to result in temporary localized perturbations; these impacts are expected to be insignificant over the long term. Dredged material disposal operations at these locations offshore of Guam are not expected to result in significant adverse impacts to the coastal zone of Guam, including any shore areas. Compliance monitoring will be implemented in accordance with a site management and monitoring plan to ensure compliance of dredged material disposal operations with site use requirements, including proper disposal at the ODMDS and no leaking of dredged material through the coastal zone in transit to the ODMDS.

In accordance with Section 7(c) of the Endangered Species Act, please advise EPA of the presence of any listed, or candidate, threatened or endangered species in the vicinity of the two study areas identified above. In addition, please advise EPA of any critical habitat for these species which may be impacted by the proposed action. Similar requests have been forwarded to NOAA. EPA would appreciate your response prior to March 31, 2009. Please direct your species advisory information as well as any questions or requests for further information to Allan Ota of the Dredging and Sediment Management Team (ota.allan@epa.gov; phone: 415-972-3476).

Sincerely,

D W Smith

David W. Smith, Chief
Wetlands Regulatory Office (WTR-8)

Enclosure

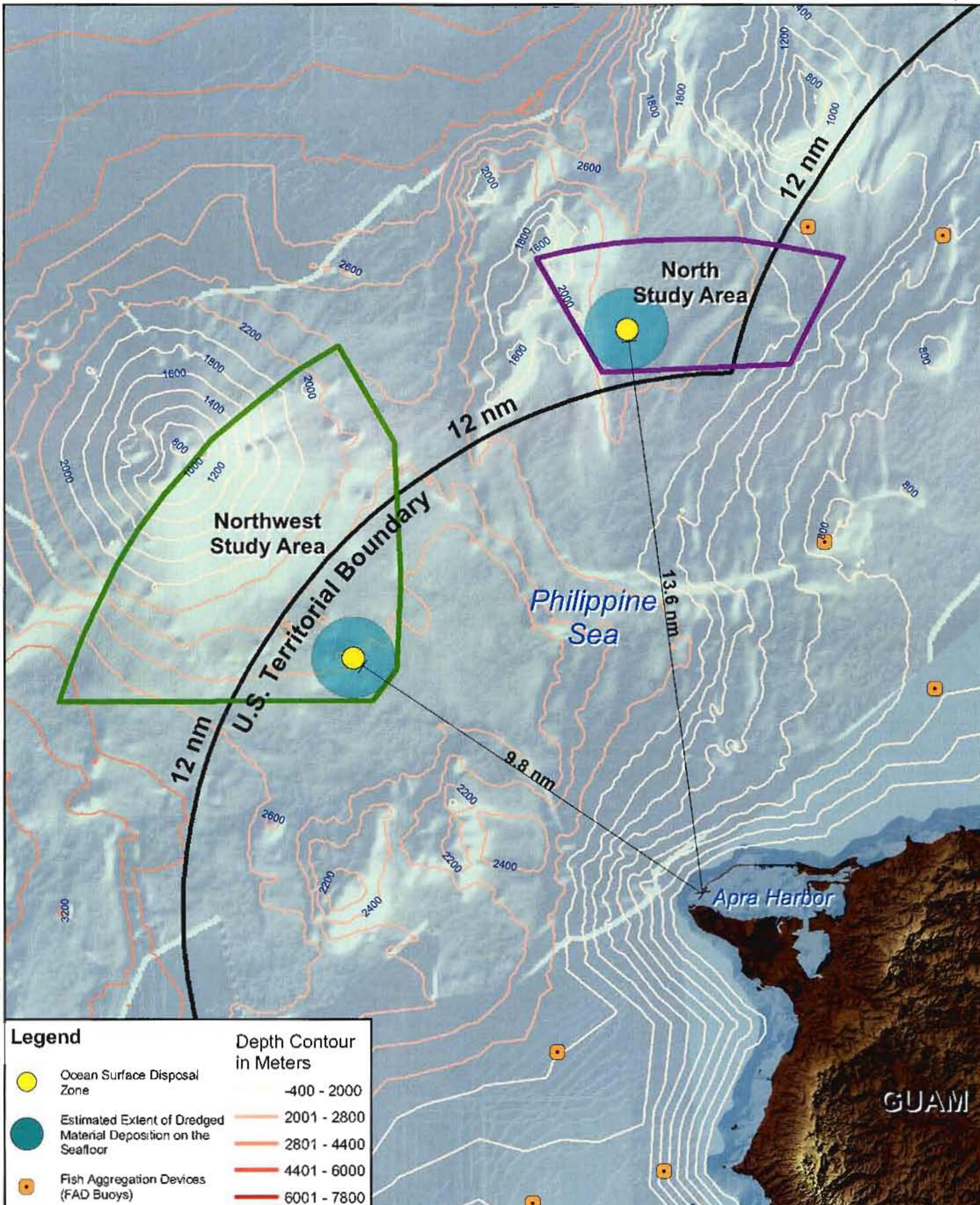

Figure 2-4
ODMDS
Alternatives
Note: To Be Modified in January 2009

Nautical Miles
0 2.5 5
0 2.5 5 10
Kilometers

N

Source: NAVFACPAC, 2006

----- Forwarded by Allan Ota/R9/USEPA/US on 03/31/2009 10:45 AM -----

Patrice_Ashfield
@fws.gov

To
01/21/2009 09:44 AM
Allan Ota/R9/USEPA/US@EPA

cc
Holly_Herod@fws.gov,
Michael_Molina@fws.gov,
Jeff_Newman@fws.gov

Subject
Re: Electronic copy of consultation request for Guam ocean dredged material disposal site designation - second try with attachment

dear allan-
got it! thank you. however, since your actions are all offshore, we the section 7 program, do not have any jurisdiction species for you to address. you probably have already contacted nmfs, hawaii, but if you still need to talk to them you can contact Lance.Smith@noaa.gov. lance will help you with any potential project impacts to aquatic species under their jurisdiction to include cetaceans and sea turtles. i will also forward your email to our federal projects group as they address CWA issues.

do you need a formal reply to your letter, or will this email suffice in your administrative record?

thank you again for contacting us.
patrice
~~~~~~

Patrice M. Ashfield
Pacific Islands Fish and Wildlife Office Consultation and Technical Assistance Program Coordinator 300 Ala Moana Blvd.
Room 3-122, Box 50088
Honolulu, Hawaii 96850
808-792-9400
808-792-9581 fax
~~~~~~

GUAM ENVIRONMENTAL PROTECTION AGENCY

AHENSIAN PRUTEKSION LINA'LA GUAHAN

P.O. Box 22439 GMF • BARRIGADA, GUAM 96921 • TEL: 475-1658/9 • FAX: 477-9402

Mr. Alan Ota
US Environmental Protection Agency, Region 9
Dredging and Sediment Management Team (WTR-8)
75 Hawthorne St.
San Francisco, CA 94105—3901
E-Mail : R9Guam_ODMDS_scoping@epa.gov

Fax: (415) 947-3537

JAN 1 1 2008

SUBJECT: Comments on Scoping for Environmental Impact Statement for Site Designation of an Ocean Dredged Material Disposal Site Off Apra Harbor, Guam

Dear Mr. Ota:

Guam Environmental Protection Agency (Guam EPA) is pleased to submit, enclosed, our scoping comments in response to the Notice of Intent by the U.S. Environmental Protection Agency to produce an Environmental Impact Statement (EIS) on the impacts of: Site Designation of an Ocean Dredged Material Disposal Site Off Apra Harbor, Guam

We understand that the comments deadline for this scoping is January 11, 2008. We submit these before that deadline and request that these be included in scoping input to the development of the Draft and the Final EIS.

We wish to thank you for the opportunity to present these concerns for scoping of the EIS.

Please call me or the Guam Environmental Protection Agency's acting Chief Planner, Mike Gawel, at (671) 475-1658 if there are questions on these comments or more information is needed.

Sincerely,

LORILEE T. CRISOSTOMO
Administrator

Enclosure
Cc: Dept. of Land Management
Dept. of Public Works
Dept. of Agriculture
Chamorro Land Trust
Port Authority of Guam
Bureau of Statistics and Plans

"ALL LIVING THINGS OF THE EARTH ARE ONE"

Guam Environmental Protection Agency

January 2008

COMMENTS FOR SCOPING INPUT TO THE EIS OF THE U.S. ENVIRONMENTAL PROTECTION AGENCY:

SITE DESIGNATION OF AN OCEAN DREDGED MATERIAL DISPOSAL SITE OFF APRA HARBOR, GUAM

Historic Ocean Disposal:
List and describe previous instances of ocean disposal off Guam or examples in other similar tropical areas and describe the resulting impacts of such disposals. As part of benthic baseline investigations, include obtaining photos of impacts at old disposal sites (e.g., 3 miles off Orote Island).

Types of Materials to be Disposed:
Characterize the range of types of dredged materials produced on Guam that may be allowed to be disposed in the designated site. Testing criteria that must be applied before approving the materials for disposal must be described in the EIS.

Quantities to be disposed:
If quantities projected from tentative future projects can be estimated, provide these. At least estimate these for the Port of Guam deep draft expansion plans and Navy aircraft carrier berthing plans.

Frequencies of Use:
If the numbers of projects that plan to use this site over future years can be estimated, the numbers and lengths of activity periods at the site should be projected.

Methods of Disposal:
Describe proposed methods for ocean disposal at the site. Include practices that would be required to be followed to minimize the plumes generated and make sure the material is placed in a stable manner (assuring there is minimal segregation of size fractions, which could lead to instability problems later, since the site is along an earthquake prone island arc). Projected effluent plumes should be described.

Qualified User Parties:
Besides the Navy and Port Authority of Guam (PAG), what other businesses and entities may be allowed to use ocean disposal at this site? Can private foreign businesses dredging on Guam be allowed to use the site? What economic considerations can be applied to control such private party use to better support beneficial uses? Also, can materials originating from non-Guam areas be allowed to be disposed at the site?

Site Users' Need for Permits:
Regulatory agencies of the US and the Government of Guam will apply their permitting and regulatory responsibilities, as required by US National laws and Guam laws, to the activities undertaken by the users of the ocean disposal site. To allow expeditious use of the disposal site, the permitting requirements should be obtained from Federal and Guam agencies, including the Guam Bureau of Statistics and Plans, the Guam Environmental Protection Agency and the Guam Department of Agriculture. The permits, approvals and consultations needed from Government of Guam Agencies as well as from other Federal Agencies should be noted as part of the draft EIS. The parameters required by US EPA for quality of disposable materials and methods of verifying this quality should be included. What bioassays will be applied to determine impact of dredged materials to living resources at the site? What justifications and analysis will be needed to qualify each dredging project for ocean disposal versus beneficial use?

Plans for Beneficial Use:
The Government of Guam in all cases prefers beneficial use of dredged materials rather than ocean disposal and requests that the US EPA recognizes and describes these uses and their estimated capacities and locations on Guam as part of this EIS. The EIS must propose and evaluate alternatives that may best serve both the civilian and the military communities on Guam through a comprehensive island-wide approach. The Guam Departments of Land Management, Public Works and Agriculture, the Chamorro Land Trust, Guam Environmental Protection Agency, Port Authority of Guam (PAG), Bureau of Statistics and Plans, Council of Mayors and others, as well as the Air force and Navy, must all be approached by the EIS preparers to obtain information on sites and needs for beneficial uses. These should include filling for fast land (as at the PAG), cover for landfills, capping of clean-up sites, restoration of old quarry sites, beach enrichment, road base fill and use for construction material.

Large quantities of fill are planned to be used for expansion of Guam's commercial port and arrangements have been made to utilize dredged material from Navy dredging.

Cover for the Ordot and the military landfills is constantly needed and possibility of using dredged material should be discussed in the EIS.

Dozens of Installation Restoration (clean-up) sites of hazardous wastes on DOD properties as well as off-Base, Formerly Used Defense Sites (FUDS), are recognized. Many more on Guam may be found in the future as resources become available to identify them. These are being assessed and slowly restored to allow safe, but often restricted, uses of at least adjoining properties. Increased DOD developments will lead to pressure to increase and speed up the investigation and restoration of these hazardous waste sites. Suitability of transporting, storing and finally using dredged materials for capping clean-up sites should be assessed in the EIS.

Old quarry sites should be assessed and calculations of potential volumes of dredged material needed to restore them for uses such as recreation should be assessed.

Although Guam has regulated shoreline developments to avoid a need for beach enrichment, future demands for this process are expected and the use of dredged material for beach replenishment or creation should be investigated as another alternative to ocean disposal. Perhaps, as part of the military expansion and training plans, new beaches may be needed for amphibious landing exercises, to avoid damage to and competition for use of natural beaches.

New road construction is required on Guam, and this should greatly expand with urgent requirements for roads needed by the military. The potential needs for road materials and the suitability and requirements of using dredged materials as sub-base fill should be addressed.

The EIS should provide the projected costs per unit of purchasing construction and fill materials for which dredged materials can be replaced. Expanded demand for quarry materials for military construction and off-base construction triggered by the military developments must be generally assessed. The costs and actions necessary to substitute dredged materials for quarry products should be listed. The possibility of exporting usable dredged materials to other ports, using ships that unload in Guam and return empty, should be considered.

Recent technology for producing "mudcrete′ from silty and salty dredged materials has been applied successfully and economically for construction. This beneficial option should also be addressed.

Assessment of Benthic Resources and Habitats:
Descriptions of the benthic ecosystem, including substrate composition, bathymetry and animal species and their abundance and values must be provided. Deep sampling and photography must be used to accomplish this. The EIS must note potential impacts to listed endangered species and marine mammals and address protection of their habitats, including providing studies and evaluation of their habitats at the disposal site and links of the benthic ecosystem with the pelagic one at the site.

Impacts to Pelagic Living Marine Resources: Some of the few remaining large scale fisheries resources in the world that are not over-fished, the Western Pacific tuna stocks, are in waters surrounding Guam. Guam has had plans for expanded development of a longline fishing fleet within its exclusive economic zone. Impacts on pelagic fish at the site should be assessed. Impacts must be addressed on Essential Fish Habitat. Whales are recorded from this area and photos document birth of a sperm whale in the vicinity. Impacts to marine mammals and information on their migration and possible exposure to disposal operations must be included.

Assessment of Oceanic Conditions:
Water quality (nutrients, salinity, turbidity, oxygen, light penetration, chlorophyll, etc) and plankton composition at a range of depths through the water column from surface to bottom at the site as well as thermoclines and ocean currents at the site to be impacted must be described.

Monitoring:
Proposed methods and protocols for monitoring impacts during disposal operations and periodically over time should be described. Monitoring activities by US EPA should be described and their frequency.

Use of Local Expertise:
Local expertise must be utilized as well as off-Island expertise in developing the assessment of impacts to living resources. There is a wealth of knowledge and expertise based on Guam, in staff at the University of Guam and with private consultants and local agencies, that should be tapped for EIS preparation. They cannot work for free and may expect consulting salaries for preparing information, reviewing documents and completing studies. They are the experts on Guam's resources, not consultants from outside of Guam.

Coordination with other Federal Use Plans:
Coordinate with Mariana Islands Range Complex EIS/OEIS identifying military training areas off Guam.

Potential Impacts on Sea Traffic Should Be Addressed.

Why not an "Overseas EIS"?
The Department of Defense (DOD) is developing an Environmental Impact Statement/Overseas Environmental Impact Statement on the impacts of 1) proposed relocation of 8,000 Marines from Okinawa to Guam, 2) facilities for berthing of nuclear aircraft carriers at Guam and 3) placement of an Army Ballistic Missile Defense Group on Guam. We have been told by representatives of the DOD that their reason for having an "Overseas Environmental Impact Statement" is because their proposed actions and impacts are to be "beyond 12 miles" from US shores and that this distance is said to trigger the need of an OEIS. Is this application of an OEIS also needed for Designation of an Ocean Dredged Material Disposal Site which is an action proposed to be more than 12 miles off shore? What is the difference between an EIS and an OEIS?

National Defense Concerns Versus EPA requirements:
What circumstances relative to National Defense would override, modify or cancel the US EPA requirements applied to ocean disposal of dredged material by the DOD?

BUREAU OF STATISTICS AND PLANS

(Bureau of Planning)

Government of Guam

Felix P. Camacho
Governor of Guam

Michael W. Cruz, M.D.
Lieutenant Governor

P.O. Box 2950 Hagåtña, Guam 96932
Tel: (671) 472-4201/3
Fax: (671) 477-1812

Alberto "Tony" Lamorena V
Director

JAN 1 1 2008

Mr. Allan Ota
US EPA, Region 9
Dredging and Sediment Management Team (WTR-8)
75 Hawthorne Street
San Francisco, California 94105-3901

Dear Mr. Ota:

The Bureau of Statistics and Plans recognizes that the existing ocean disposal site for dredged material expired in 1997, and a new disposal site must be identified and designated in conformance with the Marine Protection Research and Sanctuaries Act (MPRSA). Under the Act, the U.S. Environmental Protection Agency (USEPA) and the U.S. Corps of Engineers (USCOE) share a number of responsibilities with regard to the ocean disposal of dredged material. The principal authority and responsibility for designating ocean sites for the disposal of dredged material is vested with the Regional Administrators of EPA regions in which the sites are located. Accordingly, ocean dumping cannot occur unless a permit is issued by the USCOE under the MPRSA, using EPA's environmental criteria and subject to EPA's concurrence.

There is a need to identify a new ocean disposal site offshore of Apra Harbor, Guam, as a means to dispose of suitable (non-toxic) dredge material for which other beneficial re-uses are exhausted. We request that the following be addressed in the EIS for the site designation of an ocean dredge material disposal site off Apra Harbor, Guam:

- We understand that the material to be disposed of at this offshore site will be considered "clean" or "suitable," but it is not clear exactly what standards are used to determine if the material is suitable or not. The EIS must clearly define the test criteria that must be applied before approving the material for disposal.

- The EIS should identify the party/parties responsible for conducting the tests, and the agency responsible for making the final determination that the material is clean before it is moved to the ocean disposal site. We do not support a testing program implemented solely by the dredging contractor, and prefer that a government agency carry out or at least oversee the testing and make the final determination that the material is clean. Furthermore, we are also concerned that the Guam Environmental Protection Agency (GEPA), which is the agency likely to be tasked with such a responsibility, may not have the capacity to carry out this responsibility effectively. The demands on local natural resource agencies will increase significantly as the military build-up is undertaken, and the capacity of these agencies to effectively carry out existing and new responsibilities will be in question.

- The EIS should address the need for monitoring of disposal operations in order to ensure that the material is disposed of properly.

- We prefer beneficial re-use of dredge material over ocean disposal and suggest that the EIS include an exhaustive search of existing and future public and private sector projects that may benefit from the dredge material. The comments provided by the Guam EPA include several options for beneficial re-use. Please note that a Memorandum of Understanding (MOU) was signed on April 12, 2001 between the Department of the Navy and the Government of Guam for the beneficial use of dredge material from the Navy construction dredging project in Inner Apra Harbor for proposed PAG construction projects.

- The EIS should provide an examination of different disposal methods, such as the thin layer disposal method.

- The EIS should include a comprehensive analysis of the impacts of dredge material disposal on the benthic ecosystem at each alternative site. Deep-water sampling and photography should be used in this analysis. Plume modeling should also be utilized in the analysis in order to properly assess the extent of down-current impacts.

- The EIS should also address impacts to pelagic fisheries and marine mammals.

We are looking forward to receiving for our review a copy of the required Environmental Impact Statement (EIS) and the rulemaking paperwork associated with this ocean disposal site designation process, as well as justifications and alternatives to ocean disposal of the dredged material. Proper disposal of dredged materials and how they are secured must be included in the EIS, ensuring that toxic materials harm aquatic and wildlife.

Sincerely,

ALBERTO A. LAMORENA V
Director

cc: GEPA
DoAg
DPR
DLM
Office of the Governor
Jparks/B.Millhouser
R9guam_ODMDS_Scoping@epa.gov

Department of Agriculture
Dipåttamenton Agrikottura
163 Dairy Road, Mangilao, Guam 96913

Felix P. Camacho
Governor

Michael W. Cruz, M.D.
Lt. Governor

Director's Office	734-3942/43; Fax 734-6569
Agricultural Dev. Services	734-3946/47; Fax 734-8096
Animal Health	734-3940
Aquatic & Wildlife Resources	735-3955/56; Fax 734-6570
Forestry & Soil Resources	735-3949/50; Fax 734-0111
Plant Nursery	734-3949
Plant Protection & Quarantine	472-1651; 475-1426 Fax 477-9487

Paul C. Bassler
Director

Joseph D. Torres
Deputy Director

January 11, 2008

Mr. Allan Ota
U.S. Environmental Protection Agency, Region 9
Dredging and Sediment Management Team (WTR-8)
75 Hawthorne Street
San Francisco, California 94105-3901

Dear Mr. Ota:

The Department of Agriculture has reviewed the Federal Register Notice of November 27, 2007, (Vol. 72, No. 227) on the intent to prepare an Environmental Impact Statement (EIS) to designate a permanent Ocean Dredged Material Disposal Site (ODMDS) off Apra Harbor, Guam. The EIS will be prepared in cooperation with the U.S. Department of the Navy (Navy). The following comments have been prepared pursuant to the National Environmental Policy Act of 1969; the Endangered Species Act of 1973 as amended; the Fish and Wildlife Coordination Act of 1934, as amended; and other authorities mandating the Department of Agriculture's (Department) concern for environmental resources. The Department offers the following comments for your consideration.

The purpose of the proposed project is to designate a permanent ODMDS to accommodate harbor dredging-related work being planned for Apra Harbor. The Navy and Port Authority of Guam anticipate expanding existing harbor facilities in order to accommodate anticipated increases in vessel and cargo traffic within the harbor, new classes of vessels, dock side maintenance and support operations. Expansion-related activities would involve dredging large amounts of sediment from Apra Harbor and not all of this sediment may be acceptable for land-base reuse. The harbor will also need periodic maintenance. Therefore, it may be necessary to establish a permanent ODMDS in the vicinity of Apra Harbor to accept non-reusable dredged sediment.

Two alternative locations for the ODMDS are being considered. First, the "North Alternative ODMDS" is to designate a permanent site approximately 12-15 nautical miles from Guam at depths ranging between 6,000 to 6,600 feet. Second, the "Northwest Alternative" is approximately 9-15 nautical miles from Guam at depths ranging between 6,600 and 8,400 feet. There is also a "No Action" alternative that would not designate a ODMDS and allow limited disposal of dredged material in Guam landfills.

1. The Department recommends that an evaluation of the area for its coral reef resources be ascertained in both alternative sites. The EIS should provide an assessment of the extent of submerged ridges and peaks capable of supporting coral reef resources that may be affected by the action. Furthermore, oceanic circulation patterns, storms, and other pertinent factors should be included in this analysis that may transport suspended dredged material in disposal plumes to coral reef habitat.

2. The introduction of fine particulate from ocean-dredged material into the ocean environment may impact coral reef resources via the water column. Therefore, the EIS should include ecologically sound suspended sediment guidelines for ocean disposal to prevent sediment disposal intensity (e.g., sediment concentration values), duration (*e.g.,* sediment persistence in the water column), and frequency (*e.g.*, recovery time between high sediment events).

3. The Department recommends that the EIS discuss potential impacts to significant ecological relationships and affected marine biological communities as a result of the proposed ODMDS for each of the alternative actions presented. Particular attention should be given to addressing potential impacts to sand habitat and infauna, all forms of algae including coralline algae, coral colonies, macro-invertebrates, reef fish, and coral reef communities and their ecological functions.

4. The Department recommends that the EIS indicate that all proposed sediment disposal will be conducted to avoid Guam coral spawning periods, approximately June through August. Sediment can impact motile coral larvae thus reducing their survival.

5. The Department recommends an assessment of the impacts to Fish Aggregating Devices (FADS) located to the ODMDS.

6. The EIS should discuss sea birds, migratory birds, endangered, threatened, protected, rare, and native species that may be impacted by the proposed action. This discussion should also entail how sediment disposal would not be dumped on endangered, threatened, and protected species that may be underneath the vessel at the time of disposal. The Department is very concerned that sea turtles and marine mammals may be affected by the proposal sediment disposal activities.

7. The National Marine Fisheries Service (NMFS) should be contacted regarding the potential for adverse impacts to these resources in the vicinity of the alternative disposal sites under consideration to endangered and threatened species in

accordance with Section 7 of the Endangered Species Act of 1969. As the local resource agency responsible for the protection of endangered and threatened species, the Department would like to be included in the consultations pertaining to these marine vertebrates.

8. It also recommends that Best Management Practices be incorporated into any sediment disposal operations to avoid or minimize project-related degradation of water quality and impacts to fish and wildlife resources.

9. The Department recommends that appropriate compensatory mitigation measures be described in the EIS if unavoidable resources losses are anticipated, including provisions for monitoring mitigation actions against performance standards to assess the effectiveness of the mitigation effort.

10. The presentation at the scoping meeting held at the Westin Resort in Guam did not depict all of the fishing banks. The Department recommends that all fishing banks be included in the EIS to determine if there are other potential impacts to fishing.

11. The Department recommends that the EIS discuss why other potential sites, such as those located south and east of the island, are not being considered as proposed alternative actions. If a study was conducted previously, the EIS should contain a copy of the study.

12. The scoping presentation did discuss identifying an economic disposal distance. However, the economics related to cost between disposing at a land site and at an ocean site needs to be discussed within the EIS. This would help in making an informed decision of the alternative sites.

13. The EIS need to discuss how the disposal site will occupy a small area on the ocean bottom as explained at the December 6, 2007 scoping meeting. The actual size of the area needs to be included in the EIS and the conditions of the site at the time the option was chosen. The EIS needs to take into account differing environment conditions, such as ocean currents, circulation patterns, wind speed, storms, etc. to determine other size dimensions that the sediment would occupy on the ocean floor after disposal Previous studies involving this situation should be included in the EIS.

14. The EIS should discuss the development of a dredge material management plan to include but not limited to procedures on how and when ocean sediment disposal can occur. This would ensure that proper protocols are taken to avoid sediment from accidentally spilling into an area that is not the ocean disposal site.

The Department appreciates the opportunity to provide comments on the NOI. If you have any questions regarding this letter, please contact Acting Assistant Chief, Jay Gutierrez by telephone at (671) 735-3980.

Sincerely,

for **PAUL C. BASSLER**

cc: NMFS –PIRO Honolulu
U.S. Environmental Protection Agency – Region IX, San Francisco
U.S. Environmental Protection Agency- Region IX, Honolulu
U.S. Fish and Wildlife Service, Honolulu
Army Corps of Engineers (ACOE), Guam
Bureau of Statistics and Plans (BSP), Guam
Guam Environmental Protection Agency (GEPA)
Western Pacific Fisheries Management Council

DEIS Distribution List

DEIS Distribution List						
Office	**Official**	**Position**	**Address**			
Office of the Governor of Guam	Felix P. Camacho	Governor	P.O. Box 2950	Hagatna	GU	96932
Office of the Lt. Governor of Guam	Dr. Mike W. Cruz	Lt. Governor	P.O. Box 2951	Hagatna	GU	96933
U.S House of Representative	Madeleine Bordallo	Congresswoman	120 Father Duenas Ave., Suite 107	Hagatna	GU	96910
U.S House of Representative	Madeleine Bordallo	Congresswoman	427 Cannon House Office Bldg	Washington	DC	20515-5301
30th Guam Legislature	Judith Won Pat	Speaker	155 Hesler Street, Suite 201	Hagatna	GU	96919
30th Guam Legislature	Benjamin Cruz	Vice Speaker	155 Hesler Street, Suite 107	Hagatna	GU	96910
30th Guam Legislature	Tina Muna-Barnes	Senator	155 Hesler Street, Suite 101	Hagatna	GU	96910
30th Guam Legislature	Rory J. Respicio	Senator	155 Hesler Street, Suite 302	Hagatna	GU	96910
30th Guam Legislature	Judith P. Guthertz	Senator	155 Hesler Street, Suite 301	Hagatna	GU	96910
30th Guam Legislature	Thomas C. Ada	Senator	173 Aspinall Ave, Suite 207 Ada Plaza Ctr	Hagatna	GU	96910
30th Guam Legislature	Matt Rector	Senator	153 Sesame Street	Mangilao	GU	96923
30th Guam Legislature	Adolpho B. Palacios	Senator	155 Hesler Street, Suite 104	Hagatna	GU	96910
30th Guam Legislature	Vicente C. Pangelinan	Senator	324 W. Soledad Avenue Suite 101, Quan Building	Tamuning	GU	96913
30th Guam Legislature	Frank B. Aguon	Senator	238 Archbishop Flores Street, Suite 701 A, DNA Building	Hagatna	GU	96910
30th Guam Legislature	Edward J.B. Calvo	Senator	173 Aspinall Avenue. Suite 206, Ada Plaza Ctr	Hagatna	GU	96910

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Office	**Official**	**Position**	**Address**			
30th Guam Legislature	Ray Tenorio	Senator	167 E. Marine Corps Drive, Suite 104, Dela Corte Bldg	Hagatna	GU	96910
30th Guam Legislature	James V. Espaldon	Senator	777 Rte. 4, Sinjana Shopping Mall, Ste. 16B	Sinjana	GU	96926
30th Guam Legislature	Telo Taitague	Senator	238 Archbishop Flores St., Ste. 501, DNA Bldg	Hagatna	GU	96910
30th Guam Legislature	Frank F. Blas	Senator	238 Archbishop Flores St., Suite 907, DNA Bldg	Hagatna	GU	96910
Mayor's Council of Guam	Angel Sablan	Executive Director	P.O. Box 786	Hagatna	GU	96932
Mayor of Agana Heights	Paul M. McDonald	Mayor	P.O. Box 786	Hagatna	GU	96932
Mayor of Agat	Carol S. Tayama	Mayor	P.O. Box 786	Hagatna	GU	96932
Mayor of Asan-Maina	Vicente L. San Nicolas	Mayor	P.O. Box 786	Hagatna	GU	96932
Mayor of Barrigada	Jessie B. Pelican	Mayor	P.O. Box 786	Hagatna	GU	96932
Mayor of Pago-Ordot	Jessy Gogue	Mayor	P.O. Box 786	Hagatna	GU	96932
Mayor of Dededo	Melissa B. Savares	Mayor	P.O. Box 786	Hagatna	GU	96932
Mayor of Hagatna	John A. Cruz	Mayor	P.O. Box 786	Hagatna	GU	96932
Mayor of Inarajan	Franklin M. Taitague	Mayor	P.O. Box 786	Hagatna	GU	96932
Mayor of Mangilao	Nonito C. Blas	Mayor	P.O. Box 786	Hagatna	GU	96932
Mayor of Merizo	Ernest Chargualaf	Mayor	P.O. Box 786	Hagatna	GU	96932

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Mayor of Mongmong Toto Maite	Andrew C. Villagomez	Mayor	P.O. Box 786	Hagatna	GU	96932
Mayor of Piti	Vicente D. Gumataotao	Mayor	P.O. Box 786	Hagatna	GU	96932
Mayor of Santa Rita	Dale E. Alvarez	Mayor	P.O. Box 786	Hagatna	GU	96932
Mayor of Sinajana	Roke B. Blas	Mayor	P.O. Box 786	Hagatna	GU	96932
Mayor of Talofofo	Vicente S. Taitague	Mayor	P.O. Box 786	Hagatna	GU	96932
Mayor of Tamuning, Tumon, Harmon	Francisco C. Blas	Mayor	P.O. Box 786	Hagatna	GU	96932
Mayor of Umatac	Dean D. Sanchez	Mayor	P.O. Box 786	Hagatna	GU	96932
Mayor of Yigo	Robert Lizama	Mayor	P.O. Box 786	Hagatna	GU	96932
Mayor of Yona	Jose Terlaje	Mayor	P.O. Box 786	Hagatna	GU	96932
NOAA National Marine Fisheries - Pacific	Kay Zukeran		Islands Regional Office 1601 Kapiolani Blvd, Suite 1110	Honolulu	HI	96814
NOAA National Marine Fisheries	Valerie Brown		Guam Field Office, 163 Dairy Road, 1601 Kapiolani Blvd Suite 1110	Mangilao	GU	96923
NOAA National Marine Fisheries	Tany Topalian		CNMI Field Office P.O. Box 10007	Saipan	MP	96950
Department of Interior	Sarah Creachbaum		National Park Service 135 Murray Blvd	Hagatna	GU	96910
Department of Interior	Thomas Weimer		Office of Insular Affairs 1849 C Street	Washington	D.C.	20240

DEIS Distribution List						
Office	**Official**	**Position**	**Address**			
U.S. Fish and Wildlife Service	Chris Bandy		Guam Field Office P.O. Box 8134 MOU-3	Dededo	GU	96929
Federal Aviation Administration	Randy Reeves		Air Traffic Manager 1775 Admiral Sherman Blvd	Tiyan	GU	96913
National Resources Conservation Service	John H. Lawrence		First Hawaiian Bank, Ste 301, 400 Route 8 Pacific Basin Area Office	Mongmong	GU	96910
Office of Marine Safety - Captain of Port	William Marhoffer		455 Box 176 FPO AP U.S. Coast Guard Guam Sector GU PSC		GU	96540
Asst. Adjutant General	Franklin Leon Guerrero	Lt. Col.	Guam Air National Guard, Department of Military Affairs	APO-AP AAFB 0		
Department of Military/Guam Army National Guard	Donald Goldhom	Brig. Gen.	430 Route 16 Bldg. 300 Rm 113	Barrigada	GU	
EPA Region 9 - Honolulu	Wendy Wiltse		300 Ala Moana Blvd, Rm 5152, Box 50003	Honolulu	HI	96850
U.S. Fish and Wildlife Service	Patrick Leonard		300 Ala Moana Blvd, Rm 3122, Box 50088	Honolulu	HI	96850
U.S. Fish and Wildlife Service	Jeff Newman	Habitat Consultation Division	300 Ala Moana Blvd, Rm 3122, Box 50088	Honolulu	HI	96850
U.S. Fish and Wildlife Service	Michael Molina		300 Ala Moana Blvd, Rm 3122, Box 50088	Honolulu	HI	96850
U.S. Fish and Wildlife Service	Earl Campbell		300 Ala Moana Blvd, Rm 3122, Box 50088	Honolulu	HI	96850
U.S. Fish and Wildlife - Guam	Arthur Taimanglo		415 Chalan San Antonio Rd Baltej Pavilion, Ste 209	Tamuning	GU	
NOAA Fisheries Service	Bill Robinson		1601 Kapiolani Blvd, Ste 1110	Honolulu	HI	96814
NOAA Fisheries Service - Habitat Division	Gerry Davis		1601 Kapiolani Blvd, Suite 1110	Honolulu	HI	96814

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Office	**Official**	**Position**	**Address**			
NOAA Fisheries Service - Habitat Division	John Naughton		1601 Kapiolani Blvd, Suite 1110	Honolulu	HI	96814
NOAA Fisheries Service - Protected Resources Division	Chris Yates		1601 Kapiolani Blvd, Suite 1110	Honolulu	HI	96814
NOAA Fisheries Service - Protected Resources Division	Arlene Pangelinan		1601 Kapiolani Blvd, Suite 1110	Honolulu	HI	96814
NOAA Fisheries Service - Habitat Division	Valerie Brown		Guam Office c/o DAWR 163 Dairy Road	Mangilao	GU	96913
USDA Wildlife Services		Vice Assistant State Director	1060 Route 16, Suite 103C	Barrigada Heights	GU	96913
USDA Wildlife Services	Craig Clark		1060 Route 16, Suite 103C	Barrigada Heights	GU	96913
U.S. Army Corps of Engineers	Charles Klinge	Lt. Col.	Honolulu District, Bldg 230	Fort Shafter	HI	96858
USACE Honolulu District - Regulatory Branch	George Young		Building 230	Fort Shafter	HI	96858
USACE - Guam Regulatory Branch	Frank Dayton		PSC 455, Box 188	FPO	AP	0
Bureau of Statistics and Plans	Alberto Lamorena		P.O. Box 2059	Hagatna	GU	96932
Department of Agriculture	Paul Bassler		163 Dairy Road	Mangilao	GU	96913
Guam EPA	Lorilee Chrisostomo		P.O. Box 22439	Barrigada	GU	96921
Nieves M. Flores Memorial Public Library			254 Martyr Street	Hagatna	GU	96910

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Office	**Official**	**Position**	**Address**			
RFK Memorial Library, University of Guam			303 University Drive	Mangilao	GU	96923
Barrigada Public Library			177 San Roque Drive	Barrigada	GU	96913
Dededo Public Library			283 West Santa Barbara Ave.	Dededo	GU	96929
Agat Public Library			165 Follard Street	Agat	GU	96928
Merizo Public Library			376 Cruz Avenue	Merizo	GU	96915
Yona Public Library			265 Sister Mary Eucharita Drive	Yona	GU	96915
Hawaii State Public Library			478 S. King Street	Honolulu	HI	96813
I Nasion Chamorro	Maga Haga Ben Garrido & Debbie Quinata		P.O. Box 6132	Merizo	GU	96916
Governor's Civilian - Military Taskforce	Donald Goldhom	Adjutant General Brig. Gen.	430 Route 16 Bldg 300 Rm 113	Barrigada	GU	96913
Guam Chamber of Commerce	Eloize Baza		173 Aspinall Avenue Suite 101, Ada Plaza Center	Hagatna	GU	96910
Guam Contractor's Association	James A. Martinez	Executive Director	East West Business Center 718 N. Marine Drive, Suite 203	Upper Tumon	GU	96913
Guam Fisherman's Cooperative	Mike Duenas	Manager	Gred D. Perez Marina	Hagatna	GU	96910
Commission on Decolonization	Eddie Benavente	Executive Director	P.O. Box 2950	Hagatna	GU	96932
c/o Senator Won Pat's Office Women's Working Group			Payless Corporate Office Bldg 116 Chalan Santo Papa	Hagatna	GU	96910

DEIS Distribution List						
Office	**Official**	**Position**	**Address**			
Private Mail Bag			Pacific Concerns Resource Centre	Suva	FIJI ISLANDS	
Earth Justice National Headquarters			426 17th Street, 6th Floor	Oakland	CA	94612
Sierra Club			85 Second Street, 2nd Floor	San Francisco	CA	94105
Regional Office - Natural Resources Defense Council			111 Sutter Street, 20th Floor	San Francisco	CA	94104
	Roberto Cabrezo		P.O. Box 229	Hagatna	GU	96932

Notice of Availability of EIS
and
Public Notice of Scoping Meeting

Management Planning, To Address Conflicts between Motorized and Non-Motorized Users, Ravalli County, MT, Comment Period Ends: 09/21/2009, Contact: Dan Ritter 406–777–5461.

