

Guam and CNMI Military Relocation EIS

Volume 4: Aircraft Carrier Berthing

Table of Contents

CHAPTER 1. PURPOSE OF AND NEED FOR ACTION	1-1
1.1 INTRODUCTION	1-1
1.1.1 Introduction to Proposed Action	1-1
1.1.2 Purpose and Need	1-2
1.1.3 Global Perspective	1-2
1.1.3.1 Background	1-3
1.1.3.2 Treaty and Alliance Requirements	1-4
1.1.3.3 Freedom of Action and Force Protection	1-6
1.1.3.4 Response Times	1-7
1.1.3.5 Summary of Global Alternatives Analysis for Proposed Transient-Capable Port	1-9
1.1.3.6 Transient Berthing Capability and Operation on Guam	1-10
CHAPTER 2. PROPOSED ACTION AND ALTERNATIVES	2-1
2.1 OVERVIEW	2-1
2.2 ELEMENTS COMMON TO BOTH ACTION ALTERNATIVES	2-2
2.2.1 Operation	2-2
2.2.1.1 Aircraft Carrier Specifications	2-4
2.2.2 Support Facilities for Each Alternative	2-4
2.2.2.1 Structures	2-4
2.2.2.2 Design Standards	2-6
2.3 ALTERNATIVES CONSIDERED AND DISMISSED	2-7
2.3.1 Wharf Location Alternatives Considered	2-9
2.3.1.1 Wharf Locations Dismissed	2-9
2.3.1.2 Dry Dock Island	2-13
2.3.1.3 Alternative Wharf Locations Retained	2-18
2.3.2 Wharf Alignments Considered	2-19
2.3.3 Channel Options	2-21
2.3.3.1 Turning Basin	2-23
2.3.4 Structural Design	2-26
2.3.4.1 Steel Pile Supported Wharf	2-28
2.3.4.2 Sheet Pile Bulkhead	2-29
2.3.4.3 Concrete Caissons	2-29
2.3.5 Dredging	2-30
2.3.5.1 Methodology	2-30
2.3.6 Alternatives Considered and Dismissed Summary	2-38
2.4 ALTERNATIVES CARRIED FORWARD FOR ANALYSIS	2-40
2.4.1 Least Environmentally Damaging Practicable Alternative (LEDPA)	2-40
2.5 ALTERNATIVE 1 POLARIS POINT (PREFERRED ALTERNATIVE)	2-42
2.5.1 Operation	2-42

2.5.1.1	Radiological Material Operation	2-42
2.5.2	Facilities	2-42
2.5.2.1	Shoreside Structures	2-42
2.5.2.2	Utilities	2-48
2.5.2.3	Bilge and Oily Wastewater Treatment System (BOWTS)	2-50
2.5.3	Construction	2-53
2.5.3.1	Polaris Point-Specific	2-53
2.5.3.2	Construction Common to Both Action Alternatives.....	2-55
2.5.3.3	Equipment and Materials	2-58
2.6	ALTERNATIVE 2: FORMER SRF	2-59
2.6.1	Operation	2-59
2.6.1.1	Radiological Material Operation	2-59
2.6.2	Shoreside Structures	2-62
2.6.2.1	Design Standards	2-62
2.6.2.2	Staging Area and Access	2-62
2.6.2.3	Utilities	2-64
2.6.3	Construction	2-67
2.6.3.1	Alternative 2 - Specific	2-67
2.6.3.2	Construction Common to Both Action Alternatives.....	2-67
2.7	NO-ACTION ALTERNATIVE	2-70
CHAPTER 3. GEOLOGICAL AND SOIL RESOURCES		3-1
3.1	INTRODUCTION	3-1
3.2	ENVIRONMENTAL CONSEQUENCES	3-1
3.2.1	Approach to Analysis	3-1
3.2.1.1	Methodology.....	3-1
3.2.1.2	Determination of Significance	3-3
3.2.1.3	Issues Identified during Public Scoping Process	3-3
3.2.2	Alternative 1 Polaris Point (Preferred Alternative)	3-3
3.2.2.1	Onshore.....	3-3
3.2.2.2	Offshore	3-6
3.2.2.3	Summary of Alternative 1 Impacts.....	3-7
3.2.2.4	Alternative 1 Proposed Mitigation Measures	3-7
3.2.3	Alternative 2 Former Ship Repair Facility (SRF)	3-7
3.2.3.1	Onshore.....	3-7
3.2.3.2	Offshore	3-7
3.2.3.3	Summary of Alternative 2 Impacts.....	3-8
3.2.3.4	Alternative 2 Proposed Mitigation Measures	3-8
3.2.4	No-Action Alternative	3-8
3.2.5	Summary of Impacts	3-8
3.2.6	Summary of Proposed Mitigation Measures	3-10
CHAPTER 4. WATER RESOURCES		4-1
4.1	INTRODUCTION	4-1
4.2	ENVIRONMENTAL CONSEQUENCES	4-1
4.2.1	Approach to Analysis	4-1

