

Draft

**Commonwealth of the Northern Mariana Islands
Joint Military Training
Environmental Impact Statement/
Overseas Environmental Impact Statement**

Table of Contents

ABSTRACT	A-1
READERS GUIDE	
ACRONYMS AND ABBREVIATIONS	
GLOSSARY.....	
EXECUTIVE SUMMARY	ES-1
CHAPTER 1 INTRODUCTION	1-1
1.1 INTRODUCTION	1-1
1.2 WHY AND HOW THE U.S. MILITARY TRAINS.....	1-4
1.2.1 STATUTORY MISSION.....	1-4
1.2.2 WHY THE U.S. MILITARY TRAINS.....	1-5
1.2.3 HOW TRAINING IS CONDUCTED.....	1-6
1.3 PURPOSE OF AND NEED FOR THE PROPOSED ACTION.....	1-8
1.3.1 INSTITUTE FOR DEFENSE ANALYSES STUDY	1-8
1.3.2 2010 QUADRENNIAL DEFENSE REVIEW	1-8
1.3.3 RE-BALANCE TO THE PACIFIC.....	1-9
1.3.4 THE 2+2 STATEMENTS OF APRIL 2012 AND OCT 2013.....	1-9
1.3.5 TRAINING NEEDS ASSESSMENT.....	1-10
1.3.6 TRAINING REQUIREMENTS AND SITING STUDY	1-10
1.3.7 2014 QUADRENNIAL DEFENSE REVIEW	1-11
1.4 THE MARIANA ISLANDS	1-11
1.4.1 BACKGROUND	1-11
1.4.2 COMMONWEALTH OF THE NORTHERN MARIANA ISLANDS MILITARY LEASE AREAS	1-11
1.4.3 COMMONWEALTH OF THE NORTHERN MARIANA ISLANDS MILITARY TRAINING	1-13
1.5 ENVIRONMENTAL REVIEW PROCESS AND PUBLIC INVOLVEMENT.....	1-16
1.5.1 ENVIRONMENTAL REVIEW PROCESS	1-16
1.5.2 PUBLIC INVOLVEMENT	1-16
1.5.2.1 Notice of Intent	1-16
1.5.2.2 Public Scoping Comment Period.....	1-17
1.5.2.3 Draft EIS/OEIS.....	1-18
1.5.2.4 Final EIS/OEIS	1-19
1.5.2.5 Record of Decision	1-19

1.5.3	AGENCY AND STAKEHOLDER COORDINATION	1-19
1.5.3.1	Cooperating Agencies	1-19
1.5.3.2	Agency Consultation	1-21
1.5.3.3	Collaborative Stakeholder Coordination.....	1-21
1.5.3.4	Federal Actions.....	1-22
CHAPTER 2	PROPOSED ACTION AND ALTERNATIVES	2-1
2.1	OVERVIEW OF THE PROPOSED ACTION.....	2-1
2.2	UNIT AND COMBINED LEVEL TRAINING REQUIREMENTS, REPRESENTATIVE TRAINING, WEAPONS, EQUIPMENT, PARTICIPANTS, AND TRAINING SCENARIOS	2-4
2.2.1	UNFILLED UNIT AND COMBINED LEVEL TRAINING REQUIREMENTS	2-4
2.2.2	REPRESENTATIVE TRAINING	2-6
2.2.3	REPRESENTATIVE WEAPONS AND EQUIPMENT	2-8
2.2.4	REPRESENTATIVE LIVE-FIRE TRAINING PARTICIPANTS AND SCENARIOS	2-13
2.2.4.1	Unit Level Training Participants	2-13
2.2.4.2	Unit Level Training Scenario.....	2-16
2.2.4.3	Combined Level Training Participants.....	2-18
2.2.4.4	Combined Level Training Scenario	2-20
2.3	ALTERNATIVES DEVELOPMENT	2-22
2.3.1	OPERATIONAL SITING CRITERIA	2-22
2.3.2	DEVELOPMENT OF UNIT LEVEL RANGE AND TRAINING AREA ALTERNATIVES ON TINIAN	2-24
2.3.2.1	Initial Development of Tinian Unit Level Range and Training Area Alternatives	2-25
2.3.2.2	Refinement of Tinian Unit Level Range and Training Area Alternatives	2-26
2.3.3	DEVELOPMENT OF COMBINED LEVEL RANGE AND TRAINING AREA ALTERNATIVES ON PAGAN.....	2-28
2.3.3.1	Initial Development of Pagan Combined Level Range and Training Area Alternatives	2-28
2.3.3.2	Refinement of Pagan Combined Level Range and Training Area Alternatives	2-29
2.3.4	ACTION ALTERNATIVES CARRIED FORWARD FOR ANALYSIS.....	2-30
2.4	TINIAN ALTERNATIVES.....	2-30
2.4.1	ELEMENTS COMMON TO ALL ACTION ALTERNATIVES	2-31
2.4.1.1	Land Use Agreements	2-33
2.4.1.2	Construction and Improvements	2-33
2.4.1.3	Training Operations	2-67
2.4.1.4	Operation and Management of Tinian Range and Training Area	2-74
2.4.1.5	Transportation	2-78
2.4.1.6	Munitions	2-79
2.4.1.7	Danger Zones	2-81
2.4.1.8	Airspace Requirements	2-81

2.4.1.9	Sea Space Requirements.....	2-90
2.4.2	TINIAN ALTERNATIVE 1	2-90
2.4.2.1	Construction and Improvements	2-92
2.4.2.2	Training	2-92
2.4.3	TINIAN ALTERNATIVE 2	2-95
2.4.3.1	Construction and Improvements	2-95
2.4.3.2	Training	2-99
2.4.4	TINIAN ALTERNATIVE 3	2-100
2.4.4.1	Construction and Improvements	2-100
2.4.4.2	Training	2-100
2.4.5	TINIAN NO-ACTION ALTERNATIVE.....	2-102
2.4.5.1	Mariana Islands Range Complex	2-103
2.4.5.2	Current Training Operations on Tinian	2-104
2.4.5.3	Additional Ranges and Training	2-105
2.4.6	SUMMARY COMPARISON OF TINIAN ALTERNATIVES.....	2-108
2.5	PAGAN ALTERNATIVES	2-113
2.5.1	ELEMENTS COMMON TO ALL ACTION ALTERNATIVES	2-113
2.5.1.1	Land Use Agreements	2-113
2.5.1.2	Construction and Improvements	2-115
2.5.1.3	Training Operations	2-120
2.5.1.4	Operation and Management of Pagan Range and Training Area	2-125
2.5.1.5	Transportation	2-128
2.5.1.6	Munitions	2-129
2.5.1.7	Danger Zones	2-130
2.5.1.8	Airspace Requirements.....	2-131
2.5.1.9	Sea Space Requirements.....	2-137
2.5.2	PAGAN ALTERNATIVE 1.....	2-137
2.5.2.1	Construction and Improvements	2-137
2.5.2.2	Training	2-141
2.5.3	PAGAN ALTERNATIVE 2.....	2-141
2.5.3.1	Construction and Improvements	2-145
2.5.3.2	Training	2-145
2.5.4	PAGAN NO-ACTION ALTERNATIVE	2-146
2.5.5	SUMMARY COMPARISON OF PAGAN ALTERNATIVES.....	2-146
2.6	ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS.....	2-149
2.6.1	ALTERNATIVES OUTSIDE OF THE CNMI.....	2-149
2.6.2	ALTERNATIVES WITH A SINGLE LOCATION WITHIN THE CNMI	2-149
2.7	PREFERRED ALTERNATIVE.....	2-149
CHAPTER 3	AFFECTED ENVIRONMENT.....	3-1
3.1	INTRODUCTION	3-1
3.2	GEOLOGY AND SOILS	3-1

3.2.1	DEFINITION.....	3-1
3.2.2	REGULATORY FRAMEWORK	3-2
3.2.2.1	Federal Regulations and Codes.....	3-2
3.2.2.2	CNMI Regulation	3-2
3.2.3	METHODOLOGY.....	3-3
3.2.4	REGIONAL GEOLOGIC SETTING	3-3
3.2.5	TINIAN	3-5
3.2.5.1	Topography	3-5
3.2.5.2	Geology	3-7
3.2.5.3	Soils	3-12
3.2.6	PAGAN.....	3-15
3.2.6.1	Topography	3-15
3.2.6.2	Geology	3-18
3.2.6.3	Soils	3-23
3.3	WATER RESOURCES	3-24
3.3.1	DEFINITION.....	3-24
3.3.2	REGULATORY FRAMEWORK	3-25
3.3.2.1	Federal Regulation	3-25
3.3.2.2	CNMI Regulation	3-25
3.3.3	METHODOLOGY.....	3-26
3.3.4	TINIAN	3-26
3.3.4.1	Surface Water Resources	3-26
3.3.4.2	Groundwater Resources	3-31
3.3.4.3	Nearshore Waters.....	3-35
3.3.5	PAGAN.....	3-37
3.3.5.1	Surface Water Resources	3-37
3.3.5.2	Groundwater Resources	3-41
3.3.5.3	Nearshore Waters.....	3-41
3.4	AIR QUALITY.....	3-43
3.4.1	DEFINITION.....	3-43
3.4.2	REGULATORY FRAMEWORK	3-43
3.4.3	METHODOLOGY.....	3-44
3.4.4	TINIAN	3-44
3.4.5	PAGAN.....	3-45
3.5	NOISE	3-46
3.5.1	DEFINITION.....	3-46
3.5.1.1	Sound Level.....	3-46
3.5.1.2	Frequency Weighting (A and C Weighting).....	3-47
3.5.1.3	Noise Metrics	3-47
3.5.1.4	Noise Modeling	3-48
3.5.1.5	Noise Zones.....	3-48

3.5.2	REGULATORY FRAMEWORK	3-48
3.5.3	METHODOLOGY.....	3-51
3.5.4	TINIAN	3-51
3.5.4.1	Ground-based Military Training Activities	3-52
3.5.4.2	Aircraft and Airspace Activities	3-52
3.5.4.2.2	Tinian International Airport	3-53
3.5.4.3	Waterborne Activities	3-55
3.5.4.4	Traffic	3-55
3.5.4.5	Pagan.....	3-56
3.6	AIRSPACE	3-57
3.6.1	DEFINITION.....	3-58
3.6.2	REGULATORY FRAMEWORK	3-62
3.6.3	METHODOLOGY.....	3-63
3.6.4	TINIAN	3-63
3.6.4.1	Tinian International Airport	3-64
3.6.4.2	Tinian North Field.....	3-66
3.6.4.3	Saipan International Airport	3-66
3.6.4.4	Airspace Designated for Military Use	3-68
3.6.4.5	Commercial Aviation Routes.....	3-70
3.6.4.6	Airspace Obstructions	3-71
3.6.5	PAGAN.....	3-73
3.6.5.1	Airspace Designated for Military Use	3-73
3.6.5.2	Aviation Routes	3-73
3.6.5.3	Airspace Obstructions	3-74
3.7	LAND AND SUBMERGED LAND USE.....	3-75
3.7.1	DEFINITION.....	3-75
3.7.2	REGULATORY FRAMEWORK	3-77
3.7.2.1	Federal Regulations.....	3-77
3.7.2.2	CNMI Regulations.....	3-77
3.7.2.3	U.S.-CNMI Covenant and Lease Agreements.....	3-78
3.7.3	METHODOLOGY.....	3-79
3.7.3.1	The CNMI Coastal Resources Management Plan.....	3-79
3.7.3.2	The CNMI Land Use Plans	3-80
3.7.3.3	The CNMI Homestead Program	3-80
3.7.4	TINIAN	3-81
3.7.4.1	Jurisdictional Control and Management.....	3-81
3.7.4.2	Existing Land Use	3-87
3.7.4.3	Existing Submerged Land Use	3-90
3.7.4.4	Tinian Land Use Plans.....	3-90
3.7.4.5	Saipan Existing Land and Submerged Land Use.....	3-90
3.7.5	PAGAN.....	3-91
3.7.5.1	Land Jurisdictional Control and Management	3-91
3.7.5.2	Existing Land Use	3-91