EIS No. 20090268, Final EIS, BLM, ID, Three Rivers Stone Quarry Expansion Project, Proposing to Expand the Quarry Operation up to an Additional 73 Acres to Increase Mine Production of Flaystone, Custer County, ID, Wait Period Ends: 09/08/2009, Contact: Charles Horsburgh 208–524–1569.

EIS No. 20090269, Final EIS, TVA, 00, Mountain Reservoirs Land Management Plan, Implementation, Proposes to Develop a Plan for Managing Nine Mountain Reservoirs: Chatuge, Hiwassee, Blue Ridge, Nottely, Ocoees 1, 2, and 3, Apalachia, and Fontana Reservoirs, Fannin, Towns, and Union Counties, GA; Cherokee, Clay, Graham, and Swain Counties, North Carolina; and Polk County, TN, Wait Period Ends: 09/08/2009, Contact: James F. Williamson, Jr. 865–632–6418.

EIS No. 20090270, Draft EIS, NRC, 00, GENERIC—License Renewal of Nuclear Plants (NUREG–1437), Volumes 1 and 2, Revision 1, To Improve the Efficiency of the License Renewal Process, Implementation,, Comment Period Ends: 10/13/2009, Contact: Jennifer Davis 1–800–368–5642 Ext. 3835.

EIS No. 20090271, Final EIS, GSA, CA, San Ysidro Land Port of Entry (LPOE) Improvement Project, Propose the Configuration and Expansion of the Existing (LPOE), San Ysidro, CA, Wait Period Ends: 09/08/2009, Contact: Osmahna A. Kadri 415–522–3617.

EIS No. 20090272, Draft EIS, UAF, 00, Modification of the Condor 1 and Condor 2 Military Operation Areas, 104th Fighter Wing of the Massachusetts Air National Guard Base (ANG) Proposes to Combine the Condor 1 and Condor 2 MOA, ME and NH, Comment Period Ends: 09/21/2009, Contact: Jay Nash 703–614–0346.

EIS No. 20090273, Draft EIS, FSA, 00, PROGRAMMATIC—Biomass Crop Assistance Program (BCAP), To Establish and Administer the Program Areas Program Component of BCAP as mandated in Title IX of the 2008 Farm Bill in the United States, Comment Period Ends: 09/21/2009, Contact: Matthew T. Ponish 202–720–6853.

EIS No. 20090274, Final EIS, FHW, CA, Marin-Sonoma Narrows (MSN) HOV Widening Project, Propose to Relieve Recurrent Congestion along US 101 south of the Route 37 Interchange in the City of Novato (Marin County) and ends north of the Corona Road Overcrossing in the City of Petaluma (Sonoma County), Marin and Sonoma Counties, CA, Wait Period Ends: 09/08/2009, Contact: Lanh T. Phan, P.E. 916–498–5046.

Amended Notices

EIS No. 20090190, Draft EIS, AFS, OR, Wallowa-Whitman National Forest Travel Management Plan, Designate Roads Trails and Areas for Motor Vehicle User, Baker, Grant, Umatilla, Union and Wallowa Counties, OR, Comment Period Ends: 09/17/2009, Contact: Cindy Whitlock 541–962—8501. Revision to FR Notice Published 06/19/2009: Extending Comment Period from 08/18/2009 to 09/17/2009.

Dated: August 4, 2009.

Robert W. Hargrove,

Director, NEPA Compliance Division, Office of Federal Activities.

[FR Doc. E9–18982 Filed 8–6–09; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

[ER–FRL–8939–9]

Public Comment Requested on the Draft Environmental Impact Statement for the Proposed Site Designation of an Ocean Dredged Material Disposal Site Offshore of Guam

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice.

SUMMARY: Notice of Availability and request for public comment on a draft Environmental Impact Statement (EIS) to designate a permanent ocean dredged material disposal site (ODMDS) off Apra Harbor, Guam. EPA has the authority to designate ODMDS under Section 102 of the Marine Protection, Research and Sanctuaries Act (MPRSA) of 1972 (33 U.S.C. 1401 *et seq.*). The U.S. Department of Navy, as a cooperating agency for this action, received Congressional appropriations to fund this site designation, and managed contracts for field studies identified by EPA for the preparation of the draft EIS.

DATES: Public comments on this draft EIS evaluation will be accepted until October 6, 2009.

ADDRESSES: Submit comments to: Mr. Allan Ota, U.S. Environmental Protection Agency, Region 9, Dredging and Sediment Management Team (WTR–8), 75 Hawthorne Street, San Francisco, California 94105–3901, *Telephone:* (415) 972–3476 or *Fax:* (415) 947–3537, or *E-mail: ota.allan@epa.gov.*

FOR FURTHER INFORMATION CONTACT: Mr. Allan Ota, U.S. Environmental Protection Agency, Region 9, Dredging and Sediment Management Team (WTR–8), 75 Hawthorne Street, San Francisco, California 94105–3901, *Telephone:* (415) 972–3476 or *Fax:* (415) 947–3537, or *E-mail: ota.allan@epa.gov.*

SUPPLEMENTARY INFORMATION: EPA requests public comments and intends to conduct a public meeting in Guam to collect comments on the draft EIS, titled ''Designation of an Ocean Dredged Material Disposal Site Offshore of Guam''. Copies of this draft EIS may be viewed at the following locations:

1. Guam EPA's Main Office, 17–3304 Mariner Avenue, Tiyan, Guam 96913.
2. Nieves M. Flores Memorial Public Library, 254 Martyr Street, Hagatna, Guam 96910.
3. Barrigada Public Library, 177 San Roque Drive, Barrigada, Guam 96913.
4. Dededo Public Library, 283 West Santa Barbara Avenue, Dededo, Guam 96929.
5. Maria R. Aguigui Memorial Library (Agat Public Library), 376 Cruz Avenue, Guam 96915.
6. Rosa Aguigui Reyes Memorial Library (Merizo Public Library), 376 Cruz Avenue, Merizo, Guam 96915.
7. Yona Public Library, 265 Sister Mary Eucharita Drive, Yona, Guam 96915.
8. U.S. Environmental Protection Agency (EPA) Library, 75 Hawthorne Street, 13th Floor, San Francisco, CA 94105.
9. U.S. EPA Web site: *http://www.epa.gov/region9/.*
10. U.S. Army Corps of Engineers' Web site: *http://www.poh.usace.army.mil.*

Background: Dredging is essential for maintaining safe navigation at port and naval facilities in Apra Harbor and other locations around Guam. Not all dredged materials are suitable for beneficial re-use (*e.g.,* construction materials, landfill cover), and not all suitable materials can be used or can be stockpiled for future use given costs, logistical constraints, and capacity of existing land disposal sites. Therefore, there is a need to designate a permanent ODMDS offshore of Guam. No actual disposal operations are authorized by this action; and disposal can only take place after a Federal Corps permit is secured. Before ocean disposal may take place, dredging projects must demonstrate a need for ocean disposal and the proposed dredged material must be suitable (non-toxic) according to USEPA ocean dumping criteria. Alternatives to ocean disposal, including the option for beneficial re-use of dredged material, will be evaluated for each dredging project. The proposed ODMDS will be monitored periodically to ensure that the site operates as expected. This proposed site designation has been prepared pursuant to Section 102 of the Marine Protection, Research and Sanctuaries Act (MPRSA). The evaluation is based on EPA's general and specific criteria. Field studies, modeling of sediment dispersion following dredged material disposal under various scenarios, constrained areas, and economic considerations are included in the evaluation. The draft EIS contains an evaluation of potential impacts associated with the two ''Action'' alternatives, and the No-Action alternative. There are two alternative locations for a permanent ODMDS; either the North or Northwest alternative. The proposed North ODMDS is approximately 13.7 nautical miles offshore of Outer Apra Harbor, and in water depths ranging from 6,560 and 7,710 feet. The proposed Northwest ODMDS is approximately 8.9 nautical miles offshore of Outer Apra Harbor, and in water depths ranging from 8,200 and 9,055 feet. There would be a maximum annual disposal limit of 1,000,000 cubic yards of dredged material for whichever site is chosen. Either location has been determined to be environmentally suitable given depth and stability; however the Northwest alternative is the preferred site. The proposed ODMDS will be managed by the USEPA and U.S. Army Corps of Engineers (USACE) Honolulu District.

Comments were received during the scoping comment period and a public scoping meeting was held at the Weston Resort Guam on December 6, 2007. Revisions were made to the field sampling and data collection program (conducted in 2008) and to the analysis presented in the draft EIS to address these comments.

Public Meeting: EPA is requesting written comments on this draft EIS from federal, state, and local governments, industry, non-governmental organizations, and the general public. Comments will be accepted for 60 days, beginning with the date of this Notice. A public meeting is scheduled at the following location and date—August 20, 2009 6–8 p.m., at the Weston Resort Guam, 105 Gun Beach Road, Tumon, Guam. This meeting will consist of two parts—the first being an informational session, and the second a public hearing where the public may comment on the DEIS. Comments presented at the public hearing will be recorded and responded to in the Final EIS. If you require a reasonable accommodation for the public meeting, please contact Terisa Williams, EPA Region 9 Reasonable Accommodations Coordinator, at (415) 972–3829 or *Williams.terisa@epa.gov.*

Dated: July 16, 2009.

Responsible Official:

Laura Yoshii,

Acting Regional Administrator, Environmental Protection Agency, Region 9.

[FR Doc. E9–18871 Filed 8–6–09; 8:45 am]

BILLING CODE 6560–50–P

FARM CREDIT ADMINISTRATION

Farm Credit Administration Board; Sunshine Act; Regular Meeting

AGENCY: Farm Credit Administration.

SUMMARY: Notice is hereby given, pursuant to the Government in the Sunshine Act (5 U.S.C. 552b(e)(3)), of the regular meeting of the Farm Credit Administration Board (Board).

DATE AND TIME: The regular meeting of the Board will be held at the offices of the Farm Credit Administration in McLean, Virginia, on August 13, 2009, from 9 a.m. until such time as the Board concludes its business.

FOR FURTHER INFORMATION CONTACT: Roland E. Smith, Secretary to the Farm Credit Administration Board, (703) 883–4009, TTY (703) 883–4056.

ADDRESSES: Farm Credit Administration, 1501 Farm Credit Drive, McLean, Virginia 22102–5090.

SUPPLEMENTARY INFORMATION: This meeting of the Board will be open to the public (limited space available). In order to increase the accessibility to Board meetings, persons requiring assistance should make arrangements in advance. The matters to be considered at the meeting are:

Open Session

A. *Approval of Minutes*

- July 9, 2009

B. *New Business*

- Farm Credit Administration Board Meetings—12 CFR Part 604—Direct Final Rule

C. *Reports*

- Office of Management Services Quarterly Report

Dated: August 5, 2009.

Roland E. Smith,

Secretary, Farm Credit Administration Board.

[FR Doc. E9–19079 Filed 8–5–09; 4:15 pm]

BILLING CODE 6705–01–P

FEDERAL COMMUNICATIONS COMMISSION

[CG Docket No. 03–123; DA 09–1436]

Consumer and Governmental Affairs Bureau Seeks To Refresh the Record on Petition To Mandate Captioned Telephone Relay Service

AGENCY: Federal Communications Commission.

ACTION: Notice.

SUMMARY: In this document, the Commission, via the Consumer and Governmental Affairs Bureau (Bureau), seeks to refresh the record on a petition filed by various consumer groups requesting that the Commission initiate a rulemaking to make Captioned Telephone Relay Service (CTS) a mandatory form of telecommunications relay service (TRS). This issue has been raised again in a recently filed supplement to the petition, and comment is sought on the supplement as well.

DATES: Comments are due on or before July 27, 2009. Reply comments are due on or before August 10, 2009.

ADDRESSES: Interested parties may submit comments and reply comments identified by [CG Docket No. 03–123], by any of the following methods:

- *Federal eRulemaking Portal: http://www.regulations.gov.* Follow the instructions for submitting electronic filings.
- *Federal Communications Commission's Electronic Comment Filing System (ECFS): http://www.fcc.gov/cgb/ecfs.* Follow the instructions for submitting electronic filings.
- By filing paper copies.

For electronic filers through ECFS or the Federal eRulemaking Portal, in completing the transmittal screen, filers should include their full name, U.S. Postal Service mailing address, and [CG Docket No. 03–123]. Parties may also submit an electronic comment by Internet e-mail. To get filing instructions, filers should send an e-mail to *ecfs@fcc.gov*, and include the following words in the body of the message, ''get form.'' A sample form and directions will be sent in response.

Paper Filers: Parties who choose to file by paper must file an original and four copies of each filing. Filings can be sent by hand or messenger delivery, by commercial overnight courier, or by first-class or overnight U.S. Postal Service mail (although the Commission continues to experience delays in receiving U.S. Postal Service mail). All filings must be addressed to the

Kelis gives birth to her first child

NEW YORK — **Kelis** has welcomed her first child, a boy named Knight.

Kelis

Her representative, Tracey Nguyen, says the 29-year-old singer gave birth at a New York hospital Wednesday night. Nguyen says the baby weighed 7 pounds, 8 ounces.

The father is her soon-to-be ex-husband **Nas**. Kelis, best known for the hit single "Milkshake," filed for divorce from the rapper in April.

Nguyen says Kelis had been in labor since early Monday morning, and her mother and sister were in the hospital room.

Taco Bell ad star Gidget dies at 15

LOS ANGELES — Handlers say **Gidget the Chihuahua**, whose Taco Bell commercials made her a star, has died. She was 15.

The owner of Studio Animal Services in Castaic says Gidget suffered a massive stroke late Tuesday at her trainer's home in Santa Clarita and had to be euthanized.

Gidget

Gidget was the sassy mascot in Taco Bell commercials from 1997 to 2000. While other dogs had bit parts, it was her bug-eyed, big-eared face that is seen pronouncing, in a dubbed male voice, "Yo quiero Taco Bell."

The ads made the Taco Bell mascot wildly popular, although they provoked some criticism from activists who felt they used Mexican stereotypes.

Pop singer Rain takes on MU's Park

SEOUL, South Korea — South Korean pop star **Rain** faced off Thursday against Manchester United midfielder **Park Ji-sung** in what was billed as a "dream match" in Seoul.

Running side by side, Rain joined Park and Seoul Mayor Oh Se-hoon in kicking off a charity match during Manchester United's visit to South Korea, designed to capitalize on club's popularity in South Korea

The Associated Pr

PUBLIC NOTICE

Public Comment Requested on the Draft Environmental Impact Statement for the Proposed Site Designation of an Ocean Dredged Material Disposal Site Offshore of Guam.

AGENCY: U.S. Environmental Protection Agency (EPA)

ACTION: Notice of Availability and request for public comment on a draft Environmental Impact Statement (EIS) t designate a permanent ocean dredged material disposal site (ODMDS) off Apra Harbor, Guam. EPA has the authority t designate ODMDS under Section 102 of the Marine Protection, Research and Sanctuaries Act (MPRSA) of 197 (33USC 1401 et seq.). The US Department of Navy, as a cooperating agency for this action, received Congressiona appropriations to fund this site designation, and managed contracts for field studies identified by EPA for the preparatio of the draft EIS. Public comments on this draft EIS evaluation will be accepted for 60 days from the date of this notice.

FOR FURTHER INFORMATION AND/OR TO SUBMIT COMMENTS, CONTACT: Mr. Allan Ota, U.S Environmental Protection Agency, Region 9, Dredging and Sediment Management Team (WTR-8), 75 Hawthorn Street, San Francisco, California 94105-3901, Telephone: (415) 972-3476 or FAX: (415) 947-3537 o E-mail: ota.allan@epa.gov.

PURPOSE: EPA requests public comments and intends to conduct a public meeting in Guam to collect comments on th draft EIS, titled "Designation of an Ocean Dredged Material Disposal Site Offshore of Guam". Copies of this draft EI may be viewed at the following locations:

1. Guam EPA's Main Office, 17-3304 Mariner Avenue, Tiyan, Guam 96913
2. Nieves M. Flores Memorial Public Library, 254 Martyr Street, Hagatna, Guam 96910
3. Barrigada Public Library, 177 San Roque Drive, Barrigada, Guam 96913
4. Dededo Public Library, 283 West Santa Barbara Avenue, Dededo, Guam 96929
5. Maria R. Aguigui Memorial Library (Agat Public Library), 376 Cruz Avenue, Guam 96915
6. Rosa Aguigui Reyes Memorial Library (Merizo Public Library), 376 Cruz Avenue, Merizo, Guam 96915
7. Yona Public Library, 265 Sister Mary Eucharita Drive, Yona, Guam 96915
8. U.S. Environmental Protection Agency (EPA) Library, 75 Hawthorne Street, 13th Floor, San Francisco, CA 94105
9. U.S. EPA website: http://www.epa.gov/region9/
10. U.S. Army Corps of Engineers' website: http://www.poh.usace.army.mil

SUMMARY: Dredging is essential for maintaining safe navigation at port and naval facilities in Apra Harbor and othe locations around Guam. Not all dredged materials are suitable for beneficial reuse (e.g., construction materials, landfi cover), and not all suitable materials can be used or can be stockpiled for future use given costs, logistical constraints, an capacity of existing land disposal sites. Therefore, there is a need to designate a permanent ODMDS offshore of Guan No actual disposal operations are authorized by this action; and disposal can only take place after a Federal Corps perm is secured. Before ocean disposal may take place, dredging projects must demonstrate a need for ocean disposal and th proposed dredged material must be suitable (non-toxic) according to USEPA ocean dumping criteria. Alternatives t ocean disposal, including the option for beneficial re-use of dredged material, will be evaluated for each dredging projec The proposed ODMDS will be monitored periodically to ensure that the site operates as expected. This proposed sit designation has been prepared pursuant to Section 102 of the Marine Protection, Research and Sanctuaries Ac (MPRSA). The evaluation is based on EPA's general and specific criteria. Field studies, modeling of sedimer dispersion following dredged material disposal under various scenarios, constrained areas, and economic consideration are included in the evaluation.

The draft EIS contains an evaluation of potential impacts associated with the two "Action"alternatives, and the No-Actio alternative. There are two alternative locations for a permanent ODMDS; either the North or Northwest alternative. Th proposed North ODMDS is approximately 13.7 nautical miles offshore of Outer Apra Harbor, and in water depth ranging from 6,560 and 7,710 feet. The proposed Northwest ODMDS is approximately 11.1 nautical miles offshore o Outer Apra Harbor, and in water depths ranging from 8,200 and 9,055 feet. There would be a maximum annual dispos limit of 1,000,000 cubic yards of dredged material for whichever site is chosen. Either location has been determined to b environmentally suitable given depth and stability; however the Northwest alternative is the preferred site. The propose ODMDS will be managed by the USEPA and US Army Corps of Engineers (USACE) Honolulu District.

Comments were received during the scoping comment period and a public scoping meeting was held at the Weston Reso Guam on December 6, 2007. Revisions were made to the field sampling and data collection program (conducted in 200 and to the analysis presented in the draft EIS to address these comments.

PUBLIC MEETING: EPA is requesting written comments on this draft EIS from federal, state, and local government industry, non-governmental organizations, and the general public. Comments will be accepted for 60 days, beginning wit the date of this Notice. A public meeting is scheduled at the following location and date - August 20, 2009 6:00-8:00 pn at the Weston Resort Guam, 105 Gun Beach Road, Tumon, Guam. This meeting will consist of two parts –the first bein an informational session, and the second a public hearing where the public may comment on the DEIS. Comment presented at the public hearing will be recorded and responded to in the Final EIS. If you require a reasonab accommodation for the public meeting, by August 6, 2009, please contact Terisa Williams, EPA Region 9 Reasonabl Accommodations Coordinator, at (415) 972-3829, or Williams.terisa@epa.gov.a

3d 22h ago Environmental Protection Agency

U.S. EPA seeks comments for proposed Guam ocean disposal area draft environmental impact statement / Site to be off Apra Harbor for dredged materials, public meeting on August 20

(08/07/09) HONOLULU – The U.S. Environmental Protection Agency is seeking comments to the draft environmental impact statement for a proposed ocean disposal site for dredged materials off Apra Harbor, Guam. The draft EIS presents a detailed evaluation

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EPA Seeks Public Input on Proposed Disposal Site for Dredged Apra Harbor Sediment

Written by Kevin Kerrigan

Saturday, 08 August 2009 07:56
Guam

Guam - The U.S. Environmental Protection Agency wants the public's input on a federal plan to designate an area outside of Apra Harbor as a permanent disposal site for sediments dredged inside Apra Harbor.

The Navy is working with the EPA in seeking the site for the disposal of what the draft plan calls “clean" sediments.

A dumping site for the material outside Apra Harbor is needed they say because "existing land disposal sites are limited in capacity."

According to a release from the U.S. EPA, “dredging inside Apra Harbor is essential for maintaining safe navigation at port and naval facilities. The Navy has been working to make the Harbor and its docking facilities ready to handle aircraft carriers and other large vessels in keeping with its support requirements for the military buildup.

Two sites are under consideration. One is about 14 nautical miles north of Apra Harbor in an area more than 6-thousand feet deep.

The other site is 11 nautical miles northwest of the harbor in depths beyond 8-thousand feet.

The proposed maximum annual disposal limit would be one-million cubic yards of dredged material.

The EPA has scheduled a public meeting for August 20th at 6 pm at the Weston Resort.

Read the full text of the EPA release below:

U.S. EPA seeks comments for proposed Guam ocean disposal area draft environmental impact statement

Site to be off Apra Harbor for dredged materials, public meeting on August 20

HONOLULU – The U.S. Environmental Protection Agency is seeking comments to the draft environmental impact statement for a proposed ocean disposal site for dredged materials off Apra Harbor, Guam.

The draft EIS presents a detailed evaluation for designating a permanent ocean dredged material disposal site. An ocean dredged material disposal site provides an additional management option for clean sediments because existing land disposal sites are limited in capacity for future use.

“Dredging is essential for maintaining safe navigation at port and naval facilities in Apra Harbor and other locations around Guam,” said Alexis Strauss, water division director for the EPA Pacific Southwest Region. “The draft EIS identified a preferred location for an ocean dredged material disposal site, public review and input on the proposed locations is an important consideration when making the final site designation.”

There are two alternative locations for a permanent site. The proposed North site is around 13.7 nautical miles offshore of outer Apra Harbor, and in water depths ranging from 6,560 and 7,710 feet. The proposed Northwest location is

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- Furloughs Begin For Continental Employees On Guam
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approximately 11.1 nautical miles offshore of outer Apra Harbor, and in water depths ranging from 8,200 and 9,055 feet. There would be a maximum annual disposal limit of 1,000,000 cubic yards of dredged material for whichever site is chosen.

No actual disposal operations are authorized by a designation of a deep ocean site.Disposal of dredged material can only take place after a U.S. Army Corps permit is secured. Before ocean disposal may take place, dredging projects must demonstrate a need for ocean disposal and the proposed dredged material must meet the EPA's ocean disposal criteria. Alternatives to ocean disposal, including the option for beneficial re-use of dredged material, will be evaluated for each dredging project.

The proposed site will be monitored periodically to ensure that the site operates as expected based on the EPA's ocean site designation criteria. Field studies, modeling of sediment dispersion following dredged material disposal under various scenarios, constrained areas, and economic considerations are included in the evaluation.

The EPA is accepting written comments on the draft EIS from federal, state, and local governments, industry, non-governmental organizations, and the general public. Comments will be accepted for 60 days, beginning on August 6. A public meeting is scheduled at the following location and date: August 20, 2009 6:00-8:00 pm, at the Weston Resort Guam, 105 Gun Beach Road, Tumon, Guam.

This meeting will consist of two parts – the first being an informational session, and the second a public hearing where the public may comment on the DEIS. Comments presented at the public hearing will be recorded and responded to in the Final EIS.

The Draft EIS can be reviewed at the following locations:

1. Guam EPA's Main Office, 17-3304 Mariner Avenue, Tiyan, Guam 96913
2. Nieves M. Flores Memorial Public Library, 254 Martyr Street, Hagatna, Guam 96910
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8. U.S. Environmental Protection Agency (EPA) Library, 75 Hawthorne Street, 13th Floor, San Francisco, CA 94105
9. U.S. EPA website: http://www.epa.gov/region9/
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For further information and to submit comments, please contact: Mr. Allan Ota, U.S. Environmental Protection Agency, Region 9, Dredging and Sediment Management Team (WTR-8), 75 Hawthorne Street, San Francisco, California 94105-3901, Telephone: (415) 972-3476 or FAX: (415) 947-3537 or E-mail: ota.allan@epa.gov .

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News Releases By Date

U.S. EPA seeks comments for proposed Guam ocean disposal area draft environmental impact statement / Site to be off Apra Harbor for dredged materials, public meeting on August 20

Release date: 08/07/2009

Contact Information: Dean Higuchi, 808-541-2711, higuchi.dean@epa.gov

(08/07/09) HONOLULU – The U.S. Environmental Protection Agency is seeking comments to the draft environmental impact statement for a proposed ocean disposal site for dredged materials off Apra Harbor, Guam.

The draft EIS presents a detailed evaluation for designating a permanent ocean dredged material disposal site. An ocean dredged material disposal site provides an additional management option for clean sediments because existing land disposal sites are limited in capacity for future use.

“Dredging is essential for maintaining safe navigation at port and naval facilities in Apra Harbor and other locations around Guam,” said Alexis Strauss, water division director for the EPA Pacific Southwest Region. “The draft EIS identified a preferred location for an ocean dredged material disposal site, public review and input on the proposed locations is an important consideration when making the final site designation.”

There are two alternative locations for a permanent site. The proposed North site is around 13.7 nautical miles offshore of outer Apra Harbor, and in water depths ranging from 6,560 and 7,710 feet. The proposed Northwest location is approximately 11.1 nautical miles offshore of outer Apra Harbor, and in water depths ranging from 8,200 and 9,055 feet. There would be a maximum annual disposal limit of 1,000,000 cubic yards of dredged material for whichever site is chosen.

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This meeting will consist of two parts – the first being an informational session, and the second a public hearing where the public may comment on the DEIS. Comments presented at the public hearing will be recorded and responded to in the Final EIS.

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9. U.S. EPA website: **http://www.epa.gov/region9/**
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For further information and to submit comments, please contact: Mr. Allan Ota, U.S. Environmental Protection Agency, Region 9, Dredging and Sediment Management Team (WTR-8), 75 Hawthorne Street, San Francisco, California 94105-3901, Telephone: (415) 972-3476 or FAX: (415) 947-3537 or E-mail: ota.allan@epa.gov.

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NOA Scoping Meeting Transcript

TUMON, GUAM: THURSDAY, AUGUST 20, 2009, 7:50 P.M.

MR. ROSS: Okay. Folks, I hope you've all got some food. We're going to go ahead and start the public comment period, the Public Hearing session of the meeting.

I want to say that I really appreciate you all staying through all this and we've gone a little bit late, but I appreciate you staying with us.

Again, this portion of the hearing is so that you can comment on the EIS. The difference now is, other than just a minute here, I'm going to talk about some of the sort of rules in the format of this. It's time for you to comment on the EIS. We will not be responding to your comments at this point. This isn't the only way you can comment, but any of the comment you make tonight, either in writing on one of the sheets or verbally at the microphone, will be treated as formal public comments on the EIS and it will be responded to in the final EIS.

But, again, we won't be responding to them tonight. We want to make sure everybody has a chance to put their comments on the record one way or another.

You can also comment, whether you comment verbally or not tonight, you can also comment by e-mail. Allan Ota's e-mail address is here and it's in the EIS.

You can also, send, mail, written comments in to EPA and all of those forms of comment will be formally responded to in the EIS, in the final EIS. And we are accepting these comments through October 6, as was said.

Again, this is your opportunity now to put comments officially into the record for the draft EIS. Just to remind you, all your verbal comments are being recorded. We want to make sure we capture them accurately. And as part of that, I'd like to ask folks if you want to come up to the mic, you can cue up if you want, but whoever would like to come up and talk, come to the mic here, but please, write your name on the little cards on the table legibly so that we can make sure that the court reporter knows the right spelling of your name.

And also, please, state your name when if you want to make a comment, if you're willing to.

We’ve already gone a little bit late, but we want to make sure everybody has an opportunity to comment. We have Andrew in the front of the room, will time it. To be fair, we want to make sure everybody has the same amount of time.

So, you will have three minutes for comments. When you get down with only one minute left, Andrew will hold up a little yellow card. And when your time is up, he’ll hold up a red card. I’m not going to cut off anybody in the middle of a sentence, but we do want to make sure everybody has a chance to get their comments in. So, we’ll hold people to three minutes and see how it goes, and if necessary, we can come back through the line again.

So, with that, if there is anybody who would like to start making comments, we’d love to start getting them on the record.

MR. SEMAN: (for public comment)

MR. ROSS: Yes? And, please, would you mind coming forward and just saying your name and giving David here the card so we can get it spelled right on the recorder? Yeah. This is the one that's working.

MR. SEMAN: Good evening. My name is Richard Seman, I publish the Marianas Fishing Magazine. My comment is, taking in to account that the Navy is proposing a disposal site offshore, it brings to mind two things.

One, it's a huge volume of dredged material that to the point that reusable ones may be so much that it has to go somewhere else. Or, two, there are in fact unsuitable dredged material that it must go somewhere. Because in looking at the federal register, it mentions about the dredging project and all that. But the part there that bothered me was "Therefore", you know. A site must be identified, because it talks about -- the way I read it was, I don't have the paper with me, but it explains about the dredged materials and all that and that not all of it can be reused "Therefore"; that's the part that captured my attention.

And so, you know, with a huge volume, in order to have excess beneficial reuse of dredged material, what really -- do we have an idea just what kind of volume we're talking about that -- because my feeling is we have good reusable material, it’s hard to get rid of it. There’s always places that we can put this reusable material. But, if they are not good, then it brings this into consideration about putting it somewhere else. And that what concerns me. Thank you.

MR. ROSS: Thank you. And again, we won’t respond now, but, by the way, we will hang around afterwards if people want to ask questions informally again. Manny, would you like to step forward?

MR. MANNY DUENAS: I know I said all this last night and a few more today, a few more items today. One, the impact of suspended material on marine life. Our key issues, our concerns, are pelagic, the prey fish by which they hang around or sea mounts. And also, the coral reef species. There is nothing that -- maybe it’s in the book. Every time I hear something, it’s “Read the book”, I have a lot of books to read

Second, again, the comparison between the continental shell versus coral reef areas. I think that’s -- it doesn’t fit in this picture. Fishing areas where large pelagic congregate, that's those two known areas, one is Paris Bank, one is the area called spoon, which is north of the alternative range.

And then, again, my concern over Scripts versus NOA research vessels, which actually do some monitoring of marine life. And then, seasonal fish movement, which I mentioned earlier.

Prevailing currents, which I wish you would include into your plan of action to make sure that when the currents are going a different direction, where it won't impact anything, that is when they're authorized to do their work.

The range of protective species such as green sea turtles around the islands, is around 20 to 30 miles, that's known, that's a fact. So, I don't I know how this is going to be impacted there.

Fishing gear types, again, I wish you would deploy some and employ some fishermen to do some further research. I think further study needs to be done in these areas and not for a snapshot. It was mentioned that the barge, when filled, is better for them because it's cost-effective, they can take it straight out to the ocean. My concern is, is the material, while on the barge, going to be tested? Because when you're in the water, testing a particular point or certain quadrant, I guess, how you guys test, you might open an old drum of PCB, or whatever, contaminants, in the water.

I'm sure -- and then it was mentioned last night at the fisherman's meeting, that you're going to separate the aggregates. Larger rocks will be separated. I don't know how they're going to do it on the barge, but that bothers me, because that's going straight to the barge.

Cleaning equipment for the sediment. Twenty some years ago, there was a company, I think in Montana, that actually developed a cleaning machine that took contaminated soil and kicked out clean soil. And they used this a lot in the Alaska for the oil fields. So, I don't know why we can't use the same system here on Guam. And you're talking about the military, they got a lot of money. They pay for all this EIS. My understanding, this whole EIS contract, for everything they're doing, is way over $200,000,000,00. So, I think buying that little machine is not going to hurt many.

Further, the military is looking for more land to conduct their military exercises. They're looking at getting private land. When they built the Twin Towers in New York, when they dug up the bottom of the twin for the foundation, they put a berm around the ocean adjacent to it, and they took all that and made it backfill and they created more real state. Military needs more land. I think that's the safest way of doing it.

MR. ROSS: I just wanted to let you know, we've gone a little over your three minutes.

MR. MANNY DUENAS: I'm sorry. I got a lot more. This is only half of what I have.

MR. ROSS: No -- and if you have a lot more, I'd invite you to come back in line. I just want to make sure first --

MR. MANNY DUENAS: Okay.

MR. ROSS: -- that anybody has there their three minutes and then we'll get more;

okay? Thank you. Maybe we'll find that nobody else wants to and you can come right back. Yes? Please, just let us know your name and then --

MR. MIKE LIDIA: Mike Lidia.

MR. ROSS: And could you say that in the microphone for the reporter?

MR. MIKE LIDIA: Sure. My name is Mike Lidia. I with Vice-speaker Cruz, as you guys know. A couple of questions that I have would be, as you guys know, we get -- it's like that Credence Clearwater song where he talks about "Have you ever seen the rain"; and then it just kind of pops up here on Guam like you wouldn't expect? So, you might have an unexpected swell on the way out to the dump site, as I understand, it's about 11 miles from Point A to Point B.

So, if something on the barge, if the barge was to encounter an accident; what mitigation have you planned in advance base on the fact that it could sink and smother the coral and the fish and other crustaceans and all the other fun filled little creatures that are there?

Getting back to the radioactive

material and/or just contaminated material, when you do find something as contaminated, how do you handle them in a small island in void of a secluded safe dumping facility? I think that's about it. Thank you very much.

MR. ROSS: Good. Thank you. And, again, written comments are great. And even if you've already made verbal comments or put some comments in the box, we will take, you know, any other comments all through the comment period. You can write as many letters as you'd like. Anyone else for now? Anything on your mind? Would you like to comment?

MR. TOM FLORES: Thank you. I'm a representative of Department of Agriculture. And, right off the bat, our agency has --

MR. ROSS: Please, state your name.

MR. TOM FLORES: Oh, I'm sorry. Tom Flores. I'm a biologist with Department of Agriculture. Our agency has 14 concerns with your EIS, and we will be giving it to you in writing.

MR. ROSS: Okay.

MR. TOM FLORES: And we hope that, you know, because our agency deals a lot with fisheries and endangered species and all that, we felt that, I think, some of the -- or with your EIS, that some of the things that you had not addressed. And we hope that, that when we put down in writing, that you will, you will really address it because, you know, we have a lot of people that we do -- you know, we're the ones that are responsible for the natural resources here on Guam. And our main concern, basically, is the fishery aspects and everything else.

So, anyways, we'll give it to you in writing. But, again, like Mr. Manny said, you're only giving me three minutes and I can't go through all 14.

MR. ROSS: Well, once everybody has had -- I just want to make sure everybody's had their three minutes and then we can come back again, if you'd like, to give more verbal comments. But again, obviously, also, whatever you turn in in writing, we'll definitely address as well.

MR. TOM FLORES: Okay. Thank you.

MR. ROSS: Thank you. It looks like -- oh. Yes, sir?

MR. JULIAN FLORES: Hi, my name is Julian Flores. And, you had said something about the dump being good for 50 years. I feel that once the dredging has been done with the military or whatever, I feel that it should be just closed right after that. It doesn't need to be open for 50 years.

MR. ROSS: Thank you. Okay. Well, if anybody else is waiting to make a first comment, now is a good time. Otherwise, I'm going to open it back up to the folks who so kindly kept the three minutes to begin with. Anymore initial comment? Okay. Would anyone like to add to their comment? I know it seems formal, but we want to make sure everybody has a chance.

MR. MANNY DUENAS: I have more.

MR. MAYER: Thank you very much for coming and putting up with the format.