4.2.1.1	Methodology.....	4-1
4.2.1.2	Determination of Significance.....	4-5
4.2.1.3	Issues Identified during Public Scoping Process.....	4-5
4.2.2	Alternative 1 Polaris Point (Preferred Alternative).....	4-6
4.2.2.1	Onshore.....	4-6
4.2.2.2	Offshore.....	4-10
4.2.2.3	Summary of Alternative 1 Impacts.....	4-22
4.2.2.4	Alternative 1 Proposed Mitigation Measures.....	4-22
4.2.3	Alternative 2 Former Ship Repair Facility (SRF).....	4-23
4.2.3.1	Onshore.....	4-23
4.2.3.2	Offshore.....	4-25
4.2.3.3	Summary of Alternative 2 Impacts.....	4-26
4.2.3.4	Alternative 2 Proposed Mitigation Measures.....	4-27
4.2.4	No-Action Alternative.....	4-27
4.2.4.1	Surface Water/Stormwater.....	4-27
4.2.4.2	Groundwater.....	4-27
4.2.4.3	Nearshore Waters.....	4-27
4.2.4.4	Wetlands.....	4-28
4.2.5	Summary of Impacts.....	4-28
4.2.6	Summary of Proposed Mitigation Measures.....	4-30
4.3	LEAST ENVIRONMENTALLY DAMAGING PRACTICABLE ALTERNATIVE (LEDPA).....	4-30
CHAPTER 5. AIR QUALITY		5-1
5.1	INTRODUCTION.....	5-1
5.2	ENVIRONMENTAL CONSEQUENCES.....	5-1
5.2.1	Approach to Analysis.....	5-1
5.2.1.1	Methodology.....	5-1
5.2.1.2	Determination of Significance.....	5-3
5.2.1.3	Issues Identified during Public Scoping Process.....	5-4
5.2.2	Alternative 1 Polaris Point (Preferred Alternative).....	5-5
5.2.2.1	Onshore.....	5-5
5.2.2.2	Onshore.....	5-6
5.2.2.3	Offshore.....	5-6
5.2.2.4	Summary of Alternative 1 Impacts.....	5-7
5.2.2.5	Alternative 1 Proposed Mitigation Measures.....	5-7
5.2.3	Alternative 2 Former Ship Repair Facility (SRF).....	5-7
5.2.3.1	Onshore.....	5-7
5.2.3.2	Offshore.....	5-8
5.2.3.3	Summary of Alternative 2 Impacts.....	5-8
5.2.3.4	Alternative 2 Proposed Mitigation Measures.....	5-8
5.2.4	No-Action Alternative.....	5-8
5.2.5	Summary of Impacts.....	5-9
5.2.6	Summary of Proposed Mitigation Measures.....	5-9
CHAPTER 6. NOISE.....		6-1
6.1	INTRODUCTION.....	6-1

6.2	ENVIRONMENTAL CONSEQUENCES	6-1
6.2.1	Approach to Analysis	6-1
6.2.1.1	Methodology.....	6-1
6.2.1.2	Determination of Significance.....	6-2
6.2.1.3	Issues Identified during Public Scoping Process	6-3
6.2.2	Alternative 1 Polaris Point (Preferred Alternative).....	6-3
6.2.2.1	Onshore.....	6-3
6.2.2.2	Offshore.....	6-4
6.2.2.3	Summary of Alternative 1 Impacts.....	6-5
6.2.2.4	Alternative 1 Proposed Mitigation Measures	6-5
6.2.3	Alternative 2 Former Ship Repair Facility (SRF)	6-6
6.2.3.1	Onshore.....	6-6
6.2.3.2	Offshore	6-6
6.2.3.3	Summary of Alternative 2 Impacts.....	6-6
6.2.3.4	Alternative 2 Proposed Mitigation Measures	6-7
6.2.4	No-Action Alternative.....	6-7
6.2.5	Summary of Impacts	6-7
6.2.6	Summary of Proposed Mitigation Measures	6-8
CHAPTER 7. AIRSPACE		7-1
7.1	INTRODUCTION.....	7-1
7.2	ENVIRONMENTAL CONSEQUENCES	7-1
CHAPTER 8. LAND AND SUBMERGED LAND USE.....		8-1
8.1	INTRODUCTION.....	8-1
8.2	ENVIRONMENTAL CONSEQUENCES	8-1
8.2.1	Approach to Analysis	8-1
8.2.1.1	Land Ownership/Management.....	8-2
8.2.1.2	Land Use.....	8-2
8.2.1.3	Issues Identified During Public Scoping Process	8-4
8.2.2	Alternative 1 Polaris Point (Preferred Alternative).....	8-4
8.2.2.1	Onshore.....	8-4
8.2.2.2	Offshore	8-5
8.2.2.3	Summary of Alternative 1 Impacts.....	8-7
8.2.2.4	Alternative 1 Proposed Mitigation Measures	8-7
8.2.3	Alternative 2 Former Ship Repair Facility (SRF)	8-7
8.2.3.1	Onshore.....	8-7
8.2.3.2	Offshore.....	8-8
8.2.3.3	Summary of Alternative 2 Impacts.....	8-9
8.2.3.4	Alternative 2 Proposed Mitigation Measures	8-9
8.2.4	No-Action Alternative.....	8-9
8.2.5	Summary of Impacts	8-10
8.2.6	Summary of Proposed Mitigation Measures	8-11
CHAPTER 9. RECREATIONAL RESOURCES		9-1
9.1	INTRODUCTION.....	9-1
9.2	ENVIRONMENTAL CONSEQUENCES	9-1