3.7.5.3	Existing Submerged Land Use	3-93
3.7.5.4	Pagan Land Use Plans.....	3-93
3.8	RECREATION.....	3-94
3.8.1	DEFINITION.....	3-94
3.8.2	REGULATORY FRAMEWORK	3-94
3.8.3	METHODOLOGY.....	3-95
3.8.4	TINIAN	3-95
3.8.4.1	Historic and Cultural Sites	3-95
3.8.4.2	Beaches and Parks.....	3-102
3.8.4.3	Ocean-based Resources	3-105
3.8.4.4	Scenic Points	3-107
3.8.4.5	Annual Events	3-107
3.8.5	PAGAN.....	3-108
3.9	TERRESTRIAL BIOLOGY	3-110
3.9.1	DEFINITION.....	3-110
3.9.1.1	Vegetation Communities	3-110
3.9.1.2	Wildlife	3-110
3.9.1.3	Special-status Species	3-110
3.9.2	REGULATORY FRAMEWORK	3-111
3.9.3	METHODOLOGY.....	3-111
3.9.3.1	Study Areas	3-111
3.9.3.2	Data Sources and Surveys	3-111
3.9.4	TINIAN	3-112
3.9.4.1	Vegetation Communities	3-112
3.9.4.2	Native Wildlife.....	3-117
3.9.4.3	Non-native Wildlife	3-121
3.9.4.4	Special-status Species	3-123
3.9.5	PAGAN.....	3-133
3.9.5.1	Vegetation Communities	3-133
3.9.5.2	Native Wildlife.....	3-138
3.9.5.3	Non-native Wildlife	3-139
3.9.5.4	Special-status Species	3-140
3.10	MARINE BIOLOGY.....	3-144
3.10.1	DEFINITION.....	3-144
3.10.1.1	Marine Habitat and Essential Fish Habitat.....	3-144
3.10.1.2	Marine Flora.....	3-146
3.10.1.3	Marine Invertebrates	3-147
3.10.1.4	Fish	3-148
3.10.1.5	Special-status Species	3-148
3.10.2	REGULATORY FRAMEWORK	3-149
3.10.2.1	Federal Regulations.....	3-149
3.10.3	METHODOLOGY.....	3-150

3.10.4	TINIAN	3-150
3.10.4.1	Marine Habitat and Essential Fish Habitat.....	3-150
3.10.4.2	Marine Flora.....	3-154
3.10.4.3	Marine Invertebrates	3-155
3.10.4.4	Fish	3-165
3.10.4.5	Special-status Species	3-166
3.10.5	PAGAN.....	3-175
3.10.5.1	Marine Habitats	3-175
3.10.5.2	Marine Flora.....	3-178
3.10.5.3	Marine Invertebrates	3-178
3.10.5.4	Fish	3-190
3.10.5.5	Special-status Species	3-190
3.11	CULTURAL RESOURCES	3-196
3.11.1	DEFINITION.....	3-196
3.11.2	REGULATORY FRAMEWORK	3-197
3.11.3	METHODOLOGY.....	3-197
3.11.4	TINIAN	3-197
3.11.4.1	Previous Cultural Resource Studies and Recorded Resources.....	3-199
3.11.5	PAGAN.....	3-201
3.11.5.1	Previous Cultural Resource Studies and Recorded Resources.....	3-201
3.12	VISUAL RESOURCES	3-203
3.12.1	DEFINITION.....	3-203
3.12.2	REGULATORY FRAMEWORK	3-203
3.12.3	METHODOLOGY.....	3-203
3.12.4	TINIAN	3-204
3.12.4.1	Regional Visual Environment and Study Area.....	3-204
3.12.4.2	North Lowland	3-206
3.12.4.3	West Tinian	3-210
3.12.4.4	East Tinian	3-212
3.12.5	PAGAN.....	3-215
3.12.5.1	North Pagan	3-215
3.12.5.2	Central Pagan	3-218
3.12.5.3	South Pagan	3-218
3.13	TRANSPORTATION.....	3-219
3.13.1	DEFINITION.....	3-219
3.13.2	REGULATORY FRAMEWORK	3-219
3.13.2.1	Air Transportation.....	3-219
3.13.2.2	Ground Transportation	3-220
3.13.2.3	Marine Transportation	3-220
3.13.3	METHODOLOGY.....	3-220
3.13.3.1	Air Transportation.....	3-220
3.13.3.2	Ground Transportation	3-220

3.13.3.3	Marine Transportation.....	3-220
3.13.4	TINIAN	3-221
3.13.4.1	Air Transportation.....	3-221
3.13.4.2	Ground Transportation	3-223
3.13.4.3	Marine Transportation.....	3-226
3.13.5	PAGAN.....	3-228
3.13.5.1	Air Transportation.....	3-228
3.13.5.2	Ground Transportation	3-228
3.13.5.3	Marine Transportation.....	3-228
3.14	UTILITIES	3-230
3.14.1	DEFINITION.....	3-230
3.14.2	REGULATORY FRAMEWORK	3-230
3.14.3	METHODOLOGY.....	3-231
3.14.4	TINIAN	3-231
3.14.4.1	Electrical Power.....	3-231
3.14.4.2	Potable Water	3-234
3.14.4.3	Wastewater.....	3-237
3.14.4.4	Stormwater	3-239
3.14.4.5	Solid Waste	3-239
3.14.4.6	Information Technology/Communications.....	3-241
3.14.5	PAGAN.....	3-241
3.14.5.1	Electrical Power.....	3-241
3.14.5.2	Potable Water	3-241
3.14.5.3	Wastewater.....	3-242
3.14.5.4	Stormwater	3-242
3.14.5.5	Solid Waste	3-242
3.14.5.6	Information Technology/Communications	3-242
3.15	SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE	3-243
3.15.1	DEFINITION.....	3-243
3.15.2	REGULATORY FRAMEWORK	3-244
3.15.3	METHODOLOGY.....	3-244
3.15.4	SOCIOECONOMIC CONTEXT	3-245
3.15.4.1	Commonwealth of the Northern Mariana Islands.....	3-245
3.15.4.2	Tinian.....	3-246
3.15.4.3	Pagan.....	3-246
3.15.5	POPULATION CHARACTERISTICS.....	3-247
3.15.6	ECONOMIC CHARACTERISTICS	3-248
3.15.6.1	Employment and Income	3-248
3.15.6.2	Gross Domestic Product.....	3-250
3.15.6.3	Commonwealth Government Finances	3-250
3.15.6.4	Housing	3-251
3.15.6.5	Tourism	3-251
3.15.6.6	Commercial Agriculture	3-253

3.15.6.7 Commercial Fishing	3-255
3.15.6.8 Aquaculture.....	3-257
3.15.6.9 Commercial Hunting	3-257
3.15.6.10 Minerals	3-257
3.15.6.11 Airports and Sea Ports	3-258
3.15.6.12 Power Utility Rates.....	3-259
3.15.7 PUBLIC SERVICES.....	3-259
3.15.7.1 Education	3-259
3.15.7.2 Emergency Services.....	3-260
3.15.7.3 Health.....	3-261
3.15.8 SOCIAL AND COMMUNITY TOPICS	3-262
3.15.8.1 CNMI	3-262
3.15.8.2 Tinian.....	3-263
3.15.8.3 Pagan.....	3-264
3.15.9 ENVIRONMENTAL JUSTICE AND THE PROTECTION OF CHILDREN	3-265
3.15.9.1 Minority Population Areas	3-265
3.15.9.2 Low-income Population Areas	3-266
3.15.9.3 Areas with High Concentration of Children	3-268
3.16 HAZARDOUS MATERIALS AND WASTE	3-271
3.16.1 DEFINITIONS	3-271
3.16.1.1 Hazardous Materials	3-271
3.16.1.2 Toxic Substances	3-271
3.16.1.3 Hazardous Waste	3-272
3.16.1.4 Contaminated Sites	3-272
3.16.2 REGULATORY FRAMEWORK	3-274
3.16.2.1 Federal Regulations.....	3-274
3.16.2.2 CNMI Regulations.....	3-275
3.16.3 METHODOLOGY.....	3-275
3.16.4 TINIAN	3-275
3.16.4.1 Hazardous Materials	3-276
3.16.4.2 Toxic Substances	3-278
3.16.4.3 Hazardous Waste	3-280
3.16.4.4 Potential and Confirmed Contaminated Sites	3-281
3.16.5 PAGAN.....	3-291
3.16.5.1 Hazardous Materials	3-291
3.16.5.2 Toxic Substances	3-291
3.16.5.3 Hazardous Waste	3-291
3.16.5.4 Potentially and Confirmed Contaminated Sites.....	3-291
3.17 PUBLIC HEALTH AND SAFETY	3-294
3.17.1 DEFINITION.....	3-294
3.17.2 REGULATORY FRAMEWORK	3-294
3.17.3 METHODOLOGY.....	3-295
3.17.4 TINIAN	3-295

3.17.4.1	Aircraft Operations	3-295
3.17.4.2	Ground Operations	3-298
3.17.4.3	Marine Operations.....	3-301
3.17.5	PAGAN.....	3-302
3.17.5.1	Aircraft Operations	3-302
3.17.5.2	Ground Operations	3-302
3.17.5.3	Marine Operations.....	3-303
CHAPTER 4	ENVIRONMENTAL CONSEQUENCES	4-1
4.1	INTRODUCTION	4-1
4.1.1	ENVIRONMENTAL RESOURCE SECTIONS	4-1
4.1.2	APPROACH TO ANALYSIS	4-1
4.1.3	RESOURCE MANAGEMENT MEASURES	4-1
4.1.4	ACTION ALTERNATIVES	4-2
4.1.5	CONSTRUCTION AND OPERATION IMPACTS	4-2
4.1.5.1	Impact Determination.....	4-2
4.1.5.2	Potential Mitigation Measures	4-2
4.1.6	NO-ACTION ALTERNATIVE	4-3
4.1.7	PROGRAMMATIC ANALYSIS.....	4-3
4.1.8	SECTION 4(F) EVALUATION	4-3
4.1.9	SUMMARY OF IMPACTS AND MITIGATIONS.....	4-3
4.2	GEOLOGY AND SOILS	4-4
4.2.1	APPROACH TO ANALYSIS	4-4
4.2.2	RESOURCE MANAGEMENT MEASURES	4-5
4.2.2.1	Avoidance and Minimization Measures.....	4-5
4.2.2.2	Best Management Practices and Standard Operating Procedures	4-5
4.2.3	TINIAN	4-6
4.2.3.1	Tinian Alternative 1	4-6
4.2.3.2	Tinian Alternative 2	4-17
4.2.3.3	Tinian Alternative 3	4-21
4.2.3.4	Tinian No-Action Alternative.....	4-25
4.2.3.5	Summary of Impacts for Tinian Alternatives	4-26
4.2.4	PAGAN.....	4-27
4.2.4.1	Pagan Alternative 1	4-27
4.2.4.2	Pagan Alternative 2	4-33
4.2.4.3	Pagan No-Action Alternative.....	4-35
4.2.4.4	Summary of Impacts for Pagan Alternatives	4-35
4.3	WATER RESOURCES	4-36
4.3.1	APPROACH TO ANALYSIS	4-36
4.3.1.1	Surface Water	4-36
4.3.1.2	Groundwater.....	4-36
4.3.1.3	Nearshore Waters	4-37