MR. MANNY DUENAS: Manny Duenas, Fisherman's Coop. A few more items, and this is only a partial list. Again, we recommend that you take the dredged material and mix it with cement and use it for artificial reef somewhere or use it for seawall, I don't know what you'd do, but dumping it in the ocean; sediment is sediment, near shore or offshore, that's our bottom line.

Testing of dredged material shall be all inclusive, as it was mentioned earlier. The testing wasn't all in inclusive because there's other report. I think if you're going to really test something, you have a long list, it's like me going to see the doctor, getting a physical and he's only looking at something. So, we appreciate that.

Research. Again, I'm very concerned about the research done on this. They said, it was mentioned it was done for 24 days. I don't know if that includes the travel time, but 24 days is only a snapshot. My criticism, the same NOA ships that come down here for the same amount of time, snapshot does not tell you to you the picture.

My concern, again, are 500 cubic yards per trip, is an estimate, it could be called mix material. And again, we require or ask that testing be done on-board. And I don't know how you're going to discharge the material on-board. And bottom line is -- or the last two comments. The western part of our sea is our fishing grounds, that's our fishing area, there's no ifs' or buts' about it. And this type of activity may hamper our fishing. We don't know. And if it does, what do we get out of it? How do we handle this? If the dredged material is bad and it goes in the ocean, it's not the water column, and it's stuck in the water column for three miles and it ends up on our sea mounts, you guys, "Oh, gosh, darn it, we made a mistake."

You know, there's a lot of issues, and again we're mentioning what was 50 years of the life of the thing. It's ludicrous. I don't think we're going to be dredging anymore by that -- hopefully, in 10 years, we won't have to deal with big ships anymore.

The bottom line, the people of Guam don't want it, at least the fishermen don't, and we're the only ones affected. People living in the villages won't know or feel the impact of this. But the bottom line, as far as fishermen are concerned, we don't want this at all.

And again, we're not going to sleep

good at night knowing this, and we don't feel comfortable with the idea that sediment is going to be dumped in our waters. And we hope you respect the fact that we've been good stewards of our ocean, people living in the Marianas. And we don't need this kind of influence to change the way we live for a certain outcome by the US Military. Thank you.

MR. ROSS: Thanks Manny. Sir, are you interested in continuing? Sorry to make you get up and down.

MR. TOM FLORES: I'll turn in written comment.

MR. ROSS: Okay. That's great. That's fine. Thanks. I know it's kind of strange to come up and stand in front a microphone in front of 20 people. I appreciate anyone who has. I'll give one more call for anybody who would like to put formal comments in.

PUBLIC IN ATTENDANCE: (no public comments)

MR. ROSS: And I'll go ahead and close the public hearing portion here. And as I said, we'll stay around for a little bit if people want to ask more questions, and it's then off the record. And we'll, you know -- or informal, I should say, and we'll be happy to continue the talk. So, one last call for anybody who would like to come.

PUBLIC IN ATTENDANCE: (no public comments)

MR. ROSS: All right. With that, I want to thank you all so much for coming tonight, for listening to us and for giving us some of your thoughts about this and your concerns, we really do appreciate it. We will be responding to all of these comments. And with that I'll close the public hearing now. Thank you.

(Public Hearing concluded at 8:10 p.m.)

TUMON, GUAM: THURSDAY, AUGUST 20, 2009

REPORTER'S CERTIFICATE

I, **George B. Castro**, Court Reporter, do hereby certify the foregoing 19 pages to be a true and correct transcript of the audio recording made by me at the time and place as set forth herein.

I do hereby certify that thereafter the transcript was prepared by me or under my supervision.

I further certify that I am not a direct relative, employee, attorney or counsel of any of the parties, nor a direct relative or employee of such parties, and that I am not directly or indirectly interested in the matters in controversy.

In testimony whereof, I have hereunto set my hand and seal of Court this 11th day of September, 2009.

____

George B. Castro

Agency Correspondence and Public Officials

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Pacific Islands Regional Office
1601 Kapiolani Blvd., Suite 1110
Honolulu, Hawaii 96814-4700
(808) 944-2200 · Fax: (808) 973-2941

October 5, 2009

Mr. Allan Ota
U.S. Environmental Protection Agency, Region 9
Dredging and Sediment Management Team (WTR-8)
75 Hawthorne Street
San Francisco, CA 94105-3901

Dear Mr. Ota

The National Oceanic and Atmospheric Administration's National Marine Fisheries Service Pacific Islands Regional Office (NMFS) Habitat Conservation Division has reviewed the "Draft Environmental Impact Statement for Designation of an Ocean Dredged Material Disposal Site Offshore of Guam" prepared for The United States Environmental Protection Agency (USEPA), Region 9 in July 2009. The document and supporting documents describe the need for and potential impacts of the designation of an ocean dredged material disposal site (ODMDS) west of the Territory of Guam (Guam).

NMFS Habitat Conservation Division conducted this review in accordance with the Fish and Wildlife Coordination Act of (16 U.S.C. 662), Magnuson-Stevens Fishery Conservation and Management Act (MSA), (16§1801 et seq), EO 13089, Protection of Coral Reefs, and the National Environmental Policy Act.

Formal designation of an ODMDS does not constitute approval of dredged material for ocean disposal. Designation of an ODMDS provides an additional dredged material management option for consideration in the review of each proposed dredging project. Ocean disposal is only allowed when USEPA and United States Army Corps of Engineers (USACE) determine, on a case-by-case basis, that the dredged material: 1) is environmentally suitable according to testing criteria (40 Code of Federal Regulations [CFR] Parts 225 and 227), as determined from physical, chemical, and bioassay/ bioaccumulation testing that is briefly described in Section 2.7 (USEPA and USACE 1991), 2) does not have a viable beneficial reuse, and 3) there are no practical land placement options available.

Two ODMDS alternatives were examined in the EIS analysis. These two alternatives are referred to as the Northwest Alternative ODMDS, and North Alternative ODMDS. The Northwest Alternative ODMDS is located at 13° 35.500' N and 144° 28.733' E, approximately 11.1 nm (1 20.6 km) offshore of Guam, and occurs at a depth of approximately 8,200 ft (2,500 m). The North Alternative ODMDS is located at 13° 41.300' N and 144° 36.500' E, approximately 13.7 nm (25.4

km) offshore of Guam, and occurs at a depth of approximately 6,560 ft (2,000 m). The Northwest Alternative ODMDS was selected as the preferred alternative.

The DEIS states that the disposal of dredged material at either ODMDS site is not expected to have any measurable effect on the regional or site-specific physical oceanographic or geologic conditions. Impacts on water column organisms such as plankton, pelagic fishes, and marine mammals are expected to be minimal, temporary, and limited to the area within the site boundaries. No significant impacts to seabirds are anticipated for any of the alternatives. Furthermore, the exposure of marine organisms and other fauna to dredged material is not expected to result in significant adverse effects given that the dredged material proposed for ocean disposal must be tested and determined suitable (non-toxic) for ocean disposal according to Environmental Protection Agency (EPA) and USACE testing criteria.

NMFS Habitat Conservation Division recommends that the FEIS recognize the need to avoid peak coral spawning periods, roughly June – August, as well as key spawning periods for pelagic fisheries resources, such as Yellowfin Tuna, which also occurs during the summer months. Further, the Final EIS should recommend the use of BMPs to minimize project related degradation of water quality, and avoid marine mammal and sea turtle interactions.

Local fishers have raised concerns about possible impacts to Yellowfin Tuna and possibly other pelagic species around Perez Bank (just west of the Northwest Alternative ODMDS) and Spoon Bank (just north of the North Alternative ODMDS), which are not fully addressed by this DEIS. We recommend that this subject be addressed further with NMFS, the Guam Department of Agriculture's Division of Aquatic and Wildlife Resources, and fishers, including the Guam Fishermen's Cooperative Association.

If unavoidable resource losses are anticipated for the offshore disposal of dredged material, NMFS Habitat Conservation Division recommends that appropriate compensatory mitigation measures be proposed in the Final EIS. These should include a monitoring plan to evaluate the effectiveness of the mitigation measures against performance measures.

We thank you for the opportunity to comment on this document. If you should have further questions, please contact Valerie Brown in our Guam Field Office, Valerie.brown@noaa.gov or 671-735-4032.

Sincerely,

Alan Everson

Alan Everson
Coral Program Manager
Habitat Conservation Division

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
Pacific Southwest Region
1111 Jackson Street, Suite 520
Oakland, California 94607

IN REPLY REFER TO:
ER 09/813

Electronically Filed

25 September 2009

Mr. Allan Ota
U.S. Environmental Protection Agency, Region 9
Dredging and Sediment Management Team (WTR-8)
75 Hawthorne Street
San Francisco, California 94105-3901

Subject: Review of the Draft Environmental Impact Statement (DEIS) for the Apra Harbor, Proposed Site Designation of an Ocean Dredged Material Disposal Site Offshore, Guam (ER 09/813)

Dear Mr. Ota:

The Department of the Interior (Department) has received and reviewed the subject document and has the following comments to offer.

We recognize that the subject document deals exclusively with designating a permanent Ocean Dredged Material Disposal Site (ODMDS) to accommodate harbor dredging-related work being planned for Apra Harbor; however, we would like to express our expectation that the impacts of the dredging process itself will be addressed in the DEIS for the Guam/CNMI Military Buildup due in November 2009.

This proposed project is sponsored by the U.S. Environmental Protection Agency in cooperation with the U.S. Department of the Navy (Navy). The following comments have been prepared pursuant to the National Environmental Policy Act of 1969 [42 U.S.C. 4321 *et seq*.; 83 Stat. 853], as amended; the Endangered Species Act of 1973 [16 U.S.C. 1531 et seq.; 87 Stat. 884], as amended (ESA); the Fish and Wildlife Coordination Act of 1934 [16 U.S.C. 661 *et seq*.; 48 Stat. 401], as amended; and other authorities mandating Department concern for environmental values. Based on these authorities, we offer the following comments for your consideration.

The Navy and Port Authority of Guam anticipate expanding existing harbor facilities in order to accommodate anticipated increases in vessel and cargo traffic within the harbor. Large amounts of sediment may be dredged from Apra Harbor to support future expansion plans, as well as on-going maintenance dredging.

Sediment that may be considered for off-shore disposal must (1) be environmentally suitable, (2) not have a viable beneficial reuse, and (3) have no practical land placement options available. Under these circumstances, it may be necessary to establish a permanent ODMDS in the vicinity of Apra Harbor to accept non-reusable dredged sediment.

Under consideration are two alternative locations for the ODMDS. The North ODMDS alternative area is located approximately 13.7 nautical miles (nm) offshore of Guam at a depth of 6,560 feet (ft). The Northwest ODMDS alternative area is located approximately 11.1 nm offshore of Guam, at a depth of about 8,200 ft. The disposal area for both alternatives is about 3.1 nm in diameter. There is also a "No Action" alternative that would allow limited disposal of dredged material in Guam landfills. The Northwest ODMDS is the preferred alternative.

Existing upland dewatering and stockpile sites on Guam are able to accommodate approximately 2,100,000 cubic yards (cy) of dredged material. It is anticipated that future dredging activities will exceed existing facility capacity to dewater and stockpile materials by approximately 2,400,000 cy.

Given the need for suitable beneficial dredged material to support development projects on Guam, we suggest the EPA evaluate additional areas to dewater and stockpile dredge materials that may be appropriate for future beneficial reuse purposes. In this manner, EPA could possibly minimize the amount of dredged material that would be disposed of in the ocean.

The U.S. Fish and Wildlife Service (Service) is willing to work with the EPA and the Navy to identify additional dewatering and stockpile sites that avoid and minimize impacts to fish and wildlife resources.

We recommend that the Final EIS indicate that any proposed sediment disposal will be conducted outside of the annual Guam coral spawning period, which is approximately June through August. Additionally, we recommend that Best Management Practices be incorporated into any sediment disposal operations to avoid or minimize project-related degradation of water quality and impacts to fish and wildlife resources (enclosed).

If unavoidable resource losses are anticipated to result from offshore disposal of dredged material, we recommend that appropriate compensatory mitigation measures be proposed in the Final EIS, including provisions for monitoring mitigation actions against performance measures to assess effectiveness of the mitigation effort.

The Department appreciates the opportunity to provide comments on the DEIS. If you have any questions regarding this letter, please contact Marine Ecologist Kevin Foster at the Pacific Islands Fish and Wildlife Office in Honolulu, Hawaii, by either electronic mail (Kevin.B.Foster@fws.gov) or telephone (808-792-9420).

Sincerely,

Patricia Sanderson Port
Regional Environmental Officer

cc:
Director, OEPC
FWS, Region I
NPS, Pacific West Region

ENCLOSURE

US Fish and Wildlife Service
Recommended Standard Best Management Practices

The Fish and Wildlife Service recommends that the following measures be incorporated into projects to minimize the degradation of water quality and impacts to fish and wildlife resources:

a. Turbidity and siltation from project-related work shall be minimized and contained to within the vicinity of the site through the appropriate use of effective silt containment devices and the curtailment of work during adverse tidal and weather conditions;

b. dredging/filling in the marine environment shall be scheduled to avoid coral spawning and recruitment periods;

c. dredging and filling in the marine/aquatic environment shall be designed to avoid or minimize the loss of special aquatic site habitat (coral reefs, wetlands etc.) and the unavoidable loss of such habitat shall be compensated for;

d. all project-related materials and equipment (dredges, barges, backhoes etc) to be placed in the water shall be cleaned of pollutants prior to use;

e. no project-related materials (fill, revetment rock, pipe etc.) should be stockpiled in the water (intertidal zones, reef flats, stream channels, wetlands etc.);

f. all debris removed from the marine/aquatic environment shall be disposed of at an approved upland or ocean dumping site;

g. no contamination (trash or debris disposal, alien species introductions etc.) of adjacent marine/aquatic environments (reef flats, channels, open ocean, stream channels, wetlands etc.) shall result from project-related activities;

h. fueling of project-related vehicles and equipment should take place away from the water and a contingency plan to control petroleum products accidentally spilled during the project shall be developed. Absorbent pads and containment booms shall be stored on-site, if appropriate, to facilitate the clean-up of accidental petroleum releases; and

i. any under-layer fills used in the project shall be protected from erosion with stones (or core-loc units) as soon after placement as practicable.

The Fish and Wildlife Service believes that incorporation of these measures into projects will greatly minimize the potential for project-related adverse impacts to fish and wildlife resources.

BUREAU OF STATISTICS AND PLANS

(Bureau of Planning)

Government of Guam

Felix P. Camacho
Governor of Guam

Michael W. Cruz, M.D.
Lieutenant Governor

P.O. Box 2950 Hagåtña, Guam 96932
Tel: (671) 472-4201/3
Fax: (671) 477-1812

Alberto "Tony" Lamorena V
Director

OCT 07 2009

Mr. Allan Ota
Oceanographer, US EPA, Region IX
Dredging and Sediment Management Team (WTR-8)
75 Hawthorne Street
San Francisco, California 94105-3901

Dear Mr. Ota:

The Bureau of Statistics and Plans has completed the review of the Federal Consistency Determination for the Designation of an Ocean Dredged Material Disposal Site (ODMDS) Offshore of Guam and the corresponding Draft Environmental Impact Statement dated, July 2009.

Suggested alternatives for the ODMDS include the Marianas Trench, Off-Island upland placement, reactivation of the interim ODMDS, the North and the Northwest ODMDS. The selected Preferred Alternative is the Northwest ODMDS. As indicated in the DEIS, the North and the Northwest ODMDS meet the USEPA five general site selection criteria (40 CFR 228.5) and Specific Site Selection Criteria (40 CFR 228.6). However, the Northwest ODMDS alternative was chosen based on flatter bathymetry and proximity to Apra Harbor.

On our letter dated, January 11, 2009, we have indicated that the Bureau supports the identification and designation of a new disposal site in conformance with the Marine Protection Research and Sanctuaries Act (MPRSA), in which responsibilities are shared by the US Environmental Protection (USEPA) and the U.S. Corps of Engineers (USCOE). The DEIS has indicated that a USCOE permit is to be issued, using EPA's environmental criteria defined in the USEPA's Ocean Dumping Regulations at 40 CFR Part 227, and subject to EPA's concurrence under the MPRSA. The permitting regulations promulgated by the USACE, under the MPRSA, appear at 33 CFR Parts 320 to 330 and 335 to 338. The Guam ODMDS Site Management and Monitoring Plan has indicated that the Guam ODMDS would be restricted to the disposal of suitable dredged material only. It is permanently designated to receive an annual maximum quantity of dredged material of 1,000,000 cy (764,555 m3). The USEPA will encourage advanced planning and coordination by users of the Guam ODMDS to ensure the annual maximum quantity of dredged material is not exceeded, with consideration of potential variances in proposed volume determination for each project and unforeseen circumstances such as emergency dredging needs to maintain safe and navigable waterways. Decisions about the suitability of dredged material for ocean disposal are guided by criteria in the MPRSA and EPA's Ocean Dumping Regulations; guidance on specific aspects of these regulations is provided in Ecological Evaluation of Proposed Discharge of Dredged material into Ocean Waters; USEPA/USACE 1991).

The Federal consistency determination document states, "Ocean disposal is allowed only when USEPA and the US Army Corps of Engineers (USACE) determine on a case by case basis that the dredged material: 1) is environmentally suitable according to testing criteria (40 CFR Parts 225 and 227) as determined from physical, chemical and biological testing; 2) does not have a viable beneficial reuse; and 3) there are no practical land placement options available." The ODMDS would be managed in accordance with a Site Management and Monitoring Plan, included as Appendix C of the DEIS. Mr. Celestino Aguon, Chief, Guam Division of Aquatic and Wildlife Resources, as well as, Mr. Michael Gawel, Chief Planner from the Guam Environment Protection Agency (GEPA) have confirmed, by telephone, that they have no objection to the Preferred Northwest ODMDS. We agree that ocean disposal will only be allowed after USEPA and USACE determine the suitability of dredged materials tested; have no viable beneficial reuse; and there are no practical land placement options available.

Based on our review of the Federal Consistency Determination and the corresponding Draft EIS, we agree that the site designation alternatives and associated ocean dredged material disposal operations are not expected to have significant adverse environmental impacts on coastal uses or resources. With the implementation of the Compliance Monitoring in accordance with a site management and monitoring Plan, Appendix C of the DEIS, the Bureau concurs with the USEPA determination that there are no direct or indirect (cumulative or secondary) adverse impacts on coastal uses or resources, and that the proposed action and its alternatives are consistent to the maximum extent practicable with the enforceable policies of the Guam Coastal Management Program (GCMP), in accordance with the Coastal Zone Management Act of 1972, (P.L. 92-583) as amended (P.L. 94-370, P.L. 104-150, the Coastal Zone Protection Act of 1996).

Sincerely,

ALBERTO A. LAMORENA V
Director

cc: GEPA
DoAg/DAWR
DPR
DLM
Navy
Office of the Governor
KChaston/BMillhouser

GUAM ENVIRONMENTAL PROTECTION AGENCY

AHENSIAN PRUTEKSION LINA'LA GUAHAN

P.O. Box 22439 GMF • BARRIGADA, GUAM 96921 • TEL: 475-1658/9 • FAX: 477-9402

Mr. Alan Ota
US Environmental Protection Agency, Region 9
Dredging and Sediment Management Team (WTR-8)
75 Hawthorne St.
San Francisco, CA 94105—3901
E-Mail : Ota.Allan@epamail.epa.gov

6 OCT 2009

Fax: (415) 947-3537

SUBJECT: Comments on Draft Environmental Impact Statement for Site Designation of an Ocean Dredged Material Disposal Site Off Apra Harbor, Guam

Dear Mr. Ota:

Guam Environmental Protection Agency (Guam EPA) is pleased to submit, enclosed, our comments on the Draft Environmental Impact Statement (DEIS) on the impacts of: Site Designation of an Ocean Dredged Material Disposal Site Off Apra Harbor, Guam.

We understand that the comments deadline for this scoping is October 6, 2009. We submit these by that deadline and request that these be addressed in the Final EIS.

We wish to thank you for the opportunity to present these comments on the DEIS.

Please call me or the Guam Environmental Protection Agency's Chief Planner, Mike Gawel, at (671) 475-1658 if there are questions on these comments or more information is needed.

Sincerely,

D. Denagan FOR

LORILEE T. CRISOSTOMO
Administrator

Enclosure
Cc: Bureau of Statistics and Plans
Dept. of Land Management
Dept. of Public Works
Dept. of Agriculture
Chamorro Land Trust
Port Authority of Guam
Guam Council of Mayors

"ALL LIVING THINGS OF THE EARTH ARE ONE"

Guam EPA Comments on DEIS

Page	Paragraph/ Figure	Line	Comment
General			**National Defense Concerns Versus EPA requirements:** What circumstances relative to National Defense would override, modify or cancel the US EPA requirements applied to ocean disposal of dredged material by the DOD?
General			**Why not an "Overseas EIS"?** The Department of Defense (DOD) is developing an Environmental Impact Statement/Overseas Environmental Impact Statement on the impacts of 1) proposed relocation of 8,000 Marines from Okinawa to Guam, 2) facilities for berthing of nuclear aircraft carriers at Guam and 3) placement of an Army Ballistic Missile Defense Group on Guam. We have been told by representatives of the DOD that their reason for having an "Overseas Environmental Impact Statement" is because their proposed actions and impacts are to be "beyond 12 miles" from US shores and that this distance is said to trigger the need of an OEIS. Is this application of an OEIS also needed for Designation of an Ocean Dredged Material Disposal Site which is an action proposed to be more than 12 miles off shore?
ES-6 & 3-81		33	*Panulirus marginatus* does not occur in Guam and is not in a Guam fishery, nor is *Ranina ranina* regularly fished in Guam.
ES-10 & Table 2-3	Crit. 3		**Relation to CZMA Jurisdictions.** By having the sites greater than 3nm from the coast, it appears that, for future proposed disposal, the CWA provisions do not apply and the review of disposal activities by local Guam regulatory agencies through the Federal Consistency Process is prevented. Are there provisions to ensurethat proposals to EPA to use the disposal site can be shared with Guam regulatory agencies, to allow their input to EPA during the application review period? If Government of Guam disapproves of a proposed disposal activity at the designated site, will this cause EPA to also disapprove? As EPA decides whether a proposed disposal will be allowed, will it consult with Government of Guam on whether beneficial uses of the material are available? In particular, if the Department of Defense fails to adequately test the quality of the CVN dredged material for contaminants, or suitability for beneficial uses or fails to develop beneficial uses that could be pursued, will Guam objections be recognized and acted upon by US EPA?
ES-10 & Table 2-3	Crit. 3		**Beneficial Uses.** Government of Guam in all cases prefers beneficial use of dredged materials rather than ocean disposal and requests that the US EPA recognizes and better describes these uses and their estimated capacities and locations on Guam as part of this EIS. The suggestion by US EPA that Guam should undertake a Strategic Plan for Beneficial Use of dredged material is not practical, knowing Government of Guam lacks the resources to do this. This must be funded by the proponents of the designation for the disposal site (i.e., the DOD) and site designation or site utilization must be delayed until this plan is completed. If the EIS does not propose and evaluate alternatives that may best serve both the civilian and the military communities on Guam through a comprehensive island-wide approach, EPA should make conditions of site use approval include such a comprehensive study.

ES-10 & Table 2-3	Crit. 3	**Beneficial Use Plans.** The Guam Departments of Land Management, Public Works and Agriculture, the Chamorro Land Trust, Guam Environmental Protection Agency, Port Authority of Guam (PAG), Bureau of Statistics and Plans, Council of Mayors and others, as well as the Air Force and Navy, must all be approached by the EIS preparers or by applicants for site use (e.g., DOD) to obtain information on beneficial use sites and needs for beneficial uses. These should include filling for elevated fast land, especially considering projected sea level rises that will impact coastal facilities (as at the PAG), cover for landfills, capping of clean-up sites, restoration of old quarry sites, beach enrichment, road base fill and use for construction material. Large quantities of fill are planned to be used for expansion of Guam's commercial port and arrangements have been made to utilize dredged material from Navy dredging. Needs around Apra Harbor to accommodate sea level rise have not planned to use material dredged from the harbor, but should, just as the Agana Boat Basin dredging provided material for the adjacent GWA WWTP Island. Cover for the Ordot and the military landfills is constantly needed and feasibility of using dredged material should be discussed in the EIS. Old quarry sites should be assessed and calculations of potential volumes of dredged material needed to restore them for uses such as recreation should be assessed. New road construction is required on Guam, and this should greatly expand with urgent requirements for roads needed by the military. The potential needs for road materials and the suitability and requirements of using dredged materials as sub-base fill should be addressed. Recent technology for producing "mudcrete´ from silty and salty dredged materials has been applied successfully and economically for construction. This beneficial option should also be addressed. Although Guam has regulated shoreline developments to avoid a need for beach enrichment, future demands for this process are expected and the use of dredged material for beach replenishment or creation should be investigated as another alternative to ocean disposal. Perhaps, as part of the military expansion and training plans, new beaches may be needed for amphibious landing exercises, to avoid damage to and competition for use of natural beaches.
ES-10 & Table 2-3	Crit. 3	**DOD Beneficial Uses.** Besides use of dredged material to raise DOD shore facilities above sea level rise impacts and as cover for military landfills, it may be used at dozens of Installation Restoration (clean-up) sites of hazardous wastes on DOD properties as well as off-Base, and Formerly Used Defense Sites (FUDS) that are recognized on Guam. Many more contaminated sites may be found in the future as resources become available to identify them. These are being assessed and slowly restored to allow safe, but often restricted, uses of at least adjoining properties. Increased DOD developments will lead to pressure to increase and speed up the investigation and restoration of these hazardous waste sites. Suitability of transporting, storing and finally using dredged materials for capping clean-up sites should be assessed in the EIS. Development and improvement of DOD training ranges on Guam requires creation of berms as target back-stops, which could be developed from dredged material. Training sites being developed for Marines landing exercises may use dredged material to create the practice landing beaches. Old military quarry sites should be assessed and calculations of potential volumes of dredged material needed to restore them for uses such as recreation should be assessed.
ES-10 & Table 2-3	Crit.5	**Surveillance and Monitoring.** USACE has a single regulatory representative on Guam and US EPA has no representative resident on Guam, in spite of the increased responsibilities during the Marine Relocation, CVN Berthing development, creation of a new Army Base, etc., in the next few years. Monitoring of any proposed disposal at the site and enforcement of permit requirements may not be adequately managed without Guam-based responsible authority. How will EPA meet its responsibilities if remote monitoring and real time evaluation fails over the thousands of miles to the regulators from the regulated site?

ES-10 & Table 2-3	Crit. 8	**Special Scientific Importance**. Although not identified as a site of Special Scientific Importance, the extremely limited sampling of organisms from the proposed impacted areas and otherwise lack of information on the ecosystem of the impacted site has still produced an apparent world record size of marine fish species. Isn't it likely that further investigations of the sites may find other cases of unique scientific findings?
	1.3.2	The EIS should provide the projected costs per unit of purchasing construction and fill materials for which dredged materials can be replaced. Expanded demand for quarry materials for military construction and off-base construction triggered by the military developments must be generally assessed. The costs and actions necessary to substitute dredged materials for quarry products should be listed. The possibility of exporting usable dredged materials to other ports, using ships that unload in Guam and return empty, should be considered.
App. B		Missing from DEIS
App. C	2.1	There seem to be omissions: at 2.1.1.7 "(REFERENCE)" failed to list the reference, and at 2.1.2 "MM DD YYYY" is what date?
App. C	2.2	Special Management conditions: Condition 8) Should include provision for space for an observer representing Government of Guam to be available on any disposal vessel.
App. C	2.2	Studies have failed to determine if larvae from mass coral spawning, believed to drift in the ocean west of Guam, would be impacted by disposal operations during the spawning and subsequent larval periods. Therefore, a condition must be added that the disposal shall not take place during the larval periods following mass spawning of Guam corals in June, July and August, unless specific local scientific studies conclude that there are no coral larvae passing through the disposal impact area following these mass spawnings.

Senator Benjamin J.F. Cruz
VICE SPEAKER
CHAIRMAN, COMMITTEE ON TOURISM, CULTURAL AFFAIRS, YOUTH AND PUBLIC BROADCASTING

I Mina'Trenta na Liheslaturan Guåhan
THIRTIETH GUAM LEGISLATURE
155 HESLER PLACE, HAGÅTÑA, GUAM 96910 • *senadotbjcruz@aol.com*
TELEPHONE: (671) 477-2520/1 • FACSIMILE: (671) 477-2522

September 15, 2009

SENT VIA MAIL AND EMAIL

Allan Ota, USEPA Region 9 (WTR-8)
75 Hawthorne Street
San Francisco, CA 94105

Re: Ocean Dredged Material Disposal Site Offshore of Guam

Dear Mr. Ota:

Thank you for holding the Public Meeting and Hearing for the Proposed Designation of an Ocean Dredged Material Disposal Site Offshore of Guam on August 20, 2009. I appreciate that the USEPA realizes the importance of information dissemination and open discussion in relation to this environmental issue. However, I am concerned over one issue in particular.

It is the duty of the USEPA to conduct an extensive series of tests and studies to determine if radiation exists in Apra Harbor waters or its dredged soil. Such a study would provide an independent confirmation or repudiation of the Navy's claim that the amount of leakage from the U.S.S. Houston was insignificant. Nevertheless, in the course of the Pubic Meeting, it became apparent that the USEPA did not test for radiation in Apra Harbor as part of a comprehensive Environmental Impact Study.

Considering the USEPA did not test for radiation in Apra Harbor and because dredged material has the potential to afflict the ocean ecosystem and Guam's residents egregiously, I will not support any disposal site offshore of Guam for ocean-dredged material.

Thank you for your attention to this subject.

Sincerely,

Benjamin J.F. Cruz

GUAM

Public Comments and USEPA Responses

Attention: Mr. Allan Ota, USEPA Region 9

Comments on Draft Environmental Impact Statement (DEIS) on the Proposed Designation of an Ocean Dredged Material Disposal Site (ODMDS) Offshore of Guam;

Comments are on behalf of the Guam Fishermen's Cooperative Association (GFCA):

Dredged Material:

1. Reuse does not mention military reuse plans, placing the burden of need on the Government of Guam.

2. Dredged material testing is dredge site specific and not inclusive of a shipboard secondary testing in order to verify contamination levels.

3. Dredged material once on board the dredge vessel may contain contaminates. The vessel may not be able to control any spill-over of any contaminates during heavy rain conditions which occurs 5-6 months a year or possible impacts to the near-shore environment due to climatic changes such as typhoons.

4. The process of transporting the material from the dredge site to the disposal site lacks a monitoring process. There is a need to further develop protocols such as a ship rider observer process to verify that the disposal site is located and oceanographic conditions are excellent to begin disposal operations.

5. The observer shall be able to provide authorization for the vessel to begin at sea operations after visually observing that the disposal site area does not have the presence of seabirds, schooling fish, cetaceans, marine mammals and so forth. Pre, during and post observation should be required.

6. The observation shall include a view of the underwater environment through the use of fish finding depth sounders which shall be able to read the depths of the ODMDS and other technology to assess an area twice the size of the proposed ODMDS prior to the start of dumping process.

7. One million cubic yards of dredged material per year would be at a minimum of 333 disposals events per year at 3,000 cubic yards per event. This would mean either a multiple event per day given that at least 120 days per year severe weather conditions would not permit an event to occur. The repeated event occurrence in a single day may compound environment impacts to marine life on the surface.

8. The DEIS addresses sea current conditions for the year 2005 but it unlikely sea conditions would remain constant from year to year. In the year 2005 there were very few anomalies in ocean weather conditions compared to 2008 and as compared to the current year (2009) where the weather conditions have been extremely severe. The island has experienced at least 6 storm alerts in the last couple of months. The uncertainty of annual sea currents due to climate change would make any forecast based on a single year long study irresponsible and defies best environmental science strategies.

<u>Site Location Criteria:</u>

1. Avoiding areas of existing fisheries:
    a. The areas identified as the proposed ODMDS are historic and current fishing areas. The ODMDS sites are located within close proximity to the Perez Bank (NW site) and Spoon Bank (N Site). Both names were locally developed and the sites have documented latitude and longitude coordinates available through publications given to fishers both by DAWR and the Guam Fishermen's Cooperative Association. The ODMDS are located four miles from the seamounts and are actually located at the base.

    b. Perez Bank (NW site) is a known fishing area and is visited quite frequently by fishermen for many years. This area is known as a natural FAD where large pelagic fish are historically found but not easily landed.

    c. A local company placed a Fish Aggregating Device (FAD) near Perez Bank for the benefit of Guam fishers which stayed on line for nearly 18 months until it broke-off in the late 90's.

    d. Spoon Bank (N site) is located near the old NOAA Weather Buoy anchorage site as well as the DAWR Fish Aggregating Device (FAD) where the large pelagic fish have been historically harvested. The DAWR FAD was strategically placed a few miles away from the once NOAA Weather Buoy to compensate for the removal of the NOAA Buoy due to its fishery value.

    e. The NOAA weather buoy site was located closer to the designated ODMDS but due the hope of the re-activation of the NOAA Buoy the site the coordinates was not used by DAWR. The NOAA site was selected for it was an area that provided the best source of oceanographic information to the NOAA Weather Service.

    f. FADs are known to attract prey fish which in turn attract larger fish but the effect of the FAD is not limited the just the area within close proximity to the FAD but extends outward one to three miles. A properly place FAD normally drifts as far as a half mile to a mile from the center of the deployment site.

g. Most schools and larger pelagic fish are found and caught between two FADs whether both are man-made or one a natural FAD.

h. The ODMDS are areas where there is a frequent occurrence of deep water up-welling which attract larger pelagic fish. According to a multitude of publish reports; deep water nutrients consists of nutritional salts such as nitrates and phosphates. When brought to the surface, these nutrients are processed by phytoplankton which provides the basic nutrient of most sea creatures hence the historic harvest of larger pelagic fish in the ODMDS area.

i. Cognizant that the DEIS research claims that there is a lack of nitrates in the water column, however, the fact that the historic catch of large pelagic fish in the two sites may raise a question to the accuracy of the survey.

j. The ocean thermocline depth is extremely important to fishing operations. The thermocline at shallow depths brings the fish closer to the surface and is commonly associated with good catch rates.

k. The fact that the fisheries on Guam is a surface troll fishery and the DEIS does not address the impact to this fishery. The emphasis of the DEIS was place on determining the effect on the bottom habitat and the species associated. The use of bottom trawl to determine the specie composition and the feasibility of this fishery is misdirection for the fishery is non-existent and such gear type has long been banned from use in the Guam EEZ.

l. According to the DEIS the fishing areas are confined to the Rota Bank and Galvez area, more specifically frequented by Charter fishing vessels. This description of the fisheries around Guam is grossly inaccurate. The following is a more accurate portrait of the fishery:

    i. The entire western seaboard of Guam is the more common fishing area up to twenty miles from shore. The two highlighted areas identified in the DEIS are frequented by a limited number of fishing vessels and not commonly visited by Charter vessels.

    ii. The Charter fishery is a very small component of the entire Guam fishery and the fishing area covered by this small fleet is primarily concentrated on the western waters.

    iii. A vast majority of the off-shore fishers are fishers who fish primarily on the western area and depend highly on the migratory and seasonality movements of pelagic fish.

    iv. The fact that deep sea up-welling provide for a natural aggregation for pelagic fish. This occurrence brings life sustaining nutrients to the surface where prey fish gather and hence pelagic fish congregate.

    v. The waters on the western area consist of pelagic fish, prey fish, coral reef fish and coral larvae. The western seaboard historically is the first to demonstrate the return of seasonal fish species.

    vi. Pelagic fish to coral reef species begin their life cycle as larvae and drift with the currents and then return to the island in the juvenile stage. An example is mahi-mahi first arrives as small fish averaging four to six pounds and then through the season (4 to 6 months) the size increases to twenty pounds. Juvenile rabbit fish and skipjack return to the island during seasonal runs; again from the ocean as they have floated around during their larval stage.

    vii. The waters surrounding Guam and the Marianas have been recognized scientifically as a spawning area for all species of pelagic fish not to mention coral reef related species.

    viii. There is historic documentation that the indigenous populace of Guam has long utilized the resources within the waters surrounding Guam for over 3500 years; hence the resource has historic significance and adverse impacts which may alter its beneficial use should not be authorized.

    ix. The effects ODMDS may result in an environmental injustice perpetrated against minority and low-income populations, in this case, the Chamorro people.

m. The scientific community has declared the western and central Pacific as an area of concern due to the decline of pelagic fish stocks; therefore any impact to the environment should be discouraged.

n. Sedimentation has long been documented as a problem in the reproduction of pelagic and reef species. The plume created by the discharge at the rate of the surface currents may impact the ocean resource at the larval stage as the turbidity levels are increased. A surface speed of 3mph may disburse suspended fine sediment particles to an area six miles away before settling.

o. The worst case scenario would mean that ninety percent of the dredged material will settle on the ocean floor within the ODMDS. The ten percent conceivably could travel past the ODMDS zone and settle beyond. This would mean that one out of ten disposal actions would not be within the zone and possibly drift to nearby seamounts. The result would be 100,000 cubic yards of suspended dredged material drifting outside the zone per year.

p. According to the DEIS, the ODMDS shall be limited in size for monitoring and surveillance but the limits should include an area up five miles from the center and an environmental baseline be well documented by NOAA fishery experts. According to published scientific reports there is valuable marine life deserving of protection at depths along the coast to 35,000 feet; the latter was recognized through a Presidential Proclamation.

q. The placement of the ODMDS should beyond the continental shelf or sites historically used. The fact that the coral reef eco-system is not a stand alone system and is subject associated impacts in relation to each other. The idea that to compare the impact of dredged material on a continental shelf with a tropical eco-system is ludicrous. The characteristics of a tropical and continental shelf are night and day. Again, the fact that these sites are historically used should be evidence enough to remove these sites from consideration.

r. The DEIS identified the depth ranges for various pelagic which is erroneous. Below are factual description of the species of concern:

    i. Wahoo (DEIS 0-40 feet and solitary) depth range deep water during the migratory period but mostly at depths 240 to 300 feet and are not solitary and are abundant during seasonal runs in October to November or full moon periods.

    ii. Mahi-mahi (DEIS 0-280 feet) depth range is from deep water mostly larger sizes but are found during seasonal runs from December to May in depths from deep water to 300 feet.

    iii. Marlin (DEIS 0-650 feet) depth range is from deep water or deep water slopes areas. The deeper the water the tendency for the larger the fish. They are usually found at depths of 1200 feet or greater. Seasonal runs are from July to January.

    iv. Tunas (DEIS 0-850) depth range for tunas is deep water to as shallow as 500 feet. Large schools are often followed for up to ten miles to depths beyond any conventional depth sounders (6000ft.).

s. The DEIS reported the greater financial burden on the cost for transporting the dredged material but it does not address the socio-economic impacts to the local fishing community through potential the loss of economic opportunities should the impact be greater than the model describes.

t. The DEIS reports the economic value of the community based fisheries is one million dollars per annum but the reality is that the Guam Fishermen's Cooperative Association economic value is under three million dollars per annum and none GFCA fishery value is about one million.

u. The Socio-economic value of to the community and the Chamorro culture is immeasurable and value cannot be determined by western standards. The millennia practice of sharing with family, friends, religious and cultural events continues to possess more value than a financial benefit or return.

