

## 4.20 SUMMARY OF IMPACTS AND POTENTIAL MITIGATIONS

Section 4.20 summarizes the impacts and potential mitigation measures for the Tinian alternatives and the Pagan alternatives analyzed in this EIS/OEIS. [Table 4.20-1](#) and [Table 4.20-2](#) provides a summary of the impacts for both construction and operation activities for the Tinian and Pagan alternatives.

As described in Section 4.1, this EIS/OEIS applies resource management measures before making impact determinations. Briefly, resource management measures could include avoidance and minimization measures, best management practices, and standard operating procedures.

The *Resource Management Measures* section discusses applicable (1) avoidance and minimization measures and, (2) best management practices and standard operating procedures, and how they serve to lessen impacts to specific resources.

- Avoidance and minimization measures are not necessarily required by law, regulation, or policy, but are designed and implemented specifically for the proposed action to further reduce environmental impacts (i.e. avoiding areas of the limestone forest, not landing Amphibious Assault Vehicles on certain beaches, avoiding wetlands). Examples of avoidance and minimization include moving target locations, moving firing positions, adjusting engagement zones, limiting weapons deployment, adjusting High Hazard Impact Area boundaries, and adjusting use of tactical landing beaches.
- Best management practices include standard operating procedures and commonly accepted practices routinely implemented by the DoN in design, construction, and operations to provide for the safety of personnel and equipment, as well as aid with regulatory compliance. The EIS/OEIS impact analysis (Chapter 4) assumes that resource management measures are successfully incorporated into the proposed action. Best management practices and standard operating procedures are described in Appendix D, *Best Management Practices*.

For the purpose of this EIS/OEIS, mitigation measures are additional project-specific measures to actively minimize, rectify, reduce, or provide compensation for impacts identified through the NEPA environmental review process. Mitigation measures are implemented and monitored as practicable in addition to the resource management measures that are included as part of the proposed action. Examples of potential mitigation measures include habitat restoration to mitigate for habitat removed during construction, and removal of existing non-native invasive species. The U.S. military's commitment to a mitigation measure is determined on a project-by-project basis and documented in the Record of Decision and regulatory agency consultation and permits. A single mitigation could potentially reduce significant impacts to less than significant, but it may take multiple mitigation measures to achieve that desired result. [Table 4.20-3](#) provides a summary of potential mitigation measures for both construction and operation activities for the Tinian and Pagan alternatives.

Under the no-action alternative, there would be impacts to resources as discussed in each individual resource section. The no-action alternative impacts and mitigation are included in [Table 4.20-1](#) and [Table 4.20-2](#).

### 4.20.1 Summary of Impacts for Tinian Alternatives

Table 4.20-1 contains a summary of impacts for Tinian alternatives for all resource areas.

**Table 4.20-1. Summary of Impacts for Tinian Alternatives**

Resource Area	Tinian (Alternative 1)		Tinian (Alternative 2)		Tinian (Alternative 3)		No-Action Alternative		
	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	
<b>Geology and Soils</b>									
Topography	LSI	LSI	LSI	LSI	LSI	LSI	LSI	LSI	
Geology	LSI	LSI	LSI	LSI	LSI	LSI	LSI	LSI	
Soils	LSI	LSI	LSI	LSI	LSI	LSI	LSI	LSI	
Prime Farmland Soils	LSI	SI	LSI	SI	LSI	SI	LSI	LSI	
<b>Water Resources</b>									
Surface Water Resources	NI (Lake Hagoi, Bateha isolated wetlands) LSI (Mahalang Complex) LSI (flooding hazards and surface water quality)	NI (Lake Hagoi, Bateha isolated wetlands) LSI (Mahalang Complex) LSI (flooding hazards and surface water quality)	NI (Lake Hagoi, Bateha isolated wetlands) LSI (Mahalang Complex) LSI (flooding hazards and surface water quality)	NI (Lake Hagoi, Bateha isolated wetlands) LSI (Mahalang Complex) LSI (flooding hazards and surface water quality)	NI (Lake Hagoi, Bateha isolated wetlands) LSI (Mahalang Complex) LSI (flooding hazards and surface water quality)	NI (Lake Hagoi, Bateha isolated wetlands) LSI (Mahalang Complex) LSI (flooding hazards and surface water quality)	NI (Lake Hagoi, Bateha isolated wetlands) LSI (Mahalang Complex) LSI (flooding hazards and surface water quality)	LSI	LSI
Groundwater Resources	LSI	LSI	LSI	LSI	LSI	LSI	LSI	LSI	
Nearshore Water Resources	LSI	LSI	LSI	LSI	LSI	LSI	LSI	LSI	
<b>Air Quality</b>									
Air Quality (General)	LSI	LSI	LSI	LSI	LSI	LSI	LSI	LSI	

**Table 4.20-1. Summary of Impacts for Tinian Alternatives**

<b>Resource Area</b>	<b>Tinian (Alternative 1)</b>		<b>Tinian (Alternative 2)</b>		<b>Tinian (Alternative 3)</b>		<b>No-Action Alternative</b>	
	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>
<b>Noise</b>								
On Land	<i>LSI</i>	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>LSI</i>	<i>LSI/Not applicable</i>
In-water	<i>LSI</i>	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>LSI</i>	<i>LSI/Not applicable</i>
Ground-Based Operation	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>
Airfield and Airspace Based Operations	<i>Not applicable</i>	<i>SI</i>	<i>Not applicable</i>	<i>SI</i>	<i>Not applicable</i>	<i>SI</i>	<i>Not applicable</i>	<i>Not applicable</i>
Waterborne Operation	<i>Not applicable</i>	<i>NI</i>	<i>Not applicable</i>	<i>NI</i>	<i>Not applicable</i>	<i>NI</i>	<i>Not applicable</i>	<i>Not applicable</i>
Traffic	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>
Occupational Noise	<i>Not applicable</i>	<i>NI</i>	<i>Not applicable</i>	<i>NI</i>	<i>Not applicable</i>	<i>NI</i>	<i>NI</i>	<i>NI</i>
<b>Airspace</b>	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>
Tinian	<i>Not applicable</i>	<i>SI mitigated to LSI</i>	<i>Not applicable</i>	<i>SI mitigated to LSI</i>	<i>Not applicable</i>	<i>SI mitigated to LSI</i>	<i>Not applicable</i>	<i>NI</i>
Saipan	<i>Not applicable</i>	<i>SI mitigated to LSI</i>	<i>Not applicable</i>	<i>SI mitigated to LSI</i>	<i>Not applicable</i>	<i>SI mitigated to LSI</i>	<i>Not applicable</i>	<i>NI</i>