9.2.1	Approach to Analysis	9-1
9.2.1.1	Methodology.....	9-1
9.2.1.2	Determination of Significance.....	9-1
9.2.1.3	Issues Identified during Public Scoping Process	9-1
9.2.2	Alternative 1 Polaris Point (Preferred Alternative)	9-2
9.2.2.1	Onshore.....	9-2
9.2.2.2	Offshore	9-3
9.2.2.3	Summary of Alternative 1 Impacts.....	9-4
9.2.2.4	Alternative 1 Proposed Mitigation Measures	9-4
9.2.3	Alternative 2 Former Ship Repair Facility (SRF)	9-4
9.2.3.1	Onshore.....	9-4
9.2.3.2	Offshore	9-5
9.2.3.3	Summary of Alternative 2 Impacts.....	9-5
9.2.3.4	Alternative 2 Proposed Mitigation Measures	9-5
9.2.4	No-Action Alternative.....	9-5
9.2.5	Summary of Impacts	9-6
9.2.6	Summary of Proposed Mitigation Measures	9-7
CHAPTER 10. TERRESTRIAL BIOLOGICAL RESOURCES		10-1
10.1	INTRODUCTION.....	10-1
10.2	ENVIRONMENTAL CONSEQUENCES	10-1
10.2.1	Approach to Analysis	10-1
10.2.1.1	Methodology.....	10-1
10.2.1.2	Determination of Significance.....	10-2
10.2.1.3	Issues Identified During Public Scoping Process	10-4
10.2.2	Alternative 1 Polaris Point (Preferred Alternative)	10-4
10.2.2.1	Onshore and Offshore.....	10-4
10.2.2.2	Alternative 1 Proposed Mitigation Measures	10-10
10.2.3	Alternative 2 Former Ship Repair Facility (SRF)	10-11
10.2.3.1	Onshore and Offshore.....	10-11
10.2.3.2	Alternative 2 Proposed Mitigation Measures	10-13
10.2.4	No-Action Alternative.....	10-13
10.2.5	Summary of Impacts	10-13
10.2.6	Summary of Proposed Mitigation Measures	10-14
CHAPTER 11. MARINE BIOLOGICAL RESOURCES		11-1
11.1	AFFECTED ENVIRONMENT.....	11-1
11.1.1	Coral Assessment Methodology.....	11-3
11.1.2	Comparison of Methodologies to Assess Impacts to Coral.....	11-5
11.1.3	Marine Flora, Invertebrates, and Associated EFH	11-7
11.1.3.1	Eight Secondary Biotopes of the Survey Area	11-8
11.1.3.2	Coral and Coral Reef Community Data.....	11-13
11.1.3.3	Evaluation of the Benthic Community Structure.....	11-29
11.1.4	Essential Fish Habitat.....	11-34
11.1.4.1	Finfish Assessment	11-36
11.1.5	Special-Status Species.....	11-38

11.2	ENVIRONMENTAL CONSEQUENCES	11-40
11.2.1	Approach to Analysis	11-40
11.2.1.1	Methodology.....	11-40
11.2.1.2	Determination of Significance.....	11-42
11.2.1.3	Issues Identified during Public Scoping Process	11-44
11.2.2	Alternative 1 Polaris Point (Preferred Alternative).....	11-45
11.2.2.1	Onshore.....	11-45
	Construction.....	11-45
	Marine Flora, Invertebrates and Associated EFH	11-45
	Essential Fish Habitat	11-45
	Special-Status Species	11-46
	Non-native Species	11-46
	Operation.....	11-46
	Marine Flora, Invertebrates and Associated EFH	11-47
	Essential Fish Habitat	11-47
	Special-Status Species	11-47
	Non-native Species	11-47
11.2.2.2	Offshore	11-48
	Construction	11-48
	Marine Flora, Invertebrates and Associated EFH	11-48
	Essential Fish Habitat	11-51
	Special-Status Species	11-70
	Non-native Species	11-72
	Operation.....	11-73
	Marine Flora, Invertebrates and Associated EFH	11-73
	Essential Fish Habitat	11-73
	Special-Status Species Summary	11-75
	Non-native Species	11-77
	Avoidance and Minimization Measures.....	11-77
	Non-Native Invasive Species Control.....	11-78
11.2.2.3	Summary of Alternative 1 (Preferred Alternative) Impacts	11-79
11.2.2.4	Alternative 1 (Preferred Alternative) Proposed Mitigation Measures ...	11-80
	Mitigation Projects for Coral Reefs	11-82
	Habitat Equivalency Analysis (HEA)	11-83
11.2.2.5	Implementation of Coral Restoration	11-89
11.2.2.6	Development of Compensatory Mitigation Proposals.....	11-89
	Watershed Restoration and Management.....	11-94
	Coastal Water Resources Management.....	11-100
	In-Lieu Fee or Mitigation Banking Program.....	11-102
	Development of Compensatory Mitigation Plan.....	11-103
11.2.3	Compensatory Mitigation Impact Analysis.....	11-103
11.2.3.1	Watershed Restoration and Management for Ugum, Umatac, Toguan, and Geus Areas	11-105
	Ugum.....	11-106
	Umatac	11-106
	Toguan	11-106
	Geus	11-106
	Affected Environment.....	11-108
	Air Quality	11-108
	Geology and Soils.....	11-108
	Hydrology	11-109
	Coastal Environment.....	11-110