Specific Site Selection Criteria:

1. Distance from coast should include underwater seamounts. The fact that the ODMDS are purposely located a great distance from the coast but lie within close proximity to seamounts should also be considered.

2. Location in relation to breeding, spawning, nursery, feeding or passage areas of living resources in adult or juvenile stage should be avoided. Again, the water near the equator has been scientifically determined to meet these qualifications and therefore should not be used as an ODMDS.

3. Location to other amenity areas should not be limited to local jurisdictional areas but be inclusive of all historic fishing areas and Fish Aggregation Device placement areas with the same buffer zone consideration given to the coastal areas.

4. Types and quantities of waste material to be disposed are not to be packaged. The material should be package to lessen surface and near surface water quality concerns. A cement mixture would control the amount of sediment release in the upper layers of the water column. The concern over exhaust entering the atmosphere from transport vessels seems to be greater than the ecological impact to the marine resource. We recommend utilizing areas ten miles beyond the current site or at least five miles from the base of seamounts.

5. The feasibility of surveillance and monitoring of ODMDS is crucial and should be extended beyond the zone area. Any possible impact to the adjacent marine environments has not been fully considered or addressed. A complete baseline study must be done to the adjacent

areas up to five nautical miles from the zone boundaries and mitigation measures must also be developed to include financial support.

6. Dispersal, horizontal transport and vertical mixing characteristics of the area, including prevailing current direction and velocity, if any. The concern of surface and sub-surface turbidity impacts was not full addressed in the DEIS and the effects to adjacent seamounts or the marine eco-system as a whole not just emphasize the seafloor habitat concerns. Again, fishing on Guam is a surface troll fishery and the DEIS does no address the potential impact.

7. Existence and effects of current and previous discharges and dumping in the area is a non-issue for there has been no known dumping in the area. There are documented cases of sediment issues on the coast regarding turbidity and settling which has adversely affected marine life. There are a multitude of published scientific reports on this issue.
8. Interference with shipping, fishing, recreation, mineral extraction, desalination, fish and shellfish culture, areas of special scientific importance, and other legitimate uses of the ocean. The entire ocean surrounding Guam has a special scientific importance from the seasonal migratory pelagic fish to the juvenile reef fish that benefit from a healthy marine eco-system. The ODMDS are not transit areas for recreational or commercial users but are part of the range by which fishing occurs. The DEIS claims it is not a destination which is false for there are no geographical boundaries for highly migratory fish or juvenile coral reef species who are subject to currents and sea temperatures. The DEIS ocean current report demonstrates the variability and subjectivity by which our ocean eco-system and the marine life interact. Again, the ODMDS are historically known fishing areas.

9. Existing water quality is clean and provides for Essential Fish Habitat (EFH) for prey fish, pelagic fish and coral reef related species during their migratory travels. The DEIS does not address the potential impacts to any of these species.

10. Potentiality for the development or recruitment of nuisance species in the disposal site. The dredged material is from a site in Apra Harbor and there have been documented reports of nuisance species present in the harbor from ballast water discharge. The nuisance species may not survive at the bottom of the ODMDS but can it be safely determined that the nuisance species will not float and drift back to Guam or other island areas, exacerbating the problem? Again, not addressed in the DEIS for it only addresses the impact on the seafloor.

11. Existence at, or in proximity to, the site of any significance natural or cultural features of historic importance. The DEIS claims the areas have no significance cultural or historic importance. The fishers of Guam have for 3500 years have had historic use of this resource. Further, the names given to the areas in close proximity to these sites were locally given by fishers. Case in point, no maps identify these areas with the given local names but is well known by the community. Perez Bank received its name from the fisherman and his family that first realized the area's fishing potential. Spoon Bank received its name due the configuration of the seamount ridges and the ODMDS is the deep part of the spoon shape. The cultural significance is that for thousands of years, the Chamorro culture has been highly dependant on the ocean for sustenance and any impact which may affect the harvest ability through changes in the migratory patterns of the marine resources is culturally unconscionable.

Rio declaration on Environment and Development possible violation:

1. Human beings are the center of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature. The elevated levels of sediment and turbidity can realistically reduce the biological productivity of aquatic systems. There are lethal and sub lethal effects on fish and their habitat such as feeding, growth, egg development and survival to name a few. In essence, the healthy and productive life entitled to the users and beneficiaries of the marine resource will be greatly affected by the disposal of the dredged material. The NTU values exceed the standard which allows for only a maximum of 8 NTU for a short term increase and 2 NTU for long term increases. The DEIS does not adequately address the possible impact to the marine environment since sediment impacts has been proven to be greater in a tropical eco-system than in a shelf system.

Treaty of Peace possible violation:

1. The Treaty recognizes the right of the Chamorro People to self determination and until such time the resources of the Territory of Guam shall be held in trust for the benefit of the indigenous people. The establishment of the ODMDS is in direct violation of the conditions by the resources should protect for the beneficial use by the People of Guam.

Safety at Sea Concern:

1. The DEIS does not mention mitigation for the loss of approximately 14 square miles of fishing area. The fishing community may be forced to travel to other fishing areas where rescue and other services are not easily available.

The change of fishing habits from familiar to unfamiliar areas may be considered as a safety at sea issue, placing the fishers in harms way. The added expense to travel greater distances to fish must also be considered.

The Magnuson-Stevens Reauthorization Act concerns:

1. The DEIS did not a provide documentation whereby consultation with the Western Pacific Regional Fishery Management Council (WPRFMC) was initiated or requested.

2. The WPRFMC is not responsible for the management of the near-shore fisheries but the entire fisheries beyond the three mile Guam jurisdictional boundaries to the 200 mile limits of the EEZ.

3. The ODMDS proposal should have been made available to the Council. The possible impacts to Essential Fish Habitat (EFH) or any fish stock are all within the Council's purview.

4. The WPRFMC has untaken the Ecosystem approach to fishery management therefore any potential impacts must be thoroughly analyzed.

5. The WPRFMC has taken marine resource management measures by banning the use of Bottom Trawl gear, Closure Areas for Longlining and Bottom Fishing and pending Secretarial Approval, a complete ban on Purse Seining. These actions were developed in consultation with the fishing community for the benefit of the community.

6. The WPRFMC is mandated to address Safety at Sea concerns due to the displacement of fishers or the transferred effect due to the establishment of the ODMDS.

The Marine Mammal Protection Act and the Endangered Species Act:

1. The effects on marine mammals were not fully addressed. The effects of increase turbidity levels, sound disturbances, disposal action and increased activities on whales, dolphins, sea turtles and other species of particular concern. The encyclopedia of marine mammals was presented and observation noted during research cruise. The Action does not address a need to develop a Biological Opinion on the possible interaction or impacts.

General Concerns of the Draft Environmental Impact Statement Process:

1. The DEIS are not concise, understandable, and readily available:

a. Not concise: The DEIS document is filled with fillers from graphs which are difficult to decipher to numbers that offers no clear explanation to the impacts from the baseline. The document provides for a scientific analysis with a scientific explanation which would assume that the reader possesses the same level of training. The impacts are focused on the seafloor and the effects on that environment. Very little information on the impacts to marine life on the upper levels of the water column.

b. Not understandable: The information is not in layman terms and the report is at the scientific level or perhaps the assumption is that only scientist familiar with turbidity levels (NTUs) and ocean currents will be interested to read and understand the DEIS. The DEIS documents are required to be understood. Based on the upper level surface currents they flow erratically and a clear direction for a given period cannot be determined. Again, the emphasis is placed on the lack of current at the lower depths so the potential surface impact is not easily understood.

c. The document was not readily accessible to the public: The Public Library and governmental agencies is not conducive for public review of the DEIS. The DEIS document is approximately 377 pages which require a common person a full dedicated week to review the document and at the same time take notes. Most fishermen do not have time, access to computers and internet access. The opportunity period to review and comprehend the document before filing comments was less than sixty days. This would be fine for one who dedicates their time strictly to the document but is an unconscionable burden on the lay person affected by the measure.

2. The Public Meeting for Record:

a. The Public Meeting for Record was held in an inappropriate location and did not allow for true public in-put. A community based Public Meeting would have been more conducive and participation from the community may have been greater as was the case in the informal meeting with the GFCA members. The brief time allocated for each person during the public comment period was insufficient despite the fact public was allowed additional time after the first round of comments ended.

3. The Comment Period:

   a. The comment period should be extended for an additional 30 days. The Public is not aware of the DEIS or the ODMDS. Better outreach and public awareness is needed.

The above comments reflect the concerns of the Guam Fishermen's Cooperative Association, an artisanal fishing organization with nearly two hundred members. There are more issues with the DEIS but due to time constraints we are unable to provide additional comments. The information presented in the DEIS requires technical expertise to verify or explain the cause and effect of this measure. It is for this reason that we humbly request for an extension to the comment period in order to provide a more thorough review of the document.

We implore that the ***No Action*** alternative be selected. The coastal marine resource has been greatly impacted by land use issues and the off-shore waters are still in a pristine condition as described by the President as worthy of protection. The establishment of an Ocean Dredged Material Disposal Site in waters of Guam will greatly alter these conditions. On behalf of the GFCA, I remain,

Co-operatively yours,

Manuel P. Duenas II
President
GFCA

-----William Tracey <wpt4571@gmail.com> wrote: -----

To: Dean Higuchi/R9/USEPA/US@EPA
From: William Tracey <wpt4571@gmail.com>
Date: 08/08/2009 05:25AM
Subject: Guam,Apra Harrbor Dredging

As I recall from a tour of duty there in the '70's there is as lot of heavy current off the north end of the island which would disperse the material quickly over a large area or ocean bottom and there is I believe a deep hole about 10 miles off shore on a heading of 28.31 degrees. The ideal spot in my mind though any place over deep water would work, any place where there would be no danger of currents bringing it back over the coral reefs. From a project with the University in the 70's they were having a big problem with the Crown of Thorns Starfish and destruction of the coral reefs. You don't need to add to that devastation by adding sediment over them. William Tracey, PO Box 482, Congress, AZ. 85332

Written Comment Form

Draft Environmental Impact Statement
U.S. Environmental Protection Agency
Designation of an Ocean Dredged Material Disposal Site
West of the Territory of Guam

Comments are due to EPA or post-marked by October 6, 2009.
Options for submitting comments include:

- Leave written comments in box provided at the public meeting. *You do not have to use this form.*
- Mail written comments to EPA (see address on the back of this form).
- Provide oral testimony at the August 20, 2009 public hearing.
- Email comments to: *ota.allan@epa.gov*

Name: Richard B. Seman

Mailing Address: P.O. Box 144 Hagatna, GU 96932

Comments:

1). Has there been a similar study that resulted according to the prediction of the utilized model (modeled deposition on the seafloor)?

2). Is the DOD considering finacial compensation to fishermen (Guam Fishermen's Co-op) for potential negative effect to fishing ground should the proposal proceeded as planned? "Desposal Impact Funding"

3). ~~As~~ Has there been any consideration given to providing safe dredged materials to low-laying countries such as the Marshalls & Kiribati * who are dredging their reefs for land reclamation?

4) "Not all dredged materials are suitable for beneficial re-use.... Therefore, there is a need to designate a permanent ODMDS offshore of Guam..." This is a scary thought.

#	Commenter Last Name	Commenter First Name	Address	City	State or Territory	Zip	Affiliation or Event	DEIS Page, Figure or Table #	DEIS Line #	Comment Subject	Comment Location in EIS	Comment	Response
1	Seman	Richard B.	P.O. Box 144	Hagatna	Guam	96932	-	General	-	Modeling	Appendix A - Public Comments and USEPA Responses	Has there been a similar study that resulted according to the prediction of the utilized model (Modeled Deposition on the Seafloor)?	The STFATE model is a standard model used for dredged material dispersion modeling in the water column. Monitoring at sites around the U.S. has validated its usefulness. Even in very deep water, the intensive SF-DODS annual monitoring results [see "Review/Synthesis of Historical Environmental Monitoring Data Collected at the San Francisco Deep Ocean Disposal Site (SF-DODS) in Support of USEPA Regulatory Decision to Revise the Site's Management and Monitoring Plan", Germano & Associates, Dumber 2008] confirm the model predictions as to general location and extent.
2	Seman	Richard B.	P.O. Box 144	Hagatna	Guam	96932	-	General	-	Policy	Appendix A - Public Comments and USEPA Responses	Is the DOD considering financial compensation to fisherman (Guam Fisherman's Co-op) for potential negative effect to fishing ground should the proposal proceed as planned? "Disposal Impact Funding"	Analysis conducted in the EIS does not indicate that there will be any significant or long-term impacts from disposing suitable material at either alternative ODMDS that would require mitigation, financial or otherwise. The SMMP outlines monitoring activities that will occur, and management actions that USEPA may take if unexpected or significant impacts do occur. These actions can include modifications to BMPs or other site use requirements, or even shutting down the disposal site. Thus, significant or long-term impacts are not expected.
3	Seman	Richard B.	P.O. Box 144	Hagatna	Guam	96932	-	General	-	Policy	Appendix A - Public Comments and USEPA Responses	Has there been any consideration given to providing safe dredged materials to low-lying countries such as the Marshalls & Kiribati who are dredging their reefs for land reclamation?	Disposal or beneficial re-use alternatives are considered for every individual dredging project. The Zone of Siting Feasibility (ZSF) study was conducted to determine the disposal transport distance that could reasonably be considered for typical navigational dredging projects. The locations suggested in this comment are not feasible for typical navigational dredging projects for a myriad of reasons outlined in the ZSF study. Only in very unusual cases might the transport of dredged material across such long distances be feasible.
4	Seman	Richard B.	P.O. Box 144	Hagatna	Guam	96932	-	General	-	Beneficial re-use	Appendix A - Public Comments and USEPA Responses	"Not all dredged materials are suitable for beneficial re-use….therefore, there is a need to designate a permanent ODMDS offshore of Guam…" This is a scary thought.	All proposed dredged material must be tested to demonstrate that it is non-toxic and suitable for ocean disposal; contaminated material would not be permitted for ocean disposal. Requirements for beneficial re-use are very stringent and can be site-specific (i.e. determined by the unique needs/requirements of the discrete location or nature of the project). Beneficial re-use may not be possible for a particular project because of compatibility, timing, and/or other logistics. For example, for dredged material to be placed on a beach as beneficial fill, the sediment granularity and matrix need to match the receiving site. Otherwise, the sediment will not remain on the beach. Additionally (and often), sediment that is otherwise a good physical match might be rejected for aesthetic reasons (i.e. dark sands on a white sand beach).
5	Tracey	William	P.O. Box 482	Congress	AZ	85332	-	General	-	Ocean currents & corals	Appendix A - Public Comments and USEPA Responses	As I recall from a tour of duty there in the '70's there is as lot of heavy current off the north end of the island which would disperse the material quickly over a large area or ocean bottom and there is I believe a deep hole about 10 miles off shore on a heading of 28.31 degrees. The ideal spot in my mind though any place over deep water would work, any place where there would be no danger of currents bringing it back over the coral reefs. From a project with the University in the 70's they were having a big problem with the Crown of Thorns Starfish and destruction of the coral reefs. You don't need to add to that devastation by adding sediment over them.	Corals occur in shallow waters. The ocean disposal site is many miles from shallow waters that have the potential for coral growth. Analysis of ocean currents in the vicinity of the disposal site conclude that they are not sufficient to carry sediments to the shallow water coral reefs. The assertion that "any place over deep water would work" is inaccurate. Excessively deep water areas, such as in the Marianas Trench, can have especially unique benthic and other biological communities. For this reason all locations considered for ocean disposal, regardless of depth, were carefully surveyed for benthic and other biological communities or habitats. Sites determined to be too sensitive, or possessing the potential for substantial negative environmental impacts (such as locations with potential to impact corals) were eliminated from consideration in the ZSF study.
6	Port	Patricia S.	1111 Jackson Street, Suite 520	Oakland	CA	94607	U.S. Fish and Wildlife Service; Regional Environmental Officer	General	-	Beneficial re-use	Appendix A - Agency Correspondence and Public Officials	Given the need for suitable beneficial dredged material to support development projects on Guam, we suggest the EPA evaluate additional areas to dewater and stockpile dredge materials that may be appropriate for future beneficial reuse purposes. In this manner, EPA could possibly minimize the amount of dredged material that would be disposed of in the ocean. The U.S. Fish and Wildlife Service (Service) is willing to work with the EPA and the Navy to identify additional dewatering and stockpile sites that avoid and minimize impacts to fish and wildlife resources.	Comment noted. With this action, the USEPA is not developing an overall sediment management program for Guam, or for any individual dredging interests on Guam. The USEPA encourages dredging interests on Guam to consider developing such an overall plan because such a plan would optimize the re-use of dredged material, which in turn could minimize the volume that might need to be disposed at an ODMDS. The action to designate an ODMDS merely provides an additional management option. No project may dispose of material at the ODMDS unless there are no other practicable alternatives that would have less impact on the aquatic environment, based on project-specific circumstances and review.

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7	Port	Patricia S.	1111 Jackson Street, Suite 520	Oakland	CA	94607	U.S. Fish and Wildlife Service; Regional Environmental Officer	General	-	Corals	Appendix A - Agency Correspondence and Public Officials	We recommend that the Final EIS indicate that any proposed sediment disposal will be conducted outside of the annual Guam coral spawning period, which is approximately June through August.	Although there are no corals in the vicinity of the ODMDS, peak coral spawning period can be avoided during transportation to the site. BMPs to restrict transportation to the site during peak coral spawning periods can be included as a condition of the disposal permit.
8	Port	Patricia S.	1111 Jackson Street, Suite 520	Oakland	CA	94607	U.S. Fish and Wildlife Service; Regional Environmental Officer	General	-	BMPs	Appendix A - Agency Correspondence and Public Officials	We recommend that Best Management Practices be incorporated into any sediment disposal operations to avoid or minimize project-related degradation of water quality and impacts to fish and wildlife resources. The Fish and Wildlife Service believes that incorporation of these measures into projects will greatly minimize the potential for project-related adverse impacts to fish and wildlife resources. The Fish and Wildlife Service recommends that the following measures be incorporated into projects to minimize the degradation of water quality and impacts to fish and wildlife resources [next line down in the spreadsheet]:	Best Management Practices (BMPs) will be incorporated into sediment disposal operations as part of any disposal permit issued on a project-by-project basis. Additionally, numerous BMPs for disposal are outlined in the Section 2.2 of the Sediment Monitoring and Management Plan (SMMP) [Appendix C of the EIS]. Compliance with the conditions set forth in the SMMP and individual disposal permits are enforced by the U.S. Army Corps of Engineers (USACE) and U.S. Environmental Protection Agency (USEPA).
												a.) Turbidity and siltation from project-related work shall be minimized and contained to within the vicinity of the site through the appropriate use of effective silt containment devices and the curtailment of work during adverse tidal and weather conditions; b.) dredging/filling in the marine environment shall be scheduled to avoid coral spawning and recruitment periods; c.) dredging and filling in the marine/aquatic environment shall be designed to avoid or minimize the loss of special aquatic site habitat (coral reefs, wetlands etc.) and the unavoidable loss of such habitat shall be compensated for; d.) all project-related materials and equipment (dredges, barges, backhoes etc) to be placed in the water shall be cleaned of pollutants prior to use;	a) BMPs such as these would be included as part of a project-specific dredging permit as they are deemed appropriate. Silt curtains are not required for disposal events at an ocean disposal site located many miles from sensitive resource areas in the nearshore and coastal waters of Guam. b) Dredging and filling actions will be subject to the permitting requirements of those actions. Conditions for disposal operations at an ocean disposal site are considered separately from dredging actions. Although there are no corals in the vicinity of the ODMDS, peak coral spawning period can be avoided during transportation to the site. BMPs to restrict transportation to the site during peak coral spawning periods can be included as a condition of the disposal permit. c) A dredging action is considered separate from a disposal operation at an ocean disposal site. Standard dredging BMPs would be applied as part of a project-specific U.S. Army Corps of Engineers (USACE) dredging permit. d) BMPs such as those suggested in this comment would be included as part of a dredging and/or disposal permit as they are deemed appropriate.
												use; e.) no project-related materials (fill, revetment rock, pipe etc.) should be stockpiled in the water (intertidal zones, reef flats, stream channels, wetlands etc.); f.) all debris removed from the marine/aquatic environment shall be disposed of at an approved upland or ocean dumping site; g.) no contamination (trash or debris disposal, alien species introductions etc.) of adjacent marine/aquatic environments (reef flats, channels, open ocean, stream channels, wetlands etc.) shall result from project-related activities; h.) fueling of project-related vehicles and equipment should take place away from the water and a contingency plan to control petroleum products accidentally spilled during the project shall be developed. Absorbent pads and containment booms shall be stored on-site, if appropriate, to facilitate the clean-up of accidental petroleum releases; and i.) any under-layer fills used in the project shall be protected from erosion with stones (or core-loc units) as soon after placement as practicable. The Fish and Wildlife Service believes that incorporation of these measures into projects will greatly minimize the potential for project-related adverse impacts to fish and wildlife resources.	e) A dredging action is considered separate from a disposal operation at an ocean disposal site. For any stockpiling operations, standard dredging BMPs would be applied as part of an Army Corps of Engineers (ACOE) dredging permit. BMPs such as those suggested in this comment would be included as part of a dredging and/or disposal permit as they are deemed appropriate. f) The constituency of "debris" will determine its disposal options and handling methodology. Debris or trash should be taken to an upland disposal facility; these materials cannot be taken offshore to an ocean disposal site. Dredging and disposal permits are assessed (and rejected or approved) on a project-by-project basis. No unapproved dumping should be authorized for any reason. g) Dredging and disposal permits are assessed (and rejected or approved) on a project-by-project basis. No contamination of adjacent aquatic environments should be authorized for any reason. h) Same as d) i) Same as e)

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9	Port	Patricia S.	1111 Jackson Street, Suite 520	Oakland	CA	94607	U.S. Fish and Wildlife Service; Regional Environmental Officer	General	-	Mitigation	Appendix A - Agency Correspondence and Public Officials	If unavoidable resource losses are anticipated to result from offshore disposal of dredged material, we recommend that appropriate compensatory mitigation measures be proposed in the Final EIS, including provisions for monitoring mitigation actions against performance measures to assess effectiveness of the mitigation effort.	Analysis conducted in the EIS does not indicate that there will be any significant or long-term impacts from disposing suitable material at either alternative ODMDS that would require mitigation, financial or otherwise.
-	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	-	Appendix A - Public Comments and USEPA Responses	Comments are on behalf of the Guam Fishermen's Cooperative Association (GFCA):	Responses provided to each comment in the lines below.
10	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Military & beneficial re-use	Appendix A - Public Comments and USEPA Responses	**Dredged Material:** 1. Reuse does not mention military reuse plans, placing the burden of need on the Government of Guam.	Each dredging event is subject to USACE & USEPA permitting and approvals. Additionally, other agencies are asked to comment on permit requests. USACE and USEPA require that beneficial re-use options, if practical, be utilized first before considering the ocean disposal alternative. Such consideration must be given regardless if the dredging proponent is the U.S. Navy, the Guam Port Authority, USACE, or any other entity.
11	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Sediment testing	Appendix A - Public Comments and USEPA Responses	2. Dredged material testing is dredge site specific and not inclusive of a shipboard secondary testing in order to verify contamination levels.	Once the dredged material is tested and determined to be appropriate for re-use or disposal, the material is extremely unlikely to suddenly change its characteristic constituents. Additionally, testing occurs prior to the dredging action so that there is minimal time for conditions to change between testing and dredging.
12	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	BMPs	Appendix A - Public Comments and USEPA Responses	3. Dredged material once on board the dredge vessel may contain contaminates. The vessel may not be able to control any spill-over of any contaminates during heavy rain conditions which occurs 5-6 months a year or possible impacts to the near-shore environment due to climatic changes such as typhoons.	Once the dredged material is tested and determined to be appropriate for re-use or disposal, the material is extremely unlikely to suddenly change its characteristic constituents. Because only suitable (non-toxic) sediments will be transported to the ODMDS, the impacts of a potential to spill should be limited to physical impacts associated with suspended and deposited particles. To minimize even these kinds of impacts, BMPs for ocean disposal include safety and accident prevention measures such as avoidance of overfilling disposal scows and a prohibition against vessels operating under unsafe weather conditions; most especially under threat of an approaching typhoon.
13	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	BMPs	Appendix A - Public Comments and USEPA Responses	4. The process of transporting the material from the dredge site to the disposal site lacks a monitoring process. There is a need to further develop protocols such as a ship rider observer process to verify that the disposal site is located and oceanographic conditions are excellent to begin disposal operations.	Section 3.0 of the SMMP [Appendix C of the EIS] outlines the monitoring process. Paragraph three of Section 3.0 of the SMMP states that "[t]wo types of monitoring will be carried out at the Guam ODMDS: compliance monitoring as part of ongoing disposal projects, and periodic site monitoring." The tug will have a GPS-helmsmen display to accurately locate the surface disposal zone within the ocean disposal site and each disposal trip will be recorded on a logger contained in a secure black box. Section 3.1 of the SMMP that "Physical mapping of the dredged material footprint on the seafloor will be conducted at periodic intervals in order to confirm that management guidelines for disposal operations are operating within expected criteria and the predictions from the numerical models are correct." Moreover, Section 3.1.1 of the SMMP discusses the high resolution sediment profile imaging (SPI) methods by which the disposed material will be identified and mapped out to a distance 500 meters beyond the edge of the detectable dredged material layer.
14	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	BMPs	Appendix A - Public Comments and USEPA Responses	5. The observer shall be able to provide authorization for the vessel to begin at sea operations after visually observing that the disposal site area does not have the presence of seabirds, schooling fish, cetaceans, marine mammals and so forth. Pre, during and post observation should be required.	An onboard observer is not as critical as the automated compliance monitoring equipment to ensure proper ocean disposal operations. However, BMPs may be added to the conditions of the permit that require observations to be made, noted, and logged prior, during, and after the disposal action if it is deemed appropriate by USACE, USEPA, and other commenting agencies as a condition of permit approval.
15	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	BMPs	Appendix A - Public Comments and USEPA Responses	6. The observation shall include a view of the underwater environment through the use of fish finding depth sounders which shall be able to read the depths of the ODMDS and other technology to assess an area twice the size of the proposed ODMDS prior to the start of dumping process.	The ODMDS site has previously been studied and sampled to determine its characteristic water column properties, currents, and pelagic and benthic communities. The transient nature of the pelagic fish communities suggest that any temporary disturbances in the water column below a disposal event would be expected to result in minimal adverse impacts. The fate of transport footprint has been modeled and well-defined. Even so, for the expected depositional footprint of 10 cm of thickness on the ocean floor, a buffer zone of two-and-a-half times the expected depositional footprint has already been added as a conservative measure (Page 2-6 of the EIS). Additionally, Section 3.1.1 of the SMMP [Appendix C of the EIS] discusses the sediment profile imaging methods by which the disposed material will be identified and mapped.

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16	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Disposal frequency	Appendix A - Public Comments and USEPA Responses	7. One million cubic yards of dredged material per year would be at a minimum of 333 disposals events per year at 3,000 cubic yards per event. This would mean either a multiple event per day given that at least 120 days per year severe weather conditions would not permit an event to occur. The repeated event occurrence in a single day may compound environment impacts to marine life on the surface.	One million cubic yards of material represents the maximum disposal volume scenario, and not the amount expected to be disposed of every year. If circumstances prevent disposal, then dredging operations will be curtailed to match the disposal capability. Section 2.2 of the SMMP states that only one disposal vessel may be present within the permissible dumping target area at any time. There are no plans to have a backlog of scowls to go out to the disposal site en-masse and "make-up" for disposal days lost to weather or other circumstances. Both the dredge and disposal permits can further stipulate limitations placed upon on the respective dredge and disposal plans as desired by the permitting and permit-review agencies. Analysis of dredged material disposal conducted in the EIS does not indicate that there will be any significant or long-term impacts that would require mitigation.
17	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Ocean currents	Appendix A - Public Comments and USEPA Responses	The DEIS addresses sea current conditions for the year 2005 but it unlikely sea conditions would remain constant from year to year. In the year 2005 there were very few anomalies in ocean weather conditions compared to 2008 and as compared to the current year (2009) where the weather conditions have been extremely severe. The island has experienced at least 6 storm alerts in the last couple of months. The uncertainty of annual sea currents due to climate change would make any forecast based on a single year long study irresponsible and defies best environmental science strategies.	The potential effects of strong trade winds and El Nino/La Nina conditions were recognized and accounted for in multiple scenarios, both modeled and in-situ, which were evaluated to an order of magnitude greater than anticipated for surface current speeds, various directions, and directional reversals. No impacts were identified as a result of the evaluated scenarios. In response to the comment, additional text has been added to Sections 3.1.2, 3.1.2.4, and 4.1.4.2 (and Figures 4-11 through 4-14 and Table 4-5) to better address these conditions and scenarios.
18	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Fishing	Appendix A - Public Comments and USEPA Responses	**Site Location Criteria:** 1. Avoiding areas of existing fisheries: a. The areas identified as the proposed ODMDS are historic and current fishing areas. The ODMDS sites are located within close proximity to the Perez Bank (NW site) and Spoon Bank (N Site). Both names were locally developed and the sites have documented latitude and longitude coordinates available through publications given to fishers both by DAWR and the Guam Fishermen's Cooperative Association. The ODMDS are located four miles from the seamounts and are actually located at the base.	Pelagic and prey fish are highly migratory and are capable of traveling significant distances per day. Although these fish may occur at or near the proposed ODMDS, they will practice avoidance behavior if and when a disposal event occurs. They are not expected to congregate in the ODMDS. As a general practice, USEPA uses fish block data to avoid areas that are heavily fished; however, this information was not provided. The information provided by the Fisherman's Co-op pertained to the volumes and the types of catches. Modeling conclusions show that even under accelerated current speeds, sediments would dissipate before they even reach the seamount.
19	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Fishing	Appendix A - Public Comments and USEPA Responses	b. Perez Bank (NW site) is a known fishing area and is visited quite frequently by fishermen for many years. This area is known as a natural FAD where large pelagic fish are historically found but not easily landed.	The entire Guam fishery is not limited to Galvez and Rota Banks. In Chapter 3, Existing Environment, the Essential Fish Habitat for the pelagic fishery is described as occuring from the shoreline to the outer limit of the Exclusive Economic Zone (200 nm from the coastline) and throughout the water column from the surface to 3,300 ft deep. Pelagic and prey fish are highly migratory and are capable of traveling significant distances per day. Although these fish may occur at or near the proposed ODMDS, they will practice avoidance behavior if and when a disposal event occurs. They are not expected to congregate in the ODMDS. As a general practice, USEPA uses fish block data to avoid areas that are heavily fished; however, this information was not provided. The information provided by the Fisherman's Co-op pertained to the volumes and the types of catches. Modeling conclusions show that even under accelerated current speeds, sediments would dissipate before they even reach the seamount.
20	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Fishing	Appendix A - Public Comments and USEPA Responses	c. A local company placed a Fish Aggregating Device (FAD) near Perez Bank for the benefit of Guam fishers which stayed on line for nearly 18 months until it broke-off in the late 90's.	Comment noted. This information has been added to Section 3.3.1 of the EIS.
21	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Fishing	Appendix A - Public Comments and USEPA Responses	d. Spoon Bank (N site) is located near the old NOAA Weather Buoy anchorage site as well as the DAWR Fish Aggregating Device (FAD) where the large pelagic fish have been historically harvested. The DAWR FAD was strategically placed a few miles away from the once NOAA Weather Buoy to compensate for the removal of the NOAA Buoy due to its fishery value.	As part of the ZSF (see Section 3.7 and Figure 3.6), areas in the immediate vicinity of FADS were excluded from consideration for an ODMDS. The SDZ of the alternative ODMDS in the North Study Area is approximately 3 nm from the nearest of the existing FADS, and should not significantly affect fisheries created by them.

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22	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Fishing	Appendix A - Public Comments and USEPA Responses	e. The NOAA weather buoy site was located closer to the designated ODMDS but due the hope of the re-activation of the NOAA Buoy the site the coordinates was not used by DAWR. The NOAA site was selected for it was an area that provided the best source of oceanographic information to the NOAA Weather Service.	NOAA tide gage (not a buoy) Station APRP7 - 1630000 - Apra Harbor, Guam (13°26'31" N 144°39'10" E) is active on the west side of Guam (according to the National Data Buoy Center).
23	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Fishing	Appendix A - Public Comments and USEPA Responses	f. FADs are known to attract prey fish which in turn attract larger fish but the effect of the FAD is not limited the just the area within close proximity to the FAD but extends outward one to three miles. A properly place FAD normally drifts as far as a half mile to a mile from the center of the deployment site.	As part of the ZSF (see Section 3.7 and Figure 3.6), areas in the immediate vicinity of FADS were excluded from consideration for an ODMDS. The SDZ of the alternative ODMDS in the North Study Area is not between two FADS and is approximately 3 nm from existing FADS, and should not significantly affect fisheries created by them. nevertheless, with respect to FADS, the North Alternative ODMDS is less-attractive because it is closer to FADS than the Northwest Alternative.
24	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Fishing	Appendix A - Public Comments and USEPA Responses	g. Most schools and larger pelagic fish are found and caught between two FADs whether both are man-made or one a natural FAD.	In response to the comment, the discussion of FADS has been expanded in Section 3.3.1 of the EIS. As part of the ZSF (see Section 3.7 and Figure 3.6), areas near FADS were excluded from consideration for an ODMDS. The North and Northwest ODMDS alternatives are not located between two FADS.
25	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Oceanography	Appendix A - Public Comments and USEPA Responses	h. The ODMDS are areas where there is a frequent occurrence of deep water up-welling which attract larger pelagic fish. According to a multitude of publish reports; deep water nutrients consists of nutritional salts such as nitrates and phosphates. When brought to the surface, these nutrients are processed by phytoplankton which provides the basic nutrient of most sea creatures hence the historic harvest of larger pelagic fish in the ODMDS area.	It is recognized that any elevated feature >12 m in elevation, may influence the abundance, biomass, diversity, and taxonomic composition of the surrounding ecosystem (Brett, 2001); however, the summit depth of an elevated feature is as important as the location of the feature itself. Not all seamounts will generate the same effects due to their different sizes, shapes, depths of the summit below sea surface, and distance from other seamount or bathymetric features (Porteiro & Sutton, 2007). Whereas "shallow" seamounts reach into the euphotic zone, "intermediate" seamounts have summits below the euphotic zone but within 400 m of the sea surface, and "deep" seamounts have peaks below 400 m depth (Genin, 2004). The euphotic zone, where surface water shallow enough to receive sufficient light to support photosynthesis extends to a depth of approximately 150 m in tropical waters (Lalli and Parsons, 1993). Seamounts of interest for pelagic fisheries are most likely those with summits in the shallow euphotic zone, and in some cases extending to the intermediate depths (Allain et al 2008). The conical Tracey Seamount (i.e. Perez Bank) west of Guam, is considered a deep seamount, which rises from bottom depths of 3000 m up to a summit at approximately 800 m below the sea surface. Results from extensive scientific studies at a similar, isolated deep seamount can be applied to the Tracey Seamount. The Fieberling Guyot was the target area of a multidisciplinary program to study the physical, biological and chemical properties of oceanic waters near steep and isolated topography. It is the largest isolated feature in a group of seamounts in the northeast Pacific and is an almost axis-symmetric seamount extending from bottom depths of 4000 m up to a summit plan at approximately 500-700 m below the sea surface. Profiles of the temporal and spatial structure of motions on top of the summit plain revealed a vortex cap (i.e. flow field) 200 m thick atop the seamount. Also, current-meter data showed anticyclonic vorticity near the summit plain, while mean flows shallower than 400 m were weak and exhibited no reluctance to cross isobaths (Kunze and Toole, 1997). Similar findings were found in a detailed numerical simulation study by Beckmann and Hadivogel (1997) of the flow regime of Fieberling Guyot. The horizontal structure of the seamount trapped wave is clearly visible at the upper flanks of the seamount, while there is only a weak indication of the trapped wave at a height of 100-200 m above the seamount's summit (Beckmann and Hadivogel, 1997). These studies found that the seamount effects driven by tidal and oceanic currents occur within a limited area above the seamount summit and diminish with height. Therefore, the variability in the physical flow field associated with the Tracey Seamount, including upwelling of nutrients or other organic materials is likely limited to 100-200 m above the seamount summit (i.e. 600 m below the sea surface), well below the euphotic zone, thermo-cline and vertical migration pattern of most pelagic fish species. Therefore, the submarine physiography of the nearest sea mounts to the ODMDS would not support the mechanics necessary (most significantly, they are not shallow enough) to create substantial upwelling to the ocean surface or near-surface area.
26	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Oceanography & fishing	Appendix A - Public Comments and USEPA Responses	i. Cognizant that the DEIS research claims that there is a lack of nitrates in the water column, however, the fact that the historic catch of large pelagic fish in the two sites may raise a question to the accuracy of the survey.	The DEIS indicates that nitrates were detected at a concentration range of 0.84 to <0.01 mg/L in in-situ water column samples, collected at various depths (from 2240 m up to 50 m). Nitrite were all <0.01 mg/L in the same water. All associated QA/QC (including these analyses were made using USEPA methods approved and appropriate for the testing of nitrates/nitrites in a seawater matrix and was performed by a USEPA-certified analytical laboratory.