**Table 4.20-1. Summary of Impacts for Tinian Alternatives**

<b>Resource Area</b>	<b>Tinian (Alternative 1)</b>		<b>Tinian (Alternative 2)</b>		<b>Tinian (Alternative 3)</b>		<b>No-Action Alternative</b>	
	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>
Land and Submerged Land Use								
Land Acquisition (Jurisdictional Control)	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>LSI</i>
Submerged Land Acquisition (Jurisdictional Control)	<i>Not applicable</i>	<i>NI</i>	<i>Not applicable</i>	<i>NI</i>	<i>Not applicable</i>	<i>NI</i>	<i>Not applicable</i>	<i>LSI</i>
Land Use Within the Military Lease Area – Existing and Planned Land Use	<i>Not applicable</i>	<i>SI mitigated to LSI</i>	<i>Not applicable</i>	<i>SI mitigated to LSI</i>	<i>Not applicable</i>	<i>SI mitigated to LSI</i>	<i>Not applicable</i>	<i>LSI</i>
Land Use Within the Military Lease Area – Public Access	<i>Not applicable</i>	<i>SI</i>	<i>Not applicable</i>	<i>SI</i>	<i>Not applicable</i>	<i>SI</i>	<i>Not applicable</i>	<i>LSI</i>
Land Use Outside the Military Lease Area – Existing and Planned Land Use	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>LSI</i>
Land Use Outside the Military Lease Area – Public Access	<i>Not applicable</i>	<i>NI</i>	<i>Not applicable</i>	<i>NI</i>	<i>Not applicable</i>	<i>NI</i>	<i>Not applicable</i>	<i>LSI</i>
Land Use Outside the Military Lease Area – Noise	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>LSI</i>
Submerged Land Use – Existing and Planned Land Use	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>LSI</i>
Submerged Land Use – Public Access	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>LSI</i>

**Table 4.20-1. Summary of Impacts for Tinian Alternatives**

<b>Resource Area</b>	<b>Tinian (Alternative 1)</b>		<b>Tinian (Alternative 2)</b>		<b>Tinian (Alternative 3)</b>		<b>No-Action Alternative</b>	
	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>
Recreation (Construction Only)	<i>LSI</i>	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>
Historic and Cultural	<i>Not applicable</i>	<i>SI</i>	<i>Not applicable</i>	<i>SI</i>	<i>Not applicable</i>	<i>SI</i>	<i>Not applicable</i>	<i>LSI</i>
Beaches and Parks	<i>Not applicable</i>	<i>SI</i>	<i>Not applicable</i>	<i>SI</i>	<i>Not applicable</i>	<i>SI</i>	<i>Not applicable</i>	<i>LSI</i>
Ocean-based Resources	<i>Not applicable</i>	<i>SI</i>	<i>Not applicable</i>	<i>SI</i>	<i>Not applicable</i>	<i>SI</i>	<i>Not applicable</i>	<i>LSI</i>
Scenic Points	<i>Not applicable</i>	<i>SI</i>	<i>Not applicable</i>	<i>SI</i>	<i>Not applicable</i>	<i>SI</i>	<i>Not applicable</i>	<i>LSI</i>
Annual Events	<i>Not applicable</i>	<i>SI mitigated to LSI</i>	<i>Not applicable</i>	<i>SI mitigated to LSI</i>	<i>Not applicable</i>	<i>SI mitigated to LSI</i>	<i>Not applicable</i>	<i>LSI</i>
Training Noise Impacts	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>LSI</i>
Roadway and Access Improvements	<i>Not applicable</i>	<i>BI/LSI</i>	<i>Not applicable</i>	<i>BI/LSI</i>	<i>Not applicable</i>	<i>BI/LSI</i>	<i>Not applicable</i>	<i>LSI</i>

**Table 4.20-1. Summary of Impacts for Tinian Alternatives**

<b>Resource Area</b>	<b>Tinian (Alternative 1)</b>		<b>Tinian (Alternative 2)</b>		<b>Tinian (Alternative 3)</b>		<b>No-Action Alternative</b>	
	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>
<b>Terrestrial Biology</b>								
Vegetation Communities	SI	LSI	SI	LSI	SI	LSI	LSI	LSI
Native Wildlife	SI	LSI	SI	LSI	SI	LSI	LSI	LSI
Special-status Species: Endangered Species Act – Listed and Proposed Species	LSI (Mariana fruit bat, Mariana common moorhen, Micronesian megapode, sea turtles). NI (humped tree snail, Heritiera longipetiolata Dendrobium guamense)	LSI (Mariana fruit bat, Micronesian megapode, Mariana common moorhen sea turtles). NI (humped tree snail, Heritiera longipetiolata Dendrobium guamense)	LSI (Mariana fruit bat, Mariana common moorhen, Micronesian megapode, sea turtles). NI (humped tree snail, Heritiera longipetiolata Dendrobium guamense)	LSI (Mariana fruit bat, Micronesian megapode, Mariana common moorhen sea turtles). NI (humped tree snail, Heritiera longipetiolata Dendrobium guamense)	LSI (Mariana fruit bat, Mariana common moorhen, Micronesian megapode, sea turtles). NI (humped tree snail, Heritiera longipetiolata Dendrobium guamense)	LSI (Mariana fruit bat, Micronesian megapode, Mariana common moorhen sea turtles). NI (humped tree snail, Heritiera longipetiolata Dendrobium guamense)	LSI (Mariana fruit bat, Mariana common moorhen, Micronesian megapode). NI (sea turtles, humped tree snail)	LSI (Mariana fruit bat, Mariana common moorhen, Micronesian megapode). NI (sea turtles, humped tree snail)
Special-status Species: Migratory Bird Treaty Act	SI	LSI	SI	LSI	SI	LSI	LSI	LSI
Special-status Species: CNMI-listed Species	NI (Micronesian gecko)	NI (Micronesian gecko)	NI (Micronesian gecko)	NI (Micronesian gecko)	NI (Micronesian gecko)	NI (Micronesian gecko)	NI (Micronesian gecko)	NI (Micronesian gecko)
<b>Marine Biology</b>								
Marine Habitat/Essential Fish Habitat (Coral Reef)	SI	LSI	SI	LSI	SI	LSI	LSI	LSI
Marine Flora	LSI	LSI	LSI	LSI	LSI	LSI	LSI	LSI
Marine Invertebrates (Coral)	SI	LSI	SI	LSI	SI	LSI	LSI	LSI
Marine Invertebrates (Non-coral)	LSI	LSI	LSI	LSI	LSI	LSI	LSI	LSI
Fish	LSI	LSI	LSI	LSI	LSI	LSI	LSI	LSI
Special Status Corals	SI	SI	SI	SI	SI	SI	LSI	LSI
Sea Turtles	LSI	LSI	LSI	LSI	LSI	LSI	LSI	LSI
Marine Mammals	LSI	LSI	LSI	LSI	LSI	LSI	LSI	LSI