4.3.2	RESOURCE MANAGEMENT MEASURES	4-37
4.3.2.1	Avoidance and Minimization Measures.....	4-37
4.3.2.2	Best Management Practices and Standard Operating Procedures	4-38
4.3.3	TINIAN	4-40
4.3.3.1	Tinian Alternative 1.....	4-40
4.3.3.2	Tinian Alternative 2.....	4-51
4.3.3.3	Tinian Alternative 3	4-53
4.3.3.4	Tinian No-Action Alternative.....	4-53
4.3.3.5	Summary of Impacts for Tinian Alternatives	4-55
4.3.4	PAGAN.....	4-56
4.3.4.1	Pagan Alternative 1.....	4-56
4.3.4.2	Pagan Alternative 2.....	4-62
4.3.4.3	Pagan No-Action Alternative.....	4-62
4.3.4.4	Summary of Impacts for Pagan Alternatives	4-64
4.4	AIR QUALITY.....	4-65
4.4.1	APPROACH TO ANALYSIS	4-65
4.4.1.1	Construction.....	4-66
4.4.1.2	Operation	4-67
4.4.2	RESOURCE MANAGEMENT MEASURES	4-68
4.4.3	TINIAN	4-69
4.4.3.1	Tinian Alternative 1	4-69
4.4.3.2	Tinian Alternative 2	4-71
4.4.3.3	Tinian Alternative 3	4-71
4.4.3.4	Tinian No-Action Alternative.....	4-72
4.4.3.5	Summary of Impacts for Tinian Alternatives	4-73
4.4.4	PAGAN.....	4-74
4.4.4.1	Pagan Alternative 1.....	4-74
4.4.4.2	Pagan Alternative 2.....	4-75
4.4.4.3	Pagan No-Action Alternative.....	4-76
4.4.4.4	Summary of Impacts for Pagan Alternatives	4-76
4.5	NOISE	4-77
4.5.1	APPROACH TO ANALYSIS	4-77
4.5.1.1	Construction.....	4-77
4.5.1.2	Operations	4-78
4.5.2	RESOURCE MANAGEMENT MEASURES	4-80
4.5.2.1	Construction.....	4-80
4.5.2.2	Operation	4-80
4.5.3	TINIAN	4-81
4.5.3.1	Tinian Alternative 1	4-81
4.5.3.2	Tinian Alternative 2	4-109
4.5.3.3	Tinian Alternative 3	4-112
4.5.3.4	Tinian No-Action Alternative.....	4-115
4.5.3.5	Summary of Impacts for Tinian Alternatives	4-116

4.5.4	PAGAN	4-117
4.5.4.1	Pagan Alternative 1	4-117
4.5.4.2	Pagan Alternative 2	4-129
4.5.4.3	Pagan No-Action Alternative	4-130
4.5.4.4	Summary of Impacts for Pagan Alternatives	4-131
4.6	AIRSPACE	4-132
4.6.1	APPROACH TO ANALYSIS	4-132
4.6.2	RESOURCE MANAGEMENT MEASURES	4-135
4.6.3	TINIAN	4-136
4.6.3.1	Tinian Alternative 1	4-136
4.6.3.2	Tinian Alternative 2	4-145
4.6.3.3	Tinian Alternative 3	4-146
4.6.3.4	Tinian No-Action Alternative	4-146
4.6.3.5	Summary of Impacts for Tinian Alternatives	4-147
4.6.3.6	Summary of Potential Mitigation Measures for Tinian Alternatives	4-148
4.6.4	PAGAN	4-150
4.6.4.1	Pagan Alternative 1	4-150
4.6.4.2	Pagan Alternative 2	4-152
4.6.4.3	Pagan No-Action Alternative	4-152
4.6.4.4	Summary of Impacts for Pagan Alternatives	4-153
4.7	LAND AND SUBMERGED LAND USE.....	4-154
4.7.1	APPROACH TO ANALYSIS	4-154
4.7.2	RESOURCE MANAGEMENT MEASURES	4-155
4.7.3	TINIAN	4-155
4.7.3.1	Tinian Alternative 1	4-155
4.7.3.2	Tinian Alternative 2	4-164
4.7.3.3	Tinian Alternative 3	4-165
4.7.3.4	Tinian No-Action Alternative	4-165
4.7.3.5	Summary of Impacts for Tinian Alternatives	4-166
4.7.3.6	Summary of Potential Mitigation Measures for Tinian Alternatives	4-167
4.7.4	PAGAN	4-168
4.7.4.1	Pagan Alternative 1	4-168
4.7.4.2	Pagan Alternative 2	4-171
4.7.4.3	Pagan No-Action Alternative	4-171
4.7.4.4	Summary of Impacts for Pagan Alternatives	4-171
4.8	RECREATION.....	4-172
4.8.1	APPROACH TO ANALYSIS	4-172
4.8.2	RESOURCE MANAGEMENT MEASURES	4-173
4.8.3	TINIAN	4-174
4.8.3.1	Tinian Alternative 1	4-174
4.8.3.2	Tinian Alternative 2	4-181
4.8.3.3	Tinian Alternative 3	4-181
4.8.3.4	Tinian No-Action Alternative	4-182

4.8.3.5	Summary of Impacts for Tinian Alternatives	4-183
4.8.3.6	Summary of Potential Mitigation Measures for Tinian Alternatives	4-184
4.8.4	PAGAN.....	4-185
4.8.4.1	Pagan Alternative 1	4-185
4.8.4.2	Pagan Alternative 2	4-185
4.8.4.3	Pagan No-Action Alternative.....	4-186
4.8.4.4	Summary of Impacts for Pagan Alternatives	4-186
4.9	TERRESTRIAL BIOLOGY	4-187
4.9.1	APPROACH TO ANALYSIS	4-187
4.9.1.1	Vegetation Communities	4-188
4.9.1.2	Native Wildlife.....	4-188
4.9.1.3	Special-status Species	4-189
4.9.2	RESOURCE MANAGEMENT MEASURES	4-191
4.9.2.1	Avoidance and Minimization Measures.....	4-191
4.9.2.2	Best Management Practices and Standard Operating Procedures	4-192
4.9.3	TINIAN	4-193
4.9.3.1	Tinian Alternative 1	4-193
4.9.3.2	Tinian Alternative 2	4-217
4.9.3.3	Tinian Alternative 3	4-227
4.9.3.4	Tinian No-Action Alternative.....	4-237
4.9.3.5	Summary of Impacts for Tinian Alternatives	4-238
4.9.3.6	Summary of Potential Mitigation Measures for Tinian Alternatives	4-239
4.9.4	PAGAN.....	4-244
4.9.4.1	Pagan Alternative 1	4-244
4.9.4.2	Pagan Alternative 2	4-255
4.9.4.3	Pagan No-Action Alternative.....	4-261
4.9.4.4	Summary of Impacts for Pagan Alternatives	4-261
4.9.4.5	Summary of Potential Mitigation Measures for Pagan Alternatives	4-262
4.10	MARINE BIOLOGY.....	4-264
4.10.1	APPROACH TO ANALYSIS	4-264
4.10.1.1	Marine Habitat and Essential Fish Habitat.....	4-265
4.10.1.2	Marine Flora.....	4-266
4.10.1.3	Marine Invertebrates	4-266
4.10.1.4	Fish	4-266
4.10.1.5	Special-status Species	4-266
4.10.2	RESOURCE MANAGEMENT MEASURES	4-267
4.10.2.1	Avoidance and Minimization Measures.....	4-267
4.10.2.2	Best Management Practices and Standard Operating Procedures	4-268
4.10.3	TINIAN	4-270
4.10.3.1	Tinian Alternative 1	4-270
4.10.3.2	Tinian Alternative 2	4-297
4.10.3.3	Tinian Alternative 3	4-297
4.10.3.4	Tinian No-Action Alternative.....	4-298

4.10.3.5	Summary of Impacts for Tinian Alternatives	4-299
4.10.3.6	Summary of Potential Mitigation Measures for Tinian Alternatives	4-300
4.10.4	PAGAN.....	4-302
4.10.4.1	Pagan Alternative 1	4-302
4.10.4.2	Pagan Alternative 2	4-324
4.10.4.3	Pagan No-Action Alternative.....	4-325
4.10.4.4	Summary of Impacts for Pagan Alternatives	4-325
4.10.4.5	Summary of Potential Mitigation Measures for Pagan Alternatives	4-326
4.11	CULTURAL RESOURCES	4-327
4.11.1	APPROACH TO ANALYSIS	4-327
4.11.2	RESOURCE MANAGEMENT MEASURES	4-328
4.11.2.1	Avoidance and Minimization Measures.....	4-328
4.11.2.2	Best Management Practices and Standard Operating Procedures	4-329
4.11.3	TINIAN	4-329
4.11.3.1	Tinian Alternative 1	4-329
4.11.3.2	Tinian Alternative 2	4-337
4.11.3.3	Tinian Alternative 3	4-343
4.11.3.4	Tinian No-Action Alternative.....	4-349
4.11.3.5	Summary of Impacts for Tinian Alternatives	4-350
4.11.3.6	Summary of Potential Mitigation Measures for Tinian Alternatives	4-351
4.11.4	PAGAN.....	4-353
4.11.4.1	Pagan Alternative 1	4-353
4.11.4.2	Pagan Alternative 2	4-358
4.11.4.3	Pagan No-Action Alternative.....	4-362
4.11.4.4	Summary of Impacts for Pagan Alternatives	4-362
4.11.4.5	Summary of Potential Mitigation Measures for Pagan Alternatives	4-363
4.12	VISUAL RESOURCES	4-364
4.12.1	APPROACH TO ANALYSIS	4-364
4.12.2	RESOURCE MANAGEMENT MEASURES	4-365
4.12.3	TINIAN	4-366
4.12.3.1	Tinian Alternative 1	4-366
4.12.3.2	Tinian Alternative 2	4-374
4.12.3.3	Tinian Alternative 3	4-376
4.12.3.2	Tinian No-Action Alternative.....	4-378
4.12.3.3	Summary of Impacts for Tinian Alternatives	4-379
4.12.4	PAGAN.....	4-380
4.12.4.1	Pagan Alternative 1	4-380
4.12.4.2	Pagan Alternative 2	4-382
4.12.4.3	Pagan No-Action Alternative.....	4-382
4.12.4.4	Summary of Impacts for Pagan Alternatives	4-384
4.13	TRANSPORTATION.....	4-385
4.13.1	APPROACH TO ANALYSIS	4-385
4.13.1.1	Air Transportation.....	4-385