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27	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Oceanography & fishing	Appendix A - Public Comments and USEPA Responses	j. The ocean thermocline depth is extremely important to fishing operations. The thermocline at shallow depths brings the fish closer to the surface and is commonly associated with good catch rates.	A seasonally shallow thermocline probably induces the aggregation of skipjack schools, favoring fishing operations (Andrade, 2003). However, fish encountered within or approaching the disposal area during a disposal event are expected to practice avoidance during the temporary disturbance to the water column.
28	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Sampling methodology & fishing	Appendix A - Public Comments and USEPA Responses	k. The fact that the fisheries on Guam is a surface troll fishery and the DEIS does not address the impact to this fishery. The emphasis of the DEIS was place on determining the effect on the bottom habitat and the species associated. The use of bottom trawl to determine the specie composition and the feasibility of this fishery is misdirection for the fishery is non-existent and such gear type has long been banned from use in the Guam EEZ.	The purpose of the EIS studies was not to mimic any particular fishery or fishing method. The purpose of the studies was to fill data gaps and look for potentially unknown or unexpected habitat types and species. This was done because the surficial and pelagic habitats are already well-known and documented in other sources, and the bottom habitat is not as well documented. Therefore, it was important to survey, document, and analyze existing habitat and conditions at the seafloor.
29	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Fishing	Appendix A - Public Comments and USEPA Responses	l. According to the DEIS the fishing areas are confined to the Rota Bank and Galvez area, more specifically frequented by Charter fishing vessels. This description of the fisheries around Guam is grossly inaccurate. The following is a more accurate portrait of the fishery: i. The entire western seaboard of Guam is the more common fishing area up to twenty miles from shore. The two highlighted areas identified in the DEIS are frequented by a limited number of fishing vessels and not commonly visited by Charter vessels. ii. The Charter fishery is a very small component of the entire Guam fishery and the fishing area covered by this small fleet is primarily concentrated on the western waters. iii. A vast majority of the off-shore fishers are fishers who fish primarily on the western area and depend highly on the migratory and seasonality movements of pelagic fish. iv. The fact that deep sea up-welling provide for a natural aggregation for pelagic fish. This occurrence brings life sustaining nutrients to the surface where prey fish gather and hence pelagic fish congregate. v. The waters on the western area consist of pelagic fish, prey fish, coral reef fish and coral larvae. The western seaboard historically is the first to demonstrate the return of seasonal fish species.	l. Rota and Galvez Banks were highlighted as fishing areas primarily due to the unique bathymetric features (shallow banks and reefs (less than 660 ft [200 m])) that support a more diverse and abundant fishery in these areas. The entire Guam fishery is not limited to Galvez and Rota Banks. In Chapter 3, Existing Environment, the Essential Fish Habitat for the pelagic fishery is described as occuring from the shoreline to the outer limit of the Exclusive Economic Zone (200 nm from the coastline) and throughout the water column from the surface to 3,300 ft deep. i. In response to the comment, changes to the Executive Summary and Alternatives Chapter have been made to better reflect that the Guam fishery does occur along the western seaboard of Guam. ii. Comment noted. iii. Comment noted; see above. iv. See the response to comment #25. v. The waters surrounding Guam, and as noted on the western area, do consist of pelagic fish, prey fish, coral reef fish and coral larvae. Coral reef fish and larvae tend to associate with the shallower, nearshore habitat adjacent to Guam and will have a low incidence of occurrence at or near the proposed ODMDS. Connectivity, (i.e., the recruitment behavior of coral reef systems) was added to the EIS (Section 3.2.3.2) and suggests that coral larvae traveling great distances do not have an ecological effect on the coral reef population; rather self-recruitment (i.e., larvae settlement within its own reef) is more significant. Coral larvae that are observed far offshore near the proposed ODMDS would not be expected to return to Guam due to typically persistent easterly tradewind patterns. Pelagic and prey fish are highly migratory and are capable of traveling significant distances per day. Although these fish are more likely to have a higher incidence of occurrence at or near the proposed ODMDS, they will practice avoidance behavior if and when a disposal event occurs.
30	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Fishing	Appendix A - Public Comments and USEPA Responses	vi. Pelagic fish to coral reef species begin their life cycle as larvae and drift with the currents and then return to the island in the juvenile stage. An example is mahimahi first arrives as small fish averaging four to six pounds and then through the season (4 to 6 months) the size increases to twenty pounds. Juvenile rabbit fish and skipjack return to the island during seasonal runs; again from the ocean as they have floated around during their larval stage. vii. The waters surrounding Guam and the Marianas have been recognized scientifically as a spawning area for all species of pelagic fish not to mention coral reef related species.	vi. The ODMDS site is too far (> 11 nm) from the island to realistically have an effect on its species. Moreover, impacts to the water column would be temporary, and fish that happen to be below a disposal event are expected to avoid or go around the temporary disturbance. Spawning and fertilization, corals in particular, are exponentially more likely to occur closer to the island in shallower water, in the vicinity of the coral communities. See response to comment #29 regarding connectivity of coral reef larval species. vii. The specific areas where discrete species spawning occurs has not been scientifically delineated and documented. In general however, areas closer to shore are more likely to be nutrient rich, support fisheries, and contain coral communities. Additionally, see responses to 29iii. and 30vi. above regarding the potential for impacts to fisheries or fish and coral habitat.

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31	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Cultural	Appendix A - Public Comments and USEPA Responses	viii. There is historic documentation that the indigenous populace of Guam has long utilized the resources within the waters surrounding Guam for over 3500 years; hence the resource has historic significance and adverse impacts which may alter its beneficial use should not be authorized.	Analysis conducted in the EIS does not indicate that there will be any significant or long-term impacts to historic resources that would require mitigation.
32	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Environmental justice	Appendix A - Public Comments and USEPA Responses	ix. The effects ODMDS may result in an environmental injustice perpetrated against minority and low-income populations, in this case, the Chamorro people.	Analysis conducted in the EIS does not indicate that there will be any significant or long-term impacts to cultural or socioeconomic resources that would require mitigation.
33	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Fishing	Appendix A - Public Comments and USEPA Responses	m. The scientific community has declared the western and central Pacific as an area of concern due to the decline of pelagic fish stocks; therefore any impact to the environment should be discouraged.	Analysis conducted in the EIS does not indicate that there will be any significant or long-term impacts that would require mitigation.
34	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Ocean currents	Appendix A - Public Comments and USEPA Responses	n. Sedimentation has long been documented as a problem in the reproduction of pelagic and reef species. The plume created by the discharge at the rate of the surface currents may impact the ocean resource at the larval stage as the turbidity levels are increased. A surface speed of 3mph may disburse suspended fine sediment particles to an area six miles away before settling.	The ODMDS site has previously been studied and sampled to determine its characteristic water column properties, currents, and pelagic and benthic communities. The transient nature of the pelagic fish communities suggest that any temporary disturbances in the water column below a disposal event would be expected to result in minimal adverse impacts. Even though the fate of transport footprint has been modeled and well-defined for the expected depositional footprint of 10 cm of thickness on the ocean floor, a buffer zone of two-and-a-half times the expected depositional footprint has already been added as a conservative measure (Section 2.2.4 of the EIS). Although there are no corals in the vicinity of the ODMDS, peak coral spawning period can be avoided during transportation to the site. BMPs to restrict transportation to the site during peak coral spawning periods can be included as a condition of the disposal permit. The potential effects of strong trade winds and El Nino/La Nina conditions on sediment deposition were recognized and accounted for in multiple scenarios, both modeled and in-situ, which were evaluated to an order of magnitude greater than anticipated for surface current speeds, various directions, and directional reversals. No impacts were identified as a result of the evaluated scenarios. In response to the comment, additional text has been added to Section 3.1.2 and Section 3.1.2.4 to better address these conditions and scenarios.
35	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Modeling	Appendix A - Public Comments and USEPA Responses	o. The worst case scenario would mean that ninety percent of the dredged material will settle on the ocean floor within the ODMDS. The ten percent conceivably could travel past the ODMDS zone and settle beyond. This would mean that one out of ten disposal actions would not be with in the zone and possibly drift to nearby seamounts. The result would be 100,000 cubic yards of suspended dredged material drifting outside the zone per year.	All disposal actions will be within the surface disposal zone. The Site Management and Monitoring Plan has 10 mandatory conditions which must be met for each disposal event. Key components of these conditions include: 1) a specified one kilometer diameter surface disposal zone; 2) required use of a navigation/tracking system capable of recording the position of the vessel as well as the opening/closing of the vessel discharge doors; and 3) maintenance of daily trip logs indicating the exact times and locations of disposals.
36	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	T&E species & BMPs	Appendix A - Public Comments and USEPA Responses	p. According to the DEIS, the ODMDS shall be limited in size for monitoring and surveillance but the limits should include an area up five miles from the center and an environmental baseline be well documented by NOAA fishery experts. According to published scientific reports there is valuable marine life deserving of protection at depths along the coast to 35,000 feet; the latter was recognized through a Presidential Proclamation.	The ZSF and EIS baseline studies were designed and conducted to help identify areas with the least potential for any adverse impacts. Analysis conducted in the EIS does not indicate that there will be any significant or long-term impacts that would require mitigation. The Presidential Proclamation for the establishment of the Marianas Trench Marine National Monument is located to the east of Guam. The EIS recognized this preserve and the ODMDS location will not impact it.

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37	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Oceanography & ODMDS comparison	Appendix A - Public Comments and USEPA Responses	q. The placement of the ODMDS should beyond the continental shelf or sites historically used. The fact that the coral reef eco-system is not a stand alone system and is subject associated impacts in relation to each other. The idea that to compare the impact of dredged material on a continental shelf with a tropical eco-system is ludicrous. The characteristics of a tropical and continental shelf are night and day. Again, the fact that these sites are historically used should be evidence enough to remove these sites from consideration.	The ODMDS should be placed beyond the continental shelf or site historically used. Though Guam is not part of a continental landmass, considerations were given during the alternative selection process to ensure the proposed site would not be located over Guam's submarine slopes rising from deeper oceanic waters. Both of the proposed ODMDS alternative sites are located more than 8 nm from the interim disposal site (designated in 1977 and expired in 1997), which was never used. We also agree that the temperate and tropical ecosystems are different in many aspects such as species composition, especially in surface coastal waters; however, the physical oceanographic processes and physiological behaviors of marine organisms are very similar between the two systems. In addition, the majority of the deep ocean environment has characteristics (e.g., temperature, light, pressure) that are fairly consistent throughout the world's oceans. Therefore, utilizing monitoring results from other deep ocean disposal sites elsewhere throughout the United States is relevant as to the physics of dredged material dispersing through water column and depositing on the seafloor, as well as to the behavioral responses of demersal and benthic organisms to that material. The proposed ODMDS sites are located greater than 8 nm from the jurisdictional 3 nm coastal zone boundary.
38	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Pelagics	Appendix A - Public Comments and USEPA Responses	r. The DEIS identified the depth ranges for various pelagic which is erroneous. Below are factual description of the species of concern: i. Wahoo (DEIS 0-40 feet and solitary) depth range deep water during the migratory period but mostly at depths 240 to 300 feet and are not solitary and are abundant during seasonal runs in October to November or full moon periods. ii. Mahimahi (DEIS 0-280 feet) depth range is from deep water mostly larger sizes but are found during seasonal runs from December to May in depths from deep water to 300 feet. iii. Marlin (DEIS 0-650 feet) depth range is from deep water or deep water slopes areas. The deeper the water the tendency for the larger the fish. They are usually found at depths of 1200 feet or greater. Seasonal runs are from July to January. iv. Tunas (DEIS 0-850) depth range for tunas is deep water to as shallow as 500 feet. Large schools are often followed for up to ten miles to depths beyond any conventional depth sounders (6000ft.).	The vertical ranges presented in the EIS are intended to represent the portion of the water column the fish tend to inhabit. Many of these fish can be found in waters that may be much greater than their vertical range. For example, although mahimahi may be located 10 miles offshore in waters exceeding 6,000 ft, mahimahi will only reside in the upper water column from the surface to a depth of about 280 ft as mahimahi physiology prohibits vertical migration through the entire water column. Comments from the GFCA regarding the water depths the fish are typically found in were incorporated as suggested. In response to the comment, EIS text has been updated in Section 3.2.3 to better clarify this information.
39	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Modeling & impacts	Appendix A - Public Comments and USEPA Responses	s. The DEIS reported the greater financial burden on the cost for transporting the dredged material but it does not address the socio-economic impacts to the local fishing community through potential the loss of economic opportunities should the impact be greater than the model describes.	Analysis conducted in the EIS does not indicate that there will be any significant or long-term impacts, financial or otherwise, that would require mitigation.
40	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Economic impact	Appendix A - Public Comments and USEPA Responses	t. The DEIS reports the economic value of the community based fisheries is one million dollars per annum but the reality is that the Guam Fishermen's Cooperative Association economic value is under three million dollars per annum and none GFCA fishery value is about one million. The Socio-economic value of to the community and the Chamorro culture is immeasurable and value cannot be determined by western standards. The millennia practice of sharing with family, friends, religious and cultural events continues to possess more value than a financial benefit or return.	The value of the Guam fisheries listed in the EIS has been amended in Section 3.3.1 to include the value stated in the comment, and the commenter (the President of the Guam Fisherman's Co-op) referenced as the source of the information. The value, both intrinsic and economic, of the fisheries to the people of Guam is fully appreciated by the USEPA, and is one of many reasons so much effort was put forth to ensure that no potentially significant negative impacts would occur as a result of the ODMDS designation.

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41	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Site feasibility	Appendix A - Public Comments and USEPA Responses	**Specific Site Selection Criteria:** 1. Distance from coast should include underwater seamounts. The fact that the ODMDS are purposely located a great distance from the coast but lie within close proximity to seamounts should also be considered.	Underwater features such as bathymetry, basins, and seamounts were considered during potential impact analysis [see comment response #25 above]. Analysis conducted in the EIS does not indicate that there will be any significant or long-term impacts that would require mitigation.
42	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Oceanography and fishing	Appendix A - Public Comments and USEPA Responses	2. Location in relation to breeding, spawning, nursery, feeding or passage areas of living resources in adult or juvenile stage should be avoided. Again, the water near the equator has been scientifically determined to meet these qualifications and therefore should not be used as an ODMDS.	There are no present or historical ODMDS sites near the equator. Greater diversity and richness of species are encountered in the nearshore waters of coral reefs. All species of fish expected in the vicinity of the ODMDS have adapted to open-ocean habitat, and the biological activities suggested by this comment are not unique to open-ocean waters near the equator.
43	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Fishing	Appendix A - Public Comments and USEPA Responses	3. Location to other amenity areas should not be limited to local jurisdictional areas but be inclusive of all historic fishing areas and Fish Aggregation Device placement areas with the same buffer zone consideration given to the coastal areas.	As part of the ZSF (see Section 3.7 and Figure 3.6), productive shallow water fishing banks and areas near FADS were excluded from consideration for an ODMDS. The ODMDS is not between two FADS and is too far from existing FADS to affect fisheries created by them. Analysis conducted in the EIS does not indicate that there will be any significant or long-term impacts that would require mitigation.
44	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Disposal method	Appendix A - Public Comments and USEPA Responses	4. Types and quantities of waste material to be disposed are not to be packaged. The material should be package to lessen surface and near surface water quality concerns. A cement mixture would control the amount of sediment release in the upper layers of the water column. The concern over exhaust entering the atmosphere from transport vessels seems to be greater than the ecological impact to the marine resource. We recommend utilizing areas ten miles beyond the current site or at least five miles from the base of seamounts.	The disposal of concrete at the ODMDS could have exponentially greater potential negative impacts than the disposal of sediment alone. Analysis conducted in the EIS does not indicate that there will be any significant or long-term impacts from the disposal of sediment alone at the selected alternatives that would require mitigation. Utilizing areas ten miles beyond the current site would present numerous jurisdictional and environmental impacts. The potential negative impacts to air quality (and the use of fossil fuels) from vessel exhaust would be far greater if vessels were forced to travel an additional 10 miles beyond the current ODMDS location.
45	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Modeling	Appendix A - Public Comments and USEPA Responses	5. The feasibility of surveillance and monitoring of ODMDS is crucial and should be extended beyond the zone area. Any possible impact to the adjacent marine environments has not been fully considered or addressed. A complete baseline study must be done to the adjacent areas up to five nautical miles from the zone boundaries and mitigation measures must also be developed to include financial support.	The ODMDS site has previously been studied and sampled to determine its characteristic water column, currents, pelagic and benthic communities. The fate of transport footprint has been modeled and well-defined; even so, for the expected depositional footprint of 10 cm of thickness on the ocean floor, a buffer zone of two-and-a-half times the expected depositional footprint was added as a conservative measure (Section 2.2.4 of the EIS). Additionally, Section 3.1.1 of the SMMP [Appendix C of the EIS] discusses the sediment profile imaging (SPI) methods by which the disposed material will be observed with digital cameras. Also per Section 3.1.1 of the SMMP, SPI stations will be placed through the ODMDS site and continuing to a distance 500 meters beyond the edge of the detectable dredged material layer. Analysis conducted in the EIS does not indicate that there will be any significant or long-term impacts that would require mitigation.
46	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Modeling & fishing	Appendix A - Public Comments and USEPA Responses	6. Dispersal, horizontal transport and vertical mixing characteristics of the area, including prevailing current direction and velocity, if any. The concern of surface and sub-surface turbidity impacts was not full addressed in the DEIS and the effects to adjacent seamounts or the marine eco-system as a whole not just emphasize the seafloor habitat concerns. Again, fishing on Guam is a surface troll fishery and the DEIS does no address the potential impact.	The modeling takes into account horizontal transport and vertical mixing characteristics of the area, including prevailing current direction and velocity, which is based upon extensive site-specific oceanographic data collection. Following the public comment period, additional analysis was done for the FEIS that included a new maximum possible conditions scenario (La Nina and El Nino) for dispersion and plume modeling. These new results, included in Section 4.1.3.2 of the EIS continue to indicate that significant impacts to pelagic fisheries are not expected to occur. The purpose of the EIS studies was not to mimic any particular fishery or fishing method. The purpose of the studies was to fill data gaps and look for potentially unknown or unexpected habitat types and species. This was done because the surficial and pelagic habitats are already well-known and documented in other sources, and the bottom habitat is not as well documented. Therefore, it was important to survey, document, and analyze existing habitat and conditions at the seafloor. Note that the EIS addresses potential impacts to the pelagic fishery in Section 4.2.2.3, Fish Communities and Essential Fish Habitat (EFH).
47	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Ocean currents and site history	Appendix A - Public Comments and USEPA Responses	7. Existence and effects of current and previous discharges and dumping in the area is a non-issue for there has been no known dumping in the area. There are documented cases of sediment issues on the coast regarding turbidity and settling which has adversely affected marine life. There are a multitude of published scientific reports on this issue.	Comment noted. Unclear specifically to where in the EIS document, or to which scientific reports, the comment is referring. Sedimentation issues along the coastline are precisely that; along the coastline. The ODMDS is located many miles out in the ocean (> 11 nm for the Northwest Alternative and > 13 nm for the North Alternative) and too far for sediment to reach anywhere near the island of Guam, even under the most aggressive ocean currents conceivable for that region. Sediment dispersion in the water column during a disposal event has been modeled and is discussed in detail in Section 4.1.3.2 of the EIS.

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48	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Fishing and site feasibility	Appendix A - Public Comments and USEPA Responses	8. Interference with shipping, fishing, recreation, mineral extraction, desalination, fish and shellfish culture, areas of special scientific importance, and other legitimate uses of the ocean. The entire ocean surrounding Guam has a special scientific importance from the seasonal migratory pelagic fish to the juvenile reef fish that benefit from a healthy marine eco-system. The ODMDS are not transit areas for recreational or commercial users but are part of the range by which fishing occurs. The DEIS claims it is not a destination which is false for there are no geographical boundaries for highly migratory fish or juvenile coral reef species who are subject to currents and sea temperatures. The DEIS ocean current report demonstrates the variability and subjectivity by which our ocean eco-system and the marine life interact. Again, the ODMDS are historically known fishing areas.	The comment is correct to point out that there are no geographical boundaries for the species that could potentially be encountered in the ODMDS area, and therefore they are not expected to be especially concentrated nor particularly congregated in the ODMDS area. Pelagic and prey fish are highly migratory and are capable of traveling significant distances per day. Although these fish may occur at or near the proposed ODMDS, they will practice avoidance behavior if and when a disposal event occurs. Therefore, there would be no significant impact. Finally, the disturbance to the water column during a disposal event would be temporary and would return to pre-disposal conditions shortly after the event. Analysis conducted in the EIS does not indicate that there will be any significant or long-term impacts that would require mitigation.
49	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	ESF, pelagics, and coral	Appendix A - Public Comments and USEPA Responses	9. Existing water quality is clean and provides for Essential Fish Habitat (EFH) for prey fish, pelagic fish and coral reef related species during their migratory travels. The DEIS does not address the potential impacts to any of these species.	The EIS addresses the potential for impacts to pelagic and coral reef species in Sections 3.2.3 and 4.2 of the EIS. There is no coral reef habitat in the dispersal area, nor a plume to affect coral reef habitat. Analysis conducted in the EIS does not indicate that there will be any significant or long-term impacts, including the potential for impacts to prey, pelagics, or coral reef species that would require mitigation.
50	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Nuisance species	Appendix A - Public Comments and USEPA Responses	10. Potentiality for the development or recruitment of nuisance species in the disposal site. The dredged material is from a site in Apra Harbor and there have been documented reports of nuisance species present in the harbor from ballast water discharge. The nuisance species may not survive at the bottom of the ODMDS but can it be safely determined that the nuisance species will not float and drift back to Guam or other island areas, exacerbating the problem? Again, not addressed in the DEIS for it only addresses the impact on the seafloor.	Nuisance species are a serious concern in many areas. However, if nuisance species are present in dredged material, they are not expected to survive at a deep ocean disposal site. In addition, prevailing ocean currents at either ODMDS site would not support a return of nuisance species to the island. De-ballasting by other vessels offshore (prior to entry into Apra Harbor) is far more likely to contribute to introduction (live or dead) of nuisance species.
51	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Cultural and fishing	Appendix A - Public Comments and USEPA Responses	Existence at, or in proximity to, the site of any significance natural or cultural features of historic importance. The DEIS claims the areas have no significance cultural or historic importance. The fishers of Guam have for 3500 years have had historic use of this resource. Further, the names given to the areas in close proximity to these sites were locally given by fishers. Case in point, no maps identify these areas with the given local names but is well known by the community. Perez Bank received its name from the fisherman and his family that first realized the area's fishing potential. Spoon Bank received its name due the configuration of the seamount ridges and the ODMDS is the deep part of the spoon shape. The cultural significance is that for thousands of years, the Chamorro culture has been highly dependant on the ocean for sustenance and any impact which may affect the harvest ability through changes in the migratory patterns of the marine resources is culturally unconscionable.	Analysis conducted in the EIS does not indicate that there will be any significant or long-term cultural resource impacts that would require mitigation.

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52	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Marine biology	Appendix A - Public Comments and USEPA Responses	**Rio declaration on Environment and Development possible violation:** 1. Human beings are the center of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature. The elevated levels of sediment and turbidity can realistically reduce the biological productivity of aquatic systems. There are lethal and sub lethal effects on fish and their habitat such as feeding, growth, egg development and survival to name a few. In essence, the healthy and productive life entitled to the users and beneficiaries of the marine resource will be greatly affected by the disposal of the dredged material. The NTU values exceed the standard which allows for only a maximum of 8 NTU for a short term increase and 2 NTU for long term increases. The DEIS does not adequately address the possible impact to the marine environment since sediment impacts has been proven to be greater in a tropical eco-system than in a shelf system.	We recognize the Rio Declaration on Environment and Development does proclaim human beings are the center of concern for sustainable development and are entitled to a healthy and productive life in harmony with nature. The Rio Declaration also proclaims that an environmental impact assessment, as a national instrument, shall be undertaken for proposed activities that are likely to have a significant adverse impact on the environment and are subject to a decision of a competent national authority. This EIS has been developed in accordance with the requirements of the National Environmental Protection Act as well as other statutes in order to ascertain any potential impacts to the environment. With respect to comments made regarding regulatory guidelines for turbidity, the following information is provided. First, the NTU values presented in the FEIS are ambient (i.e., background or existing) conditions in the absence of any disposal activity. Therefore, these values are not to be considered in exceedance of any particular standard, rather these values would be used to measure potential changes against during monitoring activities. There are no federal water quality guidelines for the regulation of turbidity. The values referenced by this comment appear to be values developed by Environment Canada as presented in a review document (Developing Water Quality Criteria for Suspended and Bedded Sediment [SABS]) developed by the USEPA Office of Water and Office of Science and Technology (2003). Environment Canada's guidelines indicate that clear flow turbidity should not exceed background levels by more than 8 NTU during any 24-hour period, and for inputs that last greater than 24-hours, the mean turbidity should not exceed background levels by more than 2 NTU. Second, all federal water quality guidelines that are adopted allow discharges to be evaluated with respect to a mixing zone having specified time and distance parameters. Third, referring back to Environment Canada's guidelines, they also have thresholds for suspended sediment concentrations; these thresholds state background levels should not increase by more than 25 mg/L during any 24-hour period. Additional modeling using USACE's STFATE model to focus on plumes in the upper water column, suggests background suspended sediment concentrations would not be greater than 1 mg/L at a distance of approximately 750 ft (230 m) and within 4 hours from the point and time of discharge, respectively.
53	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Policy	Appendix A - Public Comments and USEPA Responses	**Treaty of Peace possible violation:** 1. The Treaty recognizes the right of the Chamorro People to self determination and until such time the resources of the Territory of Guam shall be held in trust for the benefit of the indigenous people. The establishment of the ODMDS is in direct violation of the conditions by the resources should protect for the beneficial use by the People of Guam.	Analysis conducted in the EIS does not indicate that there will be any significant or long-term impacts, cultural, socioeconomic or otherwise, that would require mitigation.
54	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Policy	Appendix A - Public Comments and USEPA Responses	**Safety at Sea Concern:** 1. The DEIS does not mention mitigation for the loss of approximately 14 square miles of fishing area. The fishing community may be forced to travel to other fishing areas where rescue and other services are not easily available. The change of fishing habits from familiar to unfamiliar areas may be considered as a safety at sea issue, placing the fishers in harms way. The added expense to travel greater distances to fish must also be considered.	Analysis conducted in the EIS does not indicate that there will be any significant or long-term impacts, including loss of fishing grounds, that would require mitigation. According to an earlier comment, the entire western seaboard of Guam up to twenty miles from shore is a common fishing area (comment #29). The portion the surface area utilized by the ODMDS, when compared to the entire western seaboard of Guam up to twenty miles from shore, is well below 1% of the surface area. Most importantly, the small area designated for the ODMDS does not preclude it from continued use for fishing. The ODMDS will still be available for fishing.
55	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Protocol	Appendix A - Public Comments and USEPA Responses	**The Magnuson-Stevens Reauthorization Act concerns:** 1. The DEIS did not a provide documentation whereby consultation with the Western Pacific Regional Fishery Management Council (WPRFMC) was initiated or requested.	WPRFMC involvement is not required; however, NOAA National Marine Fisheries Service (NMFS) involvement is required and they have been consulted and requested to review and comment upon project documentation during its development.
56	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Protocol	Appendix A - Public Comments and USEPA Responses	2. The WPRFMC is not responsible for the management of the near-shore fisheries but the entire fisheries beyond the three mile Guam jurisdictional boundaries to the 200 mile limits of the EEZ.	WPRFMC involvement is not required; however, NOAA National Marine Fisheries Service (NMFS) involvement is required and they have been consulted and requested to review and comment upon project documentation during its development.
57	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Protocol	Appendix A - Public Comments and USEPA Responses	3. The ODMDS proposal should have been made available to the Council. The possible impacts to Essential Fish Habitat (EFH) or any fish stock are all within the Council's purview.	WPRFMC involvement is not required. However, WPRFMC and any other organization or interested party has been provided multiple opportunities to comment on the project--comments which would be considered in-full, potentially affect the project approach (if warranted), and included in the official record--at formal and informal public meetings, in response to EIS NOI or NOA notices, or online at the project website.

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58	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Protocol	Appendix A - Public Comments and USEPA Responses	4. The WPRFMC has untaken the Ecosystem approach to fishery management therefore any potential impacts must be thoroughly analyzed.	Analysis conducted in the EIS does not indicate that there will be any significant or long-term impacts that would require mitigation.
59	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Protocol	Appendix A - Public Comments and USEPA Responses	5. The WPRFMC has taken marine resource management measures by banning the use of Bottom Trawl gear, Closure Areas for Longlining and Bottom Fishing and pending Secretarial Approval, a complete ban on Purse Seining. These actions were developed in consultation with the fishing community for the benefit of the community.	Comment noted.
60	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Safety and BMPs	Appendix A - Public Comments and USEPA Responses	6. The WPRFMC is mandated to address Safety at Sea concerns due to the displacement of fishers or the transferred effect due to the establishment of the ODMDS.	Analysis conducted in the EIS does not indicate that there will be any significant or long-term impacts, safety or otherwise, that would require mitigation. Vessel traffic associated with dredged material disposal operations are a very small fraction of overall vessel traffic transiting in and out of Apra Harbor and around Guam, and given that tugboats pulling barges would be required to operate in accordance with navigation regulations, a less than significant impact is expected to safety at sea. According to an earlier comment, the entire western seaboard of Guam up to twenty miles from shore is a common fishing area (comment #29). The portion the surface area utilized by the ODMDS, when compared to the entire western seaboard of Guam up to twenty miles from shore, is well below 1% of the surface area. Most importantly, the small area designated for the ODMDS does not preclude it from continued use for fishing.
61	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Marine biology	Appendix A - Public Comments and USEPA Responses	**The Marine Mammal Protection Act and the Endangered Species Act:** 1. The effects on marine mammals were not fully addressed. The effects of increase turbidity levels, sound disturbances, disposal action and increased activities on whales, dolphins, sea turtles and other species of particular concern. The encyclopedia of marine mammals was presented and observation noted during research cruise. The Action does not address a need to develop a Biological Opinion on the possible interaction or impacts.	Analysis on the potential to affect Marine Mammals and other species of concern is covered at length in Section 3.2 and 4.2 of the EIS. A Biological Assessment (BA) would be issued if project proponent believes there exists a potential for species to be significantly impacted by the action. Since there are no significant impacts, there was no need to conduct a BA. NOAA NMFS would issue a Biological Opinion (BO) based upon the findings of the BA. Since a BA was not necessary, a BO was not issued. NMFS has been a commenting agency on the development of the ODMDS and would have objected to the omission of a BA had it believed that one was necessary. NMFS was provided with an opportunity to comment in draft, and they agreed with the no impact findings.
62	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	DEIS	Appendix A - Public Comments and USEPA Responses	**General Concerns of the Draft Environmental Impact Statement Process:** 1. The DEIS are not concise, understandable, and readily available: a. Not concise: The DEIS document is filled with fillers from graphs which are difficult to decipher to numbers that offers no clear explanation to the impacts from the baseline. The document provides for a scientific analysis with a scientific explanation which would assume that the reader possesses the same level of training. The impacts are focused on the seafloor and the effects on that environment. Very little information on the impacts to marine life on the upper levels of the water column. b. Not understandable: The information is not in	Presentation of the methods, analysis, and results range from the basic and general to highly technical. This is necessary to meet the needs of both the general public and the scientific community, all of whom will be interested in having full-visibility as to how results were attained, and the data and methods used to derive conclusions contained therein. The determination of effects or non-effects of an action is a complex procedure that is undertaken with great care. By providing full disclosure of the complexity of the process, it provides the reviewer with a glimpse of the depth of analysis that goes into making a determination of effect or non-effect. Different reviewers will have a greater interest in some aspects of the EIS than others. One of the primary functions of the EIS is to provide maximum information in a well-organized and concise manner. It should be noted that many EISs are much larger and contain multiple volumes. It is hoped that the reviewer will appreciate the level of effort that was put into determining, to greatest extent possible, the existing environment and the potential for environmental consequences associated with the ODMDS designation. The EIS was announced to the public through notices in the local newspaper

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												layman terms and the report is at the scientific level or perhaps the assumption is that only scientist familiar with turbidity levels (NTUs) and ocean currents will be interested to read and understand the DEIS. The DEIS documents are required to be understood. Based on the upper level surface currents they flow erratically and a clear direction for a given period cannot be determined. Again, the emphasis is placed on the lack of current at the lower depths so the potential surface impact is not easily understood. c. The document was not readily accessible to the public: The Public Library and governmental agencies is not conducive for public review of the DEIS. The DEIS document is approximately 377 pages which require a common person a full dedicated week to review the document and at the same time take notes. Most fishermen do not have time, access to computers and internet access. The opportunity period to review and comprehend the document before filing comments was less than sixty days. This would be fine for one who dedicates their time strictly to the document but is an unconscionable burden on the lay person affected by the measure.	and the Federal Register periodical, formal and informal public meetings, and online at the project website. Additionally, local agencies have been kept appraised of and asked to comment upon the EIS document at various stages of its development. Copies of the EIS have been made available to the public at various stages of its development at public libraries, at formal and informal public meetings, and online at the project website. By regulation, the comment period of an EIS is only required to be 45 days. In one of the many measures taken to accommodate interested parties to the greatest extent possible, the comment period was extended to 60 days.
63	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Public meeting	Appendix A - Public Comments and USEPA Responses	2. The Public Meeting for Record: a. The Public Meeting for Record was held in an inappropriate location and did not allow for true public in-put. A community based Public Meeting would have been more conducive and participation from the community may have been greater as was the case in the informal meeting with the GFCA members. The brief time allocated for each person during the public comment period was insufficient despite the fact public was allowed additional time after the first round of comments ended.	The public meetings for the EIS Notice of Intent (NOI) and Notice of Availability (NOA) were both held at the Westin Hotel in Tumon, Guam. Tumon is a centralized location on Guam and is an economic and transportation hub. In one of the many measures taken to accommodate interested parties to the greatest extent possible, informal meetings were also held with GFCA members. Standard public meeting protocol was observed at the formal public meetings and all parties present were instructed that in order for everyone to have a fair opportunity to speak, each speaker/commenter would initially be provided three minutes to speak. Additional comments could be made, on the public record, without a time limit once everyone who wanted to speak was given an initial opportunity to speak. Comments could also be submitted to the official record in writing. Some commenter's took advantage of the extra time and returned to the podium after everyone had been given the opportunity to speak and continued to speak on the official record without a time limit. Transcripts from public involvement meetings are included in Appendix A of the EIS.
64	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	Comment period	Appendix A - Public Comments and USEPA Responses	3. The Comment Period: a. The comment period should be extended for an additional 30 days. The Public is not aware of the DEIS or the ODMDS. Better outreach and public awareness is needed.	Comment noted. The EIS was announced to the public through public notices in the local newspaper and the Federal Register periodical, formal and informal public meetings, and online at the project website. Additionally, local agencies have been kept appraised of and asked to comment upon the EIS document at various stages of its development. Copies of the EIS have been made available to the public at various stages of its development at public libraries, at formal and informal public meetings, and online at the project website. By regulation, the comment period of an EIS is only required to be 45 days. In one of the many measures taken to accommodate interested parties to the greatest extent possible, the comment period was extended to 60 days.
65	Duenas II	Manuel P.	P.O. Box 24023	GMF	Guam	96921	Guam Fisherman's Cooperative Association; President	General	-	-	Appendix A - Public Comments and USEPA Responses	The above comments reflect the concerns of the Guam Fishermen's Cooperative Association, an artisanal fishing organization with nearly two hundred members. There are more issues with the DEIS but due to time constraints we are unable to provide additional comments. The information presented in the DEIS requires technical expertise to verify or explain the cause and effect of this measure. It is for this reason that we humbly request for an extension to the comment period in order to provide a more thorough review of the document. We implore that the No Action alternative be selected. The coastal marine resource has been greatly impacted by land use issues and the off-shore waters are still in a pristine condition as described by the President as worthy of	Comment noted. The EIS was announced to the public through public notices in the newspaper and the Federal Register periodical, formal and informal public meetings, and online at the project website. Additionally, local agencies have been kept appraised of and asked to comment upon the EIS document at various stages of its development. Copies of the EIS have been made available to the public at various stages of its development at public libraries, at formal and informal public meetings, and online at the project website. By regulation, the comment period of an EIS is only required to be 45 days. In one of the many measures taken to accommodate interested parties to the greatest extent possible, the comment period was extended to 60 days. And again, analysis conducted in the EIS does not indicate that there will be any significant or long-term impacts that would require mitigation.