**Table 4.20-1. Summary of Impacts for Tinian Alternatives**

Resource Area	Tinian (Alternative 1)		Tinian (Alternative 2)		Tinian (Alternative 3)		No-Action Alternative	
	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation
Range Complex A	SI mitigated to LSI	SI mitigated to LSI	SI mitigated to LSI	SI mitigated to LSI	SI mitigated to LSI	SI mitigated to LSI	Not applicable	Not applicable
Range Complex B	SI mitigated to LSI	LSI	SI mitigated to LSI	LSI	SI mitigated to LSI	LSI	Not applicable	Not applicable
Range Complex C	SI mitigated to LSI	LSI	SI mitigated to LSI	LSI	SI mitigated to LSI	LSI	Not applicable	Not applicable
Range Complex D	SI mitigated to LSI	LSI	SI mitigated to LSI	LSI	NI	LSI	Not applicable	Not applicable
Military Lease Area-wide Training Assets and Support Facilities Outside of the Range Complexes	SI mitigated to LSI	SI mitigated to LSI	SI mitigated to LSI	SI mitigated to LSI	SI mitigated to LSI	SI mitigated to LSI	Not applicable	Not applicable
Tinian International Airport	SI mitigated to LSI	LSI	SI mitigated to LSI	LSI	SI mitigated to LSI	LSI	Not applicable	Not applicable
Outside Military Lease Area	SI mitigated to LSI	LSI	SI mitigated to LSI	LSI	SI mitigated to LSI	LSI	Not applicable	Not applicable
Military Lease Area	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	SI mitigated to LSI	SI mitigated to LSI
<b>Visual Resources<sup>1</sup></b>	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>
National Historic Landmark at North Field (#1)	Not applicable	BI/LSI	Not applicable	BI/LSI	Not applicable	BI/LSI	Not applicable	Not applicable
Unai Chulu (#2), Unai Babui (#3) and Unai Lam Lam (#4)	Not applicable	LSI	Not applicable	LSI	Not applicable	LSI	Not applicable	Not applicable
Ushi "Cross" Point A and B (#5 and #6)	Not applicable	NI (#5); SI (#6)	Not applicable	NI (#5); SI (#6)	Not applicable	NI (#5); SI (#6)	Not applicable	Not applicable
Blow Hole (#7)	Not applicable	LSI	Not applicable	LSI	Not applicable	LSI	Not applicable	Not applicable
Mount Lasso Lookout A and B (#8 and #9)	Not applicable	SI (#8); LSI (#9)	Not applicable	SI (#8); LSI (#9)	Not applicable	SI (#8); LSI (#9)	Not applicable	LSI
8 <sup>th</sup> Avenue-North of the Airport (#10)	Not applicable	LSI	Not applicable	LSI	Not applicable	LSI	Not applicable	Not applicable

**Table 4.20-1. Summary of Impacts for Tinian Alternatives**

Resource Area	Tinian (Alternative 1)		Tinian (Alternative 2)		Tinian (Alternative 3)		No-Action Alternative	
	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation
Broadway North (#11)	Not applicable	LSI	Not applicable	LSI	Not applicable	LSI	Not applicable	LSI
Broadway South A and B (#12 and #13)	Not applicable	LSI (#12); NI (#13)	Not applicable	LSI (#12); NI (#13)	Not applicable	LSI (#12); NI (#13)	Not applicable	LSI
Unai Dankulo (#14) and Unai Masalok (#15)	Not applicable	LSI (#14-15)	Not applicable	LSI (#14-15)	Not applicable	LSI (#14-15)	Not applicable	Not applicable
<b>Transportation</b>	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>
Air Transportation	LSI	LSI	LSI	LSI	LSI	LSI	NI	NI
Ground Transportation	LSI	LSI/BI	LSI	LSI/BI	LSI	LSI/BI	LSI	LSI
Marine Transportation	LSI	LSI	LSI	LSI	LSI	LSI	NI	NI
<b>Utilities</b>	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>
Electrical Power	LSI	LSI	LSI	LSI	LSI	LSI	LSI	LSI
Potable Water	LSI	LSI	LSI	LSI	LSI	LSI	LSI	LSI
Wastewater	LSI	LSI	LSI	LSI	LSI	LSI	LSI	LSI
Stormwater Management	LSI	LSI	LSI	LSI	LSI	LSI	LSI	LSI
Solid Waste	LSI	LSI	LSI	LSI	LSI	LSI	LSI	LSI
Information Technology/Communications	LSI	LSI	LSI	LSI	LSI	LSI	LSI	LSI
<b>Socioeconomic and Environmental Justice</b>	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>
Population <sup>2</sup>	NI	NI	NI	NI	NI	NI	NI	NI
<b>Economic Conditions</b>								
Tourism	LSI	LSI	LSI	LSI	LSI	LSI	LSI	LSI
Gross Domestic Product	BI	BI	BI	BI	BI	BI	LSI	LSI
Employment and Income	BI	BI	BI	BI	BI	BI	BI	BI
Government Revenues	BI	BI	BI	BI	BI	BI	LSI	LSI
Housing	LSI	LSI	LSI	LSI	LSI	LSI	LSI	LSI
Agriculture	LSI	LSI	LSI	LSI	LSI	LSI	LSI	LSI
Commercial Fishing and Aquaculture	NI	LSI	NI	LSI	NI	LSI	LSI	LSI
Airports and Sea Ports	BI	BI	BI	BI	BI	BI	LSI	LSI



**Table 4.20-1. Summary of Impacts for Tinian Alternatives**

Resource Area	Tinian (Alternative 1)		Tinian (Alternative 2)		Tinian (Alternative 3)		No-Action Alternative	
Power Utility Rates	NI	BI	NI	BI	NI	BI	LSI	LSI
<b>Public Services</b>								
Education	LSI	LSI	LSI	LSI	LSI	LSI	LSI	LSI
Emergency Services	LSI	BI	LSI	BI	LSI	BI	LSI	LSI
Public Health	LSI	LSI	LSI	LSI	LSI	LSI	LSI	LSI
<u>Community and Social Topics</u>	LSI/SI	LSI/SI	LSI/SI	LSI/SI	LSI/SI	LSI/SI	LSI	LSI
<u>Environmental Justice and Protection of Children</u>	NI	NI	NI	NI	NI	NI	LSI	LSI
<b>Hazardous Materials and Waste</b>	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>
Hazardous Materials	LSI	LSI	LSI	LSI	LSI	LSI	LSI	LSI
Toxic Substances	LSI	LSI	LSI	LSI	LSI	LSI	LSI	LSI
Hazardous Waste	LSI	LSI	LSI	LSI	LSI	LSI	LSI	LSI
Contaminated Sites	LSI	LSI	LSI	LSI	LSI	LSI	LSI	LSI
<b>Public Health and Safety</b>	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>
Aircraft Operations	LSI	LSI	LSI	LSI	LSI	LSI	LSI	LSI
Ground Operations	LSI	LSI	LSI	LSI	LSI	LSI	LSI	LSI
Marine Operations	NI	LSI	NI	LSI	NI	LSI	LSI	LSI

Notes: <sup>1</sup># indicates Key Observation Point (see Section 4.12, Figure 4.12-1).

<sup>2</sup>A change in population is not considered an impact itself. However, population change has the potential to drive positive or negative impacts to other socioeconomic factors.

Legend: BI = beneficial impact; LSI = less than significant impact; NI = no impact; SI = significant impact. Shading is used to highlight the significant impacts. *Not Applicable* indicates an element or category with no potential for impacts.

## 4.20.2 Summary of Impacts for Pagan Alternatives

[Table 4.20-2](#) contains a summary of impacts for Pagan alternatives for all resource areas.