4.13.1.2	Ground Transportation	4-386
4.13.1.3	Marine Transportation.....	4-386
4.13.2	RESOURCE MANAGEMENT MEASURES	4-387
4.13.2.1	Air Transportation.....	4-387
4.13.2.2	Ground Transportation	4-387
4.13.2.3	Marine Transportation.....	4-388
4.13.3	TINIAN	4-388
4.13.3.1	Tinian Alternative 1.....	4-388
4.13.3.2	Tinian Alternative 2.....	4-399
4.13.3.3	Tinian Alternative 3	4-401
4.13.3.4	Tinian No-Action Alternative.....	4-403
4.13.3.5	Summary of Impacts for Tinian Alternatives	4-404
4.13.4	PAGAN.....	4-405
4.13.4.1	Pagan Alternative 1.....	4-405
4.13.4.2	Pagan Alternative 2.....	4-407
4.13.4.3	Pagan No-Action Alternative.....	4-408
4.13.4.4	Summary of Impacts for Pagan Alternatives	4-409
4.14	UTILITIES	4-410
4.14.1	APPROACH TO ANALYSIS	4-410
4.14.2	RESOURCE MANAGEMENT MEASURES	4-411
4.14.3	TINIAN	4-412
4.14.3.1	Tinian Alternative 1.....	4-412
4.14.3.2	Tinian Alternative 2.....	4-424
4.14.3.3	Tinian Alternative 3	4-426
4.14.3.4	Tinian No-Action Alternative.....	4-428
4.14.3.5	Summary of Impacts for Tinian Alternatives	4-429
4.14.4	PAGAN.....	4-430
4.14.4.1	Pagan Alternative 1.....	4-430
4.14.4.2	Pagan Alternative 2.....	4-431
4.14.4.3	Pagan No-Action Alternative.....	4-431
4.14.4.4	Summary of Impacts for Pagan Alternatives	4-432
4.15	SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE	4-433
4.15.1	APPROACH TO ANALYSIS	4-433
4.15.1.1	Population.....	4-434
4.15.1.2	Economic Conditions.....	4-435
4.15.1.3	Public Services.....	4-437
4.15.1.4	Community and Social Topics	4-438
4.15.1.5	Environmental Justice and Protection of Children	4-438
4.15.2	RESOURCE MANAGEMENT MEASURES	4-439
4.15.3	TINIAN	4-439
4.15.3.1	Tinian Alternative 1.....	4-439
4.15.3.2	Tinian Alternative 2	4-451
4.15.3.3	Tinian Alternative 3	4-452

4.15.3.4	Tinian No-Action Alternative.....	4-452
4.15.3.5	Summary of Impacts for Tinian Alternatives	4-453
4.15.4	PAGAN.....	4-454
4.15.4.1	Pagan Alternative 1	4-454
4.15.4.2	Pagan Alternative 2	4-455
4.15.4.3	Pagan No-Action Alternative.....	4-455
4.15.4.4	Summary of Impacts for Pagan Alternatives	4-455
4.16	HAZARDOUS MATERIALS AND WASTE	4-457
4.16.1	APPROACH TO ANALYSIS	4-457
4.16.2	RESOURCE MANAGEMENT MEASURES	4-458
4.16.2.1	Avoidance and Minimization Measures.....	4-458
4.16.2.2	Best Management Practices and Standard Operating Procedures	4-458
4.16.3	TINIAN	4-460
4.16.3.1	Tinian Alternative 1	4-460
4.16.3.2	Tinian Alternative 2	4-473
4.16.3.3	Tinian Alternative 3	4-476
4.16.3.4	Tinian No-Action Alternative.....	4-477
4.16.3.5	Summary of Impacts for Tinian Alternatives	4-478
4.16.4	PAGAN.....	4-479
4.16.4.1	Pagan Alternative 1	4-479
4.16.4.2	Pagan Alternative 2	4-485
4.16.4.3	Pagan No-Action Alternative.....	4-487
4.16.4.4	Summary of Impacts for Pagan Alternatives	4-488
4.17	PUBLIC HEALTH AND SAFETY	4-489
4.17.1	APPROACH TO ANALYSIS	4-490
4.17.2	RESOURCE MANAGEMENT MEASURES	4-490
4.17.2.1	Avoidance and Minimization Measures.....	4-490
4.17.2.2	Best Management Practices and Standard Operating Procedures	4-491
4.17.3	TINIAN	4-492
4.17.3.1	Tinian Alternative 1	4-492
4.17.3.2	Tinian Alternative 2	4-496
4.17.3.3	Tinian Alternative 3	4-497
4.17.3.4	Tinian No-Action Alternative.....	4-497
4.17.3.5	Summary of Impacts for Tinian Alternatives	4-498
4.17.4	PAGAN.....	4-499
4.17.4.1	Pagan Alternative 1	4-499
4.17.4.2	Pagan Alternative 2	4-501
4.17.4.3	Pagan No-Action Alternative.....	4-501
4.17.4.4	Summary of Impacts of Pagan Alternatives	4-502
4.18	PROGRAMMATIC ANALYSIS OF FUTURE POTENTIAL PROJECT COMPONENTS	4-503
4.18.1	INTERNATIONAL BROADCASTING BUREAU PROGRAMMATIC ANALYSIS	4-504
4.18.1.1	Relocation Study	4-504

4.18.1.2 Programmatic Analysis.....	4-509
4.18.2 PAGAN DOCK AND BREAKWATER.....	4-521
4.18.2.1 Geology and Soils	4-523
4.18.2.2 Water Resources	4-523
4.18.2.3 Air Quality	4-523
4.18.2.4 Noise	4-524
4.18.2.5 Airspace.....	4-524
4.18.2.6 Land and Submerged Land Use.....	4-524
4.18.2.7 Recreation	4-525
4.18.2.8 Terrestrial Biology	4-526
4.18.2.9 Marine Biology	4-527
4.18.2.10 Cultural Resources	4-533
4.18.2.11 Visual Resources	4-534
4.18.2.12 Transportation	4-534
4.18.2.13 Utilities	4-534
4.18.2.14 Socioeconomics and Environmental Justice	4-535
4.18.2.15 Hazardous Materials and Waste	4-535
4.18.2.16 Public Health and Safety	4-536
4.19 SECTION 4(F) EVALUATION	4-537
4.19.1 INTRODUCTION.....	4-537
4.19.2 DESCRIPTION OF THE PROPOSED ACTION	4-539
4.19.2.1 Need for Project.....	4-539
4.19.2.2 Description of Alternatives	4-539
4.19.3 DESCRIPTION OF SECTION 4(F) PROPERTIES.....	4-540
4.19.3.1 Japanese Third Farm District (IV) (Site SC-5043).....	4-541
4.19.3.2 West Field (Site TN-6-0030)	4-541
4.19.4 IMPACTS ON THE SECTION 4(F) PROPERTIES BY THE PROJECT	4-542
4.19.4.1 Japanese Third Farm District (IV) (Site SC-5043).....	4-542
4.19.4.2 West Field (Site TN-6-0030)	4-542
4.19.5 AVOIDANCE ALTERNATIVES.....	4-543
4.19.5.1 No-Action Alternative	4-543
4.19.5.2 Alternative 1. Locate Outside of the CNMI	4-543
4.19.5.3 Alternative 2. Locate at Single Location within the CNMI	4-543
4.19.5.4 Alternative 3. Locate Airport Improvements at North Field	4-544
4.19.5.5 Alternative 4. Alternative Options at Tinian International Airport.....	4-544
4.19.6 MEASURES TO MINIMIZE OR MITIGATE HARM.....	4-544
4.19.6.1 No-Action Alternative	4-544
4.19.6.2 Tinian Airport Improvements (All Tinian Alternatives)	4-545
4.19.7 COORDINATION	4-545
4.19.8 CONCLUDING STATEMENT	4-545
4.20 SUMMARY OF IMPACTS AND POTENTIAL MITIGATIONS	4-546
4.20.1 SUMMARY OF IMPACTS FOR TINIAN ALTERNATIVES	4-547
4.20.2 SUMMARY OF IMPACTS FOR PAGAN ALTERNATIVES	4-555

4.20.3 SUMMARY OF POTENTIAL MITIGATION MEASURES.....	4-559
CHAPTER 5 CUMULATIVE IMPACTS	5-1
5.1 METHODOLOGY	5-1
5.1.1 RESOURCES CONSIDERED IN THE CUMULATIVE IMPACT ANALYSIS	5-2
5.1.2 STUDY AREA AND HEALTH OF RESOURCES CONSIDERED	5-2
5.1.3 CONCEPTUAL APPROACH TO ASSESSING CUMULATIVE IMPACTS RELATED TO PRESENT AND REASONABLY FORESEEABLE ACTIONS	5-2
5.2 PRESENT AND REASONABLY FORESEEABLE ACTIONS	5-3
5.2.1 NON-FEDERAL ACTIONS	5-3
5.2.2 FEDERAL ACTIONS	5-4
5.2.2.1 Divert Activities and Exercises (Divert)	5-4
5.2.2.2 Mariana Islands Training and Testing	5-4
5.2.2.3 Mariana Islands Range Complex Airspace	5-5
5.2.3 SUMMARY	5-6
5.3 CUMULATIVE IMPACTS ANALYSIS	5-13
5.3.1 IMPACT SUMMARIES	5-13
5.3.1.1 Impacts of Present and Reasonably Foreseeable Actions	5-13
5.3.1.2 Impacts of the Proposed Action (Chapter 4)	5-13
5.3.2 GEOLOGY AND SOILS	5-17
5.3.2.1 Tinian.....	5-17
5.3.2.2 Pagan.....	5-19
5.3.3 WATER RESOURCES.....	5-20
5.3.3.1 Tinian.....	5-20
5.3.3.2 Pagan.....	5-23
5.3.4 AIR QUALITY	5-24
5.3.4.1 Tinian.....	5-25
5.3.4.2 Pagan.....	5-27
5.3.5 NOISE	5-28
5.3.5.1 Tinian.....	5-28
5.3.5.2 Pagan.....	5-29
5.3.6 AIRSPACE.....	5-30
5.3.6.1 Tinian.....	5-30
5.3.6.2 Pagan.....	5-34
5.3.7 LAND AND SUBMERGED LAND USE	5-35
5.3.7.1 Tinian.....	5-35
5.3.7.2 Pagan.....	5-38
5.3.8 RECREATION	5-39
5.3.8.1 Tinian.....	5-39
5.3.8.2 Pagan.....	5-42
5.3.9 TERRESTRIAL BIOLOGY	5-43