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												protection. The establishment of an Ocean Dredged Material Disposal Site in waters of Guam will greatly alter these conditions.	
66	Crisostomo	Lorilee T.	P.O. Box 22439	Barrigada	Guam	96921	Guam EPA; Administrator	General	-	Policy	Appendix A - Agency Correspondence and Public Officials	**National Defense Concerns Versus EPA Requirements:** What circumstances relative to National Defense would override, modify or cancel the USEPA requirements applied to ocean disposal of dredged material by the DOD?	Even in a declared emergency, after-the-fact NEPA would be required. As an example, under such a circumstance, the Secretary of Navy would send a notice to the USEPA administrator stating that there was a need to do after-the-fact NEPA in response to a declared emergency. However, there have been no known cases of this occurring that applied to an ocean disposal. It should be noted that this hypothetical scenario of after-the-fact NEPA would apply to the future projects, that would themselves be evaluated for potential impacts, not to the action of designating a disposal site.
67	Crisostomo	Lorilee T.	P.O. Box 22439	Barrigada	Guam	96921	Guam EPA; Administrator	General	-	Overseas EIS	Appendix A - Agency Correspondence and Public Officials	**Why not an " Overseas EIS"?** The Department of Defense (DOD) is developing an Environmental Impact Statement/Overseas Environmental Impact Statement on the impacts of 1) proposed relocation of 8,000 Marines from Okinawa to Guam, 2) facilities for berthing of nuclear aircraft carriers at Guam, and 3) placement of an Army Ballistic Missile Defense Group on Guam. We have been told by representatives of the DOD that their reason for having an "Overseas Environmental Impact Statement" is because their proposed actions and impacts are to be "beyond 12 miles" from US shores and that this distance is said to trigger the need of an OEIS. Is this application of an OEIS also needed for Designation of an Ocean Dredged Material Disposal Site which is an action proposed to be more than 12 miles off shore?	The OEIS applies to Federal actions that have the potential to impact areas beyond the territorial boundary the United States. For this reason OEISs are typically prepared by the Navy for actions related to base realignment or expansion at an overseas location. By Federal law, USEPA is the action agency for designating ODMDSs. However, the site designation EIS fulfills the substantive requirements of an OEIS.
68	Crisostomo	Lorilee T.	P.O. Box 22439	Barrigada	Guam	96921	Guam EPA; Administrator	ES-6 3-81	33 -	Fishing and marine biology	Appendix A - Agency Correspondence and Public Officials	*Panulirus marginatus* does not occur in Guam and is not in a Guam fishery, nor is *Ranina ranina* regularly fished in Guam.	This change has been made as suggested. The Hawaiian spiny lobster (*Panulirus marginatus)* is endemic to Hawaii. The Kona (Spanner) crab (*Ranina ranina)* distribution includes Indo-Pacific, South and East Africa, Mauritius, Sandwich Islands, Reunion. Both species are listed as Mariana Archipelago Crustaceans Management Unit Species in the Fishery Ecosystem Plan for the Marina Archipelago (Western Pacific Regional Fishery Management Council).
69	Crisostomo	Lorilee T.	P.O. Box 22439	Barrigada	Guam	96921	Guam EPA; Administrator	ES-10 Table 2-3	Crit. 3 -	Policy	Appendix A - Agency Correspondence and Public Officials	**Relation to CZMA Jurisdictions.** By having the sites greater than 3nm from the coast, it appears that, for future proposed disposal, the CWA provisions do not apply and the review of disposal activities by local Guam regulatory agencies through the Federal Consistency Process is prevented. Are there provisions to ensure that proposals to EPA to use the disposal site can be shared with Guam regulatory agencies, to allow their input to EPA during the application review period? If Government of Guam disapproves of a proposed disposal activity at the designated site, will this cause EPA to also disapprove? As EPA decides whether a proposed disposal will be allowed, will it consult with Government of Guam on whether beneficial uses of the material are available? In particular , if the Department of Defense fails to adequately test the quality of the CVN dredged material for contaminants, or suitability for beneficial uses or fails to develop beneficial uses that could be pursued, will Guam objections be recognized and acted upon by USEPA?	A USEPA-designated ODMDS would be located more than 3 nautical miles from the coast, outside of the coastal zone under the authority of the CWA and CZMA. However, an initial portion of the transit route of dredged material transported to the ODMDS will occur in the coastal zone, and the site designation EIS evaluates any potential impacts from transportation of clean (non-toxic) dredged material in barges. Mandatory conditions for use of the ODMDS typically include requirements to minimize potential for spillage or leakage of dredged material, and include compliance monitoring requirements for sensors to track the location of the barges, to confirm that disposal operations have occurred properly at the ODMDS, and to identify when a spill or leak may have occurred (i.e., draft loss) during transportation. For any proposed dredging project, stringent physical, chemical, and biological tests are required to determine suitability of the proposed dredged material for ocean disposal. Only clean (non-toxic) sediments may be transported to an ODMDS. The local Guam agencies will have an opportunity to review the testing results as well as the alternatives analysis for each dredging project, and provide input on each project relative to CWA issues.

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70	Crisostomo	Lorilee T.	P.O. Box 22439	Barrigada	Guam	96921	Guam EPA; Administrator	ES-10 Table 2-3	Crit. 3 -	Policy	Appendix A - Agency Correspondence and Public Officials	**Beneficial Uses.** Government of Guam in all cases prefers beneficial use of dredged materials rather than ocean disposal and requests that the US EPA recognizes and better describes these uses and their estimated capacities and locations on Guam as part of this EIS. The suggestion by USEPA that Guam should undertake a Strategic Plan for Beneficial Use of dredged material is not practical, knowing Government of Guam lacks the resources to do this. This must be funded by the proponents of the designation for the disposal site (i.e. , the DOD) and site designation or site utilization must be delayed until this plan is completed. If the EIS does not propose and evaluate alternatives that may best serve both the civilian and the military communities on Guam through a comprehensive island-wide approach, EPA should make conditions of site use approval include such a comprehensive study.	The Ocean Dumping regulations require use of alternatives to ocean disposal, including beneficial reuse, whenever practical. Ocean disposal would be permitted only when there is no practicable alternative that would have less impact to the aquatic environment. Timing and logistics may preclude beneficial reuse of suitable material. The designation of an ODMDS does not approve any dredging project for ocean disposal. Each proposed dredging project is subject to a separate approval after conducting a stringent battery of physical, chemical, and biological tests to determine suitability for ocean disposal. Only clean (non-toxic) sediments are permitted for transportation to the USEPA-designated ODMDS.
71	Crisostomo	Lorilee T.	P.O. Box 22439	Barrigada	Guam	96921	Guam EPA; Administrator	ES-10 Table 2-3	Crit. 3 -	Beneficial re-use discussion in EIS	Appendix A - Agency Correspondence and Public Officials	**Beneficial Use Plans.** The Guam Departments of Land Management, Public Works and Agriculture, the Chamorro Land Trust, Guam Environmental Protection Agency, Port Authority of Guam (PAG), Bureau of Statistics and Plans, Council of Mayors and others, as well as the Air Force and Navy, must all be approached by the EIS preparers or by applicants for site use (e.g., DOD) to obtain information on beneficial use sites and needs for beneficial uses. These should include filling for elevated fast land, especially considering projected sea level rises that will impact coastal facilities (as at the PAG), cover for landfills, capping of clean-up sites, restoration of old quarry sites, beach enrichment, road base fill and use for construction material. Large quantities of fill are planned to be used for expansion of Guam's commercial port and arrangements have been made to utilize dredged material from Navy dredging. Needs around Apra Harbor to accommodate sea level rise have not planned to use material dredged from the harbor, but should, just as the Agana Boat Basin dredging provided material for the adjacent GWA WWTP Island. Cover for the Ordot and the military landfills is constantly needed and feasibility of using dredged material should be discussed in the EIS. Old quarry sites should be assessed and calculations of potential volumes of dredged material needed to restore them for uses such as recreation should be assessed. New road construction is required on Guam, and this should greatly expand with urgent requirements for roads needed by the military. The potential needs for road materials and the suitability and requirements of using dredged materials as sub-base fill should be addressed. Recent technology for producing "mudcrete" from silty and salty dredged materials has been applied successfully and economically for construction. This beneficial option should also be addressed. Although Guam has regulated shoreline developments to avoid a need for beach enrichment, future demands for this process are expected and the use of dredged material for beach replenishment or creation should be investigated as another alternative to ocean disposal. Perhaps, as part of the military expansion and training plans, new beaches may be needed for amphibious landing exercises, to avoid damage to and competition for use of natural beaches.	Various potential beneficial uses are generally acknowledged in the EIS, and USEPA encourages the development of a separate regional sediment management plan that would identify specific potential options for beneficial reuse of dredged material. Because of timing and logistics, these beneficial uses can only be evaluated in detail for each individual project when they are proposed, ideally in the context of such a regional sediment management plan.

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72	Crisostomo	Lorilee T.	P.O. Box 22439	Barrigada	Guam	96921	Guam EPA; Administrator	ES-10 Table 2-3	Crit. 3 -	Beneficial re-use discussion in EIS	Appendix A - Agency Correspondence and Public Officials	**DOD Beneficial Uses.** Besides use of dredged material to raise DOD shore facilities above sea level rise impacts and as cover for military landfills, it may be used at dozens of Installation Restoration (clean-up) sites of hazardous wastes on DOD properties as well as off-Base, and Formerly Used Defense Sites (FUDS) that are recognized on Guam. Many more contaminated sites may be found in the future as resources become available to identify them. These are being assessed and slowly restored to allow safe, but often restricted, uses of at least adjoining properties. Increased DOD developments will lead to pressure to increase and speed up the investigation and restoration of these hazardous waste sites. Suitability of transporting, storing and finally using dredged materials for capping cleanup sites should be assessed in the EIS. Development and improvement of DOD training ranges on Guam requires creation of berms as target back-stops, which could be developed from dredged material. Training sites being developed for Marines landing exercises may use dredged material to create the practice landing beaches. Old military quarry sites should be assessed and calculations of potential volumes of dredged material needed to restore them for uses such as recreation should be assessed.	Similar to #71 above. Beneficial reuse of dredged material as cover or cap material for cleanup operations will be considered in general in the EIS. USEPA encourages the development of a separate regional sediment management plan that would identify potential options for beneficial reuse of dredged material, including for cover and cap in cleanup operations. Because of timing and logistics, these beneficial uses can only be evaluated in detail for each individual project when they are proposed, ideally in the context of such a regional sediment management plan.
73	Crisostomo	Lorilee T.	P.O. Box 22439	Barrigada	Guam	96921	Guam EPA; Administrator	ES-10 Table 2-3	Crit. 5 -	Policy	Appendix A - Agency Correspondence and Public Officials	**Surveillance and Monitoring.** USACE has a single regulatory representative on Guam and USEPA has no representative resident on Guam, in spite of the increased responsibilities during the Marine Relocation, CVN Berthing development, creation of a new Army Base, etc., in the next few years. Monitoring of any proposed disposal at the site and enforcement of permit requirements may not be adequately managed without Guam-based responsible authority. How will EPA meet its responsibilities if remote monitoring and real time evaluation fails over the thousands of miles to the regulators from the regulated site?	Monitoring will not be affected because the SMMP outlines specific site use requirements and tracking requirements, which are all electronic. The equipment is monitored remotely by third party contractor.
74	Crisostomo	Lorilee T.	P.O. Box 22439	Barrigada	Guam	96921	Guam EPA; Administrator	ES-10 Table 2-3	Crit. 8 -	Marine biology and sampling	Appendix A - Agency Correspondence and Public Officials	**Special Scientific Importance.** Although not identified as a site of Special Scientific Importance, the extremely limited sampling of organisms from the proposed impacted areas and otherwise lack of information on the ecosystem of the impacted site has still produced an apparent world record size of marine fish species. Isn't it likely that further investigations of the sites may find other cases of unique scientific findings?	Field studies to support development of this FEIS focused on the deep ocean environment because this environment, offshore of Guam as well as in other parts of the world, is poorly documented. Based on the extensive sampling that was conducted, relatively few species were caught, trapped or observed on video. The bottom-dwelling species that were identified within the region are not unique to this area, rather they were consistent with observations from other deep ocean sites.
75	Crisostomo	Lorilee T.	P.O. Box 22439	Barrigada	Guam	96921	Guam EPA; Administrator	-	1.3.2	Unclear	Appendix A - Agency Correspondence and Public Officials	The EIS should provide the projected costs per unit of purchasing construction and fill materials for which dredged materials can be replaced. Expanded demand for quarry materials for military construction and off-base construction triggered by the military developments must be generally assessed. The costs and actions necessary to substitute dredged materials for quarry products should be listed. The possibility of exporting usable dredged materials to other ports, using ships that unload in Guam and return empty, should be considered.	The actions requested in this comment are beyond the scope of a designation-only action.

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76	Crisostomo	Lorilee T.	P.O. Box 22439	Barrigada	Guam	96921	Guam EPA; Administrator	Appendix B	-	CZM	Appendix A - Agency Correspondence and Public Officials	Missing from DEIS	The Coastal Zone Management is not provided until the EIS goes Final. In anticipation of the FEIS, a placeholder was created for Appendix B.
77	Crisostomo	Lorilee T.	P.O. Box 22439	Barrigada	Guam	96921	Guam EPA; Administrator	Appendix C	2.1	SMMP	Appendix A - Agency Correspondence and Public Officials	There seem to be omissions: at 2.1.1.7 "(REFERENCE)" failed to list the reference, and at 2.1.2 "MM DD YYYY" is what date?	The REFERENCE is the ODMDS EIS which at the time of this comment was a draft document. Therefore, a placeholder was created to reference the FEIS. The MM DD YYY is a placeholder for the date the ODMDS is officially designated which cannot occur until the EIS goes Final.
78	Crisostomo	Lorilee T.	P.O. Box 22439	Barrigada	Guam	96921	Guam EPA; Administrator	Appendix C	2.2	SMMP	Appendix A - Agency Correspondence and Public Officials	Special Management conditions: Condition 8) Should include provision for space for an observer representing Government of Guam to be available on any disposal vessel.	The ODMDS is jointly managed by the USEPA and USACE. The SMMP includes provisions for observers from these two agencies to have space made available on any disposal trip, if necessary. Compliance monitoring is most effectively implemented by use of secure "black box" tracking technology. Special arrangements may be made at the request of these agencies for the purpose of providing information to the local Guam agencies. There may be agreement among the regulatory and resource agencies to implement an observer program for an initial period of site usage to confirm whether there may be potential impacts from disposal operations to wide ranging species, including marine mammals and seabirds.
79	Crisostomo	Lorilee T.	P.O. Box 22439	Barrigada	Guam	96921	Guam EPA; Administrator	Appendix C	2.3	SMMP	Appendix A - Agency Correspondence and Public Officials	Studies have failed to determine if larvae from mass coral spawning, believed to drift in the ocean west of Guam, would be impacted by disposal operations during the spawning and subsequent larval periods. Therefore, a condition must be added that the disposal shall not take place during the larval periods following mass spawning of Guam corals in June, July and August, unless specific local scientific studies conclude that there are no coral larvae passing through the disposal impact area following these mass spawnings.	Although there are no corals in the vicinity of the ODMDS, peak coral spawning period can be avoided during transportation to the site. BMPs to restrict transportation to the site during peak coral spawning periods can be included as a condition of the disposal permit.
80	Everson	Alan	1601 Kapiolani Blvd., Suite 1110	Honolulu	HI	96814	NOAA National Marine Fisheries; Coral Program Manager	General	-	Spawning and BMPs	Appendix A - Agency Correspondence and Public Officials	NMFS Habitat Conservation Division recommends that the FEIS recognize the need to avoid peak coral spawning periods, roughly June - August, as well as key spawning periods for pelagic fisheries resources, such as Yellowfin Tuna, which also occurs during the summer months. Further, the Final EIS should recommend the use of BMPs to minimize project related degradation of water quality, and avoid marine mammal and sea turtle interactions.	Although there are no corals in the vicinity of the ODMDS, peak coral spawning period can be avoided during transportation to the site. BMPs to restrict transportation to the site during peak coral spawning periods can be included as a condition of the disposal permit. Project-related avoidance measures can be addressed by project-specific permits.
81										Fishing impacts	Appendix A - Agency Correspondence and Public Officials	Local fishers have raised concerns about possible impacts to Yellowfin Tuna and possibly other pelagic species around Perez Bank (just west of the Northwest Alternative ODMDS) and Spoon Bank (just north of the North Alternative ODMDS), which are not fully addressed by this DEIS. We recommend that this subject be addressed further with NMFS, the Guam Department of Agriculture's Division of Aquatic and Wildlife Resources, and fishers, including the Guam Fishermen's Cooperative Association.	Analysis conducted in the EIS does not indicate that there will be any significant or long-term impacts that would require mitigation. BMPs to further ensure that there will be no impacts have been established for dredge disposal activities and are presented in the SMMP (Appendix C of the EIS).
82										Mitigation	Appendix A - Agency Correspondence and Public Officials	If unavoidable resource losses are anticipated for the offshore disposal of dredged material, NMFS Habitat Conservation Division recommends that appropriate compensatory mitigation measures be proposed in the Final EIS. These should include a monitoring plan to evaluate the effectiveness of the mitigation measures against performance measures.	Analysis conducted in the EIS does not indicate that there will be any significant or long-term impacts that would require mitigation.

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83	Cruz	Senator Benjamin J.F.	155 Hesler Place	Hagatna	Guam	96910	Vice Speaker, 13th Guam Legislature	General	-	Radiation testing in Apra Harbor	Appendix A - Agency Correspondence and Public Officials	Thank you for holding the Public Meeting and Hearing for the Proposed Designation of an Ocean Dredged Material Disposal Site Offshore of Guam on August 20, 2009. I appreciate that the USEPA realizes the importance of information dissemination and open discussion in relation to this environmental issue. However, I am concerned over one issue in particular. It is the duty of the USEPA to conduct an extensive series of tests and studies to determine if radiation exists in Apra Harbor waters or its dredged soil. Such a study would provide an independent confirmation or repudiation of the Navy's claim that the amount of leakage from the U.S.S. Houston was insignificant. Nevertheless, in the course of the Pubic Meeting, it became apparent that the USEPA did not test for radiation in Apra Harbor as part of a comprehensive Environmental Impact Study.	The designation of an ODMDS does not approve any dredging project for ocean disposal. Each proposed dredging project is subject to a separate approval after conducting a stringent battery of physical, chemical, and biological tests to determine suitability for ocean disposal. Only clean (non-toxic) sediments are permitted for transportation to the USEPA-designated ODMDS. Sediments found unsuitable for ocean disposal will be handled in an appropriately constructed confined disposal facility (on land). Radioactive sediments, if they exist, would have to be handled on a case-by-case basis, with a separate analysis to identify a suitable location and appropriate handling process. Dredging and testing of sediments in Apra Harbor are evaluated at length within the Marine Relocation EIS, which is separate from the ODMDS effort. Information pertaining to the The Marine Relocation EIS is available at the project website: http://www.guambuildupeis.us/.
84	Seman	Richard					Verbal comment made at Aug. 20 Public Meeting in Tumon, Guam	General	-	Beneficial re-use and volumes	Appendix A - NOA Scoping Meeting Transcript	I publish the Marianas Fishing Magazine. My comment is, taking in to account that the Navy is proposing a disposal site offshore, it brings to mind two things. One, it's a huge volume of dredged material that to the point that reusable ones may be so much that it has to go somewhere else. Or, two, there are in fact unsuitable dredged material that it must go somewhere. Because in looking at the federal register, it mentions about the dredging project and all that. But the part there that bothered me was "Therefore", you know. A site must be identified, because it talks about -- the way I read it was, I don't have the paper with me, but it explains about the dredged materials and all that and that not all of it can be reused "Therefore"; that's the part that captured my attention. And so, you know, with a huge volume, in order to have excess beneficial reuse of dredged material, what really -- do we have an idea just what kind of volume we're talking about that -- because my feeling is we have good reusable material, it's hard to get rid of it. There's always places that we can put this reusable material. But, if they are not good, then it brings this into consideration about putting it somewhere else. And that what concerns me.	Mr. Seman also submitted a written set of comments reflecting very similar statements; see comments 1-3 in this comment matrix.
85	Duenas	Manny					Verbal comment made at Aug. 20 Public Meeting in Tumon, Guam		-	Fishing, sampling, oceanography, and marine biology	Appendix A - NOA Scoping Meeting Transcript	One, the impact of suspended material on marine life. Our key issues, our concerns, are pelagic, the prey fish by which they hang around or sea mounts. And also, the coral reef species. There is nothing that -- maybe it's in the book. Every time I hear something, it's "Read the book", I have a lot of books to read Second, again, the comparison between the continental shell versus coral reef areas. I think that's -- it doesn't fit in this picture. Fishing areas where large pelagic congregate, that's those two known areas, one is Paris Bank, one is the area called spoon, which is north of the alternative range. And then, again, my concern over Scripts versus NOA research vessels, which actually do some monitoring of marine life. And then, seasonal fish movement, which I mentioned	Mr. Duenas also submitted a written set of comments reflecting very similar statements; see comments 10-65 in this comment matrix.

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												earlier. Prevailing currents, which I wish you would include into your plan of action to make sure that when the currents are going a different direction, where it won't impact anything, that is when they're authorized to do their work. The range of protective species such as green sea turtles around the islands, is around 20 to 30 miles, that's known, that's a fact. So, I don't I know how this is going to be impacted there. Fishing gear types, again, I wish you would deploy some and employ some fishermen to do some further research. I think further study needs to be done in these areas and not for a snapshot. It was mentioned that the barge, when filled, is better for them because it's cost-effective, they can take it straight out to the ocean. My concern is, is the material, while on the barge, going to be tested? Because when you're in the water, testing a particular point or certain quadrant, I guess, how you guys test, you might open an old drum of PCB, or whatever, contaminants, in the water. I'm sure -- and then it was mentioned last night at the fisherman's meeting, that you're going to separate the aggregates. Larger rocks will be separated. I don't know how they're going to do it on the barge, but that bothers me, because that's going straight to the barge. Cleaning equipment for the sediment. Twenty some years ago, there was a company, I think in Montana, that actually developed a cleaning machine that took contaminated soil and kicked out clean soil. And they used this a lot in the Alaska for the oil fields. So, I don't know why we can't use the same system here on Guam. And you're talking about the military, they got a lot of money. They pay for all this EIS. My understanding, this whole EIS contract, for everything they're doing, is way over $200,000,000,00. So, I think buying that little machine is not going to hurt many.	
86	Duenas	Manny					Verbal comment made at Aug. 20 Public Meeting in Tumon, Guam		-	Disposal, sampling, fishing, BMPs	Appendix A - NOA Scoping Meeting Transcript	Further, the military is looking for more land to conduct their military exercises. They're looking at getting private land. When they built the Twin Towers in New York, when they dug up the bottom of the twin for the foundation, they put a berm around the ocean adjacent to it, and they took all that and made it backfill and they created more real state. Military needs more land. I think that's the safest way of doing it. Again, we recommend that you take the dredged material and mix it with cement and use it for artificial reef somewhere or use it for seawall, I don't know what you'd do, but dumping it in the ocean; sediment is sediment, near shore or offshore, that's our bottom line. Testing of dredged material shall be all inclusive, as it was mentioned earlier. The testing wasn't all in inclusive because there's	Mr. Duenas also submitted a written set of comments reflecting very similar statements; see comments 10-65 in this comment matrix.

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												other report. I think if you're going to really test something, you have a long list, it's like me going to see the doctor, getting a physical and he's only looking at something. So, we appreciate that. Research. Again, I'm very concerned about the research done on this. They said, it was mentioned it was done for 24 days. I don't know if that includes the travel time, but 24 days is only a snapshot. My criticism, the same NOA ships that come down here for the same amount of time, snapshot does not tell you to you the picture. My concern, again, are 500 cubic yards per trip, is an estimate, it could be called mix material. And again, we require or ask that testing be done on-board. And I don't know how you're going to discharge the material on-board. And bottom line is -- or the last two comments. The western part of our sea is our fishing grounds, that's our fishing area, there's no ifs' or buts' about it. And this type of activity may hamper our fishing. We don't know. And if it does, what do we get out of it? How do we handle this? If the dredged material is bad and it goes in the ocean, it's not the water column, and it's stuck in the water column for three miles and it ends up on our sea mounts, you guys, "Oh, gosh, darn it, we made a mistake." You know, there's a lot of issues, and again we're mentioning what was 50 years of the life of the thing. It's ludicrous. I don't think we're going to be dredging anymore by that -- hopefully, in 10 years, we won't have to deal with big ships anymore. The bottom line, the people of Guam don't want it, at least the fishermen don't, and we're the only ones affected. People living in the villages won't know or feel the impact of this. But the bottom line, as far as fishermen are concerned, we don't want this at all. And again, we're not going to sleep good at night knowing this, and we don't feel comfortable with the idea that sediment is going to be dumped in our waters. And we hope you respect the fact that we've been good stewards of our ocean, people living in the Marianas. And we don't need this kind of influence to change the way we live for a certain outcome by the US Military.	
87	Lidia	Mike					Verbal comment made at Aug. 20 Public Meeting in Tumon, Guam		-	BMPs, mitigation, contaminated dredge material	Appendix A - NOA Scoping Meeting Transcript	I with Vice-speaker Cruz, as you guys know. A couple of questions that I have would be, as you guys know, we get -- it's like that Credence Clearwater song where he talks about "Have you ever seen the rain"; and then it just kind of pops up here on Guam like you wouldn't expect? So, you might have an unexpected swell on the way out to the dump site, as I understand, it's about 11 miles from Point A to Point B. So, if something on the barge, if the barge was to encounter an accident; what mitigation have you planned in advance base on the fact that it could sink and smother the coral and the fish and other crustaceans and all the other fun filled little creatures that are there? Getting back to the radioactive material and/or just contaminated material, when you do find something as contaminated, how do you handle them in a small island in void of a secluded safe dumping facility?	Analysis conducted in the EIS does not indicate that there will be any significant or long-term impacts that would require mitigation. Vessel traffic associated with dredged material disposal operations are a very small fraction of overall vessel traffic transiting in and out of Apra Harbor and around Guam. Tugboats pulling barges would be required to operate in accordance with navigation regulations, so a less than significant impact is expected to safety at sea. Dredged material to be disposed will be tested to ensure that it is clean (non-toxic). Additionally, transport of dredged material will be limited to times during the year outside of coral spawning season. Therefore, in the very unlikely event that a barge would sink, the material would not contain significant contaminants, would not occur during coral spawning season, and the area would have ample opportunity to self-mitigate though dispersion (by way of the movement of sediment offshore or downcoast in the longshore current). Sediments found unsuitable for ocean disposal will be handled in an appropriately constructed confined disposal facility (on land). Radioactive sediments, if they exist, would have to be handled on a case-by-case basis, with a separate analysis to identify a suitable location and appropriate handling process.

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88	Flores	Tom					Verbal comment made at Aug. 20 Public Meeting in Tumon, Guam		-	Fishing and T&E species	Appendix A - NOA Scoping Meeting Transcript	I'm a biologist with Department of Agriculture. Our agency has 14 concerns with your EIS, and we will be giving it to you in writing. And we hope that, you know, because our agency deals a lot with fisheries and endangered species and all that, we felt that, I think, some of the -- or with your EIS, that some of the things that you had not addressed. And we hope that, that when we put down in writing, that you will, you will really address it because, you know, we have a lot of people that we do -- you know, we're the ones that are responsible for the natural resources here on Guam. And our main concern, basically, is the fishery aspects and everything else. So, anyways, we'll give it to you in writing. But, again, like Mr. Manny said, you're only giving me three minutes and I can't go through all 14.	Comment noted.
89	Flores	Julian					Verbal comment made at Aug. 20 Public Meeting in Tumon, Guam		-	ODMDS	Appendix A - NOA Scoping Meeting Transcript	You had said something about the dump being good for 50 years. I feel that once the dredging has been done with the military or whatever, I feel that it should be just closed right after that. It doesn't need to be open for 50 years.	Comment noted.

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Mayor of Yona	Jose Terlaje	Mayor	P.O. Box 786	Hagatna	GU	96932
NOAA National Marine Fisheries - Pacific	Kay Zukeran		Islands Regional Office 1601 Kapiolani Blvd, Suite 1110	Honolulu	HI	96814
NOAA National Marine Fisheries	Valerie Brown		Guam Field Office, 163 Dairy Road, 1601 Kapiolani Blvd Suite 1110	Mangilao	GU	96923
NOAA National Marine Fisheries	Tany Topalian		CNMI Field Office P.O. Box 10007	Saipan	MP	96950
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U.S. Fish and Wildlife Service	Chris Bandy		Guam Field Office P.O. Box 8134 MOU-3	Dededo	GU	96929
Federal Aviation Administration	Randy Reeves		Air Traffic Manager 1775 Admiral Sherman Blvd	Tiyan	GU	96913
National Resources Conservation Service	John H. Lawrence		First Hawaiian Bank, Ste 301, 400 Route 8 Pacific Basin Area Office	Mongmong	GU	96910
Office of Marine Safety - Captain of Port	William Marhoffer		455 Box 176 FPO AP U.S. Coast Guard Guam Sector GU PSC		GU	96540
Asst. Adjutant General	Franklin Leon Guerrero	Lt. Col.	Guam Air National Guard, Department of Military Affairs	APO-AP AAFB 0		
Department of Military/Guam Army National Guard	Donald Goldhom	Brig. Gen.	430 Route 16 Bldg. 300 Rm 113	Barrigada	GU	
EPA Region 9 - Honolulu	Wendy Wiltse		300 Ala Moana Blvd, Rm 5152, Box 50003	Honolulu	HI	96850
U.S. Fish and Wildlife Service	Patrick Leonard		300 Ala Moana Blvd, Rm 3122, Box 50088	Honolulu	HI	96850
U.S. Fish and Wildlife Service	Jeff Newman	Habitat Consultation Division	300 Ala Moana Blvd, Rm 3122, Box 50088	Honolulu	HI	96850
U.S. Fish and Wildlife Service	Michael Molina		300 Ala Moana Blvd, Rm 3122, Box 50088	Honolulu	HI	96850
U.S. Fish and Wildlife Service	Earl Campbell		300 Ala Moana Blvd, Rm 3122, Box 50088	Honolulu	HI	96850
U.S. Fish and Wildlife - Guam	Arthur Taimanglo		415 Chalan San Antonio Rd Baltej Pavilion, Ste 209	Tamuning	GU	
NOAA Fisheries Service	Bill Robinson		1601 Kapiolani Blvd, Ste 1110	Honolulu	HI	96814
NOAA Fisheries Service - Habitat Division	Gerry Davis		1601 Kapiolani Blvd, Suite 1110	Honolulu	HI	96814

EIS Distribution List						
Office	**Official**	**Position**	**Address**			
NOAA Fisheries Service - Habitat Division	John Naughton		1601 Kapiolani Blvd, Suite 1110	Honolulu	HI	96814
NOAA Fisheries Service - Protected Resources Division	Chris Yates		1601 Kapiolani Blvd, Suite 1110	Honolulu	HI	96814
NOAA Fisheries Service - Protected Resources Division	Arlene Pangelinan		1601 Kapiolani Blvd, Suite 1110	Honolulu	HI	96814
NOAA Fisheries Service - Habitat Division	Valerie Brown		Guam Office c/o DAWR 163 Dairy Road	Mangilao	GU	96913
USDA Wildlife Services		Vice Assistant State Director	1060 Route 16, Suite 103C	Barrigada Heights	GU	96913
USDA Wildlife Services	Craig Clark		1060 Route 16, Suite 103C	Barrigada Heights	GU	96913
U.S. Army Corps of Engineers	Charles Klinge	Lt. Col.	Honolulu District, Bldg 230	Fort Shafter	HI	96858
USACE Honolulu District - Regulatory Branch	George Young		Building 230	Fort Shafter	HI	96858
USACE - Guam Regulatory Branch	Frank Dayton		PSC 455, Box 188	FPO	AP	0
Bureau of Statistics and Plans	Alberto Lamorena		P.O. Box 2059	Hagatna	GU	96932
Department of Agriculture	Paul Bassler		163 Dairy Road	Mangilao	GU	96913
Guam EPA	Lorilee Chrisostomo		P.O. Box 22439	Barrigada	GU	96921
Nieves M. Flores Memorial Public Library			254 Martyr Street	Hagatna	GU	96910

EIS Distribution List						
Office	**Official**	**Position**	**Address**			
RFK Memorial Library, University of Guam			303 University Drive	Mangilao	GU	96923
Barrigada Public Library			177 San Roque Drive	Barrigada	GU	96913
Dededo Public Library			283 West Santa Barbara Ave.	Dededo	GU	96929
Agat Public Library			165 Follard Street	Agat	GU	96928
Merizo Public Library			376 Cruz Avenue	Merizo	GU	96915
Yona Public Library			265 Sister Mary Eucharita Drive	Yona	GU	96915
Hawaii State Public Library			478 S. King Street	Honolulu	HI	96813
I Nasion Chamorro	Maga Haga Ben Garrido & Debbie Quinata		P.O. Box 6132	Merizo	GU	96916
Governor's Civilian - Military Taskforce	Donald Goldhom	Adjutant General Brig. Gen.	430 Route 16 Bldg 300 Rm 113	Barrigada	GU	96913
Guam Chamber of Commerce	Eloize Baza		173 Aspinall Avenue Suite 101, Ada Plaza Center	Hagatna	GU	96910
Guam Contractor's Association	James A. Martinez	Executive Director	East West Business Center 718 N. Marine Drive, Suite 203	Upper Tumon	GU	96913
Guam Fisherman's Cooperative	Mike Duenas	Manager	Gred D. Perez Marina	Hagatna	GU	96910
Commission on Decolonization	Eddie Benavente	Executive Director	P.O. Box 2950	Hagatna	GU	96932
c/o Senator Won Pat's Office Women's Working Group			Payless Corporate Office Bldg 116 Chalan Santo Papa	Hagatna	GU	96910

EIS Distribution List						
Office	**Official**	**Position**	**Address**			
Private Mail Bag			Pacific Concerns Resource Centre	Suva	FIJI ISLANDS	
Earth Justice National Headquarters			426 17th Street, 6th Floor	Oakland	CA	94612
Sierra Club			85 Second Street, 2nd Floor	San Francisco	CA	94105
Regional Office - Natural Resources Defense Council			111 Sutter Street, 20th Floor	San Francisco	CA	94104
	Roberto Cabrezo		P.O. Box 229	Hagatna	GU	96932

APPENDIX B
COASTAL ZONE MANAGEMENT

BUREAU OF STATISTICS AND PLANS

(Bureau of Planning)

Government of Guam

Felix P. Camacho
Governor of Guam

Michael W. Cruz, M.D.
Lieutenant Governor

P.O. Box 2950 Hagåtña, Guam 96932
Tel: (671) 472-4201/3
Fax: (671) 477-1812

Alberto "Tony" Lamorena V
Director

JAN 11 2008

Mr. Allan Ota
US EPA, Region 9
Dredging and Sediment Management Team (WTR-8)
75 Hawthorne Street
San Francisco, California 94105-3901

Dear Mr. Ota:

The Bureau of Statistics and Plans recognizes that the existing ocean disposal site for dredged material expired in 1997, and a new disposal site must be identified and designated in conformance with the Marine Protection Research and Sanctuaries Act (MPRSA). Under the Act, the U.S. Environmental Protection Agency (USEPA) and the U.S. Corps of Engineers (USCOE) share a number of responsibilities with regard to the ocean disposal of dredged material. The principal authority and responsibility for designating ocean sites for the disposal of dredged material is vested with the Regional Administrators of EPA regions in which the sites are located. Accordingly, ocean dumping cannot occur unless a permit is issued by the USCOE under the MPRSA, using EPA's environmental criteria and subject to EPA's concurrence.

There is a need to identify a new ocean disposal site offshore of Apra Harbor, Guam, as a means to dispose of suitable (non-toxic) dredge material for which other beneficial re-uses are exhausted. We request that the following be addressed in the EIS for the site designation of an ocean dredge material disposal site off Apra Harbor, Guam:

- We understand that the material to be disposed of at this offshore site will be considered "clean" or "suitable," but it is not clear exactly what standards are used to determine if the material is suitable or not. The EIS must clearly define the test criteria that must be applied before approving the material for disposal.