**Table 4.20-2. Summary of Impacts for Pagan Alternatives**

<i>Resource Area</i>	<i>Pagan (Alternative 1)</i>		<i>Pagan (Alternative 2)</i>		<i>No-Action Alternative</i>	
	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>
<b>Geology and Soils</b>						
Topography	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>
Geology	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>
Soils	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>
Prime Farmland Soils	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>
<b>Water Resources</b>						
Surface Water Resources	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>
Groundwater Resources	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>
Nearshore Water Resources	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>
<b>Air Quality</b>						
Air Quality	<i>LSI</i>	<i>LSI;</i> <i>NI (regarding volcanic activity)</i>	<i>LSI</i>	<i>LSI;</i> <i>NI (regarding volcanic activity)</i>	<i>NI</i>	<i>NI</i>
<b>Noise</b>						
On Land	<i>NI</i>	<i>Not applicable</i>	<i>NI</i>	<i>Not applicable</i>	<i>NI</i>	<i>Not applicable</i>
In Water	<i>NI</i>	<i>Not applicable</i>	<i>NI</i>	<i>Not applicable</i>	<i>NI</i>	<i>Not applicable</i>
Ground-Based Operation	<i>Not applicable</i>	<i>NI</i>	<i>Not applicable</i>	<i>NI</i>	<i>Not applicable</i>	<i>NI</i>
Airfield and Airspace Based Operations	<i>Not applicable</i>	<i>NI</i>	<i>Not applicable</i>	<i>NI</i>	<i>Not applicable</i>	<i>NI</i>
Waterborne Operation	<i>Not applicable</i>	<i>NI</i>	<i>Not applicable</i>	<i>NI</i>	<i>Not applicable</i>	<i>NI</i>
Traffic	<i>Not applicable</i>	<i>NI</i>	<i>Not applicable</i>	<i>NI</i>	<i>Not applicable</i>	<i>NI</i>
Occupational Noise	<i>Not applicable</i>	<i>NI</i>	<i>Not applicable</i>	<i>NI</i>	<i>Not applicable</i>	<i>NI</i>

**Table 4.20-2. Summary of Impacts for Pagan Alternatives**

<b>Resource Area</b>	<b>Pagan (Alternative 1)</b>		<b>Pagan (Alternative 2)</b>		<b>No-Action Alternative</b>	
	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>
<b>Airspace</b>						
Pagan	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>NI</i>
<b>Land and Submerged Land Use</b>						
Land Acquisition (Jurisdictional Control)	<i>Not applicable</i>	<i>SI</i>	<i>Not applicable</i>	<i>SI</i>	<i>Not applicable</i>	<i>NI</i>
Submerged Land Acquisition (Jurisdictional Control)	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>NI</i>
Land Use – Current and Planned Use	<i>Not applicable</i>	<i>SI</i>	<i>Not applicable</i>	<i>SI</i>	<i>Not applicable</i>	<i>NI</i>
Land Use – Public Access	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>NI</i>
Submerged Land Use – Current and Planned	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>NI</i>
Submerged Land Use – Public Access	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>LSI</i>	<i>Not applicable</i>	<i>NI</i>
<b>Recreation</b>						
Recreation	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>NI</i>	<i>NI</i>
<b>Terrestrial Biology</b>						
Vegetation Communities	<i>SI</i>	<i>LSI</i>	<i>SI</i>	<i>LSI</i>	<i>NI</i>	<i>NI</i>
Native Wildlife	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>NI</i>	<i>NI</i>
Special-status Species: Endangered Species Act – Listed and Proposed Species and CNMI-listed Species	<i>LSI</i>	<i>SI (Mariana fruit bat) LSI (Micronesian megapode, sea turtles, humped tree snail, Slevin’s skink) NI (Cycas micronesica, Bulbophyllum guamense)</i>	<i>LSI</i>	<i>SI (Mariana fruit bat) LSI (Micronesian megapode, sea turtles, humped tree snail, Slevin’s skink) NI (Cycas micronesica, Bulbophyllum guamense)</i>	<i>NI</i>	<i>NI</i>
Special-status Species: Migratory Bird Treaty Act-listed	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>NI</i>	<i>NI</i>

**Table 4.20-2. Summary of Impacts for Pagan Alternatives**

<b>Resource Area</b>	<b>Pagan (Alternative 1)</b>		<b>Pagan (Alternative 2)</b>		<b>No-Action Alternative</b>	
	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>
<b>Marine Biology</b>						
Marine Habitat/Essential Fish Habitat	LSI	LSI	LSI	LSI	LSI	LSI
Marine Flora	LSI	LSI	LSI	LSI	LSI	LSI
Marine Invertebrates (Coral)	LSI	LSI	LSI	LSI	LSI	LSI
Marine Invertebrates (Non-Coral)	LSI	LSI	LSI	LSI	LSI	LSI
Fish	LSI	LSI	LSI	LSI	LSI	LSI
Special Status Coral Species	LSI	SI	LSI	SI	LSI	LSI
Sea Turtles	LSI	LSI	LSI	LSI	LSI	LSI
Marine Mammals	LSI	LSI	LSI	LSI	LSI	LSI
<b>Cultural Resources</b>						
North Range Complex	SI mitigated to LSI	SI mitigated to LSI	SI mitigated to LSI	SI mitigated to LSI	LSI	LSI
South Range Complex	LSI	LSI	LSI	LSI	LSI	LSI
<b>Visual Resources</b>						
Visual Resources	Not applicable	LSI	Not applicable	LSI	Not applicable	NI
<b>Transportation</b>						
Air Transportation	LSI	BI	LSI	BI	NI	NI
Ground Transportation	NI	NI	NI	NI	NI	NI
Marine Transportation	NI	NI	NI	NI	NI	NI
<b>Utilities</b>						
Electrical Power	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
Potable Water	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
Wastewater	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
Stormwater Management	LSI	LSI	LSI	LSI	Not applicable	Not applicable
Solid Waste	LSI	LSI	LSI	LSI	Not applicable	Not applicable
Information Technology/ Communications	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
<b>Socioeconomics and Environmental Justice</b>						
Population <sup>1</sup>	NI	NI	NI	NI	NI	NI
Economic Conditions	BI	BI	BI	BI	NI	LSI
Public Services	NI	LSI	NI	LSI	NI	NI
Community and Social Topics	NI	Potential for SI	NI	Potential for SI	NI	LSI

**Table 4.20-2. Summary of Impacts for Pagan Alternatives**

<b>Resource Area</b>	<b>Pagan (Alternative 1)</b>		<b>Pagan (Alternative 2)</b>		<b>No-Action Alternative</b>	
	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>
<b>Hazardous Materials and Waste</b>						
Hazardous Materials	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>
Toxic Substances	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>
Hazardous Waste	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>
Contaminated Sites	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>
<b>Public Safety and Health</b>	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>	<b>Construction</b>	<b>Operation</b>
Aircraft Operations	<i>NI</i>	<i>LSI</i>	<i>NI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>
Ground Operations	<i>NI</i>	<i>LSI</i>	<i>NI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>
Marine Operations	<i>NI</i>	<i>LSI</i>	<i>NI</i>	<i>LSI</i>	<i>LSI</i>	<i>LSI</i>

Notes: <sup>1</sup>A change in population is not considered an impact itself. However, population change has the potential to drive positive or negative impacts to other socioeconomic factors.

Legend: *BI* = beneficial impact; *LSI* = less than significant impact; *NI* = no impact; *SI* = significant impact. Shading is used to highlight the significant impacts. *Not Applicable* indicates an element or category with no potential for impacts.

### 4.20.3 Summary of Potential Mitigation Measures

Table 4.20-3 contains a summary of potential mitigation measures for Tinian and Pagan construction and operation phases.