5.3.9.1	Tinian.....	5-43
5.3.9.2	Pagan.....	5-46
5.3.10	MARINE BIOLOGY	5-48
5.3.10.1	Tinian.....	5-48
5.3.10.2	Pagan.....	5-53
5.3.11	CULTURAL RESOURCES.....	5-55
5.3.11.1	Tinian.....	5-55
5.3.11.2	Pagan.....	5-59
5.3.12	VISUAL RESOURCES	5-60
5.3.12.1	Tinian.....	5-60
5.3.12.2	Pagan.....	5-62
5.3.13	TRANSPORTATION	5-63
5.3.13.1	Air Transportation	5-63
5.3.13.2	Ground Transportation	5-66
5.3.13.3	Marine Transportation.....	5-68
5.3.14	UTILITIES	5-70
5.3.14.1	Tinian.....	5-70
5.3.14.2	Pagan.....	5-75
5.3.15	SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE.....	5-76
5.3.15.1	Tinian.....	5-76
5.3.15.2	Pagan.....	5-78
5.3.16	HAZARDOUS MATERIALS AND WASTE	5-80
5.3.16.1	Tinian.....	5-80
5.3.16.2	Pagan.....	5-82
5.3.17	PUBLIC HEALTH AND SAFETY.....	5-83
5.3.17.1	Tinian.....	5-83
5.3.17.2	Pagan.....	5-85
5.4	NEED FOR MITIGATION.....	5-86
CHAPTER 6 ADDITIONAL CONSIDERATIONS REQUIRED BY NEPA		6-1
6.1	INTRODUCTION	6-1
6.2	CONSISTENCY WITH OTHER FEDERAL, COMMONWEALTH, AND LOCAL LAND USE PLANS, POLICIES, AND CONTROLS.....	6-1
6.2.1	FEDERAL PLANS	6-1
6.2.2	REGIONAL AND LOCAL LAND USE PLANS	6-2
6.2.2.1	Tinian.....	6-2
6.2.2.2	Pagan.....	6-2
6.2.3	APPLICABLE FEDERAL AND LOCAL REGULATIONS	6-3
6.3	UNAVOIDABLE SIGNIFICANT ADVERSE IMPACTS.....	6-3
6.4	IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES	6-5

6.5 RELATIONSHIP BETWEEN SHORT-TERM USE OF THE ENVIRONMENT AND LONG-TERM PRODUCTIVITY	6-6
6.5.1 BENEFITS OF SHORT-TERM USE.....	6-7
6.5.2 THE COST OF SHORT-TERM U.S. MILITARY TRAINING USE.....	6-7
6.5.3 TINIAN	6-8
6.5.4 PAGAN.....	6-9
CHAPTER 7 REFERENCES.....	7-1
ES.1 EXECUTIVE SUMMARY.....	7-1
7.1 CHAPTER 1.....	7-2
7.2 CHAPTER 2.....	7-3
7.3 CHAPTER 3.....	7-5
7.3.1 INTRODUCTION.....	7-5
7.3.2 GEOLOGY AND SOILS	7-5
7.3.3 WATER RESOURCES.....	7-7
7.3.4 AIR QUALITY	7-9
7.3.5 NOISE	7-9
7.3.6 AIRSPACE.....	7-10
7.3.7 LAND USE AND SUBMERGED LAND USE	7-11
7.3.8 RECREATION	7-13
7.3.9 TERRESTRIAL BIOLOGY	7-14
7.3.10 MARINE BIOLOGY	7-22
7.3.11 CULTURAL RESOURCES.....	7-29
7.3.12 VISUAL RESOURCES	7-30
7.3.13 TRANSPORTATION	7-30
7.3.14 UTILITIES	7-31
7.3.15 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE.....	7-32
7.3.16 HAZARDOUS MATERIALS AND WASTE	7-34
7.3.17 PUBLIC HEALTH AND SAFETY.....	7-36
7.4 CHAPTER 4.....	7-37
7.4.1 INTRODUCTION.....	7-37
7.4.2 GEOLOGY AND SOILS	7-37
7.4.3 WATER RESOURCES.....	7-38
7.4.4 AIR QUALITY	7-39
7.4.5 NOISE	7-40
7.4.6 AIRSPACE.....	7-41
7.4.7 LAND USE AND SUBMERGED LAND USE	7-42
7.4.8 RECREATION	7-42
7.4.9 TERRESTRIAL BIOLOGY	7-43

7.4.10 MARINE BIOLOGY	7-46
7.4.11 CULTURAL RESOURCES.....	7-50
7.4.12 VISUAL RESOURCES	7-51
7.4.13 TRANSPORTATION	7-51
7.4.14 UTILITIES	7-52
7.4.15 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE.....	7-52
7.4.16 HAZARDOUS MATERIALS AND WASTE	7-53
7.4.17 PUBLIC HEALTH AND SAFETY.....	7-54
7.4.18 IBB PROGRAMMATIC ANALYSIS.....	7-54
7.4.19 SECTION 4(F) EVALUATION	7-57
7.5 CHAPTER 5.....	7-57
7.6 CHAPTER 6.....	7-60
CHAPTER 8 LIST OF PREPARERS	8-1
8.1 GOVERNMENT CONTRIBUTORS	8-1
8.1.1 MARINE CORPS (MARINE FORCES, PACIFIC AND HEADQUARTERS MARINE CORPS).....	8-1
8.1.2 NAVFAC	8-1
8.1.3 FEDERAL AVIATION ADMINISTRATION	8-2
8.2 CARDNO TEC-AECOM PACIFIC JOINT VENTURE	8-2
8.2.1 MANAGEMENT	8-2
8.2.2 NEPA ANALYSIS TEAM	8-2
CHAPTER 9 DISTRIBUTION.....	9-1
9.1 PARTIES RECEIVING NOTICE OF AVAILABILITY OF DRAFT ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT	9-1
9.1.1 ELECTED OFFICIALS – CNMI	9-1
9.1.2 ELECTED OFFICIALS – CNMI LOCAL	9-1
9.1.3 FEDERAL AGENCIES	9-1
9.1.4 CNMI AGENCIES	9-3
9.1.5 HAWAII AGENCIES.....	9-3
9.1.6 LIBRARIES RECEIVING HARD COPY AND ELECTRONIC COPY ON COMPACT DISK	9-4
9.1.7 CNMI INTEREST GROUPS.....	9-4
9.1.8 NATIONAL/INTERNATIONAL ENVIRONMENTAL INTEREST GROUPS	9-4

List of Figures

ES-1	U.S. Pacific Command Area of Responsibility.....	ES-2
ES-2	Mariana Islands Regional Map	ES-3
ES-3	Tinian All Action Alternatives Military Lease Area-wide Training Assets	ES-25
ES-4	Tinian All Action Alternatives Surface Danger Zones	ES-27
ES-5	Tinian All Action Alternatives Special Use Airspace: Two-Dimensional Perspective	ES-29
ES-6	Tinian All Action Alternatives Base Camp	ES-30
ES-7	Tinian All Action Alternatives Munitions Storage Area	ES-31
ES-8	Tinian All Action Alternatives Airport Improvements	ES-32
ES-9	Tinian All Action Alternatives Port Improvements and Supply Route	ES-33
ES-10	Tinian All Action Alternatives Range Access Improvements, Fence Lines, and Gates.....	ES-35
ES-11	Tinian All Action Alternatives Utility Improvements	ES-37
ES-12	Unai Chulu Tactical Amphibious Beach Landing Dredging and Construction	ES-38
ES-13	Unai Chulu Tactical Amphibious Beach Landing Operations	ES-39
ES-14	Pagan Alternative 1 Range Complexes.....	ES-45
ES-15	Pagan Alternative 2 Range Complexes.....	ES-46
ES-16	Pagan All Action Alternatives Surface Danger Zones	ES-47
1.1-1	U.S. Pacific Command Area of Responsibility.....	1-2
1.1-2	Mariana Islands Regional Map	1-3
1.2-1	Building Block Approach to Military Training.....	1-7
1.4-1	Mariana Islands Range Complex Extent	1-14
1.5-1	NEPA Public Involvement Process.....	1-16
2.2-1	Representative Marine Corps Battalion Landing Team.....	2-6
2.4-1	Tinian Location Map	2-32
2.4-2	Tinian All Action Alternatives Base Camp	2-35
2.4-3	Tinian All Action Alternatives Munitions Storage Area	2-36
2.4-4	Tinian All Action Alternatives Airport Improvements	2-38
2.4-5	Tinian All Action Alternatives Port Improvements and Supply Route	2-39
2.4-6	Tinian All Action Alternatives Range Access Improvements, Fence Lines, and Gates.....	2-41
2.4-7	Tinian All Action Alternatives Utility Improvements	2-51
2.4-8	Tinian Range Complexes	2-54
2.4-9	Tinian All Action Alternatives Range Complex A	2-55
2.4-10	Tinian All Action Alternatives Range Complex B	2-57
2.4-11	Tinian All Action Alternatives Range Complex C	2-59
2.4-12	Tinian All Action Alternatives Range Complex D	2-60
2.4-13	Tinian All Action Alternatives Military Lease Area-wide Training Assets	2-61
2.4-14	Tinian Tactical Amphibious Beach Landing Laydown Area and Access.....	2-63

2.4-15	Unai Chulu Tactical Amphibious Beach Landing Dredging and Construction	2-64
2.4-16	Unai Chulu Tactical Amphibious Beach Landing Operations	2-65
2.4-17	Tinian All Action Alternatives Surface Danger Zones	2-83
2.4-18	Tinian All Action Alternatives Special Use Airspace: Two-Dimensional Perspective	2-85
2.4-19	Tinian All Action Alternatives Special Use Airspace: Three-Dimensional Perspective	2-86
2.4-20	Tinian All Action Alternatives Danger Zones	2-88
2.4-21	Tinian Alternative 1 Range Complexes.....	2-91
2.4-22	Tinian Alternatives 1 and 2 Range Complex D	2-93
2.4-23	Tinian Alternative 1 Convoy Course	2-94
2.4-24	Tinian Alternative 2 Range Complexes.....	2-96
2.4-25	Tinian Alternatives 2 and 3 Range Complex C.....	2-97
2.4-26	Tinian Alternatives 2 and 3 Convoy Course.....	2-98
2.4-27	Tinian Alternative 3 Range Complexes.....	2-101
2.4-28	Tinian No-Action Alternative	2-106
2.5-1	Pagan Location Map	2-114
2.5-2	Pagan All Action Alternatives Bivouac Area, Munitions Storage, and Airfield Improvements	2-116
2.5-3	Pagan All Action Alternatives Military Training Trail Improvements	2-119
2.5-4	Pagan All Action Alternatives Surface Danger Zones	2-133
2.5-5	Pagan All Action Alternatives Special Use Airspace: Two-Dimensional Perspective	2-135
2.5-6	Pagan All Action Alternatives Danger Zones	2-136
2.5-7	Pagan Alternative 1 Range Complexes.....	2-138
2.5-8	Pagan Alternative 1 North Range Complex.....	2-139
2.5-9	Pagan Alternative 1 South Range Complex	2-140
2.5-10	Pagan Alternative 2 Range Complexes.....	2-142
2.5-11	Pagan Alternative 2 North Range Complex.....	2-143
2.5-12	Pagan Alternative 2 South Range Complex	2-144
3.2-1	Regional Geologic Map of the Mariana Islands.....	3-4
3.2-2	Tinian Physiographic and Topographic Map	3-6
3.2-3	Tinian Geologic Units.....	3-8
3.2-4	Proposed Amphibious Training Beaches on Tinian	3-10
3.2-5	Tinian Soil Classes Associated with the Affected Environment.....	3-13
3.2-6	Tinian Prime Farmland Soil Classes Associated with the Affected Environment.....	3-16
3.2-7	Pagan Topographic Map.....	3-17
3.2-8	Pagan Generalized Geologic Map	3-19
3.2-9	Pagan Pozzolan Deposits	3-20
3.3-1	Tinian Surface Waters and Flood Zones	3-28
3.3-2	Graphic Depiction of a Freshwater Lens above a Saltwater Wedge – Standard, Vertical Pumping Well	3-32