- The EIS should identify the party/parties responsible for conducting the tests, and the agency responsible for making the final determination that the material is clean before it is moved to the ocean disposal site. We do not support a testing program implemented solely by the dredging contractor, and prefer that a government agency carry out or at least oversee the testing and make the final determination that the material is clean. Furthermore, we are also concerned that the Guam Environmental Protection Agency (GEPA), which is the agency likely to be tasked with such a responsibility, may not have the capacity to carry out this responsibility effectively. The demands on local natural resource agencies will increase significantly as the military build-up is undertaken, and the capacity of these agencies to effectively carry out existing and new responsibilities will be in question.

- The EIS should address the need for monitoring of disposal operations in order to ensure that the material is disposed of properly.

- We prefer beneficial re-use of dredge material over ocean disposal and suggest that the EIS include an exhaustive search of existing and future public and private sector projects that may benefit from the dredge material. The comments provided by the Guam EPA include several options for beneficial re-use. Please note that a Memorandum of Understanding (MOU) was signed on April 12, 2001 between the Department of the Navy and the Government of Guam for the beneficial use of dredge material from the Navy construction dredging project in Inner Apra Harbor for proposed PAG construction projects.

- The EIS should provide an examination of different disposal methods, such as the thin layer disposal method.

- The EIS should include a comprehensive analysis of the impacts of dredge material disposal on the benthic ecosystem at each alternative site. Deep-water sampling and photography should be used in this analysis. Plume modeling should also be utilized in the analysis in order to properly assess the extent of down-current impacts.

- The EIS should also address impacts to pelagic fisheries and marine mammals.

We are looking forward to receiving for our review a copy of the required Environmental Impact Statement (EIS) and the rulemaking paperwork associated with this ocean disposal site designation process, as well as justifications and alternatives to ocean disposal of the dredged material. Proper disposal of dredged materials and how they are secured must be included in the EIS, ensuring that toxic materials harm aquatic and wildlife.

Sincerely,

ALBERTO A. LAMORENA V
Director

cc: GEPA
DoAg
DPR
DLM
Office of the Governor
Jparks/B.Millhouser
R9guam_ODMDS_Scoping@epa.gov

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

July 24, 2009

Mr. Alberto A. Lamorena V
Director
Guam Bureau of Statistics and Plans
P.O. Box 2950
Hagåtña, Guam 96923

SUBJECT: FEDERAL CONSISTENCY DETERMINATION FOR THE DESIGNATION OF AN OCEAN DREDGED MATERIAL DISPOSAL SITE OFFSHORE OF GUAM

Dear Mr. Lamorena:

In accordance with the Federal Coastal Zone Management Act, we request your review and concurrence on the United States Environmental Protection Agency (USEPA), Region IX, Guam Coastal Management Program consistency assessment that is attached to this letter and provided as Appendix B of the June 2009 draft Environmental Impact Statement (EIS, which has been sent separately; electronic file on CD is enclosed .

As detailed in the draft EIS, the proposed federal action is to designate an ocean dredged material disposal site (ODMDS) at one of two alternative sites, which are located approximately 8.9 and 13.7 nautical miles (nm) northwest and north, respectively, of the Apra Harbor entrance channel (refer to Figure ES-2 of the draft EIS). Although both ODMDS sites would be outside of the Guam coastal zone boundary (3 nm from shore), USEPA is submitting this consistency determination because vessels would be transporting the dredged material through the coastal zone to whichever site is selected.

Formal designation of an ODMDS does not constitute approval of dredged material for ocean disposal. The designation does provide an additional dredged material management option for each dredging project. Ocean disposal is allowed only when USEPA and the US Army Corps of Engineers (USACE) determine on a case by case basis that the dredged material: 1) is environmentally suitable according to testing criteria (40 CFR Parts 225 and 227) as determined from physical, chemical and biological testing; 2) does not have a viable beneficial reuse; and 3) there are no practical land placement options available. USACE may issue disposal permits for use of the ODMDS if USEPA concurs with the decision. The designation is anticipated in 2010 and would be effective for 50 years, but could be interrupted at USEPA discretion. The maximum capacity per year would be 1,000,000 cubic yards. The ODMDS would be managed in accordance with a Site Management and Monitoring Plan, the draft of which is included as Appendix C of the draft EIS.

As part of the National Environmental Policy Act (NEPA) process, the USEPA, assessed reasonably foreseeable direct and indirect effects on Guam's resources within the defined coastal zone relative to relevant management program enforceable policies. The enclosed Guam Coastal Management Program Assessment form references relevant sections of the EIS to support this consistency determination. The USEPA has determined that there are no direct or indirect (cumulative or secondary) adverse impacts on coastal uses or resources, and the proposed action and its alternatives are consistent to the maximum extent practicable with the enforceable policies of Guam's Coastal Zone Management (CZM) Program.

We appreciate your continued support. If you have any questions on this matter, please contact me at your convenience.

Sincerely,

Allan Y Ota

Allan Ota
Oceanographer
Water Division (WTR-8)

Enclosures (2):
CD – electronic file of Draft Environmental Impact Statement, Designation of an Ocean Dredged Material Disposal Site Offshore of Guam; printed copy mailed separately

Guam Coastal Management Program Assessment Form

GUAM COASTAL MANAGEMENT PROGRAM ASSESSMENT

DEVELOPMENT POLICIES (DP):

DP1. Shore Area Development

Intent: To insure 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 two proposed alternative ODMDS's are outside of the coastal zone of Guam, located approximately 11 to 14 nautical miles (nm) northwest and north, respectively, of Guam, in water depths ranging from 6,560 to 9,055 feet. Dredged material disposal operations at these locations offshore of Guam are not expected to result in adverse impacts to the coastal zone of Guam, including any shore areas. The proposed ocean dredged material disposal site (ODMDS) would not be located within the Seashore Reserve or other shore area. There would be no surface markers delineating the site. It would not be visible from the shoreline. Compliance monitoring would be implemented in accordance with a site management and monitoring plan described in the Draft Environmental Impact Statement (EIS), Appendix C, to ensure compliance of dredged material disposal operations with site use requirements, including proper disposal at the ODMDS and no leaking of dredged material through the coastal zone in transit to the ODMDS. As such, the site designation alternatives and associated ocean dredged material disposal operations are not expected to have significant adverse environmental impacts on shore area land uses.

DP2. 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 urban districts as outlined on the Land Use Districting Map.

Discussion:
The proposed ODMDS alternatives are located in submerged lands approximately 11 to 14 nm offshore and Urban Development policies are not applicable. As such, the site designation alternatives do not involve construction of any structure or changes to existing land uses.

DP3. 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 sewering is provided.

Discussion:
The proposed ODMDS alternatives are located in submerged lands approximately 11 to 14 nm offshore and Rural Development policies are not applicable. As such, the site designation alternatives and associated ocean dredged material disposal operations are not expected to affect existing land and water uses or change development patterns in rural areas.

DP4. 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, the Territory 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 ODMDS alternatives are located in submerged lands approximately 11 to 14 nm offshore and would not qualify as a major facility siting. As such, the site designation alternatives support the national interest for the maintenance and future development of infrastructure associated with the Navy and PAG port facilities.

DP5. 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 flood plains, 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 alternative ODMDS sites are not located on fault lines, based on best available information. Even if they were located on a fault line, the deposition of approximately 3.9 inches or less per year (EIS Chapter 2.5.2) would not trigger movement of the fault line. The use of the ODMDS would not increase the anticipated risk to the health, safety or welfare of the people of Guam. The Mariana Islands are subject to typhoons that bring heavy rains and storm surge. Dredging and transport to the ODMDS would not occur under these conditions; therefore, no increased risk to human health would result from the ODMDS site. Flood plains, air installations crash and sound zones, and land use regulations are not relevant to the ODMDS designation.

DP6. 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 ODMDS alternatives are located in submerged lands approximately 11 to 14 nm offshore and housing policies are not applicable. As such, the site designation

alternatives and associated ocean dredged material disposal operations are not expected to have significant adverse impacts on residential development.

DP7. Transportation

Intent: To provide transportation systems while protecting potentially impacted resources.

Policy: The Territory shall develop an efficient and safe transportation system, while limiting adverse environmental impacts on primary aquifers, beaches, estuaries and other coastal resources.

Discussion:
Transport of dredged material to the ODMDS would be within existing shipping lanes. A notice to mariners would be issued to alert other traffic to the dredged material transport operations. The US Coast Guard maintains jurisdiction over the shipping lanes and the barge traffic would adhere to the same laws and regulations of other ships. There would be increased use of the shipping lane that would vary with the specific dredging projects and associated dredged material production rates. The traffic impacts of each project would be addressed in their respective National Environmental Policy Act (NEPA) documents. Compliance monitoring would be implemented in accordance with a site management and monitoring plan (EIS Appendix C) to ensure compliance of dredged material disposal operations with site use and permit requirements, including real time remote monitoring of transport to and disposal at the ODMDS. As such, the site designation alternatives and associated ocean dredged material disposal operations are not expected to cause significant adverse environmental impacts on primary aquifers, beaches, estuaries and other coastal resources.

DP8. 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% or greater slope by requiring strict compliance with erosion, sedimentation, and land use districting guidelines, as well as other related land use standards for such areas.

Discussion:
The ODMDS sites were specifically selected to avoid seamounts and slopes. As described in EIS Chapter 4.1.4, neither ODMDS is not expected to have any measurable effect on regional or site specific bathymetry. The dredged materials would be deposited on relatively flat areas. As such, the site designation alternatives and associated ocean dredged material disposal operations are not expected to cause significant adverse environmental impacts related to erosion and siltation.

RESOURCES POLICIES (RP):

RP1. 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:
The additional vessel traffic associated with dredged material disposal operations are expected to generate transient and localized air impacts, but these are considered insignificant relative to the overall marine transportation-related emissions in and around the island. The air impact associated with the increase in traffic is described in the EIS chapter 4.1.1.2. Assumptions include an estimated 333 round trips per year and one trip per day. The conservative approach results in the NOx and SOx levels exceeding the Guam standards at the emissions point and meeting the standards through dilution and mixing within approximately1,300 feet of the emission. There are no sensitive receptors (residences, schools, medical facilities within 1,300 ft of the transport route. As such, the site designation alternatives and associated ocean dredged material disposal operations are not expected to have significant adverse environmental impacts on Guam's air quality.

RP2. 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:
EIS Chapter 4.1.3 describes the potential water quality impacts of dredged material disposal at the site. While there would be short-term localized impacts resulting in turbidity and decreased light transmittance, no significant impact was identified at either of the ODMDS sites. There would be no impacts on drinking water, estuaries, or reefs, which are located no closer than 11 nautical miles away. Pre-disposal testing ensures that only clean (nontoxic) sediments are transported and disposed at ODMDS's. Compliance monitoring will be implemented in accordance with a site management and monitoring plan to ensure compliance of dredged material disposal operations with site use

requirements, including proper disposal at the ODMDS and no leaking of dredged material through the coastal zone in transit to the ODMDS. As such, the site designation alternatives and associated ocean dredged material disposal operations are not expected to pose significant pollution threats to Guam's waters, including estuaries, reef and aquifer areas.

RP3. <u>Fragile Areas</u>

Intent: To protect significant cultural areas, and natural marine and terrestrial wildlife and plant habitats.

Policy: Development in the following types of fragile areas shall be regulated to protect their unique character:
- historical and archaeological sites
- wildlife habitats
- pristine marine and terrestrial communities
- limestone forests
- mangrove stands and other wetlands

Discussion:
The proposed alternative ODMDS sites could be considered pristine marine communities. The other fragile areas listed are not relevant to the ODMDS designation of use. The biological impacts of ODMDS use is described in the EIS Chapter 4.2. There would be short-term and localized impact to planktonic communities during the first few hours after disposal prior to natural dilution of the discharge. The planktonic communities would recover quickly because of natural high turn-over rates resulting in rapidly reinstated local populations.

Benthic infaunal and epifaunal species are expected to experience high levels of mortality within 0.5nm radius of the ODMDS center within the boundary (approximately 3 nm diameter) of the ODMDS. The benthic community is not unique and is homogeneous within the vicinity. Recovery is rapid and the temporary loss due to burial is considered less than significant.

The pelagic fishery is consists of highly mobile species that would likely avoid plumes from dredged material disposal. The Guam bottom fishery occurs at depths much shallower than the two alternative ODMDS sites. Any impacts to fish communities outside the disposal area would be short-term and insignificant.

Noise may be the most dominant and continuous source of anthropogenic impact in the ocean. Ship traffic would be the primary source of noise in the vicinity of the ODMDS sites and the shipping lanes. The noise may result in alteration of migratory routes. Generally, marine mammals avoid the noise. The addition of one to two more ship trips within the shipping lane is not expected to significantly increase the noise impact. The turbidity at the ODMDS would reduce the accessibility of marine mammal prey, but these populations are patchy in the vicinity. The impacts would be short-term and localized.

Threatened and endangered species include mammals and seabirds. The potential impacts to marine mammals is described above. Seabirds often follow ships. The disposal may reduce water clarity and reduce the ability of seabirds to find prey at the disposal site. Seabirds may also be attracted to the buoyant fragments in the surface plume that may have the appearance of prey. Due to the temporary and localized nature of dredged material disposal operations, the impacts on threatened and endangered species would be less than significant.

As such, the site designation alternatives and associated ocean dredged material disposal operations are not expected to create unreasonable risks to natural marine and terrestrial wildlife and plant habitats.

RP4. Living Marine Resources

Intent: To protect marine resources in Guam's waters.

Policy: All living resources within the territorial waters of Guam, particularly corals and fish, shall be protected from over harvesting and, in the case of marine mammals, from any taking whatsoever.

Discussion:
See response to RP3.

RP5. 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 alternative ODMDS sites are outside of the coastal zone of Guam, located approximately 11 to 14 nm north or northwest of Guam There would be no surface markers delineating the site. It would not be visible from the shoreline. As such, the site designation alternatives and associated ocean dredged material disposal operations are not expected to have significant adverse impacts on the scenic beauty of Guam, including significant views from scenic overlooks, highways and trails.

RP6. <u>Recreational Areas</u>

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 and marine conservation areas, scenic overlooks, parks and historical sites.

Discussion:
Because of the restriction on long-line fishing, there is no commercial bottom fishing in the waters near the alternative ODMDS sites. The nearest fish aggregating device is 5 nm of the north ODMDS alternative. Most commercial fishing and recreational fishing occurs within 6 nm of shore. The shipping lanes traverse suitable fishing areas and the tugs boats and scows with dredged material may encounter a fishing vessel but a notice to mariners would be issued and the tug travels slowly. Minimal impact from transiting barges is anticipated on fishing vessels. Other recreational activities would be much closer to the shoreline and coral reef. As such, the site designation alternatives and associated ocean dredged material disposal operations are not expected to have significant adverse impacts on environmentally compatible recreational development of land or shore areas.

RP7. 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 Territorial recreation areas, parks, scenic overlooks, designated conservation areas and their public lands; and 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:
There would be no impact on public access to the ODMDS except during dredged material disposal operations. The alternative ODMDS sites are 11 to 14 nm from all territorial recreational areas, parks, and public lands. As such, the site designation alternatives and associated ocean dredged material disposal operations are not expected to have significant adverse impacts on public access of land or shore areas.

RP8. 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 ODMDS alternatives are located in submerged lands approximately 11 to 14 nm offshore and agricultural policies are not applicable. There are no mariculture operations to be impacted by the ODMDS designation and use. As such, the site designation alternatives and associated ocean dredged material disposal operations are not expected to have significant adverse impacts related to urban development of agricultural land or shore areas.

BUREAU OF STATISTICS AND PLANS

(Bureau of Planning)
Government of Guam

Felix P. Camacho
Governor of Guam

Michael W. Cruz, M.D.
Lieutenant Governor

P.O. Box 2950 Hagåtña, Guam 96932
Tel: (671) 472-4201/3
Fax: (671) 477-1812

Alberto "Tony" Lamorena V
Director

OCT 07 2009

Mr. Allan Ota
Oceanographer, US EPA, Region IX
Dredging and Sediment Management Team (WTR-8)
75 Hawthorne Street
San Francisco, California 94105-3901

Dear Mr. Ota:

The Bureau of Statistics and Plans has completed the review of the Federal Consistency Determination for the Designation of an Ocean Dredged Material Disposal Site (ODMDS) Offshore of Guam and the corresponding Draft Environmental Impact Statement dated, July 2009.

Suggested alternatives for the ODMDS include the Marianas Trench, Off-Island upland placement, reactivation of the interim ODMDS, the North and the Northwest ODMDS. The selected Preferred Alternative is the Northwest ODMDS. As indicated in the DEIS, the North and the Northwest ODMDS meet the USEPA five general site selection criteria (40 CFR 228.5) and Specific Site Selection Criteria (40 CFR 228.6). However, the Northwest ODMDS alternative was chosen based on flatter bathymetry and proximity to Apra Harbor.

On our letter dated, January 11, 2009, we have indicated that the Bureau supports the identification and designation of a new disposal site in conformance with the Marine Protection Research and Sanctuaries Act (MPRSA), in which responsibilities are shared by the US Environmental Protection (USEPA) and the U.S. Corps of Engineers (USCOE). The DEIS has indicated that a USCOE permit is to be issued, using EPA's environmental criteria defined in the USEPA's Ocean Dumping Regulations at 40 CFR Part 227, and subject to EPA's concurrence under the MPRSA. The permitting regulations promulgated by the USACE, under the MPRSA, appear at 33 CFR Parts 320 to 330 and 335 to 338. The Guam ODMDS Site Management and Monitoring Plan has indicated that the Guam ODMDS would be restricted to the disposal of suitable dredged material only. It is permanently designated to receive an annual maximum quantity of dredged material of 1,000,000 cy (764,555 m3). The USEPA will encourage advanced planning and coordination by users of the Guam ODMDS to ensure the annual maximum quantity of dredged material is not exceeded, with consideration of potential variances in proposed volume determination for each project and unforeseen circumstances such as emergency dredging needs to maintain safe and navigable waterways. Decisions about the suitability of dredged material for ocean disposal are guided by criteria in the MPRSA and EPA's Ocean Dumping Regulations; guidance on specific aspects of these regulations is provided in Ecological Evaluation of Proposed Discharge of Dredged material into Ocean Waters; USEPA/USACE 1991).

The Federal consistency determination document states, "Ocean disposal is allowed only when USEPA and the US Army Corps of Engineers (USACE) determine on a case by case basis that the dredged material: 1) is environmentally suitable according to testing criteria (40 CFR Parts 225 and 227) as determined from physical, chemical and biological testing; 2) does not have a viable beneficial reuse; and 3) there are no practical land placement options available." The ODMDS would be managed in accordance with a Site Management and Monitoring Plan, included as Appendix C of the DEIS. Mr. Celestino Aguon, Chief, Guam Division of Aquatic and Wildlife Resources, as well as, Mr. Michael Gawel, Chief Planner from the Guam Environment Protection Agency (GEPA) have confirmed, by telephone, that they have no objection to the Preferred Northwest ODMDS. We agree that ocean disposal will only be allowed after USEPA and USACE determine the suitability of dredged materials tested; have no viable beneficial reuse; and there are no practical land placement options available.

Based on our review of the Federal Consistency Determination and the corresponding Draft EIS, we agree that the site designation alternatives and associated ocean dredged material disposal operations are not expected to have significant adverse environmental impacts on coastal uses or resources. With the implementation of the Compliance Monitoring in accordance with a site management and monitoring Plan, Appendix C of the DEIS, the Bureau concurs with the USEPA determination that there are no direct or indirect (cumulative or secondary) adverse impacts on coastal uses or resources, and that the proposed action and its alternatives are consistent to the maximum extent practicable with the enforceable policies of the Guam Coastal Management Program (GCMP), in accordance with the Coastal Zone Management Act of 1972, (P.L. 92-583) as amended (P.L. 94-370, P.L. 104-150, the Coastal Zone Protection Act of 1996).

Sincerely,

ALBERTO A. LAMORENA V
Director

cc: GEPA
DoAg/DAWR
DPR
DLM
Navy
Office of the Governor
KChaston/BMillhouser

APPENDIX C
SITE MANAGEMENT AND MONITORING PLAN

Architect-Engineering Services for Environmental Engineering Services at Various Navy and Marine Corps Activities, Pacific Basin and Indian Ocean Areas
Contract No. N62742-06-D-1870
Amendment 10 and 23

Guam ODMDS
Site Management and Monitoring Plan

FINAL

Prepared For:

Department of the Navy
Naval Facilities Engineering Command Pacific
258 Makalapa Drive, Suite 100
Pearl Harbor, Hawaii 96860-3134

March 2010

Guam ODMDS
Site Management and Monitoring Plan

FINAL

Prepared For:

Department of the Navy
Naval Facilities Engineering Command Pacific
258 Makalapa Drive, Suite 100
Pearl Harbor, Hawaii 96860-3134

Prepared By:

Weston Solutions, Inc.
2433 Impala Drive
Carlsbad, California 92010

March 2010

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ACRONYMS AND ABBREVIATIONS

CDF	confined disposal facility
CFR	Code of Federal Regulations
cm	centimeter
cy	cubic yard
DAMOS	Disposal Area Monitoring System
DEIS	Draft Environmental Impact Statement
EIS	Environmental Impact Statement
ft	feet
GPS	Global Positioning System
in	inches
km	kilometer
m	meter
m^3	cubic meter
MISTICS	Marianas Islands Sea Turtle and Cetecean Survey
MPRSA	Marine Protection, Research, and Sanctuaries Act of 1972
nm	nautical mile
ODMDS	ocean dredged disposal sites
PAH	polycyclic aromatic compounds
PCB	polychlorinated phenyls
PSDDA	Puget Sound Dredged Disposal Analysis
SF-DODS	San Francisco Deep Ocean Disposal Site
SMMP	site management and monitoring plan
SP	solid phase
SPI	Sediment Profile Imaging
STFATE	Short-term fate
TKN	total Kjeldahl nitrogen
TON	total organic nitrogen
TOC	total organic carbon
TRPH	total recoverable petroleum hydrocarbons
USACE	United States Army Corp of Engineers
USEPA	United States Environmental Protection Agency
WRDA 92	Water Resources Development Act of 1992

1.0 INTRODUCTION

The disposal of dredged material in ocean waters, including the territorial sea is regulated under the Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA), 33 U.S.C. § 1401, ff. The transportation of dredged material for disposal into ocean waters is permitted by the US Army Corps of Engineers (USACE) (or, in the case of federal projects, authorized for disposal under MPRSA §103(e)) only after environmental criteria established by US Environmental Protection Agency (USEPA) are applied. The Water Resources Development Act of 1992 (WRDA 92; Public Law 102-580) made a number of changes to the MPRSA. As amended by Section 506 of WRDA 92, Section 102 (c) of the MPRSA provides that, in the case of ocean dredged material disposal sites (ODMDS), no site shall receive a final designation unless a management plan has been developed. Both USEPA and the USACE issued a joint guidance document in February, 1996 for the development of ODMDS management plans (USEPA/USACE, 1996).

MPRSA Section 102(c)(3), as amended by WRDA 92, sets forth a number of requirements regarding the content and development of site management plans, including:

(A) a baseline assessment of conditions at the site;

(B) a program for monitoring the site;

(C) special management conditions or practices to be implemented at each site that are necessary for protection of the environment;

(D) consideration of the quantity of the material to be disposed of at the site, and the presence, nature, and bioavailability of the contaminants in the material;

(E) consideration of the anticipated use of the site over the long term, including the anticipated closure date for the site, if applicable, and any need for management of the site after the closure of the site; and

(F) a schedule for review and revision of the plan (which shall not be reviewed and revised less frequently than 10 years after adoption of the plan, and every 10 years thereafter).

Multiple ODMDSs receiving similar material may be combined into a single management plan provided that all MPRSA Section 102 (c)(3) requirements are met for each individual site (USEPA/USACE, 1996). Currently, only one ODMDS is being designated offshore of Guam, therefore this provision does not apply.

The requirements of this site management and monitoring plan (SMMP), and the compliance and enforcement provisions of the MPRSA regulations themselves, apply to all projects using the Guam ODMDS, including projects which have received an "ocean dumping permit" issued by the USACE under Section 103 of the MPRSA, and Federal projects conducted by/or for the USACE. Throughout this SMMP, the term "permittee" is used to generically to apply to all these projects, even though the USACE does not issue a "permit" per se for its own dredging projects.

1.1 Objectives

The three main objectives for management of the Guam ODMDS are not different than any other open-water disposal site:

- Protection of the marine environment
- Beneficial use of dredged material whenever practical
- Documentation of disposal activities at the ODMDS

USEPA Region IX and USACE Honolulu District personnel will achieve these objectives by jointly administering the following activities:

- Regulation and administration of ocean disposal permits
- Development and maintenance of a site monitoring program
- Project-specific compliance tracking of disposal operations
- Evaluation of permit compliance and monitoring results
- Maintenance of an active database for dredged material testing and site monitoring results to ensure compliance with annual disposal volume targets and to facilitate future revisions to the SMMP
- Active planning and coordination with the users of the Guam ODMDS to properly manage proposed dredged material disposal in accordance with the site use conditions and mitigate potential disposal of dredged material outside of the site use conditions.

2.0 SITE MANAGEMENT PLAN

This management plan has been developed jointly by the USEPA Region IX and the USACE Honolulu District. An interim ODMDS, located approximately three miles offshore of Apra Harbor, was designated, but that site expired (along with all other "interim" disposal sites in the U.S. and Pacific Territories) on January 1, 1997. This interim ODMDS did not have a SMMP. By law, starting in 1997, ocean disposal may only occur at sites that have gone through a formal designation process to ensure that significant adverse impacts to the marine environment, and human uses of the ocean, would not occur. In addition, as stated previously, a site management and monitoring plan must be developed for newly designated ODMDSs. The following sections present the Site Management and Monitoring Plans for the Guam ODMDS.

2.1 Baseline Assessment of Conditions

A comprehensive description of physical, chemical, and biological characteristics of the sediments and water column can be found in the *Environmental Impact Statement for the Designation of an Ocean Dredged Material Disposal Site, West of the Territory of Guam* (USEPA 2009) to which this document has been appended; a brief summary of the site conditions at the Guam ODMDS is presented in the following section.

2.1.1 Disposal Site Characterization

The Guam ODMDS is located approximately 11.1 nm (20.6 km) offshore of Guam, northwest of the entrance to Apra Harbor. It is located in 8,790 ft (2,680 m) of water. The regional bathymetry of the target disposal area, located southeast of a conical seamount, is characterized by a gentle slope descending towards the southeast. The target disposal area (located on the ocean surface) is centered at 13° 35.500'N and 144° 28.733'E with a 1,640 ft (500 m) radius. The disposal site boundary (located on the seafloor) is also centered at 13° 35.500'N and 144° 28.733'E with a 2.98 mi (4.80 km) radius.

2.1.1.1 Physical Oceanography

Sea surface temperature (measured at 50 ft [15 m]) in the Guam ODMDS study region averaged 83.7°F (28.7°C), which is consistent with historical data. Temperatures within the upper water column were fairly uniform, averaging 82.8°F (28.2°C) from the surface down to the top of the thermocline. The top of the thermocline was located between approximately 410 and 490 ft (125 and 150 m), with an average temperature of 81.0°F (27.2°C). The thermocline was approximately 790 ft (240 m) thick, extending to depths of approximately 1,250 ft (380 m). Below the thermocline, temperatures gradually decreased from an average of 50.9°F (10.5°C) to an average of 35.2°F (1.8°C) near the ocean floor.

Salinity in the surface waters (measured at 50 ft [15 m]) averaged 34.5 parts per thousand (ppth). At the base of the surface water and just above the thermocline, salinity increased rapidly to a maximum average value of 35.1 ppth at approximately 560 ft (170 m) depth. Salinity then decreased to a minimum average value of 34.3 ppth near the base of the thermocline. Below the thermocline, the salinity remained relatively constant, with an average concentration of 34.6 ppth near the seafloor.

Transmissivity was slightly lower in surface waters of the Guam ODMDS than in the middle and lower water column. At the surface, the average transmissivity value was 85.2%, while in the mid-water column transmissivity values were higher at 85.7%.

Turbidity was relatively constant through the water column; however, slight changes in the turbidity measurements did have a discernable trend. Turbidity in the surface waters averaged 43.9 NTU. Minimum turbidity values were measured just below the thermocline, averaging approximately 42.2 NTU. Turbidity increased slightly through the remainder of the water column, with an average value of 44.9 NTU near the seafloor.

Dissolved oxygen concentrations in the surface waters averaged 5.98 mg/L. Dissolved oxygen concentrations slowly increased through the surface layer to an average 6.16 mg/L at 260 ft (80 m) depth. Concentrations then decreased to 2.21 mg/L at approximately 1,800 ft (550 m) depth. From 1,800 ft (550 m) to the bottom of the water column, dissolved oxygen concentrations slowly increased to 3.76 mg/L.

2.1.1.2 Water Quality

Conventional and chemical analyses were performed on seawater samples from four discrete depths to determine current baseline conditions at the Guam ODMDS. Analyses included nitrogen (ammonia, nitrate, and nitrite), dissolved orthophosphate, TOC, dissolved trace metals and organic pollutants (PAHs, chlorinated pesticides/PCBs).

Overall, nutrients tended to increase in concentration with increasing water depth, whereas TOC tended to decrease in concentration with increasing water depth. Ammonia ranged from non-detectable levels at the surface to 0.04 mg/L in the mid-water column sample; ammonia was not detected in the near bottom sample. Dissolved orthophosphate concentrations ranged from non-detectable levels at the surface to 0.06 mg/L in the near bottom sample. Nitrate concentrations ranged from non-detectable levels in the surface sample to 0.51 mg/L in the near bottom sample. TOC concentrations ranged from 0.4 mg/L in the surface sample to an estimated value of 0.1 mg/L in the near bottom sample.

In the dissolved form, all trace metals were detected with the exception of aluminum, beryllium, iron, mercury and tin. Throughout the water column, dissolved metals concentrations were consistent with other deep ocean reference samples and were one to three orders of magnitude below their respective Criterion Continuous Concentration (CCC) and Criterion Maximum Concentration (CMC) values. Very few PAH or chlorinated pesticides, including PCBs (both Aroclors and individual congeners), were detected in any of the water samples.

2.1.1.3 Sediment Quality

Physical, conventional, chemical and radiological sediment characteristics were examined to determine current baseline conditions at the Guam ODMDS. Measurements included grain size, TOC, nitrogen (ammonia, Total Kjeldahl Nitrogen (TKN), Total Organic Nitrogen (TON), sulfides, solids, trace metals, Acid volatile sulfides Simultaneously Extracted Metals (AVS-SEM), persistent organic pollutants (PAHs, chlorinated pesticides/PCBs, organotins, dioxins/furans) and gross alpha/beta.

Sediment samples were primarily sand and silt with some clay and no gravel fraction detected. The dominant sand fraction had an average of 52.1%, with the lesser silt fraction average of 39.5%, and the minor clay fraction average of 8.47%. Conventional parameters were detected in low concentrations. Percent solid content averaged 52.5% while TOC averaged 0.28%, and TON averaged 89.0 mg/dry kg. Ammonia-N averaged 0.24 mg/dry kg, approximately 2 orders of magnitude lower than biologically toxic concentrations (30 ppm) and were supported by toxicity test results conducted on project sediments. TKN averaged 170 mg/wet kg while total sulfides averaged 0.53 mg/dry kg.

All 23 metals measured were detected at concentrations characteristic of available oceanic crustal abundance values measured in the central Pacific Ocean. Cadmium, zinc, mercury, arsenic, chromium, lead and silver concentrations were below ER-L levels. Copper and nickel concentrations exceeded ER-L values but were below ER-M concentrations. AVS and SEM were also detected in low concentrations. AVS averaged 0.039 µmol/dry g while the combined SEM averaged 0.154 µmol/dry g, and the calculated ∑SEM:AVS ratio averaged 3.93. While this implies the potential for toxicity due to metal bioavailability, studies suggests that ∑SEM:AVS ratio greater than 40 is required for certainty of metal toxicity predictions.

PAHs, chlorinated pesticides/PCBs, and organotins analyzed were not detected. Dioxins and furans as well as alpha and beta particle activity were detected in low concentrations. The sum of all detectable dioxins averaged 18.3 pg/g while the sum of all detectable furans averaged 2.20 pg/g. Gross alpha averaged 11.5 pCi/g while gross beta averaged 3.31 pCi/g.

2.1.1.4 Planktonic Community

As suggested in the guidance document for designation surveys for ODMDS (Pequegnat *et al.*, 1990), plankton surveys were not conducted during the Site Characterization Study in April 2008 (Weston Solutions, Inc. and TEC 2008). However, information obtained through literature reviews and a generic oceanographic understanding provided sufficient background for the description of planktonic communities. Typically, plankton are concentrated in the neritic zone (shallower, coastal waters) where nutrients and light are abundant. Planktonic communities in the pelagic region (open ocean) tend to have patchy distributions and are dependent on resource availability (Nybakken 2001). In tropical waters, there is a significant amount of sunlight available throughout the year due to little change in the position of the sun in the equatorial region. This tends to result in large density and thermal gradients in the water column, thereby limiting mixing between the surface waters and deep nutrient rich waters. Therefore, in tropical seas, primary production is relatively constant because the light conditions are optimal for phytoplankton to photosynthesize but production rates tend to be lower in tropical seas due to the limited upwelling of nutrients (Nybakken 2001).

Zooplankton typically found in shallow, coastal tropical waters include Cladocera, Ostracods, Copedpods, Mysids, Cumaceans, Cirripede nauplii, Cyprids and Amphipods. Pelagic species consist primarily of Copepods and Ostracods, but similar to phytoplankton communities, distributions of zooplankton tend to be patchy and sparse in oceanoic waters. Zooplankton tend to have diurnal migrations throughout the photic zone (Wickstead 1965).

2.1.1.5 Benthic Community

Invertebrate communities consist of organisms living in, on, or above the bottom of the ocean. These organisms are often characterized by body size and where they live in relation to the seafloor. For the study region, the focus is on those invertebrates that live in the sediments (infauna and meiofauna), as these organisms are less able to move from an area if disturbed.

Benthic macroinfauna are small invertebrates that live within sediments and can be retained on a 0.5mm sieve. These organisms are important marine ecological community members because they burrow within and oxygenate sediments, may filter large volumes of water, contribute organic materials to the overall marine system, and serve as food for bottom-feeding fish and other invertebrates. In summary, a total of 30 different species were collected in the Guam ODMDS. Polychaetes dominated the benthic populations while crustaceans and molluscs were in low abundance. Echinoderms were absent at all of the stations.

Benthic meiofauna are described as small organisms that live within the sediment and can be retained on a 63µm sieve, but pass through a 0.5-mm sieve. Nematodes and harpactacoid copepods make up the majority of meiofauna; therefore, the presence of only these two taxa were accounted for in the samples collected. Meiofaunal organisms were absent throughout the Guam ODMDS. In addition to the absence of nematodes and harpactacoid copepods in the majority of the samples, it must be noted that when the samples were analyzed there were no other meiofaunal organisms present. Similar to the macroinfauna samples, there were large quantities of foraminifera (both living specimens and empty shells) present in all of the samples.

2.1.1.6 Fish Community

The demersal fish community in the deep offshore environment are those that reside directly in the action area, as these species live on or near the bottom of the Guam ODMDS. Species assemblages were assessed using three gear types: beam trawl, traps, and photography. Fish captured by images in photographs and video were generally unable to be identified to an advanced taxonomic level due to the quality of the camera equipment. These typically fell into two morphological types that were referred to as Ophidiiform (e.g., cuskeels that are relatively short and "tadpole" shaped, often with a bulbous head) and Anguilliform (e.g., true eels that are long and slender).

Specimens collected include fish species from the genus *Bassogigas, Bathypterois, Cyclothone, Eptatretus, and Tauredophidiumi.* Commonly called a cuskeel (although not a true eel), *Bassogigas gillii*, has been collected from all major oceans but is considered uncommon. The abyssal spiderfish, *Bathypterois longipes*, is named for the elongated extensions of the pelvic and caudal fin which form a tripod on which the fish rests on the seafloor. *Cyclothone pallida* is found in all major oceans and is one of the most abundant of all types of fishes. The largest of the "slime eels," the giant hagfish (*Eptatretus carlhubbsi*) is known for its ability to produce copious amounts of slime when agitated. The uncommon species of cuskeel, *Tauredophidium hextii*, is quite unique in that it has three long spines on the operculum and does not have eyes.

2.1.1.7 Marine Birds

Birds that live in association with marine habitats fall into three main groups: shorebirds (such as plovers, sandpipers, etc.), water birds (such as ducks, cormorants, and loons) and seabirds (such as albatrosses, petrels, puffins, penguins, frigate birds and boobies). Seabirds are those species that obtain most of their food from the ocean and are found over water for more than half of the year.

A diversity of 27 seabird species has been recorded in Guam's marine habitats, most of which are visitors. During the last century, most resident pelagic seabirds have decreased (Brown Noddies and White Terns) or have been lost entirely (Brown Boobies and possibly Wedge-tailed Shearwaters). Extensive predation by non-native Brown Tree Snakes (*Boiga irregularis*) since the 1950s is one of the major causes of these avifauna population declines. In response, nesting by Brown Noddies and White Terns, both common residents of Guam, is now largely constrained to offshore locations that are free of snakes, including Cocos Island, smaller islets and rocks.