**Table 4.20-3. Summary of Potential Mitigation Measures**

Impacts	Category	Potential Mitigation Measures	Tinian Phase		Pagan Phase	
			Construction	Operation	Construction	Operation
<b>AIRSPACE</b>						
<p><u>Tinian</u> The increase in military air traffic would not restrict access to Tinian International Airport. Private flights could experience minimal delays in departures and arrivals during the time when military aircraft are practicing approaches to the Tinian International Airport runway.</p> <p>Restricted Area 7203 was segmented to minimize impacts to commuter flight traffic between Tinian and Saipan. Civilian aircraft can be routed around the restricted airspace while staying within the minimum safety glide slope except for periods when Restricted Area 7203A/B/C/X/Y/Z/E/W are activated together. Indirect effects such as increased fuel consumption and time en route could be experienced.</p> <p>No impacts would be expected with activation of the Tinian Military Operations Area.</p>	SI mitigated to LSI	<ul style="list-style-type: none"> <li>Establish a Letter of Procedure or Joint Use Agreement to accommodate civilian arrivals and departures into the airport.</li> <li>Establish communication procedures between Tinian Range Control and Saipan International Airport Air Traffic Control to ensure priority access to Tinian International Airport for life-flight and other emergency-related activities.</li> <li>Add positive control measures (e.g., air traffic control tower at Tinian, short-range radar on Tinian or Saipan that would allow air traffic controllers to see aircraft operating below 2,000 feet [609 meters]), and communications capability at Saipan or Tinian to ensure non-participating aircraft are advised of military operations.</li> <li>Establish communication procedures to provide immediate feedback between air traffic controllers and range control to accommodate smaller inter-island commuter aircraft travelling between Saipan and Tinian.</li> </ul>		X		
<p><u>Saipan</u> Air and ground activities would have the potential to significantly impact current airspace procedures during the 140 days per year that the Restricted Areas 7203A/B/C and W are scheduled and activated for use.</p>	SI mitigated to LSI	<ul style="list-style-type: none"> <li>Establish a Letter of Procedure between the Federal Aviation Administration and the U.S. military that contains the procedures for access to the airspace and gives priority to large commercial aircraft. The agreement would ensure proper range scheduling</li> </ul>		X		

**Table 4.20-3. Summary of Potential Mitigation Measures**

Impacts	Category	Potential Mitigation Measures	Tinian Phase		Pagan Phase	
			Construction	Operation	Construction	Operation
Restricted areas would not be activated during times with scheduled Saipan International Airport commercial large passenger jet and jetliner activity. Existing procedures used to manage aircraft operations at Tinian North Field and deconflict military and civilian aircraft would be expected to continue.		<p>procedures are in place to ensure no significant disruption of normal flights into and out of Saipan International Airport.</p> <ul style="list-style-type: none"> <li>Electronically monitor each training event through the use of radar and other surveillance equipment such as an expeditionary control tower that would continually monitor the airspace to ensure the safety of the flying public during times when training is occurring.</li> <li>Schedule and coordinate training events with Saipan International Airport arrivals and departures as to not conflict.</li> <li>Establish procedures and communications that allow for air traffic controllers and range controllers to simultaneously see the airspace and ensure priority is given to any aircraft heading to or from Saipan International Airport. In the event of an unforeseen incursion into an active restricted airspace, the simultaneous ability to monitor activities on the ground and in the air should provide the ability to stop any training in seconds.</li> </ul>				
<b>LAND AND SUBMERGED LAND USE</b>						
<p><u>Land Use Within the Military Lease Area – Existing and Planned Land Use</u> There would be land use incompatibilities associated with the Tinian Military Retention Land for Wildlife Conservation and the agricultural and cattle grazing activities in the Lease Back Area.</p>	SI mitigated to LSI	<ul style="list-style-type: none"> <li>Four areas are being assessed as potential conservation areas for the protection of the Tinian monarch and other wildlife species (Section 4.9, <i>Terrestrial Biology</i>, Figure 4.9-2). These areas may also be used for additional natural resource conservation actions such as forest enhancement and/or invasive species control. The Department of Defense is coordinating with the Federal Aviation Administration and the U.S. Fish and Wildlife</li> </ul>		X		

**Table 4.20-3. Summary of Potential Mitigation Measures**

Impacts	Category	Potential Mitigation Measures	Tinian Phase		Pagan Phase	
			Construction	Operation	Construction	Operation
		<p>Service on these potential conservation areas.</p> <ul style="list-style-type: none"> <li>The DoN has identified and proposed a total of 2,554 acres (1,034 hectares) of land for grazing areas within the Military Lease Area. Of this total 1,010 acres (409 hectares) would be unencumbered and 1,544 acres (625 hectares) would be encumbered by surface danger zones.</li> </ul>				
<b>RECREATION</b>						
<p><u>Historic and Cultural Attractions</u> Due to restricted access, there would be significant impacts to historic and cultural attractions (10 of 12 sites). These impacts would remain significant even with the implementation of the proposed mitigation measures.</p>	SI	<ul style="list-style-type: none"> <li>In as much as possible, training would be scheduled around peak tourist holidays, such as the three tour seasons that correspond to specific World War II anniversaries.</li> <li>There is no mitigation currently proposed to minimize this impact to the Shinto Shrine and Hinode American Memorial. The DoN is consulting with the CNMI Historic Preservation Officer and other interested parties regarding impacts to the Shinto Shrine and Hinode American Memorial as part of the Section 106 process (see Appendix N, <i>Cultural Resources Technical Memo</i> for a discussion of the consultation process). Potential mitigation will be determined through this consultation process and could include documentation and relocation of the Shinto Shrine and Hinode American Memorial.</li> </ul>		X		
<p><u>Annual Events</u> Closure of recreational areas on Tinian during training operations could result in reduced event attendance. Impacts would be mitigated to less than significant with implementation of the proposed mitigation measures.</p>	SI mitigated to LSI	<ul style="list-style-type: none"> <li>In as much as possible, the DoN would coordinate with event sponsors to ensure that training events do not occur during annual events.</li> </ul>		X		



**Table 4.20-3. Summary of Potential Mitigation Measures**

Impacts	Category	Potential Mitigation Measures	Tinian Phase		Pagan Phase	
			Construction	Operation	Construction	Operation
<b>TERRESTRIAL BIOLOGY</b>						
<p><u>Vegetation Communities</u>  <i>Alternatives 1, 2, and 3:</i> The conversion of 6.3 acres (2.5 hectares) of native limestone forest on Tinian to developed land would be unavoidable.</p>	SI	<ul style="list-style-type: none"> <li>Department of Defense may implement forest enhancement on 6.3 acres (2.5 hectares) to replace the area of native limestone forest removed during construction. Forest enhancement would include removal of non-native vegetation and establishment of native species that are characteristic of native limestone forest habitats.</li> <li>To avoid and minimize impacts to native limestone forest on Tinian, the Department of Defense will implement training restrictions within native limestone forest. All limestone forest habitat within the Military Lease Area will be designated as "No Wildlife Disturbance Areas," with the following actions prohibited: off-road vehicle travel; vehicle parking except on existing roads or trails; firing of live or inert munitions; mechanical vegetation clearing; digging or excavation without prior approval; open fires; and aircraft landings. Any maneuvers conducted in native limestone forest will be on foot (no off-road vehicle maneuvers), and units will be tactical, with no support camps. Limestone forest "No Wildlife Disturbance Area" restrictions will be implemented upon initiation of CJMT training activities on Tinian.</li> <li>Department of Defense may implement forest enhancement in areas of tangantangan or herbaceous scrub habitat to replace the forested habitats removed during construction. Forest enhancement would include removal of non-native vegetation and establishment of</li> </ul>	X			