3.3-3	Graphic Depiction of a Freshwater Lens above Saltwater Wedge – Horizontal, Maui-Type Pumping Well	3-32
3.3-4	Tinian Groundwater Wells, Elevation, and Flow Direction	3-33
3.3-5	Pagan Surface Waters and Groundwater Well Locations	3-38
3.5-1	Sensitive Noise Receptor Locations – Tinian and Saipan	3-49
3.5-2	Baseline Noise Contours at Tinian International Airport	3-54
3.6-1	Cross Section of Airspace Classes and Relationships	3-60
3.6-2	Special Use and Other Airspace Designated for Military Use	3-61
3.6-3	Commuter Flight Routes	3-65
3.6-4	Annual Airport Operations at Tinian International Airport.....	3-66
3.6-5	Tinian and Saipan Regional Airspace.....	3-67
3.6-6	Annual Operations at Saipan International Airport	3-68
3.6-7	Existing Mariana Islands Airspace Designated for Military Use	3-69
3.6-8	Regional Airports and Commercial Aviation Routes	3-72
3.7-1	Region of Influence for Land and Submerged Land Use	3-76
3.7-2	Tinian Land Jurisdictional Control	3-82
3.7-3	Tinian Land Jurisdictional Control and Management.....	3-83
3.7-4	Tinian CNMI Areas of Particular Concern	3-85
3.7-5	Tinian and Saipan Existing Land Use	3-86
3.7-6	Military Land Use on Tinian.....	3-88
3.7-7	Pagan CNMI Areas of Particular Concern	3-92
3.8-1	Tinian Recreation Resources and Places of Interest	3-96
3.9-1	Vegetation Communities – Tinian Military Lease Area	3-114
3.9-2	Estimated Tinian Monarch Population (1982 – 2013)	3-120
3.9-3	Occurrence of Special-status Species - Tinian Military Lease Area	3-125
3.9-4	Past and Current Occurrences of Mariana Common Moorhen within the Military Lease Area	3-127
3.9-5	Vegetation Communities – Pagan	3-135
3.9-6	Occurrence of Special-status Species – Pagan	3-141
3.10-1	Typical Reef Zonation	3-148
3.10-2	Tinian Marine Habitat Overview	3-152
3.10-3	Unai Chulu Coral Cover.....	3-158
3.10-4	Unai Babui Coral Cover.....	3-160
3.10-5	Unai Lam Lam Coral Cover	3-162
3.10-6	Unai Masalok Coral Cover	3-164
3.10-7	Pagan Marine Habitat Overview	3-176
3.10-8	Green Beach Coral Cover.....	3-180
3.10-9	Red Beach Coral Cover	3-182
3.10-10	Blue Beach Coral Cover	3-184

3.10-11	South Beach Coral Cover	3-187
3.10-12	Gold Beach Coral Cover.....	3-189
3.11-1	Major Historic Events for Tinian and Pagan	3-198
3.11-2	North Field National Historic Landmark.....	3-200
3.12-1	Tinian Key Observation Points.....	3-205
3.12-2	Pagan Visual Resources	3-216
3.13-1	Tinian International Airport Facilities.....	3-222
3.13-2	Tinian Existing Roads and Average Daily Traffic.....	3-224
3.13-3	Port of Tinian Cargo Tonnage Handled	3-227
3.14-1	Tinian Power Distribution.....	3-233
3.14-2	Tinian Potable Water Distribution.....	3-236
3.14-3	Tinian Wastewater Systems	3-238
3.14-4	Tinian Solid Waste Facility.....	3-240
3.15-1	CNMI Population Trends, 1958-2000	3-247
3.15-2	Compensation and Gross Domestic Product.....	3-250
3.15-3	CNMI Total Visitors, 2000-2013	3-252
3.15-4	Percent Change in Total Visitors to the CNMI, 2000-2013	3-252
3.15-5	Tinian Fishing Areas and Type of Fishing.....	3-256
3.15-6	Minority and Low-income Population Areas.....	3-267
3.15-7	Schools and Highly Populated Areas	3-270
3.16-1	Tinian Areas of Potential Environmental Concern and Military Munitions Response Program Sites	3-279
3.16-2	Probable Munitions Presence Locations	3-293
3.17-1	Tinian Military Lease Area	3-296
4.2-1	Tinian Ground Disturbance and Geologic Map for Alternatives 1 and 2	4-12
4.2-2	Tinian Ground Disturbance and Geologic Map for Alternatives 1 and 3	4-24
4.3-1	Tinian Alternative 1 Surface Waters and Flood Zones	4-43
4.3-2	Tinian Alternative 1 Groundwater Wells, Elevation, and Flow Direction.....	4-45
4.3-3	Tinian Alternative 2 Surface Waters.....	4-52
4.3-4	Tinian Alternative 3 Surface Waters.....	4-54
4.3-5	Pagan Alternative 1 Surface Waters.....	4-58
4.3-6	Pagan Alternative 2 Surface Waters.....	4-63
4.5-1	All Tinian Alternatives Small-caliber Weapons Noise Levels (A-weighted).....	4-85
4.5-2	All Tinian Alternatives Small-caliber Weapons Noise Levels (Peak).....	4-87
4.5-3	All Tinian Alternatives Large-caliber Weapons Noise Levels (C-weighted).....	4-91
4.5-4	All Tinian Alternatives Large-caliber Noise Levels under Neutral Weather Conditions (Peak)	4-93
4.5-5	All Tinian Alternatives Large-caliber Noise Levels under Unfavorable Weather Conditions (Peak)	4-95
4.5-6	Airfield and Airspace Noise Levels for All Tinian Alternatives (A-weighted).....	4-103

4.5-7	All Pagan Alternatives Small-caliber Weapons Noise Levels (A-weighted)	4-118
4.5-8	All Pagan Alternatives Small-caliber Weapons Noise Levels (Peak).....	4-119
4.5-9	All Pagan Alternatives Large-caliber Weapons Noise Levels (C-weighted)	4-122
4.5-10	All Pagan Alternatives Large-caliber Noise Levels under Neutral Weather Conditions (Peak)	4-123
4.5-11	All Pagan Alternatives Large-caliber Noise Levels under Unfavorable Weather Conditions (Peak)	4-124
4.5-12	All Pagan Alternatives Airfield and Airspace Noise Levels (A-weighted)	4-127
4.6-1	Airspace Region of Influence.....	4-133
4.6-2	Commuter Flight Routes	4-139
4.7-1	Tinian Proposed Land Acquisition	4-157
4.7-2	Tinian Potential Agricultural Use in the Military Lease Area.....	4-160
4.7-3	Tinian All Action Alternatives Areas of Particular Concern	4-163
4.7-4	Pagan All Action Alternatives Areas of Particular Concern	4-170
4.9-1a	Northern Military Lease Area – Tinian Alternative 1, Vegetation Communities	4-195
4.9-1b	Southern Military Lease Area – Tinian Alternative 1, Vegetation Communities	4-196
4.9-2	Potential Mitigation Areas with Implementation of Tinian Alternatives 1, 2 or 3	4-199
4.9-3a	Northern Military Lease Area – Tinian Alternative 1, Occurrence of Special-status Species.....	4-202
4.9-3b	Southern Military Lease Area – Tinian Alternative 1, Occurrence of Special-status Species.....	4-203
4.9-4a	Northern Military Lease Area – Tinian Alternative 2, Vegetation Communities	4-218
4.9-4b	Southern Military Lease Area – Tinian Alternative 2, Vegetation Communities	4-219
4.9-5a	Northern Military Lease Area – Tinian Alternative 2, Occurrence of Special-status Species.....	4-223
4.9-5b	Southern Military Lease Area – Tinian Alternative 2, Occurrence of Special-status Species.....	4-224
4.9-6a	Northern Military Lease Area – Tinian Alternative 3, Vegetation Communities	4-228
4.9-6b	Southern Military Lease Area – Tinian Alternative 3, Vegetation Communities	4-229
4.9-7a	Northern Military Lease Area – Tinian Alternative 3, Occurrence of Special-status Species.....	4-233
4.9-7b	Southern Military Lease Area – Tinian Alternative 3, Occurrence of Special-status Species.....	4-234
4.9-8	Pagan Alternative 1, Vegetation Communities	4-245
4.9-9	Pagan Alternative 1, Occurrence of Special-status Species	4-247
4.9-10	Pagan Alternative 2, Vegetation Communities	4-256
4.9-11	Pagan Alternative 2, Occurrence of Special-status Species	4-258
4.10-1	Unai Chulu Training Impact Area- Depth	4-272
4.10-2	Unai Chulu Training Impact Area- Coral Cover.....	4-273
4.10-3	Unai Babui Training Impact Area-Depth	4-284
4.10-4	Unai Babui Training Impact Area-Coral Cover.....	4-285

4.10-5	Unai Lam Lam Training Impact Area-Depth	4-286
4.10-6	Unai Lam Lam Training Impact Area-Coral Cover	4-287
4.10-7	Unai Masalok Training Impact Area-Depth	4-288
4.10-8	Unai Masalok Training Impact Area-Coral Cover	4-289
4.10-9	Green Beach Training Impact Area-Depth	4-308
4.10-10	Green Beach Training Impact Area-Coral Cover.....	4-309
4.10-11	Red Beach Training Impact Area-Depth	4-310
4.10-12	Red Beach Training Impact Area-Coral Cover	4-311
4.10-13	Blue Beach Training Impact Area-Depth	4-312
4.10-14	Blue Beach Training Impact Area-Coral Cover	4-313
4.10-15	South Beach Training Impact Area Depth	4-314
4.10-16	South Beach Training Impact Area Coral Cover	4-315
4.10-17	North Beach Training Impact Area-Depth.....	4-316
4.10-18	Gold Beach Training Impact Area-Depth.....	4-318
4.10-19	Gold Beach Training Impact Area-Coral Cover.....	4-319
4.12-1	Tinian Alternative 1 Key Observation Points.....	4-367
4.12-2	Tinian Alternative 2 Key Observation Points.....	4-375
4.12-3	Tinian Alternative 3 Key Observation Points.....	4-377
4.12-4	Pagan Alternative 1 Visual Resources	4-381
4.12-5	Pagan Alternative 2 Visual Resources	4-383
4.13-1	Ground Transportation Improvements.....	4-391
4.16-1	Tinian All Action Alternatives Hazardous Materials/Waste Use and Storage Areas and Contaminated Sites for Range Training Area	4-461
4.16-2	Tinian All Action Alternatives Hazardous Materials/Waste Use and Storage Areas, Base Camp Munitions Storage, and Airport Improvements	4-462
4.16-3	Tinian All Action Alternatives Hazardous Materials/Waste Use and Storage Areas for Tinian Port and Supply Route	4-463
4.16-4	Pagan Alternative 1 Hazardous Materials/Waste Use and Storage Area	4-482
4.16-5	Pagan Alternative 2 Hazardous Materials/Waste Use and Storage Area	4-486
4.18-1	Potential Rota Site.....	4-506
4.18-2	Potential Saipan Site.....	4-507
4.18-3	Potential Tinian Site	4-508
4.18-4	Potential Guam Site.....	4-510
4.18-5	Proposed Pagan Pier and Breakwater.....	4-522
5.2-1	Tinian and Pagan Present and Reasonably Foreseeable Actions	5-12