	Vegetation.....	11-116
	Terrestrial and Marine Protected Species.....	11-118
	Land Use Compatibility	11-119
	Cultural Resources	11-119
	Infrastructure and Services.....	11-121
	Hazardous and Regulated Materials and Wastes	11-121
Potential	Impacts.....	11-121
	Air Quality	11-121
	Geology and Soils.....	11-121
	Hydrology	11-121
	Coastal Environment.....	11-122
	Vegetation.....	11-122
	Terrestrial Protected Species.....	11-122
	Social and Economic Environment.....	11-122
	Infrastructure and Services.....	11-122
	Hazardous and Regulated Materials and Wastes	11-123
11.2.3.2	Coastal Water Resources Management	11-123
	Conservation Areas for Coral Reef Ecosystem Protection	11-123
	Project Description.....	11-124
Affected	Environment.....	11-125
	Geology and Soils	11-125
	Marine Biological Environment and EFH	11-125
	Terrestrial Biological Environment.....	11-125
	Threatened, Endangered and Protected Species.....	11-126
	Social and Economic Environment.....	11-126
Potential	Impacts.....	11-127
	Geology and Soils.....	11-127
	Marine Biological Environment and EFH	11-127
	Terrestrial Biological Environment.....	11-127
	Threatened, Endangered and Protected Species.....	11-128
	Social and Economic Environment.....	11-128
11.2.3.3	Apra Harbor and Coastal Water Resource Management.....	11-128
	Affected Environment.....	11-129
	Deep Water Artificial Reef Sites.....	11-129
	Project Description.....	11-131
Affected	Environment.....	11-133
	Inner Glass Breakwater.....	11-133
	Kilo Wharf	11-134
	San Luis Beach	11-134
	Sasa Bay.....	11-134
Potential	Impacts.....	11-134
	Water Quality.....	11-135
	Marine Biological Environment.....	11-135
	Cultural Resources	11-136
Shallow	Water Reef Enhancement.....	11-136
	Project Description.....	11-137
Affected	Environment.....	11-137
	Marine Biological Environment and EFH	11-137
	Social and Economic Environment.....	11-137
Potential	Impacts.....	11-137
	Marine Biological Environment and EFH	11-137
	Social and Economic Environment.....	11-138
11.2.3.4	Summary of Mitigation Effects	11-138
11.2.4	Alternative 2 Former SRF	11-138

11.2.4.1	Onshore.....	11-138
	Construction.....	11-138
	Marine Flora, Invertebrates and Associated EFH	11-139
	Essential Fish Habitat	11-139
	Special-Status Species	11-139
	Non-native species	11-139
	Operation.....	11-139
	Marine Flora, Invertebrates and Associated EFH	11-139
	Essential Fish Habitat	11-140
	Special-Status Species	11-140
	Non-native species	11-140
11.2.4.2	Offshore	11-140
	Construction	11-140
	Marine Flora, Invertebrates and Associated EFH	11-140
	Essential Fish Habitat	11-140
	Special-Status Species	11-146
	Non-Native Species	11-146
	Operation.....	11-146
	Marine Flora, Invertebrates, and Associated EFH	11-146
	Essential Fish Habitat	11-146
	Special-Status Species	11-147
	Non-native Species	11-147
11.2.4.3	Summary of Alternative 2 Impacts.....	11-147
11.2.4.4	Alternative 2 Proposed Mitigation Measures	11-149
11.2.5	No-Action Alternative.....	11-149
11.2.6	Summary of Alternative 1 (Preferred Alternative) and Alternative 2 Impacts ...	11-149
11.2.6.1	Summary of EFH Assessment.....	11-150
11.2.6.2	Summary of Impact Analysis Considerations	11-157
11.2.7	Summary of Proposed Mitigation Measures	11-157
CHAPTER 12. CULTURAL RESOURCES.....		12-1
12.1	INTRODUCTION.....	12-1
12.2	ENVIRONMENTAL CONSEQUENCES	12-1
12.2.1	Approach to Analysis	12-1
12.2.1.1	Methodology.....	12-1
12.2.1.2	Determination of Significance under NEPA	12-2
12.2.1.3	Issues Identified during Public Scoping Process	12-3
12.2.2	Alternative 1 Polaris Point (Preferred Alternative).....	12-3
12.2.2.1	Onshore.....	12-3
12.2.2.2	Offshore	12-3
12.2.2.3	Summary of Alternative 1 Impacts.....	12-5
12.2.2.4	Alternative 1 Proposed Mitigation Measures	12-5
12.2.3	Alternative 2 Former Ship Repair Facility (SRF)	12-5
12.2.3.1	Onshore.....	12-5
12.2.3.2	Offshore	12-7
12.2.3.3	Summary of Alternative 2 Impacts.....	12-7
12.2.3.4	Alternative 2 Proposed Mitigation Measures	12-7
12.2.4	Summary of Impacts	12-8
12.2.5	Summary of Proposed Mitigation Measures	12-8

CHAPTER 13. VISUAL RESOURCES	13-1
13.1 INTRODUCTION	13-1
13.2 ENVIRONMENTAL CONSEQUENCES	13-1
13.2.1 Approach to Analysis	13-1
13.2.1.1 Methodology.....	13-1
13.2.1.2 Determination of Significance.....	13-1
13.2.1.3 Issues Identified during Public Scoping Process	13-1
13.2.2 Alternative 1 Polaris Point (Preferred Alternative)	13-2
13.2.2.1 Onshore.....	13-2
13.2.2.2 Offshore	13-2
13.2.2.3 Summary of Alternative 1 Impacts.....	13-3
13.2.2.4 Alternative 1 Proposed Mitigation Measures	13-3
13.2.3 Alternative 2 Former Ship Repair Facility (SRF)	13-3
13.2.3.1 Onshore.....	13-3
13.2.3.2 Offshore	13-3
13.2.3.3 Summary of Alternative 2 Impacts.....	13-4
13.2.3.4 Alternative 2 Proposed Mitigation Measures	13-4
13.2.4 No-Action Alternative.....	13-4
13.2.5 Summary of Impacts	13-4
13.2.6 Summary of Proposed Mitigation Measures	13-5
CHAPTER 14. MARINE TRANSPORTATION	14-1
14.1 INTRODUCTION.....	14-1
14.2 ENVIRONMENTAL CONSEQUENCES	14-1
14.2.1 Approach to Analysis	14-1
14.2.1.1 Methodology.....	14-1
14.2.1.2 Determination of Significance.....	14-1
14.2.1.3 Issues Identified during Public Scoping Process	14-1
14.2.2 Alternative 1 Polaris Point (Preferred Alternative)	14-2
14.2.2.1 Onshore and Offshore.....	14-2
14.2.2.2 Summary of Alternative 1 Impacts.....	14-5
14.2.2.3 Alternative 1 Proposed Mitigation Measures	14-5
14.2.3 Alternative 2 Former Ship Repair Facility (SRF)	14-5
14.2.3.1 Onshore and Offshore.....	14-5
14.2.3.2 Summary of Alternative 2 Impacts.....	14-6
14.2.3.3 Alternative 2 Proposed Mitigation Measures	14-6
14.2.4 No-Action Alternative.....	14-6
14.2.5 Summary of Impacts	14-6
14.2.6 Summary of Proposed Mitigation Measures	14-7
CHAPTER 15. UTILITIES	15-1
CHAPTER 16. SOCIOECONOMICS AND GENERAL SERVICES	16-1
16.1 INTRODUCTION.....	16-1
16.2 ENVIRONMENTAL CONSEQUENCES	16-1
16.2.1 Methodology	16-1
16.2.1.1 Determination of Significance.....	16-1