**Table 4.20-3. Summary of Potential Mitigation Measures**

Impacts	Category	Potential Mitigation Measures	Tinian Phase		Pagan Phase	
			Construction	Operation	Construction	Operation
		native species that are characteristic of native forest habitats.				
<p><u>Native Wildlife</u></p> <ul style="list-style-type: none"> <li>• <i>Alternative 1:</i> The removal of 1,745 acres (706 hectares) of forested and herbaceous scrub habitats (including Tinian Military Retention Land for Wildlife Conservation) used by native landbirds, including the Tinian monarch, and other native wildlife species would be unavoidable.</li> <li>• <i>Alternative 2:</i> The removal of 1,883 acres (762 hectares) of forested and herbaceous scrub habitats (including Tinian Military Retention Land for Wildlife Conservation) used by native landbirds, including the Tinian monarch, and other native wildlife species would be unavoidable.</li> <li>• <i>Alternative 3:</i> The removal of 1,862 acres (754 hectares) of forested and herbaceous scrub habitats (including Tinian Military Retention Land for Wildlife Conservation) used by native landbirds, including the Tinian monarch, and other native wildlife species would be unavoidable</li> </ul>	SI	<ul style="list-style-type: none"> <li>• Department of Defense may implement forest enhancement in areas of mixed introduced forest, tangantangan, or herbaceous scrub habitat to replace the forest habitat removed during construction. Forest enhancement would include removal of non-native vegetation and establishment of native species that are characteristic of native forest habitats.</li> <li>• Department of Defense may replace the current Tinian Military Retention Land for Wildlife Conservation by establishing a conservation area(s) for the protection of the Tinian monarch and other wildlife species with one or more conservation sites within the Military Lease Area. Forest enhancement and invasive species control may also be implemented within the replacement Wildlife Conservation site(s).</li> <li>• To improve habitat quality for native wildlife on Tinian, the Department of Defense may implement monitoring and control of non-native invasive species within forest habitat, including control of invasive plant, mammal, and insect species.</li> <li>• To avoid and minimize impacts to native wildlife species that use native limestone forest on Tinian, the Department of Defense will implement training restrictions within native limestone forest. All limestone forest habitat within the Military Lease Area will be designated as "No Wildlife Disturbance Areas," with the following actions prohibited: off-road vehicle travel;</li> </ul>	X			

**Table 4.20-3. Summary of Potential Mitigation Measures**

Impacts	Category	Potential Mitigation Measures	Tinian Phase		Pagan Phase	
			Construction	Operation	Construction	Operation
		vehicle parking except on existing roads or trails; firing of live or inert munitions; mechanical vegetation clearing; digging or excavation without prior approval; open fires; and aircraft landings. Any maneuvers conducted in native limestone forest will be on foot (no off-road vehicle maneuvers), and units will be tactical, with no support camps. Limestone forest "No Wildlife Disturbance Area" restrictions will be implemented upon initiation of CJMT training activities on Tinian.				
<p><u>Special-status Species: Endangered Species Act-listed and Proposed Species</u></p> <p>Noise impacts to foraging Mariana common moorhens at the Mahalang sites from large-caliber munitions on the High Hazard Impact Area would be unavoidable.</p>	SI	<ul style="list-style-type: none"> <li>To avoid impacts to Mariana common moorhens at the Lake Hagoi and two Bateha wetland sites, the Department of Defense will designate the three wetland sites as "No Training Areas." Ground disturbance and vegetation removal of any kind will be prohibited within these "No Training Areas." In addition, CJMT-associated aircraft overflights of these sites will be limited to a minimum altitude of 500 feet (152 meters) above ground level. Wetland "No Training Area" restrictions would be implemented upon initiation of CJMT training activities on Tinian.</li> <li>To mitigate for loss of Mariana common moorhen foraging habitat at Mahalang, the Department of Defense may implement portions of the DoN Tinian Wetlands Management Plan at Hagoi and two Bateha sites. This may include invasive plant surveys, monitoring, and control; habitat restoration and improvement; baseline surveys for moorhen predators; and predator control at Hagoi and Bateha.</li> <li>To avoid and minimize impacts to special-status species</li> </ul>		X		

**Table 4.20-3. Summary of Potential Mitigation Measures**

<i>Impacts</i>	<i>Category</i>	<i>Potential Mitigation Measures</i>	<i>Tinian Phase</i>		<i>Pagan Phase</i>	
			<i>Construction</i>	<i>Operation</i>	<i>Construction</i>	<i>Operation</i>
		<p>that use native limestone forest on Tinian, the Department of Defense will implement training restrictions within native limestone forest. All limestone forest habitat within the Military Lease Area will be designated as "No Wildlife Disturbance Areas," with the following actions prohibited: off-road vehicle travel; vehicle parking except on existing roads or trails; firing of live or inert munitions; mechanical vegetation clearing; digging or excavation without prior approval; open fires; and aircraft landings. Any maneuvers conducted in native limestone forest will be on foot (no off-road vehicle maneuvers), and units will be tactical, with no support camps. Limestone forest "No Wildlife Disturbance Area" restrictions will be implemented upon initiation of CJMT training activities on Tinian.</p> <ul style="list-style-type: none"> <li>To avoid and minimize impacts to nesting sea turtles, the Department of Defense will implement training protocols at all beaches used for amphibious operations on Tinian. Biologists trained in identifying sea turtle nests will survey landing beaches no more than 6 hours prior to the first craft landing or use of other beach landing equipment. Any potential sea turtle nests will be flagged, with a buffer zone of 20 feet (6 meters) from the edge of the nesting activity (area disturbed by the turtle) to ensure complete avoidance. The flagged area will be avoided by landing craft and personnel. Beach training activities will also be coordinated with monthly sea turtle nest monitoring, during which any potential turtle nests will be flagged, with a buffer zone of 20 feet</li> </ul>				