List of Tables

ES-1	Summary of No-Action Alternative Training on Tinian Exclusive Military Use Area by U.S. Air Force, Army, Marine Corps, Navy, and Guam National Guard/Reserve	ES-17
ES-2	Summary Comparison of Action Tinian Alternatives	ES-19
ES-3	Summary Comparison of Pagan Alternatives.....	ES-42
ES-4	Summary of Impacts for Tinian Alternatives.....	ES-51
ES-5	Summary of Impacts for Pagan Alternatives.....	ES-58
ES-6	Summary of Potential Mitigation Measures	ES-62
1.5-1	Dates of Newspaper Notification Announcements for Public Scoping Meetings	1-17
1.5-2	Federal Aviation Administration Resource Impact Categories	1-20
2.2-1	Pacific Command Service Components' Unfilled Training Requirements in the CNMI.....	2-5
2.2-2	Representative Weaponry and Equipment.....	2-9
2.2-3	Unit Level Training and Exercises, Duration, and Personnel.....	2-15
2.2-4	Combined Level Training and Exercises, Duration, and Personnel	2-19
2.3-1	Requirements and Siting Study – Operational Siting Criteria	2-23
2.3-2	RTA Siting Criteria for Islands in the CNMI.....	2-24
2.4-1	Proposed Tinian Unit Level RTA Road Improvements.....	2-45
2.4-2	All Tinian Action Alternatives Proposed Annual Amphibious Operations	2-71
2.4-3	Tinian All Alternatives Proposed Annual Airfield Military Operations.....	2-73
2.4-4	All Tinian Action Alternatives Proposed Typical Annual Landing Zone Operations	2-73
2.4-5	Proposed Tinian RTA Representative Annual Munitions Expenditures: All Tinian Action Alternatives	2-80
2.4-6	All Tinian Action Alternatives Proposed Annual Operations in Special Use Airspace	2-89
2.4-7	Summary of No-Action Alternative Training on Tinian Exclusive Military Use Area by U.S. Air Force, Army, Marine Corps, Navy, and Guam National Guard/Reserve	2-102
2.4-8	Summary Comparison of Action Tinian Alternatives	2-108
2.5-1	All Pagan Action Alternatives Proposed Amphibious Operations.....	2-124
2.5-2	All Pagan Alternatives Proposed Annual Airfield Military Operations.....	2-124
2.5-3	All Pagan Action Alternatives Proposed Typical Annual Landing Zone Operations	2-125
2.5-4	All Pagan Action Alternatives Proposed Representative Annual Munitions Expenditures.....	2-129
2.5-5	All Pagan Action Alternatives Aircraft Operations Proposed in Special Use Airspace	2-132
2.5-6	Summary Comparison of Pagan Alternatives.....	2-146
3.2-1	Soil Classifications Associated with the Affected Environment	3-14
3.3-1	Tinian Surface Water Features.....	3-27
3.3-2	Summary of Potential Wetlands of the Bateha and Mahalang Complexes	3-29
3.3-3	Tinian – Tinian Municipal Well Water Quality.....	3-35

3.3-4	Tinian Impaired Coastal Waters	3-36
3.3-5	Pagan Surface Water Quality Data Summary.....	3-39
3.3-6	Pagan Surface Water Quality Sample Report.....	3-40
3.5-1	Noise Zones and Sensitive Land Use Compatibility.....	3-50
3.5-2	General Land Use Compatibility by Noise Zone	3-51
3.5-3	Large-caliber Weapons and Explosives Risk of Complaints Levels.....	3-51
3.5-4	Baseline Noise Levels at Representative Points of Interest	3-55
3.6-1	Current Use of Air Traffic Control Assigned Airspace.....	3-70
3.9-1	Terrestrial Biology Field Studies on Tinian and Pagan	3-112
3.9-2	Tinian Vegetation Communities (acres)	3-113
3.9-3	Occurrence of Federally Endangered Species Act-Listed and Proposed Species and CNMI-Listed Species on Tinian	3-124
3.9-4	Bird Species Observed on Tinian and Protected under the Migratory Bird Treaty Act.....	3-132
3.9-5	Vegetation Communities – Pagan	3-134
3.9-6	Occurrence of Federally Endangered Species Act-Listed and Proposed Species and CNMI-Listed Species on Pagan	3-140
3.9-7	Bird Species Occurring on Pagan and Protected under the Migratory Bird Treaty Act.....	3-143
3.10-1	Estimates of Select Total Physical Features Compared to Tinian	3-150
3.10-2	Essential Fish Habitat and Habitat Areas of Particular Concern for Management Unit Species of the Western Pacific Region	3-153
3.10-3	CNMI Marine Invertebrate Species of Special Conservation Need of Tinian.....	3-166
3.10-4	Special-status Coral Species of Tinian	3-167
3.10-5	Special-status Fish Species of Tinian	3-168
3.10-6	Special-status Sea Turtle Species of Tinian	3-168
3.10-7	Marine Mammals Species with Reported Occurrence in the Region of Influence Surrounding Tinian	3-173
3.10-8	Estimates of Select Total Physical Characteristics Compared to Pagan.....	3-175
3.10-9	Marine Invertebrates Identified by the CNMI Division of Fish and Wildlife Marine Species of Special Conservation Need in Pagan	3-191
3.10-10	Special-status Coral Species of Pagan	3-191
3.10-11	Special-status Sea Turtle Species of Pagan	3-192
3.11-1	Contributing Features to the North Field National Historic Landmark	3-199
3.15-1	CNMI Labor Force, Employment, and Unemployment, 2010	3-248
3.15-2	Employment by Industry, 2010	3-248
3.15-3	CNMI Income by Occupation, 2011.....	3-249
3.15-4	CNMI Government Revenues by Source, 2002-2009 (Millions of \$'s)	3-251
3.15-5	Farms, Land in Farms, and Land Use by Municipality, 2002 and 2007	3-254
3.15-6	Tinian Cattle Ranching Data, December 2012-February 2013	3-254

3.15-7	Tinian Fishing Areas and Type of Fishing.....	3-255
3.15-8	Minority Population Areas (> 50%) by Census Tract	3-266
3.15-9	Low-income Population Areas (>20%) by Census Tract	3-268
3.15-10	Children in the CNMI and Tinian, 2010	3-268
3.15-11	Percentage of Children Below the Poverty Line.....	3-269
3.16-1	Sites of Potential Environmental Concern Associated with Agricultural Activities within the Tinian Military Lease Area.....	3-284
3.16-2	Sites of Potential Environmental Concern Associated with World War II Activities within the Tinian Military Lease Area.....	3-286
3.16-3	Sites of Potential Environmental Concern within the Tinian Military Lease Area	3-290
3.16-4	Potential Historical Hazardous Waste Sites and Munitions and Explosives of Concern Areas on Pagan	3-292
3.17-1	CNMI Five Year (2008-2012) Collision Summary.....	3-299
4.2-1	Summary of Ground Disturbance, Slope, Geologic Units, Soil Conditions, Prime Farmland Soils, and Geologic Hazards Associated with Construction Under Tinian Alternative 1	4-7
4.2-2	Summary of Ground Disturbance, Slope, Geologic Units, Soil Conditions, Prime Farmland Soils, and Geologic Hazards Associated with Construction Under Tinian Alternative 2	4-18
4.2-3	Summary of Ground Disturbance, Slope, Geologic Units, Soil Conditions, Prime Farmland Soils, and Geologic Hazards Associated with Construction Under Tinian Alternative 3	4-22
4.2-4	Summary of Impacts for Tinian Alternatives.....	4-26
4.2-5	Summary of Ground Disturbance, Slope, Geologic Units and Geologic Hazards Associated with Construction under Pagan Alternative 1	4-28
4.2-6	Summary of Ground Disturbance, Slope, Geologic Units and Geologic Hazards Associated with Construction under Pagan Alternative 2	4-34
4.2-7	Summary of Impacts for Pagan Alternatives.....	4-35
4.3-1	Summary of Impacts for Tinian Alternatives.....	4-55
4.3-2	Summary of Impacts for Pagan Alternatives.....	4-64
4.4-1	Annual Average Construction Emissions – Tinian Alternative 1.....	4-69
4.4-2	Operational Training Annual Emissions – Tinian Alternatives 1, 2, and 3.....	4-70
4.4-3	Annual Average Construction Emissions – Tinian Alternative 2	4-71
4.4-4	Annual Average Construction Emissions – Tinian Alternative 3	4-71
4.4-5	Summary of Impacts for Tinian Alternatives.....	4-73
4.4-6	Annual Construction Emissions – Pagan Alternative 1.....	4-74
4.4-7	Operational Training Activity Annual Emissions – Pagan Alternative 1.....	4-75
4.4-8	Annual Construction Emissions – Pagan Alternative 2.....	4-76
4.4-9	Summary of Impacts for Pagan Alternatives.....	4-76
4.5-1	Area and Population on Tinian Affected by Small-caliber Weapons Noise for All Tinian Alternatives(A-weighted).....	4-84

4.5-2	Area and Population on Tinian Affected by Small-caliber Weapons Noise for All Tinian Alternatives (Peak)	4-84
4.5-3	Tinian Alternative 1 Representative Points of Interest on Tinian Affected by Small-caliber Weapons Noise (A-weighted and Peak)	4-89
4.5-4	Area and Population on Tinian and Saipan Affected by Large-caliber Weapons Noise for All Tinian Alternatives (C-weighted)	4-90
4.5-5	Area and Population on Tinian and Saipan Affected by Large-caliber Weapons Noise - Risk Complaint Neutral Weather for All Tinian Alternatives (Peak).....	4-97
4.5-6	Area and Population on Tinian and Saipan Affected by Large-caliber Weapons Noise - Risk Complaint Unfavorable Weather for All Tinian Alternatives (Peak).....	4-97
4.5-7	Representative Points of Interest on Tinian Affected by Large-caliber Weapons Noise under All Tinian Alternatives (C-weighted)	4-98
4.5-8	Representative Points of Interest on Saipan Affected by Large-caliber Weapons Noise under All Tinian Alternatives (C-weighted)	4-99
4.5-9	Representative Points of Interest on Tinian Affected by Large-caliber Weapons Noise for All Tinian Alternatives (Peak).....	4-100
4.5-10	Representative Points of Interest on Saipan Affected by Large-caliber Weapons Noise for All Tinian Alternatives (Peak).....	4-101
4.5-11	Annual Airfield Operations at Tinian International Airport and North Field for All Tinian Alternatives.....	4-102
4.5-12	Noise Area and Population Generated by Aircraft Operations for All Tinian Alternatives Compared to Baseline (2012) Levels (A-weighted).....	4-104
4.5-13	All Tinian Alternatives Points of Interest Noise Level Exposure Generated by Aircraft Operations (A-weighted).....	4-106
4.5-14	Representative Unit Level Vehicle Requirements	4-107
4.5-15	All Tinian Alternatives Proposed Base Vehicles	4-107
4.5-16	Tinian Alternative 2 Representative Points of Interest Affected by Small-caliber Weapons Noise on Tinian (A-weighted and Peak)	4-110
4.5-17	Tinian Alternative 3 Representative Points of Interest Affected by Small-caliber Weapons Noise on Tinian (A-weighted and Peak)	4-113
4.5-18	Summary of Impacts for Tinian Alternatives	4-116
4.5-19	All Pagan Alternatives Affected by Small-caliber Weapons Noise (A-weighted and Peak)	4-120
4.5-20	All Pagan Alternatives Area Affected by Large-caliber Weapons Noise (C-weighted and Peak)	4-121
4.5-21	All Pagan Alternatives Points of Interest from Large-caliber Weapon Activity (C-weighted).....	4-125
4.5-22	All Pagan Alternatives Representative Points of Interest Affected by Large-caliber Weapons Noise (Peak)	4-126
4.5-23	All Pagan Alternatives Noise Exposure Area at and Around the Airfield (A-weighted).....	4-126
4.5-24	Summary of Impacts for Pagan Alternatives.....	4-131
4.6-1	Change in Tinian International Airport Annual Airport Operations	4-137