16.2.1.2	Issues Identified During Public Scoping Process	16-1
16.2.2	Alternative 1 Polaris Point (Preferred Alternative)	16-1
16.2.2.1	Population Impacts	16-2
16.2.2.2	Economic Impacts	16-3
16.2.2.3	Public Services Impacts	16-11
16.2.2.4	Sociocultural Impacts	16-16
16.2.3	Summary of Impacts	16-17
16.2.3.1	Population Impacts	16-17
16.2.3.2	Economic Impacts	16-17
16.2.3.3	Public Service Impacts	16-18
16.2.3.4	Sociocultural Impacts	16-18
16.2.4	No-Action Alternative	16-19
16.2.4.1	Population/Economic Impacts	16-20
16.2.4.2	Public Service Impacts	16-20
16.2.4.3	Sociocultural Impacts	16-20
16.2.5	Summary of Proposed Mitigation Measures	16-21
CHAPTER 17. HAZARDOUS MATERIALS AND WASTE		17-1
17.1	INTRODUCTION	17-1
17.2	ENVIRONMENTAL CONSEQUENCES	17-1
17.2.1	Approach to Analysis	17-1
17.2.1.1	Methodology	17-1
17.2.1.2	Determination of Significance	17-1
17.2.1.3	Issues Identified During Public Scoping Process	17-1
17.2.2	Alternative 1 Polaris Point (Preferred Alternative)	17-2
17.2.2.1	Hazardous Materials	17-2
17.2.2.2	Toxic Substances	17-2
17.2.2.3	Hazardous Waste	17-3
17.2.2.4	Radiological Material Operation	17-3
17.2.2.5	Summary of Alternative 1 Impacts	17-3
17.2.2.6	Alternative 1 Proposed Mitigation Measures	17-3
17.2.3	Alternative 2 Former Ship Repair Facility (SRF)	17-5
17.2.3.1	Summary of Alternative 2 Impacts	17-5
17.2.3.2	Alternative 2 Proposed Mitigation Measures	17-5
17.2.4	No-Action Alternative	17-6
17.2.5	Summary of Impacts	17-6
17.2.6	Summary of Proposed Mitigation Measures	17-7
CHAPTER 18. PUBLIC HEALTH AND SAFETY		18-1
18.1	INTRODUCTION	18-1
18.1.1	Radiological Substances	18-1
18.1.1.1	Naval Nuclear Propulsion Program	18-1
18.1.1.2	Emergency Preparedness	18-2
18.2	ENVIRONMENTAL CONSEQUENCES	18-3
18.2.1	Approach to Analysis	18-3
18.2.1.1	Methodology	18-3

18.2.1.2	Determination of Significance	18-4
18.2.1.3	Issues Identified during Public Scoping Process	18-4
18.2.2	Alternative 1 Polaris Point (Preferred Alternative)	18-4
18.2.2.1	Environmental/Social Safety	18-4
18.2.2.2	Notifiable Diseases	18-7
18.2.2.3	Mental Illness	18-8
18.2.2.4	Traffic Incidents	18-8
18.2.2.5	UXO.....	18-8
18.2.2.6	Radiological Substances	18-9
18.2.2.7	Summary of Alternative 1 Impacts	18-12
18.2.2.8	Alternative 1 Proposed Mitigation Measures	18-12
18.2.3	Alternative 2 Former Ship Repair Facility (SRF)	18-12
18.2.3.1	Summary of Alternative 2 Impacts	18-13
18.2.3.2	Alternative 2 Proposed Mitigation Measures	18-13
18.2.4	No-Action Alternative.....	18-13
18.2.5	Summary of Impacts	18-13
18.2.6	Summary of Proposed Mitigation Measures	18-14
CHAPTER 19. ENVIRONMENTAL JUSTICE AND THE PROTECTION OF CHILDREN		19-1
19.1	INTRODUCTION.....	19-1
19.2	ENVIRONMENTAL CONSEQUENCES	19-1
19.2.1	Approach to Analysis	19-1
19.2.1.1	Methodology.....	19-1
19.2.1.2	Determination of Significance	19-3
19.2.1.3	Issues Identified during Public Scoping Process	19-3
19.2.1.4	Public Involvement.....	19-4
19.2.2	Alternative 1 Polaris Point (Preferred Alternative)	19-4
19.2.2.1	Onshore.....	19-4
19.2.2.2	Offshore	19-5
19.2.2.3	Summary of Alternative 1 Impacts	19-6
19.2.2.4	Alternative 1 Proposed Mitigation Measures	19-6
19.2.3	Alternative 2 Former Ship Repair Facility (SRF)	19-6
19.2.3.1	Onshore.....	19-6
19.2.3.2	Offshore	19-6
19.2.3.3	Summary of Alternative 2 Impacts.....	19-6
19.2.3.4	Alternative 2 Proposed Mitigation Measures	19-6
19.2.4	Summary of Impacts	19-7
19.2.5	Summary of Proposed Mitigation Measures	19-7
CHAPTER 20. REFERENCES.....		20-1
20.1	PURPOSE OF AND NEED FOR ACTION	20-1
20.2	PROPOSED ACTION AND ALTERNATIVES	20-1
20.3	GEOLOGICAL AND SOIL RESOURCES	20-2
20.4	WATER RESOURCES	20-2
20.5	AIR QUALITY	20-5
20.6	NOISE.....	20-6