**Table 4.20-3. Summary of Potential Mitigation Measures**

Impacts	Category	Potential Mitigation Measures	Tinian Phase		Pagan Phase	
			Construction	Operation	Construction	Operation
		(6 meters) to ensure avoidance. If an active nest with a pre-hatch hole is discovered on a beach during monitoring, night training over the next 5 nights will be conducted only on other beaches. If beach sand is compacted by landing craft, the beach topography will be restored within 3 days using non-mechanized methods (e.g., rakes or other hand tools). The Department of Defense will implement beach training protocols upon initiation of CJMT amphibious training activities.				
<p><u>Special-status Species: Migratory Bird Treaty Act-listed Species</u></p> <ul style="list-style-type: none"> <li>• <i>Alternative 1:</i> The removal of 1,745 acres (706 hectares) of forested and herbaceous scrub habitats (including Tinian Military Retention Land for Wildlife Conservation) used by native landbirds, including the collared kingfisher, Mariana fruit dove, and white-throated ground-dove, would be unavoidable.</li> <li>• <i>Alternative 2:</i> The removal of 1,883 acres (762 hectares) of forested and herbaceous scrub habitats (including Tinian Military Retention Land for Wildlife Conservation) used by native landbirds, including the collared kingfisher, Mariana fruit dove, and white-throated ground-dove, would be unavoidable.</li> <li>• <i>Alternative 3:</i> The removal of 1,862 acres (754 hectares) of forested and herbaceous scrub habitats (including Tinian Military Retention Land for Wildlife Conservation) used by native landbirds, including the collared kingfisher, Mariana fruit dove, and white-throated ground-dove, would be unavoidable.</li> </ul>	SI	<ul style="list-style-type: none"> <li>• Department of Defense may implement forest enhancement in areas of tangantangan or herbaceous scrub habitat to replace the mixed introduced forest and herbaceous scrub removed during construction. Forest enhancement would include removal of non-native vegetation and establishment of native species that are characteristic of native forest habitats.</li> <li>• Department of Defense may establish a conservation area for the protection of the Tinian monarch and other wildlife species with one or more conservation sites within the Military Lease Area. Forest enhancement and invasive species control may also be implemented within the wildlife conservation site(s).</li> <li>• To avoid and minimize impacts to Migratory Bird Treaty Act-listed species that use native limestone forest on Tinian, the Department of Defense will implement training restrictions within native limestone forest. All limestone forest habitat within the Military Lease Area will be designated as "No Wildlife Disturbance Areas,"</li> </ul>	X			

**Table 4.20-3. Summary of Potential Mitigation Measures**

<i>Impacts</i>	<i>Category</i>	<i>Potential Mitigation Measures</i>	<i>Tinian Phase</i>		<i>Pagan Phase</i>	
			<i>Construction</i>	<i>Operation</i>	<i>Construction</i>	<i>Operation</i>
		<p>with the following actions prohibited: off-road vehicle travel; vehicle parking except on existing roads or trails; firing of live or inert munitions; mechanical vegetation clearing; digging or excavation without prior approval; open fires; and aircraft landings. Any maneuvers conducted in native limestone forest will be on foot (no off-road vehicle maneuvers), and units will be tactical, with no support camps. Limestone forest “No Wildlife Disturbance Area” restrictions will be implemented upon initiation of CJMT training activities on Tinian.</p> <ul style="list-style-type: none"> <li>• To improve habitat quality for native wildlife on Tinian, Department of Defense may implement monitoring and control of non-native species within forest habitat, including control of invasive plant, mammal, and insect species.</li> <li>• To avoid and minimize impacts to Mariana fruit bats and sea turtles, hooded lights will be used to the maximum extent practicable at all new roads and facilities within sea turtle nesting habitat and fruit bat foraging and roosting habitat. “Night-adapted” lights will be installed in the briefing and bleacher areas. Illumination of forests, coastlines, and beaches will be kept to an absolute minimum. Lighting will be designed to meet minimum safety, anti-terrorism, and force protection requirements.</li> <li>• To avoid impacts to Migratory Bird Treaty Act-listed species that use the Lake Hagoi and two Bateha wetland sites, the Department of Defense will designate the three wetland sites as “No Training Areas.” Ground</li> </ul>				

**Table 4.20-3. Summary of Potential Mitigation Measures**

Impacts	Category	Potential Mitigation Measures	Tinian Phase		Pagan Phase	
			Construction	Operation	Construction	Operation
		disturbance and vegetation removal of any kind will be prohibited within these "No Training Areas." In addition, CJMT-associated aircraft overflights of these sites will be limited to a minimum altitude of 500 feet (152 meters) above ground level. Wetland "No Training Area" restrictions would be implemented upon initiation of CJMT training activities on Tinian.				
<u>Pagan Vegetation Communities</u> Loss of 20 acres (8 hectares) of native forest habitat would result in an unavoidable impact.	SI	<ul style="list-style-type: none"> <li>To minimize the effects of construction on native vegetation communities on Pagan, Department of Defense may facilitate native habitat regeneration on Pagan by implementing feral ungulate removal. This would consist of active control (i.e. trapping, snaring, shooting) of animals, with the goal of eradicating all feral ungulates from southern Pagan.</li> </ul>			X	
<u>Pagan Special-status Species, Endangered Species Act-listed and Proposed Species and CNMI-listed Species</u> Large-caliber weapons firing would result in direct impacts to Mariana fruit bats associated with the northeastern colony and on the isthmus colony. Impacts would be unavoidable.	SI	<ul style="list-style-type: none"> <li>To minimize the effects of operations on Mariana fruit bats on Pagan, Department of Defense would facilitate native habitat regeneration on southern Pagan by implementing feral goat and pig removal. This would consist of active control (i.e. trapping, snaring, shooting) of animals, with the goal of eradicating all feral ungulates from southern Pagan.</li> <li>To improve habitat quality for Mariana fruit bats on Pagan, Department of Defense may implement monitoring and control of non-native invasive species within forest habitat, including control of invasive plant, mammal, and insect species.</li> <li>To avoid and minimize impacts to the Mariana fruit bat, Micronesian megapode, and tree snails, the Department of Defense will implement training restrictions within</li> </ul>				X

**Table 4.20-3. Summary of Potential Mitigation Measures**

<i>Impacts</i>	<i>Category</i>	<i>Potential Mitigation Measures</i>	<i>Tinian Phase</i>		<i>Pagan Phase</i>	
			<i>Construction</i>	<i>Operation</i>	<i>Construction</i>	<i>Operation</i>
		native forest on southern Pagan. All native forest habitat on southern Pagan will be designated as “No Wildlife Disturbance Areas,” with the following actions prohibited: vehicle maneuvers; firing of live or inert munitions; mechanical vegetation clearing; digging or excavation without prior approval; open fires; flights below 500 feet (152 meters) above ground level, with the exception of personnel insertion/extraction via helicopter; and aircraft landings. Any maneuvers conducted in native forest will be on foot. In addition to restricting aircraft flights to a minimum of 500 feet (152 meters) above ground level in southern Pagan, a 0.5-mile (0.8-kilometer) lateral buffer zone will be established for the two fruit bat colonies in southern Pagan. In addition to avoiding and minimizing noise disturbance to fruit bat colonies, the proposed 0.5-mile (0.8-kilometer) buffer zone around each colony will significantly reduce the potential for aircraft strikes of fruit bats. Native forest “No Wildlife Disturbance Area” restrictions will be implemented upon initiation of CJMT training activities on southern Pagan.				