4.6-2	Distances between Saipan and Tinian.....	4-140
4.6-3	North Field Annual Operations	4-142
4.6-4	Summary of Impacts for Tinian Alternatives.....	4-147
4.6-5	Summary of Potential Mitigation Measures for Tinian Alternatives	4-148
4.6-6	Summary of Impacts for Pagan Alternatives.....	4-153
4.7-1	Summary of Impacts for Tinian Alternatives.....	4-166
4.7-2	Summary of Potential Mitigation Measures for Tinian Alternatives	4-167
4.7-3	Summary of Impacts for Pagan Alternatives.....	4-171
4.8-1	Summary of Impacts for Tinian Alternatives.....	4-183
4.8-2	Summary of Potential Mitigation Measures for Tinian Alternatives	4-184
4.8-3	Summary of Impacts for Pagan Alternatives.....	4-186
4.9-1	Potential Direct Impacts to Vegetation Communities with Implementation of Tinian Alternative 1	4-194
4.9-2	Potential Direct and Permanent Impacts to Five Native Bird Species from Proposed Construction Activities under Tinian Alternative 1	4-198
4.9-3	Potential Direct and Permanent Impacts to Three Migratory Bird Treaty Act-listed Species from Proposed Construction Activities under Tinian Alternative 1	4-206
4.9-4	Potential Direct Impacts to Vegetation Communities with Implementation of Tinian Alternative 2	4-220
4.9-5	Potential Direct and Permanent Impacts to Five Native Bird Species from Proposed Construction Activities under Tinian Alternative 2	4-221
4.9-6	Potential Direct and Permanent Impacts to Three Migratory Bird Treaty Act-listed Species from Proposed Construction Activities under Tinian Alternative 2	4-225
4.9-7	Potential Direct Impacts to Vegetation Communities with Implementation of Tinian Alternative 3	4-230
4.9-8	Potential Direct and Permanent Impacts to Five Native Bird Species from Proposed Construction Activities under Tinian Alternative 3	4-231
4.9-9	Potential Direct and Permanent Impacts to Three Migratory Bird Treaty Act-listed Species from Proposed Construction Activities under Tinian Alternative 3	4-235
4.9-10	Summary of Impacts for Tinian Alternatives.....	4-238
4.9-11	Summary of Mitigation Measures for Tinian Alternatives.....	4-239
4.9-12	Potential Direct Impacts to Vegetation Communities with Implementation of Pagan Alternative 1	4-244
4.9-13	Modeled Weapons and Aircraft Noise Levels at Mariana Fruit Bat Colonies on Pagan under Alternative 1.....	4-252
4.9-14	Potential Direct Impacts to Vegetation Communities with Implementation of Pagan Alternative 2	4-257
4.9-15	Modeled Weapons and Aircraft Noise Levels at Mariana Fruit Bat Colonies on Pagan under Alternative 2.....	4-260
4.10-1	Summary of Potential Direct and Indirect Impacts to Marine Habitat at Unai Chulu.....	4-274
4.10-2	Potential Impacts to Acropora globiceps at Unai Chulu During Construction	4-280

4.10-3	Tinian Beach Activity Overview	4-283
4.10-4	Summary of Potential Direct and Indirect Impacts to Marine Habitat on Tinian	4-291
4.10-5	Potential Impacts to <i>Acropora globiceps</i> at Unai Chulu, Unai Babui, Unai Masalok, and Unai Lam Lam During Operation/Training Activities.....	4-294
4.10-6	Summary of Impacts for Tinian Alternatives	4-299
4.10-7	Summary of Potential Mitigation Measures for Tinian Alternatives	4-300
4.10-8	Pagan Beach Activity Overview	4-302
4.10-9	Summary of Potential Direct and Indirect Impacts to Marine Habitat on Pagan	4-304
4.10-10	Potential Impacts to <i>Acropora globiceps</i> at Green, Red, Blue, South, Gold, and North Beach on Pagan.....	4-321
4.10-11	Summary of Impacts for Pagan Alternatives	4-325
4.10-12	Summary of Potential Mitigation Measures for Pagan Alternatives	4-326
4.11-1	Tinian Alternative 1: Summary of Significant Direct Impacts on Historic Properties from Construction	4-330
4.11-2	Tinian Alternative 1 Summary of Significant Direct Impacts on Historic Properties from Operations	4-335
4.11-3	Tinian Alternative 2 Summary of Significant Direct Impacts on Historic Properties from Construction	4-338
4.11-4	Tinian Alternative 2 Summary of Significant Direct Impacts on Historic Properties from Operations	4-341
4.11-5	Tinian Alternative 3 Summary of Significant Direct Impacts on Historic Properties from Construction	4-344
4.11-6	Tinian Alternative 3 Summary of Significant Direct Impacts on Historic Properties from Operations	4-347
4.11-7	Summary of Impacts for Tinian Alternatives	4-350
4.11-8	Summary of Potential Mitigation Measures for Tinian Alternatives	4-351
4.11-9	Pagan Alternative 1 Summary of Significant Direct Impacts on Historic Properties from Construction	4-353
4.11-10	Pagan Alternative 1 Summary of Significant Direct Impacts on Historic Properties from Operations	4-356
4.11-11	Pagan Alternative 2: Summary of Significant Direct Impacts on Historic Properties from Construction	4-358
4.11-12	Pagan Alternative 2: Summary of Significant Direct Impacts on Historic Properties from Operations	4-360
4.11-13	Summary of Impacts for Pagan Alternatives	4-362
4.11-14	Summary of Potential Mitigation Measures for Pagan Alternatives	4-363
4.12-1	Degree of Visual Contrast Defined	4-364
4.12-2	Degree of Visual Impact Defined.....	4-365
4.12-3	Tinian Alternative 1 Summary of Visual Impacts	4-373
4.12-4	Tinian Alternative 2 Summary of Visual Impacts	4-376
4.12-5	Tinian Alternative 3 Summary of Visual Impacts	4-378

4.12-6	Summary of Impacts for Tinian Alternatives	4-379
4.12-7	Summary of Impacts for Pagan Alternatives.....	4-384
4.13-1	Summary of Impacts for Tinian Alternatives.....	4-404
4.13-2	Summary of Impacts for Pagan Alternatives.....	4-409
4.14-1	Total Estimated Change to Tinian Population	4-410
4.14-2	Tinian Alternative 1 Projected Construction Waste.....	4-417
4.14-3	Tinian Future Proposed Plan Electrical Power Demand Forecast	4-419
4.14-4	Estimated Potable Water Demand for Proposed Tinian Range Training Area System	4-419
4.14-5	Estimated Wastewater Flows generated by Military Personnel.....	4-420
4.14-6	CNMI Secondary Treated Effluent Requirements (Base Camp)	4-421
4.14-7	Estimated Influent Loading (Base Camp)	4-421
4.14-8	Estimated Total Solid Waste Generation	4-423
4.14-9	Tinian Alternative 2 Projected Construction Waste.....	4-425
4.14-10	Tinian Alternative 3 Projected Construction Waste.....	4-427
4.14-11	Summary of Impacts for Tinian Alternatives	4-429
4.14-12	Summary of Impacts for Pagan Alternatives.....	4-432
4.15-1	Summary of Impacts for Tinian Alternatives.....	4-453
4.15-2	Summary of Impacts for Pagan Alternatives	4-456
4.16-1	Potentially Contaminated Sites Within or Near Training Areas Under Alternative 1	4-471
4.16-2	Potentially Contaminated Sites Within or Near Training Areas Under Alternative 2	4-475
4.16-3	Summary of Impacts for Tinian Alternatives.....	4-478
4.16-4	Summary of Impacts for Pagan Alternatives	4-488
4.17-1	Summary of Impacts for Tinian Alternatives	4-498
4.17-2	Summary of Impacts for Pagan Alternatives	4-502
4.18-1	Density Estimates for Species Potentially Occurring in the Project Area	4-532
4.20-1	Summary of Impacts for Tinian Alternatives	4-547
4.20-2	Summary of Impacts for Pagan Alternatives	4-555
4.20-3	Summary of Potential Mitigation Measures	4-559
5.2-1	Mariana Islands Training and Testing EIS/OEIS Proposed Training Activities that Could Occur on Tinian	5-5
5.2-2	Warning Area 13 Proposed Use and Characteristics.....	5-6
5.2-3	CNMI: Present and Reasonably Foreseeable Actions	5-7
5.2-4	Tinian: Present and Reasonably Foreseeable Actions.....	5-8
5.2-5	Pagan: Present and Reasonably Foreseeable Actions.....	5-11
5.3-1	Tinian: Potential for Cumulative Impact	5-15
5.3-2	Pagan: Potential for Cumulative Impact	5-16
5.3-3	Existing CNMI Airspace Available for U.S. Military Training.....	5-31
6.3-1	Unavoidable and Irreversible Significant Adverse Impacts	6-4

APPENDICES

Table of Contents

Appendix A – Agency and Elected Official Correspondence

1. Cooperating Agency Correspondence
2. Public Notices

Appendix B – Final Scoping Summary Report

Appendix C – Unconstrained Training Concept for Tinian and Pagan

Appendix D – Best Management Practices

Appendix E – Applicable Federal and Local Regulations

Appendix F – Geology and Soils Technical Memo

Appendix G – Air Quality Technical Memo

Appendix H – Noise Study

Appendix I – Airspace Technical Memo

Appendix J – Amphibious Beach Landing Site Engineering and Coastal Processes Analyses

1. Tinian AAV Landing Site Engineering Investigations
2. Engineering Analysis Evaluation
3. Coastal Processes Report

Appendix K – Summary of Historical Land Use Agreements between the U.S. and the CNMI

Appendix L – Biological Resources Supporting Documentation

1. Terrestrial and Marine Species List
2. Terrestrial and Marine Species Profiles
3. Terrestrial Biological Surveys on Tinian
4. Wetland Survey Report
5. Biosecurity

Appendix M – Marine Biological Resources Technical Memo and Survey Reports

1. Marine Biological Resources Technical Memo
2. Coral Marine Resources Survey Report
3. Marine Mammal Survey Report
4. Sea Turtle Marine Resources Survey Report

Appendix N – Cultural Resources Technical Memo

Appendix O – Transportation Study

Appendix P – Utilities Study

Appendix Q – Socioeconomic Impact Assessment Study

Appendix R – Hazardous Materials and Waste Technical Memo

Appendix S – Draft Engineering Drawing of Airport Layout Plan

This page intentionally left blank.