20.7 AIRSPACE.....20-6

20.8 LAND AND SUBMERGED LANDS USE.....20-6

20.9 RECREATIONAL RESOURCES20-6

20.10 TERRESTRIAL BIOLOGICAL RESOURCES20-6

20.11 MARINE BIOLOGICAL RESOURCES20-7

20.12 CULTURAL RESOURCES.....20-16

20.13 VISUAL RESOURCES20-17

20.14 TRANSPORTATION20-17

20.15 UTILITIES20-17

20.16 SOCIOECONOMICS AND GENERAL SERVICES20-17

20.17 HAZARDOUS MATERIALS AND WASTE.....20-18

20.18 PUBLIC HEALTH AND SAFETY20-18

20.19 ENVIRONMENTAL JUSTICE AND THE PROTECTION OF CHILDREN20-18

List of Figures

Figure	Page
1.1-1. Location Map.....	1-5
1.1-2. Travel Distances within the Pacific Region.....	1-8
2.3-1. Wharf Location Screening Process.....	2-8
2.3-2. Aircraft Carrier Berthing Alternatives.....	2-10
2.3-3. Delta/Echo Wharf Location Limitations	2-12
2.3-4. Inner Harbor Wharf Location Limitations.....	2-15
2.3-5. Aircraft Carrier Channel Options	2-22
2.3-6. Aircraft Carrier Berthing Channel and Turning Basin	2-24
2.3-7. Inner Apra Harbor Turning Basin Alternative.....	2-25
2.3-8. Dry Dock Island Carrier Location Alternatives.....	2-27
2.3-9. Sediment Sample Locations (2006).....	2-33
2.3-10. Sediment Sample Locations (2010).....	2-35
2.4-1. Summary of Proposed Action and Alternatives Carried Forward for the Navy Aircraft Carrier Berthing, Guam.....	2-41
2.5-1. Alternative 1- Polaris Point	2-43
2.5-2. Polaris Point Alternative Site Plan	2-44
2.5-3. Polaris Point Improvements.....	2-45
2.5-4. Polaris Point Wharf Plan View.....	2-54
2.5-5. Wharf Profile View-Steel Piles	2-56
2.5-6. Polaris Point Dredge Areas.....	2-57
2.6-1. Alternative 2-Former SRF	2-60
2.6-2. Former SRF Alternative Site Plan	2-61
2.6-3. Former SRF Improvements	2-63
2.6-4. Former SRF Wharf-Plan View	2-68
2.6-5. Former SRF Dredge Areas	2-69
4.2-1. Alternative 1 Dredge Areas and Water Resources, Apra Harbor	4-9
4.2-2. Alternative 2 Dredge Areas and Water Resources, Apra Harbor	4-24
10.2-1. Vegetation Impacts, Naval Base Guam	10-5
10.2-2. Special-Status Species Impacts, Naval Base Guam.....	10-8
11.1-1 Bathymetric Map of the Study Area and Proposed Alternatives.....	11-2
11.1-2. Outer Apra Harbor Showing 67 Data Points/Transect Stations for Coral Habitat Surveys.....	11-4
11.1-3. Sand-rubble bottom (0% coral coverage) at Transects 58 (upper) and 67 (lower) (both potential direct dredge impacted areas; 35% of the dredge area includes this bottom type).....	11-7
11.1-4. Algae dominated areas of the CVN study area (0% coral coverage) include mats of <i>Padina</i> spp. (40% of the dredge area includes an algal bottom type).	11-8
11.1-5. Representative areas of mixed algae and coral on Transect 17 (a potentially indirectly [siltation only] impacted site) is representative of an area with 30% to <50% coral coverage.....	11-9