**Table 4.20-3. Summary of Potential Mitigation Measures**

Impacts	Category	Potential Mitigation Measures	Tinian Phase		Pagan Phase	
			Construction	Operation	Construction	Operation
<b>MARINE BIOLOGY</b>						
<ul style="list-style-type: none"> <li>Marine Habitat and Essential Fish Habitat</li> <li>Construction of underwater landing areas for Amphibious Assault Vehicles at Unai Chulu would result in the loss of 20.6 acres (8.3 hectares) of marine habitat within these areas impacted by direct and indirect physical disturbance stressors at Unai Chulu.</li> <li>Construction would cause short- and long-term impacts to ecological function, including abundance/distribution of marine organisms.</li> <li>Construction would result in loss/alteration of hard-bottom habitat and bathymetry.</li> </ul>	SI	<ul style="list-style-type: none"> <li>DoD may consider transplantation of coral species.</li> <li>DoD may consider debris removal and disposal as a one-time effort to collect large quantities of debris from a area such as Dankulo Beach on Tinian.</li> <li>DoD may consider recreational mooring Buoys and/or Fish Aggregation Devices to avoid impacts to coral by dropping anchors and to reduce the potential effects on access to fishing areas.</li> <li>Implementation of Marine Species Awareness Training for all lookouts and other key personnel.</li> <li>Additional measures may be recommended during agency consultations.</li> </ul>	X	X		
<p><u>Marine Invertebrates</u></p> <ul style="list-style-type: none"> <li>A total area of 20.6 acres (8.3 hectares) of marine habitat that includes coral reef substrate (coral colonies and coral reef habitat) and supports populations of non-coral invertebrates would be directly and indirectly impacted by the construction of the Amphibious Assault Vehicle landing area at Unai Chulu. Adjacent corals outside the Amphibious Assault Vehicles landing areas may be indirectly impacted from the construction activities due to movement of coral rubble, and from the movement of mobile species out of the construction area. Construction would cause direct loss of coral reef substrate: 10.3 acres (4.1 hectares).</li> <li>Amphibious training activities at Unai Babui would directly impact 3.05 acres (1.2 hectares), 3.83 acres (1.55 hectares) would be directly impacted at Unai Lam Lam, and 4.50 acres</li> </ul>	SI	See above, <i>Potential Mitigation Projects to Offset Impacts to Coral</i> .	X	X		

**Table 4.20-3. Summary of Potential Mitigation Measures**

Impacts	Category	Potential Mitigation Measures	Tinian Phase		Pagan Phase	
			Construction	Operation	Construction	Operation
(1.82 hectares) of marine habitat, including corals and coral reef habitat, would be directly impacted at Unai Masalok.						
<u>Special-status Species - Coral</u> <ul style="list-style-type: none"> <li>Construction of the Amphibious Assault Vehicle landing area would cause a loss of 1,344 <i>Acropora globiceps</i> coral colonies at Unai Chulu.</li> <li>At Unai Chulu, an estimate of 995 colonies of <i>Acropora globiceps</i> would be likely to be directly affected by training activities. At Unai Babui, an estimate of 381 colonies of <i>Acropora globiceps</i> would be likely to be directly affected by amphibious landings; at Unai Lam Lam, an estimate of 550 colonies of <i>Acropora globiceps</i> would likely be directly affected by amphibious landings; and at Unai Masalok, an estimate of 22 colonies of <i>Acropora globiceps</i> would likely be directly affected by amphibious landings.</li> </ul>	SI	<ul style="list-style-type: none"> <li>See above, <i>Potential Mitigation Projects to Offset Impacts to Coral</i>.</li> </ul>	X	X		
<u>Special-status Species - Coral</u> Amphibious training activities would cause a loss of 1 <i>Acropora globiceps</i> coral colony at Green Beach and an estimated 10,609 colonies at South Beach.	SI	<ul style="list-style-type: none"> <li>DoD may consider transplantation of coral species.</li> <li>DoD may consider debris removal and disposal as a one-time effort to collect large quantities of debris from an area such as Gold Beach.</li> <li>DoD may consider recreational mooring Buoys and/or Fish Aggregation Devices to avoid impacts to coral by dropping anchors and to reduce the potential effects on access to fishing areas.</li> <li>Implementation of Marine Species Awareness Training for all lookouts and other key personnel.</li> <li>Additional measures may be recommended during agency consultations.</li> </ul>				X

**Table 4.20-3. Summary of Potential Mitigation Measures**

Impacts	Category	Potential Mitigation Measures	Tinian Phase		Pagan Phase	
			Construction	Operation	Construction	Operation
<b>CULTURAL RESOURCES</b>						
<p>All Tinian alternatives would have a significant direct impact on historic properties in the Military Lease Area, immediately north of Tinian International Airport runways, and at the Port of Tinian.</p> <ul style="list-style-type: none"> <li><i>Tinian Alternative 1</i> would have a significant direct impact to 172 historic properties from construction and to 15 historic properties from operations, as well as significant indirect impacts to 4 historic properties. These historic properties include the North Field National Historic Landmark; Pre-Contact <i>latte</i> sites, pottery scatters, and rock shelters; pre-World War II Japanese farms and shrines; World War II-era Japanese and American military sites; and potential traditional cultural properties.</li> <li><i>Tinian Alternative 2</i> would have a significant direct impact to 182 historic properties from construction and to 15 historic properties from operations, as well as significant indirect impacts to 4 historic properties. These historic properties include. North Field National Historic Landmark; Pre-Contact <i>latte</i> sites, pottery scatters, and rock shelters; pre-World War II Japanese farms and shrines; World War II-era Japanese and American military sites; and potential traditional cultural properties.</li> <li><i>Tinian Alternative 3</i> would have a significant direct impact to 179 historic properties from construction and to 15 historic properties from operation, as well as significant indirect impacts to 4 historic properties. These historic properties include the North Field National Historic Landmark; Pre-Contact <i>latte</i> sites, pottery scatters, and rock shelters; pre-World War II Japanese farms and shrines; World War II-era</li> </ul>	<p><i>SI mitigated to LSI</i></p>	<p>Measures to mitigate significant impacts to historic properties will be identified through consultation with the CNMI Historic Preservation Officer, Advisory Council on Historic Preservation, National Park Service, and other interested parties representing the interests of the local government and the public. These measures, which may include data recovery excavations, archaeological monitoring, documentation, public education, and/or other appropriate measures, will be formalized in an agreement document.</p>	X	X		

**Table 4.20-3. Summary of Potential Mitigation Measures**

Impacts	Category	Potential Mitigation Measures	Tinian Phase		Pagan Phase	
			Construction	Operation	Construction	Operation
Japanese and American military sites; and potential traditional cultural properties.						
<p>All Pagan alternatives would have a significant direct impact to historic properties.</p> <ul style="list-style-type: none"> <li><i>Pagan Alternative 1</i> would have a significant direct impact to 27 historic properties and resources of cultural importance in the range complexes and expeditionary area due to vegetation clearance, as well as 54 historic properties due to operations. These historic properties include Pre-Contact <i>latte</i> complexes, pre-World War II Japanese Administration sites, and World War II-era Japanese defensive sites.</li> <li><i>Pagan Alternative 2</i> would have a significant direct impact to 25 historic properties and resources of cultural importance in the range complexes and expeditionary area due to construction, as well as 50 historic properties due to operations. These historic properties include Pre-Contact <i>latte</i> complexes, pre-World War II Japanese Administration sites, and World War II-era Japanese defensive sites.</li> </ul>	<p><i>SI mitigated to LSI</i></p>	<p>Measures to mitigate significant impacts to historic properties will be identified through consultation with the CNMI Historic Preservation Officer, Advisory Council on Historic Preservation, National Park Service, and other interested parties representing the interests of the local government and the public. These measures, which may include data recovery excavations, archaeological monitoring, documentation, public education, and/or other appropriate measures, will be formalized in an agreement document.</p>			X	X

Legend: LSI = less than significant impact; SI = significant impact. Shading is used to highlight the significant impacts.

Note: Mitigation measures only change the significance of impacts where noted.

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