The *Environmental Impact Statement for the Designation of an Ocean Dredged Material Disposal Site Offshore of Guam* (USEPA 2010) provided a comprehensive list of birds associated with the different marine habitats as well as detailed descriptions of 11 key seabird species including the Short-tailed Shearwater (*Puffinus tenuirostris*), Brown Noddy (*Anous stolidus*), Black Noddy (*Anous minutus*), White Tern (*Gygis alba*), Wedge-tailed Shearwater (*Puffinus pacificus*), Brown Booby (*Sula leucogaster*), Red-footed Booby (*Sula sula*), Great Crested Tern (*Thalasseus bergii*), Streaked Shearwater (*Calonectris leucomelas*), Black-naped Tern (*Sterna sumatrana*) and Matsudaira's Storm-Petrel (*Oceanodroma matsudaira*).

2.1.1.8 Marine Mammals and Sea Turtles

The Marianas Islands Sea Turtle and Cetecean Survey (MISTCS), document in *Marine Mammal and Sea Turtle Survey and Density Estimates for Guam and the Commonwealth of the Northern Mariana Islands Final Report* (SRS-Parsons JV *et al*., 2007) was conducted in 2007 to determine marine mammals and sea turtle densities in the Mariana Islands region. This survey covered an area much larger than the area in the immediate vicinity of the Guam ODMDS, however, due to the highly migratory nature of marine mammals and sea turtles, species identified during this survey may likely be observed near the Guam ODMDS.

During the MISTCS there were a total of 149 individuals sighted of 13 different species. One Hawksbill Turtle was sighted, and the other 148 sightings were of 12 cetacean species. The Sperm Whale was the species that had the highest frequency of sightings followed by the Bryde's and Sei Whales which had the 2^{nd} and 3^{rd} highest sighting frequency. The survey found that the most frequently sighted delphinids were the pantropical spotted dolphin followed by the false killer whale and striped dolphin. Groups that were sighted ranged from 1 to 115 individuals in size and varied depending upon the species. The range of bottom depth for the sightings was highly variable from 470 to 32,400 ft (144 to 9,874 m) and was largely species dependent (SRS-Parsons JV *et al*., 2007).

Although only one species of sea turtle was identified during the MISTCS, five species have distributions that extend in to Guam including the green, hawksbill, leatherback, loggerhead and olive ridley. However, only the green sea turtle is considered common to the area and the hawksbill is considered extremely rare (DON 2005). The leatherback, loggerhead and olive ridley sea turtles are considered infrequent visitors to the region.

2.1.2 Disposal Site History

The Guam ODMDS is expected to be designated as a permanent disposal site in June of 2010; this site has never previously been used for the disposal of dredged materials.

2.2 Special Management Conditions or Practices

In addition to any project-specific site-use conditions, the following generic conditions on the use of the Guam ODMDS include the following (as explained in Section 1.0 [Introduction], references to "permit" and "permittee" are generic references to all projects or project sponsors):

A) *Mandatory conditions.* All permits or federal project authorizations authorizing use of the Guam ODMDS shall include the following conditions, unless approval for an alternative permit condition is sought and granted pursuant to paragraph (C) of this section:

1) Transportation of dredged material to the Guam ODMDS shall only be allowed when weather and sea state conditions will not interfere with safe transportation and will not create risk of spillage, leak or other loss of dredged material in transit to the Guam ODMDS .

2) Dredged material shall not be leaked or spilled from disposal vessels during transit to the Guam ODMDS.

3) When dredged material is discharged within the Guam ODMDS, no portion of the vessel from which the materials are to be released (*e.g.*, hopper dredge or towed barge) can be further than 1,640 ft (500 m) from the center of the surface disposal zone designated in the permit. The center of the Guam ODMDS (Table 1) is also the center of the surface disposal zone for disposal:

Table 1. Location and Dimensions of Surface Disposal Zone and Overall Disposal Site for the Guam ODMDS

ODMDS	Diameter of Surface Disposal Zone	Diameter of Disposal Site	Latitude (NAD 83)	Longitude (NAD 83)
Guam	3,280 ft (1,000 m)	2.98 mi (4,795 m)	13º 35.500’ N	144º 28.733’ E

4) No more than one disposal vessel may be present within the permissible dumping target area referred to in paragraph (3) of this section at any time.

5) Disposal vessels shall use an appropriate primary navigation/tracking system capable of indicating and recording the position of the vessel carrying dredged material (for example, a hopper dredged vessel or towed barge) with a minimum accuracy and precision of 100 ft (30.5 m) during all disposal operations. The primary system must also indicate the opening and closing of the doors of the vessel carrying the dredged material. If the primary navigation/tracking system fails, all disposal operations must cease until the navigational capabilities are restored. If the primary system fails during transit to the ODMDS, a back-up navigation/tracking system, with all of the capabilities listed in this condition, may be used to complete the trip.

6) The permittee shall maintain daily records of the amount of material dredged and loaded into barges for disposal, the times that disposal vessel depart for, arrive at and return from the Guam ODMDS, the exact locations and times of disposal, and the volumes of material disposed at the Guam ODMDS during each vessel trip. The permittee shall further record wind and sea state observations at intervals to be established in the permit.

7) For each disposal vessel trip, the permittee shall maintain a computer printout from a Global Positioning System (GPS) or other acceptable navigation system showing transit routes and disposal coordinates, including the time and position of the disposal vessel when dumping was commenced and completed.

8) An authorized and responsible representative of the prime contractor or permittee (not a subcontractor) shall inspect each disposal vessel prior to its departure for the Guam ODMDS. The authorized representative shall certify (along with the disposal vessel captain) whether the specifications on the approved Scow Certification Checklist have been met. The authorized representative shall promptly inform the permittee whether there are any inaccuracies or discrepancies concerning this information, and shall provide a summary for the calendar month in a report to USEPA and USACE by the 15th day of the following month. Space for a representative from USEPA or the USACE will be available on any disposal vessel should a federal regulator desire to observe disposal operations on any specific trip.

9) The permittee shall report any variances from mandatory or special conditions during disposal operations to the District Engineer and the Regional Administrator within 24 hours. In addition, the permittee shall prepare and submit reports, including a cover letter summarizing problems and corrective action(s) taken, certified accurate by the designated authorized representative, on a frequency that shall be specified in permits, to the District Engineer and the Regional Administrator setting forth the information required by Mandatory Conditions in paragraphs (7) and (8) of this section.

10) At the completion of short-term dredging projects, at least annually for ongoing projects, and at any other time or interval requested by the District Engineer or Regional Administrator, permittees shall prepare and submit to the District Engineer and Regional Administrator a report that includes complete records of all dredging, transport and disposal activities, such as navigation logs, disposal coordinates, scow certification checklists, and other information required by permit conditions. Electronic data submittals may be required to conform to a format specified by the agencies. Permittees shall include a report indicating whether any dredged material was dredged outside the areas authorized for dredging or was dredged deeper than authorized for dredging by their permits.

B) *Project-specific conditions.* Permits or federal project authorizations authorizing use of the Guam ODMDS may include additional conditions, if USEPA or the USACE determines these conditions are necessary to facilitate safe use of the Guam ODMDS, the prevention of potential harm to the environment or accurate monitoring of site use. These can include any conditions that USEPA or the USACE determine to be necessary or appropriate to facilitate compliance with the requirements of the MPRSA, such as timing of operations or methods of transportation and disposal.

C) *Alternative permit/project conditions.* Alternatives to the permit conditions specified in this section in a permit or federal project authorization may be authorized if the permittee demonstrates to the District Engineer and the Regional Administrator that the alternative conditions are sufficient to accomplish the specific intended purpose of the permit condition in issue and further demonstrates that the waiver will not increase the risk of harm to the environment, the health or safety of persons, nor will impede monitoring of compliance with the MPRSA, regulations promulgated under the MPRSA, or any permit issued under the MPRSA.

2.3 Quantity and Type of Material to be Disposed

The Guam ODMDS would be restricted to the disposal of suitable dredged material, only. The Guam ODMDS is permanently designated to receive an annual maximum quantity of dredged material of 1,000,000 cy (764,555 m^3). This quantity is based on a conservative (i.e., maximum volume of material to be dredged in a given year) estimate of dredged material for upcoming construction and maintenance dredging projects, calculations for determining the economic feasibility zone (*Zone of Siting Feasibility Study* [Weston Solutions and Belt Collins, Hawaii, 2006]), and the expected operating capacity for a dredge plant in Apra Harbor (one 3,000 cy [2,294 m^3] disposal event per day over the course of a year). The USEPA Region IX and USACE Honolulu District will encourage advanced planning and coordination by users of the Guam ODMDS to ensure the annual maximum quantity of dredged material is not exceeded, with consideration of potential variances in proposed dredged material volume determinations for each project and unforeseen circumstances such as emergency dredging needs to maintain safe and navigable waterways.

Management decisions about the suitability of dredged material for ocean disposal are guided by criteria in the MPRSA and EPA's Ocean Dumping Regulations; guidance on specific aspects of these regulations is provided in *Ecological Evaluation of Proposed Discharge of Dredged Material into Ocean Waters* (the "Green Book"; USEPA/USACE 1991). USEPA Region IX in coordination with USACE Honolulu District may develop additional regional guidance in the future for sediment testing which should be used in addition to the 1991 Green Book. The USACE Honolulu District has the authority to evaluate the suitability of projects for ocean disposal and issue the required permits.

Regulatory decisions about dredged material proposed for ocean disposal will be based on the following:

1. Compliance with applicable criteria defined in the USEPA's Ocean Dumping Regulations at 40 Code of Federal Regualtion (CFR) Part 227.
2. Requirements imposed on the permittee under the USACE Permitting Regulations at 33 CFR CFR Parts 320-330 and 335-338.
3. The potential for significant adverse environmental impacts at the Guam ODMDS from disposal of the proposed dredged material.

Potential environmental impacts from dredged material disposal are considered significant when such impacts pose an unacceptable risk to the marine environment or human health. Determinations will be based on appropriate methods to evaluate differences between the proposed dredged material and reference site sediments for chemicals of concern, acute toxicity of the proposed dredged material, the magnitude of bioaccumulation, and potential ecological impacts. The main concerns are that disposal of sediments may cause: 1). significant mortality or bioaccumulation of contaminants within the disposal site or adjacent to the site boundaries; and, 2). adverse ecological changes to either the ODMDS or the surrounding ocean floor. Changes in the benthic community are expected because different sediment-grain size and periodic disturbance will promote colonization of the site by different benthic species that may be on the surrounding bottom outside the site.

Management actions, involving the permit process or disposal site(s), are designed to reduce or mitigate any adverse environmental impact (see Section 3, Site Monitoring Plan). Management options for the permitting process include, but are not limited to: 1) full or partial approval of the dredged material proposed for ocean disposal; 2) prohibition of sediments proposed for ocean disposal; or, 3). special management restrictions for ocean disposal of the suitable material (e.g., limits on disposal quantities, specification of frequency, timing, equipment, or disposal at designated areas within either ODMDS). Management actions for the disposal site following unfavorable monitoring results may include, but are not limited to: additional confirmatory monitoring to delineate the extent of the problem, capping to isolate the sediments from potential biological receptors, and/or closure of the site.

2.3.1 Reference Material Database

In April 2008, sediment collected from the designated reference site for the Guam ODMDS was collected for chemistry analyses, toxicity and bioaccumulation testing. Results from these tests are presented in the *Field Report: Baseline Studies Conducted for the Designation of an Ocean Dredged Material Disposal Site, Apra Harbor, Guam* (Weston Solutions, Inc. and TEC 2008), which is referenced in the *Environmental Impact Statement for the Designation of an Ocean Dredged Material Disposal Site, West of the Territory of Guam* (USEPA 2009). Results from these tests formed the basis for a reference material database. Permittees may compare results from project-specific toxicity and bioaccumulation tests to the reference material database or collect additional reference material. If additional reference material is collected and similarly evaluated, the reference material database may be subsequently amended with the new results, pending verification of test acceptability and approval by the regulatory agencies.

2.4 Anticipated Site Use

The Guam ODMDS is a permanent disposal site located in deep water (8,790 ft [2,680 m]) where accumulation of material will never become a navigation hazard; therefore, no closure is planned for this site at this time.

2.5 Site Management Plan Review and Revision

The SMMP for the Guam ODMDS has been developed subsequent to over 10 years of management and monitoring conducted at a similar deep ocean disposal site, specifically the San Francisco Deep Ocean Disposal Site (SF-DODS) located in approximately 8,200 to 9,840 ft (2,500 to 3,000 m) of water about 50 nm (90 km) west of the Golden Gate, San Francisco, California. Although it is noted that each ODMDS is unique, data obtained from regular management and monitoring from these sites may be reviewed to determine potential impacts to the marine environment at the Guam ODMDS. However, there is always the possibility for unanticipated problems or events, in which case modifications to the management or monitoring plan will be decided jointly by USEPA Region IX and USACE Honolulu District personnel.

Absent any unforeseen or unanticipated problems with the management or monitoring of dredged material disposal at the Guam ODMDS, this plan will be reviewed (and revised if necessary) at regular intervals not exceeding 10 years from the final designation date, or as necessary if additional confirmatory or compliance monitoring results suggest a revised approach to site management and monitoring is warranted.

3.0 SITE MONITORING PLAN

Site monitoring is a requirement for using the Guam ODMDS; disposal operations will be prohibited if resources for implementing the SMMP are not available. The primary purpose of the environmental monitoring plan is to confirm the conclusions of the Environmental Impact Statement (EIS) in regard to predicted site conditions following disposal. Simply stated, these conclusions are that: a) only acceptable dredged material is disposed at the site; b) no significant quantities of disposed dredged material are outside the designated site boundary and c) although physical impacts are expected, no significant toxicity and/or bioaccumulation is occurring inside the site.

Dredged material that is suitable for ocean disposal under the 1991 Green Book guidelines may cause impacts deemed acceptable within the disposal site. These include burial of any onsite benthic communities and potentially some chronic, sub-lethal biological effects to any onsite fauna from associated chemicals of concern in the disposed sediments. Rapid recolonization will occur within and outside of the site, as demonstrated by the monitoring studies at SF-DODS (Germano and Associates, Inc., 2008). However, recovery of the benthic community within the designated footprint of the Guam ODMDS may only occur for short durations during active use of the site, because continued disposal operations will rebury any recolonizing fauna. Full recolonization of the site with no long-term associated environmental impact would be expected should the Guam ODMDS ever be closed in the future and disposal at the site discontinued, or if site use is interrupted for a period of several years.

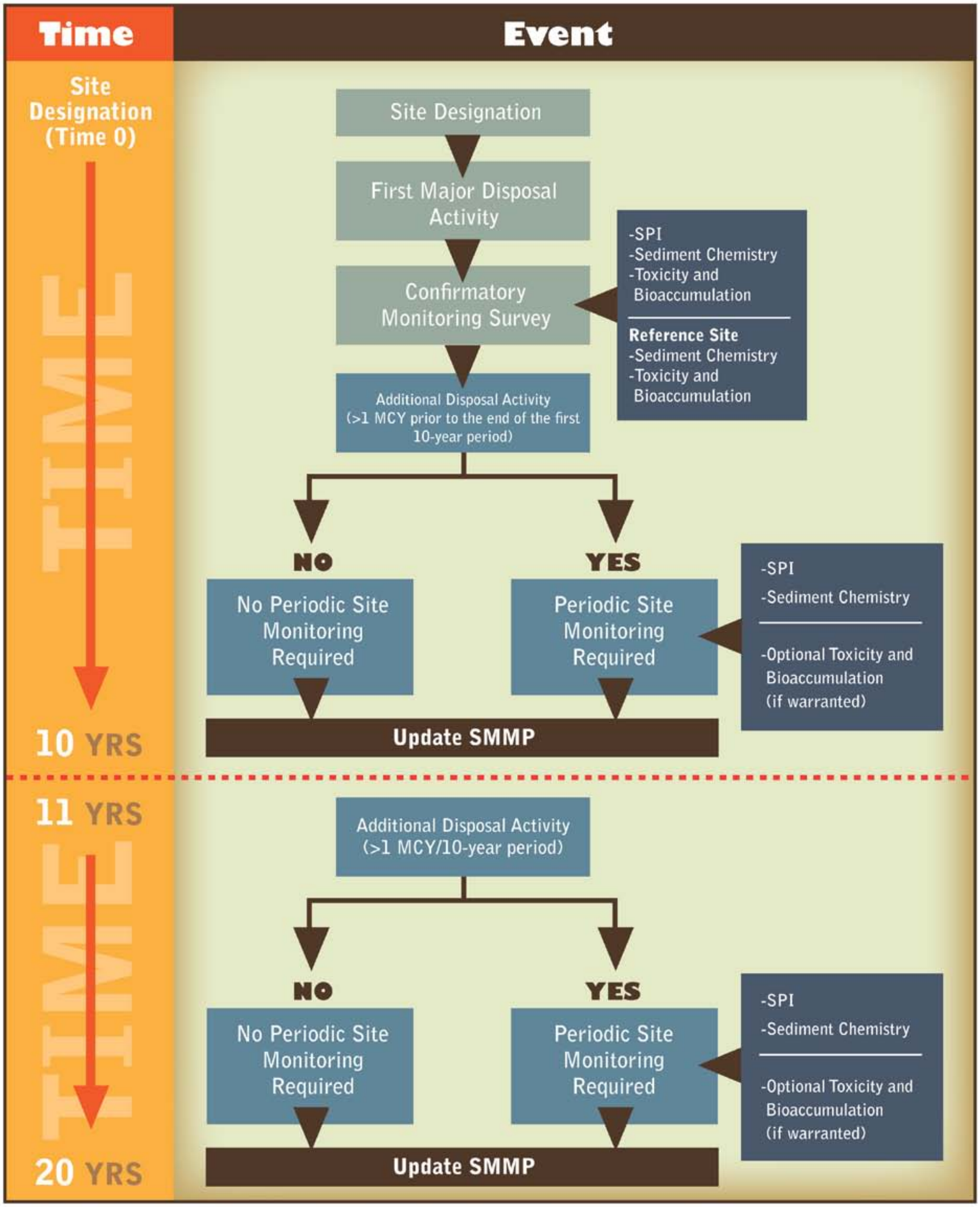
Two types of monitoring will be carried out at the Guam ODMDS: compliance monitoring as part of ongoing disposal projects, and periodic site monitoring. Compliance monitoring will only be conducted in the event that the disposal site management requirements (see Section 2.2) are not being met. Specifically, compliance monitoring may be initiated if an inappropriate volume of sediment is disposed (e.g., annual limits are exceeded), disposal of unsuitable material occurs, and/or if disposal occurs outside the designated boundaries of the site as determined from completed post-cruise scow log sheets, inspection reports, records of transport and disposal activities, etc., for each issued permit. If any of these reports show serious discrepancies (e.g., known permit violations for disposal scow conditions, awareness of misplaced dredged material as a result of permittee disposal reports), then the resulting management actions may include fines or additional monitoring activities carried out by the permittee at the disposal site as specified by either USACE Honolulu District or USEPA Region IX. These additional monitoring activities may include one or more of the monitoring elements described for periodic site monitoring below.

The periodic site monitoring consists of sampling tasks that will provide a comprehensive assessment of current conditions at the Guam ODMDS to be compared against baseline conditions. Baseline conditions at the Guam ODMDS are documented in USEPA Region IX's EIS for the Guam ODMDS designation action. This document will be used, along with reference data, to evaluate future changes to each site. A tiered approach will not be used to perform the periodic site monitoring due to the prohibitive costs associated with mobilizing and sampling at the remote, deep-ocean disposal site off of Guam. An ocean disposal database for the Guam ODMDS will be developed and maintained by USACE Honolulu District and USEPA Region IX; all acceptable sediment testing results for project-specific dredged material characterization studies as well as from routine compliance monitoring activities will be entered into this database.

The first monitoring survey at the designated disposal site will be a confirmatory monitory survey, conducted after the first major dredged material disposal event. Subsequently, periodic site monitoring will occur before the tenth year after designation of the Guam disposal site and approximately every 10 years thereafter, assuming the disposal site continues to be actively used (i.e., disposal of greater than 1,000,000 cy [764,556 m^3] cumulatively during the remaining portion of the first 10 year period and each subsequent 10 year period. A volume of 1,000,000 cy [764,556 m3] was selected as the threshold for triggering periodic site monitoring to be able to compare modeling conducted for the environmental impact statement for site designation with site conditions and to verify disposal activities continue within site use guidelines). Figure 1 illustrates the schedule for confirmatory and periodic site monitoring at the Guam ODMDS during the first 20 years following site designation. For each subsequent 10 year period, refer to the 11 to 20 year period of the flow chart.

As part of the site monitoring program described in this section, USEPA Region IX and USACE Honolulu District will determine if there are any significant impacts to the following areas, based on monitoring physical, chemical, and biological parameters:

1. Inside the ODMDS boundary; and
2. Over an area adjacent to the ODMDS boundary if monitoring shows that significant accumulations of dredged material (> 5.9 in [15 cm]) are outside the site boundary or that adverse biological effects are occurring inside the site. [NOTE: This is an extremely conservative trigger level that will have little or no adverse effects on the benthic infauna; details to follow in Section 3.1 below]



Refer to the 11 to 20-year period for each subsequent 10-year period.

Figure 1. Schedule for Confirmatory and Periodic Site Monitoring at the Guam ODMDS

The monitoring plan includes the following objectives: (1) to assess the vertical and horizontal extents of dredged material disposal and confirmation of predicted depositional thicknesses as stated in the Draft Environmental Impact Statement (DEIS), (2) to evaluate the sediment physical and chemical characteristics within the Guam ODMDS boundary to determine the potential for contaminants to impact benthic communities, and (3) to quantify the potential impacts dredged material disposal may have on the benthic communities, as necessary according to the schedule of events illustrated in Figure 1. This program facilitates monitoring of both short-term (dredged material is largely confined within site boundaries as modeling studies predict; see Chapter 4 of DEIS) and long-term (recolonization and toxicity testing) conditions, enabling both USEPA Region IX and the USACE Honolulu District to make management decisions in a timely manner should potential unacceptable impacts be discovered. The physical, biological, and chemical monitoring also will help these agencies verify whether disposal operations are being carried out in compliance with permit requirements and environmental regulations.

Long-term dredged material monitoring programs on the east-coast (the Disposal Area Monitoring System, or DAMOS program , run by the USACE New England District since 1979) and west coast (the Puget Sound Dredged Disposal Analysis, PSDDA program, run by the USACE Seattle District since 1986; SF-DODS monitoring, run by the USACE San Francisco District since 1996 and periodic monitoring conducted by USEPA Region IX; and LA-2/LA-3 disposal site monitoring run by the USACE Los Angeles District) have demonstrated that monitoring resources are better allocated toward measuring impacts that are not transient, i.e. persist on time scales that are greater than those occurring in the range of hours to days. As such, the planned sampling efforts for the Guam ODMDS focused on the seafloor and will provide a complete impact assessment. These studies have shown that water column effects are transient and impacts to most components of the biological environment (plankton, epifauna, fish, birds, mammals, threatened or endangered species) and socioeconomic environment (commercial/recreational fisheries, shipping, military usage, oil and natural gas development) are rated as a Class III impact (adverse but insignificant or no anticipated impacts; no mitigation measures are necessary; see Chapter 4 of EIS).

As described above, sampling activities associated with all monitoring objectives should be completed during the same cruise due to the prohibitive costs associated with mobilizing and performing deep-ocean sampling. Although sufficient sediment should be collected to complete all biological testing associated with Objective III; these tests are only necessary during periodic site monitoring activities if results from Objectives I and II suggest biological testing is necessary, as determined through consultation with USEPA Region IX and USACE Honolulu District.

3.1 Objective I

The monitoring for physical/biological processes is focused on the potential transport of dredged material outside of the designated site boundaries following disposal and the recolonization of dredged material by benthic infauna. Short-term fate (STFATE), a model developed by the USACE, was run for predictions of transport and fate of dredged material disposed at Guam ODMDS (Weston Solutions, Inc. and Belt Collins 2007; Chapter 4, Guam ODMDS DEIS for summary of results), and no substantial accumulations were expected outside the site boundary; the physical portion of the module focuses on mapping and tracking the dredged material deposit on the seafloor to verify the predictions of the numerical model. If material is found outside the site in accumulations thicker than expected, biological monitoring will be performed to document that infaunal recolonization is proceeding as expected.

Objective I monitoring activities focus on the statement (null hypothesis):

- *The accumulation of dredged material deposits is greater than 5.9 in (15 cm) outside the Guam ODMDS boundary.* Rejection of the null hypothesis indicates the accumulation of dredged material deposits is less than 5.9 in (15 cm) outside the Guam ODMDS boundary, suggesting there are no potential impacts outside the boundary.

Objective I monitoring activities should be completed primarily using a sediment profile imaging (SPI) digital camera. Supplemental Objective I monitoring activities may also include high-resolution multibeam bathymetric surveys to map bathymetric features and dredged material deposits within and surrounding the Guam ODMDS boundary. It should be noted, though, due to the extreme water depths and the accuracy (resolution) of available multibeam data collection systems (i.e. the multibeam system mounted on the survey vessel of opportunity), dredged material deposits may not be resolved.

The SMMP is designed to ensure that significant deposits of dredged material do not consistently occur or extend beyond the site boundaries. A substantial deposit is defined as 5.9 in (15 cm) or more since the last monitoring event (thicker deposits are expected to occur and are acceptable within the site boundaries). Physical mapping of the dredged material footprint on the seafloor will be conducted at periodic intervals in order to confirm that management guidelines for disposal operations are operating within expected criteria and the predictions from the numerical models are correct.

The 5.9 in (15 cm) deposit thickness of dredged material outside the site boundary has been selected as a trigger level to proceed to Objective 2 for a number of reasons:

1. The maximum deposit thickness that can be detected by the sediment profile imaging equipment is 7.9 in (20 cm) but the camera settings are usually adjusted so that actual prism penetration is somewhat less than that (4.7 – 7.5 in [12-19 cm]) in order to capture details at the sediment-water interface.

2. Impacts to infauna from deposition of dredged material can range from negligible to total mortality, depending on the type of material and rate of deposition (a 19.7 in [50 cm] layer deposited at the rate of 0.4 in (1 cm) per week over the course of a year would have little detectable impact as compared with a 19.7 in [50 cm] layer that occurred at a location in one depositional event). Estimates of deposit thicknesses through which native infauna can re-establish themselves range from 2 in (5 cm) to 33.5 in (85 cm) (Kranz, 1974; Nichols et al., 1978; Maurer et al., 1980, 1986).

3. Repeated monitoring other open-water dredged material sites off all coasts of the USA (e.g., Rhoads and Germano, 1986; Germano et al., 1994; Newell et al., 1998; Germano and Associates, Inc., 2008) have shown that even in dredged material deposits exceeding a meter or more (where one can safely assume that all resident infauna were smothered and killed), benthic recolonization and community succession will occur with full ecosystem recovery over time, so any impact to the benthic community from deposition of dredged material that has passed testing criteria as acceptable for open-water disposal will be temporary. Using 5.9 in (15 cm) as the trigger level is an extremely conservative value; while this will most likely have little, if any, adverse effects on the benthic infauna, it will be a good verification check for the disposal model's predicted footprint of dredged material on the seafloor.

3.1.1 Sediment Profile Imaging

A series of radial transects through the Guam ODMDS site and continuing out 500 meters beyond the edge of the detectable dredged material layer will be sampled with SPI technology. SPI stations will be placed at 655 – 1640 ft (200 - 500 m) intervals along the transects or at appropriate spacing so that any area outside the site boundary with dredged material has at least 3-5 stations located on the dredged material. The SPI system must be equipped with a digital camera to allow on-board evaluation of results (necessary for assessing the adequacy of station locations for mapping the dredged material and for Objective 2 activities; see below).

3.2 Objective II

Sufficient sediment volumes of material will be collected for Objectives II and III analyses during the monitoring event for Objective I**.**

Objective II sampling activities focus the statements (null *hypotheses):*

- *The sediment chemical concentrations within the Guam ODMDS boundary are elevated above those measured in the sediment prior to disposal.* Rejection of the null hypothesis indicates that sediment chemistry concentrations within the Guam ODMDS are not elevated above those measured in the sediment prior to disposal.
- *The sediment grain size distribution within the Guam ODMDS boundary is different than the baseline grain size distribution and the grain size distribution of material prior to disposal..* Rejection of the null hypothesis indicates grain size characteristics within the Guam ODMDS boundary are not different than those of the site prior to any disposal activities.

3.2.1 Sediment Sampling

A minimum of three sediment samples within the site boundary would need to be collected and analyzed for physical and chemical parameters. Sufficient sediment volume should be collected to perform all Objective II physical and chemical analyses, as well as all Objective III analyses.

3.3 Objective III

Objective III analyses include solid phase toxicity testing and bioaccumulation testing.

Objective III sampling activities focus on the following statements (null hypotheses):

- *Toxicity (reduced survivorship) of sediment from within the site boundary is elevated relative to toxicity of baseline conditions t.* Rejection of the null hypothesis indicates sediment toxicity within the Guam ODMDS boundary is less or non-existent compared to baseline conditions, suggesting dredged material disposal is not impacting benthic communities within the Guam ODMDS boundary.
- *Tissues from organisms exposed to sediment collected within the site boundary show increased uptake (bioaccumulation) of contaminants relative to tissues from organisms exposed to baseline conditions sediment.* Rejection of the null hypothesis indicates bioaccumulation of contaminants within the Guam ODMDS boundary is less or non-existent compared to bioaccumulation of contaminants within sediment collected during baseline condition surveys, suggesting dredged material disposal is not impacting benthic communities within the Guam ODMDS boundary.

3.3.1 Solid Phase Toxicity Testing

Solid Phase (SP) toxicity tests should be conducted on sediment collected from within the Guam ODMDS and a reference location. SP tests are performed to estimate the potential impact of ocean disposal of dredged material on benthic organisms that attempt to recolonize the area. Sediment samples should be used in 10-day SP tests using two species: one amphipod (*Ampelisca abdita* or *Eohaustorius estuarius*) and one polychaete worm (*Neanthes arenaceodentata*).

3.3.2 Bioaccumulation Potential Testing

Bioaccumulation potential tests should be conducted with sediment collected from within the Guam ODMDS and a reference location. Bioaccumulation potential tests are performed to determine the availability of sediment contaminants taken up by test organisms. Tissue analysis (including pre-exposure samples) should be conducted for the same parameters required on sediment when conducting dredge material evaluations as wells as percent lipids.

3.3.3 Benthic Community Analysis

Benthic community analyses (macroinfauna and meiofauna organisms) should be conducted with sediment from within the Guam ODMDS and compared to benthic community analyses in the area prior to disposal. Benthic community analyses are performed to estimate the population diversity and organism abundance of macroinfauna and meiofauna organisms in the sediment.

3.4 Reference Site

Due to location of the Guam ODMDS in extreme water depths, the costs and effort to plan, mobilize and conduct monitoring activities offshore of Guam is relatively high. As such, during disposal site monitoring activities, sediment should also be collected from the Guam ODMDS reference site. Sediment from the reference site will be analyzed for physical and chemical parameters and used in SP toxicity tests and bioaccumulation tests for the comparisons described above and to further develop the reference material database. Permittees may compare results from project-specific toxicity and bioaccumulation tests to the reference material database.

3.4.1 Sediment Chemistry

At a minimum, sediment collected from the reference site should be analyzed for physical and chemical parameters similar to those required for conducting dredged material evaluations. These include grain size, specific gravity, Atterberg limits, total solids, total organic carbon (TOC), total sulfides, dissolved sulfides, total ammonia, total recoverable petroleum hydrocarbons (TRPH), trace metals, polycyclic aromatic hydrocarbons (PAHs), chlorinated pesticides (including Aroclor polychlorinated biphenyls (PCBs) and individual PCB congeners) and organotins. For comparison to site characterization studies, additional analyses may be conducted including total organic nitrogen (TON), total Kjeldahl nitrogen (TKN), dioxins/furans and gross alpha/beta radioactive content.

3.4.2 Solid Phase Toxicity Testing

SP toxicity tests should be conducted on sediment collected from the reference site. SP tests are performed to estimate the potential impact of ocean disposal of dredged material on benthic organisms that attempt to recolonize the area. Reference material should be similarly tested in 10-day SP tests using two species: one amphipod (*Ampelisca abdita* or *Eohaustorius estuarius*) and one polychaete worm (*Neanthes arenaceodentata*).

3.4.3 Bioaccumulation Potential Testing

Bioaccumulation potential tests should be conducted with sediment collected from the reference site. Bioaccumulation potential tests are performed to determine the availability of sediment contaminants taken up by test organisms. Tissue analysis (including pre-exposure samples) should be conducted for the same parameters required on sediment when conducting dredge material evaluations as wells as percent lipids.

4.0 MANAGEMENT ACTIONS

The results of any monitoring events that demonstrate disposed material outside the site boundary in excess of 5.9 in [15 cm] or a cumulative impact to the benthic community will trigger a review of management implications or a management action. The review of management implications (triggered by either disposed material outside the site boundary in excess of 5.9 in [15 cm] or bulk sediment chemistry values greater than baseline concentration ranges could mean one or more of the following problems exist:

- Control of disposal operations is not occurring as planned
- Numerical modeling predictions are inaccurate (site boundary may be too small)
- Inadequate characterization of dredged material during the permitting process (material is either more heterogeneous than anticipated or sampling density for characterizing a specified volume is too low)

Depending on which path leads to review of management implications or a management action, further investigations would identify which of the above problems is most likely the cause of the false positive trigger and allow correction once EPA Region IX and USACE Honolulu District personnel concur on the proper remedy and adjustment to the management plan. However, each agency is free to operate solely under its own authority as outlined in Table 2.

If, however, it is determined that the potential for risk to human health or the marine environment exists because of bioavailable contaminants being placed at the site, the potential management actions include any or all of the following actions:

- Review and revise the sediment characterization process as part of permit activity
- Suspend or modify any further use of the site while the cause of the problem is being identified
- Identify additional monitoring tasks that must be performed to better identify or delineate the source of the problem
- Permanently terminate use of the site if this is the only means for eliminating the adverse environmental impacts

In general, any management action would be initiated only after consensus has been reached between EPA Region IX and USACE Honolulu District. USEPA and the USACE still retain their respective authority over the disposal site and dredging site, and may exercise their independent authority (i.e., enforcement) if appropriate and necessary for environmental protection in either area. Any changes to the SMMP will be published by USEPA.

5.0 ROLES, RESPONSIBILITIES AND FUNDING

5.1 Site Management and Monitoring Roles and Responsibilities

While USEPA and the USACE work in coordination on all ODMDSs in waters of the U.S., they also have separate authorities over these sites. The roles and responsibilities for managing the Guam ODMDS are outlined in Table 2.

5.2 Funding

Funding for site characterization studies for the designation of the Guam ODMDS as well as this SMMP was provided by U.S. Navy. Funding for future site monitoring will be provided by the users of the Guam ODMDS. Confirmatory site monitoring, conducted after the first major dredged material disposal event, will be funded by the user or users (prorated by volume). Periodic site monitoring, conducted every 10 years, will be funded by the user or users (prorated by volume). Compliance monitoring, as required because the disposal site requirements were not met, will be the sole responsibility of the user in violation of the disposal site requirements.

It is recognized that funding site monitoring activities will likely be costly and extensive pre-monitoring planning is required due to the logistical and technical difficulties inherent in working in a deep-ocean environment offshore of Guam. Site monitoring will require specialized marine vessels and oceanographic equipment capable of operating and collecting samples in extreme environmental conditions. Due to high mobilization and daily leases costs associated with such vessels and equipment, every effort should be made by the site users to coordinate and plan monitoring efforts. Coordination with the USEPA and USACE regarding monitoring activities is also recommended to reduce potential costs, for example, USEPA's research vessel may be available as a monitoring platform (though the user would likely be responsible for a fuel surcharge to mobilize the vessel to and from Hawaii or the West Coast).

Further, it is recognized that federal funding sources may expire. Therefore, it is recommended that disposal activities and potential monitoring activities be coordinated with the USEPA Region IX and USACE Honolulu District in order to satisfy regulatory monitoring requirements without the need for excessive or supplemental monitoring events.

Table 2. Designation of Site Management and Monitoring Responsibilities

Site Management Task	Responsible Agency
ODMDS Site Designation	USEPA Region IX
Disposal Project Evaluation & Permit Issuance	USACE Honolulu District[1] with USEPA Region IX concurrence
Project-specific Compliance Tracking of Disposal Operations	USACE Honolulu District and USEPA Region IX
Enforcement Actions for Permit Violations at Dredging Site	USACE Honolulu District (lead agency)
Enforcement Actions for Permit Violations for Disposal Operations (primary) and Dredging Site (secondary)	USEPA Region IX
Disposal Site Monitoring	USACE Honolulu District with periodic assistance (including vessel support) from USEPA Region IX
Disposal Site Data Maintenance – Pre-disposal and Confirmatory Testing	USACE Honolulu District and USEPA Region IX

[1] Issued by either the Planning/Operations or Regulatory Branch of the USACE Honolulu District, as appropriate

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