11.1-6. Benthic cover of upper edges of patch reefs on Transect 21 (a potentially directly [dredged] impacted site) dominated by hemispherical colonies of <i>P. lutea</i> (represents 70% to <90% coverage) – 4.8% of this bottom type may be indirectly impacted.	11-9
11.1-7. Monospecific field of <i>A. aspera</i> with black sponge smothering coral located at Western Shoals, Transect 9 (a potentially indirectly [siltation only] impacted site).	11-10
11.1-8. Various plating and laminar growth forms of <i>P. rus</i> , including colonies with upper living surfaces partially covered with sediment.	11-11
11.1-9. Bathymetric Coral Abundance for Alternative 1 and 2	11-12
11.1-10. Coral Abundance Map Showing Only Affected Areas of the Polaris Point and Former SRF Alternatives to a Depth of 60 ft (18 m)	11-17
11.1-11. Coral Abundance Map Showing Direct and Indirect Buffer Line and Transect Sites Associated with Proposed Alternatives 1 and 2	11-19
11.1-12. Dive Surveys and Transects.....	11-22
11.1-13. Coral Abundance Inner Apra Harbor Entrance Channel	11-28
11.1-14. Stacked Bar Graph Showing Cumulative Percent Covers for Each General Class in Each Transect. Transects are Arranged in Order of Lowest to Highest Coral Cover.	11-30
11.1-15. Cumulative Percent Covers for Each General Class in Each Transect, Arrange by Survey Stratum.....	11-31
11.1-16. Sensitive Marine Biological Resources and Habitats Associated with Apra Harbor	11-35
11.2-1. Coral Abundance and Sensitive Marine Biological Resources Associated with the Proposed Polaris Point Alternative.....	11-49
11.2-2. Sediment Deposition Contours from SEI Model Run 7B.....	11-57
11.2-3. Estimated Limits of Sediment Accumulation Exceeding 0.25 in (6 mm) 0.03oz/0.15in ² (1,000 mg/cm ²) for the Duration of the Dredging (8 to 18 months) within the Aircraft Carrier Fairway and Berthing Area	11-59
11.2-4. Potential Impacts to Sensitive Marine Biological Resources in Outer Apra Harbor with Implementation of the Action Alternative.....	11-68
11.2-5. Boundary of Guam Agency Proposed CVN Mitigation Area	11-96
11.2-6. Mitigation Area, GovGuam Parcel Ownership.....	11-97
11.2-7. Mitigation Area, Riparian Buffers for Stream	11-98
11.2-8. Mitigation Area Vegetation Types	11-99
11.2-9. Watershed and Subwatershed Restoration Areas	11-107
11.2-10. Coastal and Benthic Habitat for Southwestern Watershed Areas.....	11-111
11.2-11. Coastal and Benthic Habitat for Southeastern Watershed Areas.....	11-112
11.2-12. Watershed Vegetation Types.....	11-117
11.2-13. Deep Water Artificial Reef Schematic	11-131
11.2-14. Candidate Apra Harbor Deep Water Artificial Reef Sites and Orote Point ERA Expansion	11-132
11.2-15. Coral Abundance and Sensitive Marine Biological Resources Associated with the Proposed Former SRF Alternative	11-142
12.2-1. Alternative 1 Aircraft Carrier Berthing and Archaeological Probability Areas	12-4

12.2-2. Alternative 2 Aircraft Carrier Berthing and Archaeological Probability Areas 12-6

16.2-1. Population With and Without Proposed Action 16-3

16.2-2. Labor Force Demand (FTE Jobs) With and Without CVN Proposed Action 16-4

16.2-3. Labor Force Income (Millions of 2008 \$s) With and Without Proposed Action 16-6

16.2-4. Civilian Housing Demand with Proposed Action and Housing Supply 16-7

16.2-5. Gross Receipts Tax Revenue With and Without Proposed Action..... 16-8

16.2-6. Gross Island Product (Millions of 2008 \$s) With and Without Proposed Action 16-9

List of Tables

<u>Table</u>	<u>Page</u>
1.1-1. Representative Response Times to Southeast Asia by Sea.....	1-7
2.2-1. Vessel Characteristics.....	2-4
2.3-1. Alternative Analysis Summary.....	2-38
2.5-1. Aircraft Carrier Utility Requirements.....	2-49
2.5-2. Aircraft Carrier Utility Type of Construction.....	2-50
3.2-1. Erosion Potential at Apra Harbor	3-3
3.2-2. Summary of Alternative 1 Impacts.....	3-7
3.2-3. Summary of Alternative 2 Impacts.....	3-8
3.2-4. Summary of Impacts.....	3-9
4.2-1. Summary of Aggregate Effects to Jurisdictional Waters of the U.S. and Wetlands.....	4-10
4.2-2. Sediment Sampling Summary Table	4-15
4.2-3. Comparison of ER-Mq's for Each Analyte Group per Area Between Study Years.....	4-17
4.2-4. Radiological Test Results for Alpha/Bravo Wharves.....	4-20
4.2-5. Radiological Test Results for Outer Apra Harbor	4-20
4.2-6. Summary of Alternative 1 Impacts.....	4-22
4.2-7. Summary of Alternative 2 Impacts.....	4-26
4.2-5. Summary of Impacts.....	4-29
4.2-6. Summary of Proposed Mitigation Measures	4-30
4.3-1. Comparison of Alternative 1 and Alternative 2s	4-59
5.2-1. Total Increased Annual Emissions - Alternatives 1 and 2.....	5-6
5.2-2. Summary of Alternative 1 Impacts.....	5-7
5.2-3. Summary of Alternative 2 Impacts.....	5-8
5.2-4. Summary of Impacts.....	5-9
5.2-5. Summary of Proposed Mitigation Measures	5-9
6.2-1. Examples of Construction Noise Equipment.....	6-2
6.2-2. Summary of Alternative 1 Impacts.....	6-6
6.2-3. Summary of Alternative 2 Impacts.....	6-7
6.2-4. Summary of Impacts.....	6-7
8.2-1. Summary of Alternative 1 Impacts.....	8-7
8.2-2. Summary of Alternative 2 Impacts.....	8-9
8.2-3. Summary of Impacts.....	8-10
8.2-4. Summary of Proposed Mitigation Measures	8-11
9.2-1. Summary of Alternative 1 Impacts.....	9-4
9.2-2. Summary of Alternative 2 Impacts.....	9-5
9.2-3. Summary of Impacts.....	9-6
9.2-4. Summary of Proposed Mitigation Measures	9-7
10.2-1. Summary of Alternative 1 Impacts.....	10-10
10.2-2. Summary of Alternative 2 Impacts.....	10-13
10.2-3. Summary of Impacts.....	10-13

10.2-4. Summary of Proposed Mitigation Measures	10-14
11.1-1. Coral Cover in Six Levels for Direct and Indirect Areas at Polaris Point and Former SRF Alternative Aircraft Carrier Wharf Sites, Apra Harbor Guam	11-15
11.1-2. General Classes of Benthic Cover Percentages Exclusively Associated with Either Alternative 1 or Alternative 2 Direct Impact Areas	11-18
11.1-3. Prevalence of All Coral Species from Photo-quadrat Transect Data.....	11-32
11.1-4. Sensitive CRE MUS Associated with EFH for Apra Harbor	11-36
11.1-5. Special-Status Species Potentially Occurring within Apra Harbor	11-38
11.1-6. Hearing Thresholds and Bandwidth for Sea Turtles.....	11-40
11.2-1. Estimated Coral Area and Percentages Impacted by Proposed Dredging Activities with Implementation of Alternative 1	11-53
11.2-2. EFH Areas Associated with Apra Harbor and Potential Construction-related Impacts with Implementation of Alternative 1	11-65
11.2-3. Sensitive Months for EFH MUS within Apra Harbor	11-67
11.2-4. Sensitive Months for Sea Turtles within Apra Harbor	11-70
11.2-5. EFH Areas Associated with Apra Harbor and Operational Impacts with Implementation of Alternative 1	11-76
11.2-6. Summary of Alternative 1 Impacts.....	11-79
11.2-7. Coral Habitat Index Ranges.....	11-85
11.2-8. HEA Loss Calculations for Direct Impacts Arising from the Aircraft Carrier Project.....	11-86
11.2-9. HEA Loss Calculations for Indirect Impacts Arising from the Aircraft Carrier Project	11-87
11.2-10: Summary of Compensatory Mitigation Actions.....	11-104
11.2-11 Watershed Soil Types.....	11-109
11.2-12. Watershed Hydrologic Characteristics	11-110
11.2-13 Watershed and Target Vegetation Acreage within Bolanos Reserve Area	11-118
11.2-14 Historic Properties in Ugum, Umatac, Toguan, and Geus Watersheds*	11-120
11.2-16. Estimated Coral Area and Percentages Impacted by Proposed Dredging Activities with Implementation of Alternative 2	11-141
11.2-17. EFH Areas Associated with Apra Harbor and Potential Construction-related Effects with Implementation of Alternative 2	11-143
11.2-18. Summary of Alternative 2 NEPA Impacts	11-147
11.2-19. Summary of Impacts.....	11-151
11.2-20. EFHA Summary for Alternative 1 and Alternative 2 Proposed Actions.....	11-152
11.2-21. Estimated Coral Area and Percentages Impacted with Implementation of Alternative 1 and 2 Proposed Dredging Activities.....	11-156
11.2-22. Summary of Mitigation Measures	11-158
12.2-1. Summary of Alternative 1 Impacts.....	12-5
12.2-2. Summary of Alternative 2 Impacts.....	12-7
12.2-3. Summary of Impacts.....	12-8
13.2-1. Summary of Alternative 1 Impacts.....	13-3
13.2-2. Summary of Alternative 2 Impacts.....	13-4
13.2-3. Summary of Impacts.....	13-5
14.2-1. Travel Distance to Upland Placement Sites.....	14-3

14.2-2. Summary of Alternative 1 Impacts 14-5

14.2-3 Summary of Alternative 2 Impacts 14-6

14.2-4 Summary of Impacts 14-7

16.2-1. Construction Component Assumptions for Project Related Population Impacts 16-2

16.2-2. Operational Component Assumptions for Project Related Population Impacts 16-2

16.2-3. Estimated Population Increase Related to Navy Proposed Action 16-2

16.2-4. Impact on Civilian Labor Force Demand (Full-Time Equivalent Jobs) 16-4

16.2-5. Estimated Origin of Workers Constructing Naval Facilities 16-5

16.2-6. Estimated Numbers of On-Island Workers for Various Job Categories Other Than
Direct On-Site Construction 16-5

16.2-7. Impact on Civilian Labor Force Income (Millions of 2008 \$s) 16-5

16.2-8. Demand for New Civilian Housing Units 16-6

16.2-9. Impact on Selected Tax Revenues (1,000s of 2008 \$s) 16-8

16.2-10. Impact on Gross Island Product (Millions of 2008 \$s) 16-8

16.2-11. Topics for Tourism Impact Analysis (Aircraft Carrier Berthing) 16-10

16.2-12. GPSS Student Population Impacts Summary 16-11

16.2-13. Primary and Secondary Education Teacher Requirements Impacts Summary 16-11

16.2-14. Higher Education Student Population Impacts Summary 16-12

16.2-15. Higher Education Faculty Requirement Impacts Summary 16-12

16.2-16. Impact on Public Health and Human Services, Service Population Summary 16-12

16.2-17. Public Health and Human Services Impact Summary 16-13

16.2-18. Impact on Public Safety Service Population Summary 16-14

16.2-19. Public Safety Services Staffing Impacts Summary 16-14

16.2-20. Impact on Other Selected General Service Agency Service Population 16-15

16.2-21. Other Selected General Service Agency Impacts Summary 16-15

16.2-22. Additional Growth Permitting Staff Required 16-16

16.2-23. Summary of Impacts 16-19

16.2-24. Summary of Proposed Mitigation Measures 16-21

17.2-1. Summary of Alternative 1 Impacts 17-3

17.2-2. Hazardous Materials Consequences, BMPs, and SOPs 17-4

17.2-3. Hazardous Waste Consequences, BMPs, and SOPs 17-5

17.2-4. Summary of Impacts 17-6

17.2-5. Summary of BMPs and SOPs 17-7

18.2-1. Summary of Alternative 1 Impacts 18-12

18.2-2. Summary of Alternative 2 Impacts 18-13

18.2-3. Summary of Impacts 18-13

19.2-1. Summary of Alternative 1 Impacts 19-6

19.2-2. Summary of Alternative 2 Impacts 19-6

19.2-3. Summary of Impacts 19-7